DS-3000U

Digital Display Module

4-channel USB Sensor Input

Users Guide

Notes:

Manual Part Number

033-01419

First Edition: Released June 2008
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WARRANTY

SAFETY INFORMATION

General

Do not use this product in any manner not specified by the manufacturer. The protective features of this product may be impaired if it is used in a manner not specified in the operating instructions.

Do not install substitute parts or perform any unauthorized modification to the product. Return the product to a Loadstar Sensors office for any required service and repair to ensure that safety features are maintained.

Instrument Grounding

If your product is provided with a grounding type power plug, the instrument chassis and cover must be connected to an electrical ground to minimize shock hazard. The ground pin must be firmly connected to an electrical ground (safety ground) terminal at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal may cause a shock hazard that could result in personal injury.

Cleaning

Clean the outside of the instrument with a soft lint-free, slightly dampened cloth. Do not use detergent or chemical solvents. Doing so may void your warranty.

WARNING

1. *Do not use the display with the cover, or part of the cover, removed or loose as a hazardous condition may result. Inspect the case for cracks or missing plastic. Do not use if the display is damaged.*

2. *Use only AC Adapter Charger(s), which conforms to the display required voltage and current ratings provided.*

3. *Do not operate the display in an explosive atmosphere, or in the presence of flammable gases or fumes.*

4. *Do not immerse the display in liquid, the housing is not fluid-tight. Humidity specifications are specified as non-condensing only.*

5. *Do not substitute parts or modify the display box to avoid the introduction of additional hazards. Return the display to Loadstar sensors office for service and repair to insure all safety features are maintained.*

6. *When the built in Li Ion Polymer battery option is present, take care not to:*

    a. *Operate or store the display in temperatures beyond -20C to 60C. Battery failure may occur.*

    b. *Excessive barometric pressure changes may also cause the battery to fail or outgas. This display is not to be used within a pressure vessel, or vacuum environment, for example.*

    c. *Excessive physical damage, or severe product impact, may cause battery failure. Units showing evidence of physical damage, should be returned to the factory for service and repair.*

RoHS/WEEE COMPLIANCE STATEMENT

EUROPE

Directive 2002/95/EC. Restriction of the Use of Certain Hazardous Substances in Electrical & Electronic Equipment, as amended by EU Commission Decision 2005/95/EC.

This product is RoHS Compliant 2005/95/EC.

"RoHS Compliant 2005/95/EC" means that the product or part ("Product") does not contain any of the substances in excess of the maximum concentration values in EU Directive 2002/95/EC, as amended by Commission Decision 2005/618/EC, unless the substance is in an application that is exempt under EU RoHS. Unless otherwise stated by Loadstar sensors in writing, this information represents Loadstar Sensors best knowledge and belief based upon information provided by third party suppliers to Loadstar Sensors.

In the event any product is proven not to conform to Loadstar Sensors Regulatory Information Appendix, then Loadstar Sensors's entire liability and Buyer's exclusive remedy will be in accordance with the Warranty stated below.

WEEE Directive (2002/96/EC)

The Waste Electrical and Electronic Equipment Directive (WEEE) applies to companies that manufacture, sell, and distribute electrical and electronic equipment in the E.U. It covers a wide range of large and small household appliances, IT equipment, radio and audio equipment, electrical tools, telecommunications equipment, electrical toys, etc.

The Directive aims to reduce the waste arising from electrical and electronic equipment, and improve the environmental performance of everything involved in the life cycle of electrical and electronic equipment. This is translated into the following requirements:

❖ Producers (manufacturers or importers) of electrical and electronic equipment will be required to register in their countries.

❖ Private households will be able to return their WEEE to collection facilities free of charge and producers will be responsible for financing these facilities.

❖ Producers will be required to achieve a series of demanding recycling and recovery targets.

❖ Wheeled bin emblem Producers will be required to mark their products with the 'crossed out wheeled bin'. This symbol indicates that the equipment carrying this mark must NOT be thrown into general waste but should be collected separately and properly processed under local regulations.

The WEEE directive has been transposed into each EU member state's legislation and so the exact timing and details will vary slightly from country to country, but the above principles will apply. In particular, the arrangements for the separate collection of WEEE will vary in each country but might include for example: public collection points, retailers take back schemes, collection from households, etc. The Directive encourages reuse, recycling and other forms of recovery in order to prevent WEEE. Users of electrical and electronic equipment in the E.U. can therefore play an important role in reducing WEEE and helping the environment by separating out WEEE and disposing of it properly. Consumers can ask the supplier from whom they purchased the Electronic & Electrical equipment from about local arrangements for the disposal of WEEE.

Business users are advised to ensure that WEEE, which is not suitable for reuse or recycling, be disposed of properly via approved authorized treatment facilities. The Producer in your country may be able to assist you.

Loadstar sensors is dedicated to minimizing the impact our products have on the environment and to comply with the WEEE Directive.

ROHS in China

Electronic Industry Standard of the People's Republic of China, SJ/T11363-2006. Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products.

This symbol, per Marking for the Control of Pollution Caused by Electronic Information Products SJ/T11364-2006, means that the product or part **does not** contain any of the following substances in excess of the following maximum concentration values in any homogenous material: (a) 0.1% (by weight) for cadmium. Unless otherwise stated by Loadstar Sensors in writing, this information represents Loadstar Sensors best knowledge and belief based upon information provided by third party suppliers to Loadstar Sensors.

In the event any product is proven not to conform with Loadstar Sensors Regulatory Information, as provided herein, then Loadstar Sensors entire liability and Buyer's exclusive remedy will be in accordance with the Warranty stated below.

China RoHS is a two-step process that identifies concentration limits of certain hazardous substances in electronic information products that are sold into China. Per the deadline set by the Chinese government, March 1, 2007, Loadstar Sensors has implemented step one of China RoHS, self declaration of hazardous materials and marking of the product. Loadstar Sensors display modules

that are sold into the China market have the required marking on the product designating that the product meets the China RoHS requirements.

The second step involving a testing obligation is currently under development. Full compliance will follow once it has been finalized.

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2 INTRODUCTION

The Loadstar Sensors DS-3000 portable display provides a convenient method of monitoring loads on up to four Loadstar load cells simultaneously. The DS-3000 device supports the complete range of Loadstar's iLoad USB load cell line: the iLoad Digital USB, iLoad Pro Digital USB, iLoad TR Digital load cells, the iLoad Mini when paired with the DQ-1000U Frequency to USB converter, and the complete FlexiSensor line when paired with the CS2000/CS4000.

The 6-digit LED displays the loading of one to four connected sensors in any combination. A front panel push-button or an external input can be used to simultaneously tare all connected sensors. Other front panel push buttons change displayed units (Newton/Pound/Kilogram), and display precision. Combinations of push-buttons access the advanced settings and programming menus- where many advanced features and PLC like programmable functions are accessible for advanced users.

Two programmable relay outputs can be synchronized to an external input, or programmed to respond to complex sensor/load set-point combinations. Relay outputs may be activated and de-activated on pre-selected loading criteria based on single sensors or multiple sensor sums.

The built in host USB-uplink port connects to your PC for simplified remote control, or remote data collection. Either your virtual serial port based software, or Loadstar Sensors windows based LoadVUE Software can be used to log and chart displayed data from the DS-3000U.

3 MODULE FEATURES

- *Power input may be provided either by the provided AC adapter (90-250 VAC 50/60 Hz) or an optional DC input pigtail (9-32 VDC).*

- *Precise six digit display plus sign (+9.9.9.9.9.9./-9.9.9.9.9.9.) provides properly scaled output (in selectable units and precision) for compatible Loadstar sensor inputs..*

- *Connected sensor(s) are powered by the display module. No additional power supply is required.*

- *Front panel "TARE" button to simultaneously zero all connected load cells.*

- *Front panel "UNITS" button to conveniently toggle display units between LBS, KG or N.*

- *Front panel SHIFT, ENTER, UP and DOWN buttons for access to the powerful programming menus.*

- *Remote input connector contacts may be used to synchronize the internal program or tare currently connected sensors.*

- *Dual SPST relay contacts provide NO (Normally OPEN) and NC (Normally CLOSED) contacts under program control.*

- *Each relay is independently programmed and activated. Output logic sequencing, load band activation, sensor hysteresis, set-point control, and pulsed output periods are all user programmable.*

- *Password protected menu for program protection.*

- *All programming parameters are automatically stored in non-volatile memory.*

- *Optional Lithium-Ion Polymer backup battery can be used to keep DS-3000 and attached sensors alive during power failure conditions. The internal battery is automatically recharged when sufficient external power is available. A convenient front panel indicator, shows when the internal battery is charging.*

4 PHYSICAL DETAILS

The following pictures of the DS-3000 Display module show the locations of all exterior connections, the user interface, and the optional mounting base. Descriptions of each are in the following sections.

4.1 DS-3000 Physical Orientation
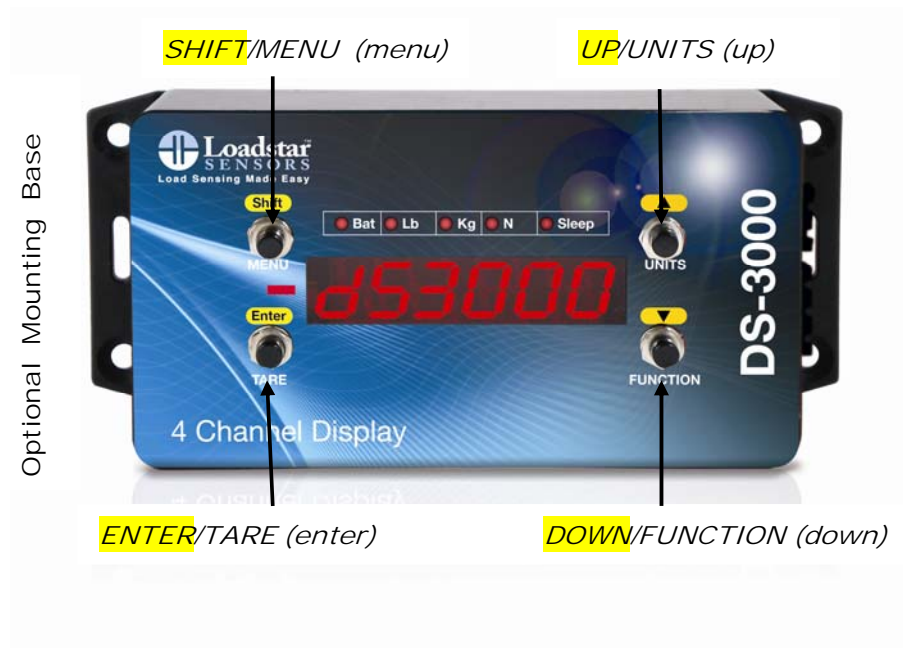
Figure 1: **DS-3000 Top View**- **User Interface**
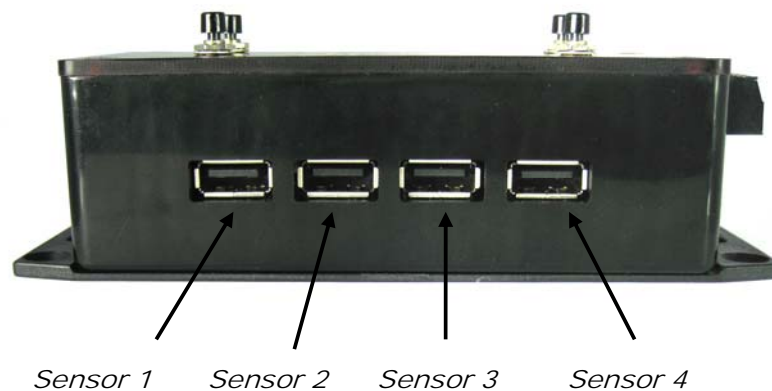
Figure 2: **Side View: Input Sensor Connectors**

POWER INPUT

USB HOST

Figure 3: **End View: Power and USB Host Connections**
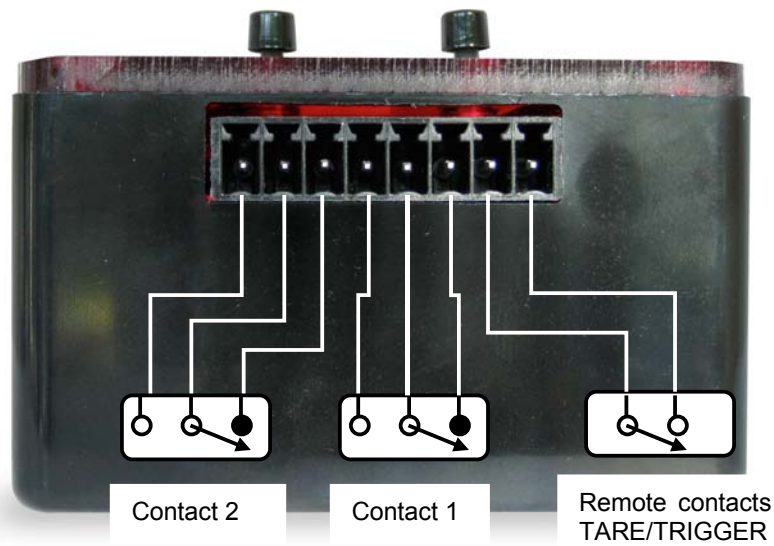
Figure 4: **End View: Wiring Adapter Socket**

4.2   DS-3000 Mechanical Dimensions
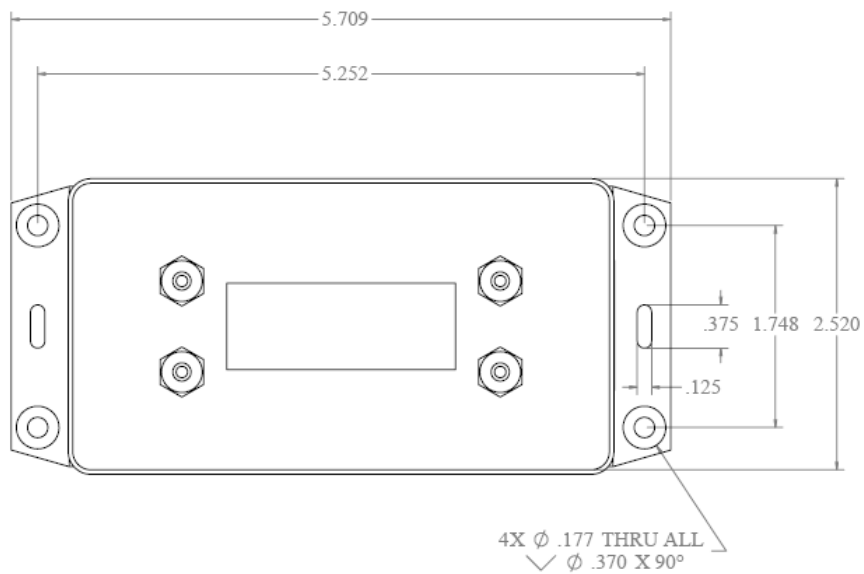
Figure 5**: DS-3000 Top View (Includes optional mounting base)**
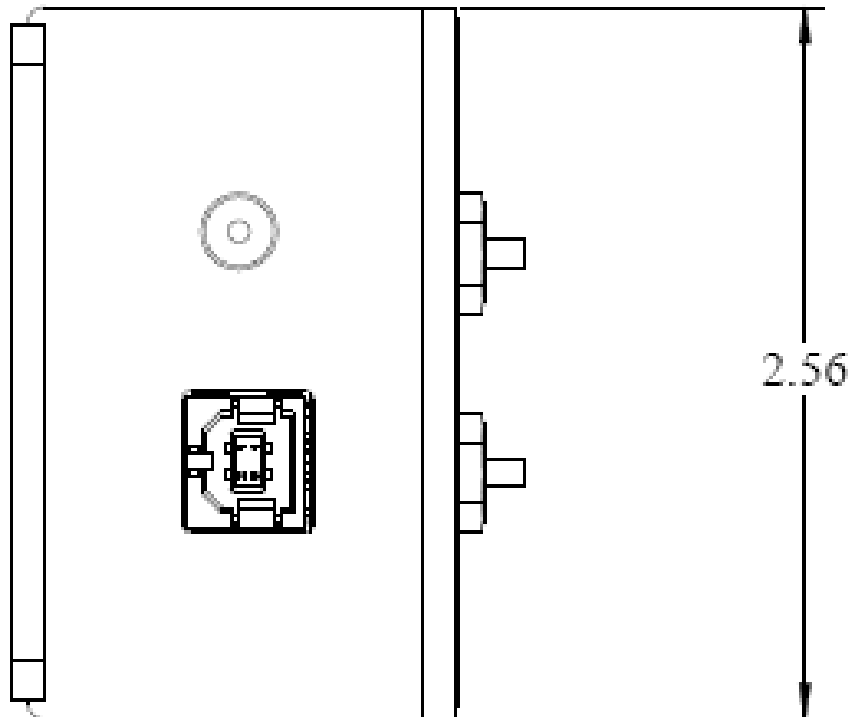
Figure 6: **DS-3000U Mechanical Host End View**
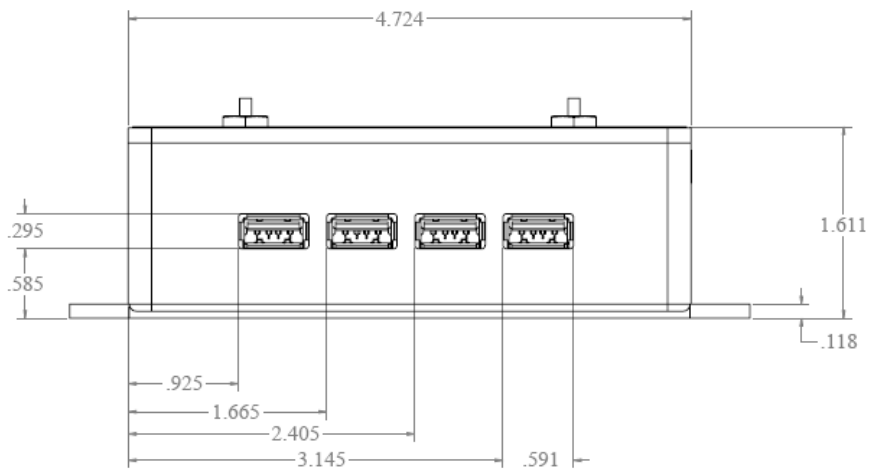
Figure 7: **DS-3000U Mechanical Side View**

5   OPERATION QUICK START GUIDE

When power is first applied to the DS-3000 Series display, all segments of the LED display will be momentarily illuminated,(‑88888888) while the instrument goes through an internal self test procedure. When the self-test is completed, the unit will display the LoAdStAr SEnSorS dS‑3000 banner, then display the load on the attached sensors in either the factory programmed way (SUM of ALL attached sensors) or in the way most recently set within the programming menu.

5.1   Quick Operation and Programming Overview

All programming is accomplished using four front panel pushbuttons. Each front panel pushbutton has two functions. The "immediate" or "run mode" function, that occurs when you press the button while load is displayed, and the alternate "shifted" function, which occurs while in "programming" mode. In the description which follows, no distinction is made between shifted/non-shifted functions. All buttons are referred to by their common run-mode label, indicated in *italicized bold text*.

The function of each button is described below. With any key-press, there will be a delay before response. Press and hold the desired button until the function occurs. This feature helps to eliminate false key-presses.

SHIFT/MENU [menu]

- When in *run* or normal operation mode, this pushbutton selects programming mode.

- When in *programming* mode, this button steps through the high level menu columns.

- When in a *programming* mode sub-entry, pressing this button will return to the top most menu item.

- When in a *programming* mode numeric data entry field, this button increments to the next significant digit (Numeric fields are typically edited one digit at a time).

- The **SHIFT/MENU** key will be abbreviated: **menu** in the remainder of this document.

ENTER/TARE ALL [enter]

- In *run* mode this push button automatically "tares" all active sensors (even if the display is set to display something different).

- In *programming* mode this button accepts the currently entered/selected value i.e. "ENTER."

- In *enter password* mode, if the incorrect password is entered, this key will automatically return you to *run* mode.

- The **ENTER/TARE ALL** key will be abbreviated **enter** in the remainder of this document.

UP/UNITS [up]

- In *run* mode this pushbutton cycles through and selects the displayed units. You may select from US pounds (Lb), Kilograms (Kg) or Newtons (N).

- In *programming* mode this button steps UP in the currently selected menu tree, or increments the current highlighted digit in a numeric entry field.

- The **UP/UNITS** key will be abbreviated **up** in the remainder of this document.

DOWN/FUNCTION [down]

- In *run* mode this pushbutton selects the position of the decimal point.

- In *programming* mode, this button steps **DOWN/FUNCTION** in the currently selected menu tree, or decrements the current highlighted digit in a numeric entry field.

- The **DOWN/FUNCTION** key will be abbreviated *down* in the remainder of this document.

5.2 Getting Started

Figure 8: **What you need to get started with the DS-3000**

If you plan to communicate with the DS-3000U from a PC and/or use LoadVUE software with it, install the PC drivers and/or LoadVUE on the PC *first*.

Next, plug in the provided power adapter into the DS3000 (top left).

If you wish to communicate with a host PC (or use LoadVUE), plug in the provided USB Host cable (bottom left). Attach the other end of USB host cable to your PC.

Plug in your Loadstar Load-cell into any sensor port.

Press *units* button (top right) to display weight in desired units. LED will illuminate with the currently displayed units setting Lb/Kg/N.

Press *tare* button (bottom left) and hold until all decimal points light on display bottom. This will tare or "zero" all connected sensors at the current loading.

Set the desired decimal point location: While pressing the *down* button (bottom right) and holding it, press *tare* (bottom left). Now release the *down* button while continuing to hold *tare* down. As you continue to hold down *tare*, press *up* (top right) or *down* (bottom right) to select location of desired display decimal point. For your convenience, the current decimal point location is illuminated on the display, release *tare* when the decimal point is in the desired position.

That's it! Your DS-3000 is now displaying the sum of all the loads attached to the input connectors. The next section will detail the various advanced features of the DS-3000 accessible through the programming menu(s) with examples of how to customize settings for your application.

6 RUNNING OR PROGRAMMING?

Default DS-3000 operation is in *run* mode, with all active input sensors summed, and the sum displayed onscreen in the selected units. Any setting changes made in the internal programming menu are retained after power off, so your current settings may differ from the default values. You may reset the current DS-3000 settings to the factory default using the menu entry *FACtor* under the *oPtionS* programming page, documented later in this document.

6.1 Entering programming mode (from run mode)

1. Press *menu*

2. Display will show *EntEr PASS*

3. Display will show a numeric entry field *000000*

4. Press *enter* to directly return to *run* mode, or

5. Press *up* or *down* to select the desired password value (default is *000001*)

6. Press and hold *enter* until the first programming page *dSPLAY* appears

7. Now pressing *menu* will step through the available programming mode pages.

6.2 Entering run mode (from programming mode)

1. Press *shift* until *rUn* is displayed

2. Press and hold *enter*

3. Display will return to *run* mode and display the load using the current display settings.

6.3 Modifying a Programmed Value

1. In programming mode, Press *menu* until the desired programming page is displayed

2. Press *up* or *down* to select the sub-menu entry

3. Press *enter* to edit the currently displayed sub-menu field

   a. If the field is a logical field, *up* or *down* will toggle through the available values

   b. If the field is a numeric data entry field, *up* or *down* will increment or decrement the currently highlighted digit. Press *menu* to step through all numeric digits, setting each one in turn until the desired value is displayed.

   c. If an enable field is selected the decimal point lights will turn on (enable) or turn off (disable) the currently selected ports. .

4. Press *enter* to retain the newly changed value.

7 QUICK PROGRAMMING HOW-TO TIPS

7.1 How to change the displayed decimal point location

1. Press the **down** button (bottom right) and holding it down, press **enter** (bottom left).

2. Now release the **down** button while continuing to hold down **enter.**

3. While continuing to hold **enter** press **up** (top right) or **down** (bottom right) to select your desired decimal point location. The current decimal point location is illuminated on the display while you continue to hold down the **enter** button.

4. Release **enter** when the decimal point is at the desired position. The display will retain this new decimal point selection until changed again, or reset to the factory default.

7.2 How to reset or TARE the current displayed value to zero?

1. Press and hold the **enter** button until the display shows ᴛᴀʀᴇ and all the decimal points (for all the currently active sensors) illuminate. Releasing the button will now tare all the connected and active sensors.

7.3 How to display the load from only sensors I choose?

1. Press and hold **menu** until "EnᴛEr PASS" and "000000" appear on the display

2. Press the **up** or **down** keys to select the programming mode password (default is 000001)

3. Press **enter**

4. You are now in programming mode at the dSPLAY prompt. Notice the decimal points are flashing for inactive ports, and solid on for active ports.

5. Press **down**, one time to the d ·SP · menu. Press **enter** to enable or disable this port from being displayed. It is displayed if the decimal point corresponding to the port is illuminated, it is NOT displayed if the port is extinguished.

6. Press **down** as above for d ·SP 2, d ·SP 3, d ·SP 4 leaving only the ports you want illuminated, or enabled.

7. Press **up** to dSPLAY, and confirm that the decimal point is not illuminated on the ports you've disabled.

8. Press **mode** until the rUn entry

9. Then press **enter** to return to run mode. Your display will now only show the sum of the ports you've chosen.

7.4 How do I tare only one connected sensor?

1. Press and hold **menu** until "EnᴛEr PASS" and "000000" appear on the display

2. Press the **up** or **down** keys to select the programming mode password (default is 000001)

3. Press **enter**

4. You are now in programming mode at the dSPLAY prompt. Press **mode** until you reach the ᴛᴀʀᴇ menu .page

5. Press **down**, to the menu entry corresponding to the sensor you want to tare- from sensor 1 -> ᴛᴀʀᴇ · to sensor 4 -> ᴛᴀʀᴇ 4.

6. Press *enter* to tare the selected sensor. The chosen port decimal point will flash when taring is completed. You may individually tare any sensors you like in this manner.

7. Exit programming mode when completed: Press *mode* to the ⚘Uⁿ entry.

8. Then press *enter* to return to run mode. The display will now reflect the new result based on the newly tared sensor.

7.5 How can I tell which sensors are currently being displayed?

1. Press and hold *menu* until "EⁿｔEⱼ PA55" and "000000" appear on the display

2. Press the *up* or *down* keys to select the programming mode password (default is 000001)

3. Press *enter*

4. You are now in programming mode at the d5PLAY prompt. Notice the decimal points are flashing for inactive ports, and solid on for active ports. Thus any port with a solid decimal point is summed in the current display mode. Any flashing port is enabled to be summed, but is currently inactive and not summed/displayed because no sensor is currently installed in that port position.

5. To exit back to run mode: Press *mode* until the ⚘Uⁿ entry.

6. Then press *enter* to return to run mode.

7.6 How do I get the firmware version?

1. Press and hold *menu* until "EⁿｔEⱼ PA55" and "000000" appear on the display

2. Press the *up* or *down* keys to select the programming mode password (default is 000001)

3. Press *enter*

4. You are now in programming mode at the d5PLAY prompt. Press *mode* until you reach the oPｔ ｉoⁿ menu.

5. Press *down*, three times to the "u3 05" this is the current firmware revision. At the time of this writing, version 3.05

6. Now exit programming mode: Press *mode* until the ⚘Uⁿ entry

7. Then press *enter* to return to run mode. Closing the remote contacts will now automatically tare sensors, same as the onscreen *tare* pushbutton.

7.7 How do I enable the remote tare function?

1. Press and hold *menu* until "EⁿｔEⱼ PA55" and "000000" appear on the display

2. Press the *up* or *down* keys to select the programming mode password (default is 000001)

3. Press *enter*

4. You are now in programming mode at the d5PLAY prompt. Press *mode* until you reach the oPｔ ｉoⁿ menu.

5. Press *down*, to the ｔⱼ9ｔ entry. Press *enter* until ｔⱼ9ｔ ｔ is displayed.

6. Now exit programming mode: Press *mode* until the ⚘Uⁿ entry

7. Then press *enter* to return to run mode. Closing the remote contacts will now automatically tare sensors, same as the front panel *enter* pushbutton.

7.8 How do I change the display brightness?

1. Press and hold *menu* until "EⁿｔEⱼ PA55" and "000000" appear on the display

2. Press the *up* or *down* keys to select the programming mode password (default is ⌐⌐⌐⌐⌐ I)

3. Press *enter*

4. You are now in programming mode at the ⌐5PL⌐⌐ prompt. Press *mode* until you reach the ⌐Pt ⌐⌐⌐ menu.

5. Press *down*, to the LE⌐ entry. Press *enter* and a numeric field appears onscreen.

6. Press *down* and *up* until the desired brightness is achieved. Maximum brightness is 128 and minimum is 10. Default is 64. If power consumption is a concern, the power requirements double from 64 to 128, so it is recommended that you choose the minimum value which is acceptable for your application. Press *enter* to retain your final setting. The display changes immediately when this value is edited, so it is easy to determine the best value.

7. Now exit programming mode: Press *mode* until the ⌐U⌐ entry

8. Then press *enter* to return to run mode. The display will now retain your newly set display brightness, even when powered off then powered back on.

7.9 How do I turn off attached sensor ports to save power?

1. Press and hold *menu* until "E⌐tE⌐ P⌐55" and "⌐⌐⌐⌐⌐⌐" appear on the display

2. Press the *up* or *down* keys to select the programming mode password (default is ⌐⌐⌐⌐⌐ I)

3. Press *enter*

4. You are now in programming mode at the ⌐5PL⌐⌐ prompt. Press *mode* until you reach the Po⌐'E⌐ menu.

5. Press *down*, to the 5 I entry. Press *enter* to toggle this port on or off. 5 I corresponds to port 1, 52 corresponds to port 2, 53 to port 3, and 54 to port 4.

6. Now exit programming mode: Press *mode* until the ⌐U⌐ entry

7. Then press *enter* to return to run mode.

7.10 How do I change the password?

8. Press and hold *menu* until "E⌐tE⌐ P⌐55" and "⌐⌐⌐⌐⌐⌐" appear on the display

9. Press the *up* or *down* keys to select the programming mode password (default is ⌐⌐⌐⌐⌐ I)

10. Press *enter*

11. You are now in programming mode at the ⌐5PL⌐⌐ prompt. Press *mode* until you reach the ⌐Pt ⌐⌐⌐ menu.

12. Press *down*, to the P⌐55 entry. Press *enter* to toggle to the numeric entry field.

13. Press *up* and *down* pushbuttons to increment and decrement the currently selected (flashing) digit. Press the *menu* button to highlight the next digit. Repeat as necessary until your desired password is displayed onscreen.

14. Press *enter* when you are done. The new password is automatically updated.

15. Now exit programming mode: Press *mode* until the ⌐U⌐ entry

16. Then press *enter* to return to run mode.

NOTE: You will need to use this new password every time you enter programming mode. Do not lose it! There is no way to reset the unit to a known password without it, BEWARE !!

7.11 What if I've lost the password, How can I get into program mode?

1. Unfortunately, you can't. If you lose the password, you have to send the unit back to Loadstar Sensors, so we can reset the unit for you.

7.12 How do I reset the unit to factory defaults?
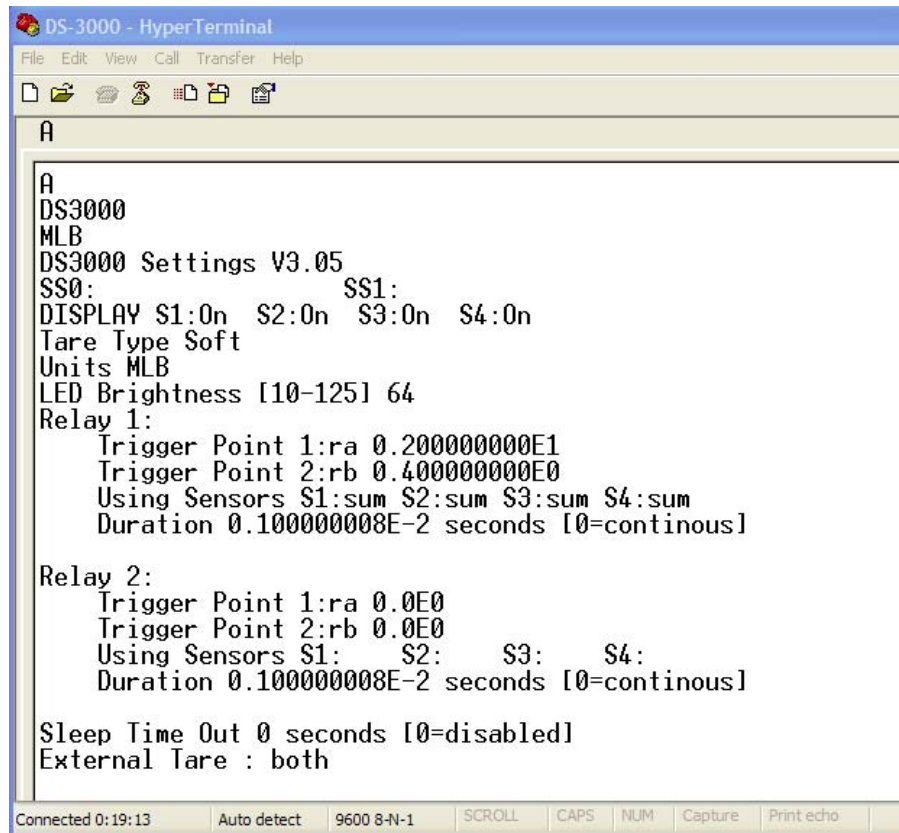
1. Press and hold *menu* until "*EntEr PASS*" and "*000000*" appear on the display
2. Press the *up* or *down* keys to select the programming mode password (default is *000001*)
3. Press *enter*
4. You are now in programming mode at the *dSPLAY* prompt. Press *mode* until you reach the *oPt ion* menu.
5. Press *down*, to the *FActor* entry. Press *enter,* and once all the LED decimal points illuminate, the unit will be reset back to factory defaults. NOTE: All programming and other customizations WILL BE LOST.
6. Now exit programming mode: Press *mode* until the *rUn* entry
7. Then press *enter* to return to run mode.

7.13 Is there an easy way to see what is currently programmed

or

7.14 How do I check my programming?

The easiest way to do this is using the REMOTE interface. See chapters Installing Virtual com port drivers and Remotely Programming the DS-3000. Once you are connected to the DS-3000 using Hyperterminal, or another terminal program from your host PC, you may issue the command: settings <enter>

```
DS-3000 - HyperTerminal
File  Edit  View  Call  Transfer  Help

A

A
DS3000
MLB
DS3000 Settings V3.05
SS0:                    SS1:
DISPLAY S1:On   S2:On   S3:On   S4:On
Tare Type Soft
Units MLB
LED Brightness [10-125] 64
Relay 1:
     Trigger Point 1:ra 0.200000000E1
     Trigger Point 2:rb 0.400000000E0
     Using Sensors S1:sum S2:sum S3:sum S4:sum
     Duration 0.100000008E-2 seconds [0=continous]

Relay 2:
     Trigger Point 1:ra 0.0E0
     Trigger Point 2:rb 0.0E0
     Using Sensors S1:     S2:     S3:     S4:
     Duration 0.100000008E-2 seconds [0=continous]

Sleep Time Out 0 seconds [0=disabled]
External Tare : both

Connected 0:19:13    Auto detect    9600 8-N-1    SCROLL    CAPS    NUM    Capture    Print echo
```

Which outputs all of your current programmed settings.

8   COMMAND REFERENCE

8.1   Run Mode Command Descriptions

Run mode is when the DS-3000 is currently displaying load on the display, and is not awaiting any user input. This is the default state. All run mode keystrokes have an immediate effect on the displayed value.

8.1.1   Tare All Sensors

Function:	TARE ALL
Keystrokes:	Press key **enter** until *t.A.r.E...* is displayed, then release. Displayed decimal points correspond to currently active sensors.
Summary:	Tare all connected and active sensors simultaneously.

8.1.2   Set Displayed Units

	DISPLAY UNITS
Keystrokes:	Press key **up** until the desired units LED is illuminated. Options are US Pounds (Lb), Kilograms (Kg) and Newtons (N).
Summary:	Display the current load value in the selected units.

8.1.3   Enter Programming Mode

Function:	PROGRAM MODE
Keystrokes:	1. Press **menu** 2. Display will show *EntEr PASS* 3. Press **up** or **down** to change the value of the currently highlighted digit, and **menu** selects which digit is currently highlighted. Enter the correct password value (default is *000001*) 4. Press **enter** 5. Now pressing **menu** will step through the programming mode pages.
Summary:	Switch from *run* mode to *programming* mode.

8.1.4   Change Display Precision Mode

Function:	SPECIAL FUNCTIONS
Keystrokes:	To Manually select the display precision: 1. Press the **down** button (bottom right) and holding it down, press **enter** (bottom left). 2. Now release the **down** button while continuing to hold down **enter.** 3. While continuing to hold **enter** press **up** (top right) or **down** (bottom right) to select your desired decimal point location. The current decimal point location is illuminated on the display while you

	continue to hold down the *enter* button.
	4. Release *enter* when the decimal point is at the desired position. The display will retain this new decimal point selection until changed again, or reset to the factory default.
Summary:	Manually changing the display precision.

8.2   Programming Mode Commands

Program mode is when the DS-3000 characteristics, responses and outputs are being changed by the user. While in programming mode, the DS-3000 will not display load from attached sensors, it will display a programming menu, summarized below, awaiting user commands. Once done editing, you'll need to leave programming mode and go back to run mode to see the results of any programming changes you've made. The unit will not automatically "time out" and return to run mode once you've entered programming mode.

8.2.1   Programming Command Summary

SHIFT/MENU →							
↑ UP/UNITS DOWN/FUNCTION ↓	dSPLAY	tArE	rELAY1	rELAY2	PoWEr	oPtI on	rUn
	di5P1	tArE 1	tr9r1	tr9r1	toUt	LEd	
	di5P2	tArE 2	Pnt1	Pnt1	bAt	tr9t	
	di5P3	tArE 3	tr9r2	tr9r2	S1	u3 05*	
	di5P4	tArE 4	Pnt2	Pnt2	S2	PASS	
		tYPE	SEn1	SEn1S1	S3	FActor	
			SEn2	SEn2S2	S4		
			SEn3	SEn3S3			
			SEn4	SEn4S4			
			dUrAtn	dUrAtn			

*Version: The actual version of the firmware is displayed (e.g. u3 05).

8.2.2   Display Options Menu

Function:	*Display Source Select*
Keystrokes:	Mode Key *menu* till dSPLAY is displayed, then press *up* or *down* buttons to select your desired display mode, then press *enter* to change enabled/disabled (decimal point lights when enabled).
	di5P1 ↵	Display connected Sensor 1
	di5P2 ↵	Display connected Sensor 2
	di5P3 ↵	Display Connected Sensor 3
	di5P4 ↵	Display Connected Sensor 4
		Factory default is for all 4 displays to be on

| **Summary:** | Select which sensor, or combination of sensors is currently displayed on the front panel LED display. Does not affect the value returned by the USB uplink port to a connected PC (all four summed). |

8.2.3 Tare Options Menu

Function:	**TARE Connected Sensors**	
Keystrokes:	Mode Key *menu* till ᴇᴀʳᴇ is displayed, then press *up* or *down* to select input sensor to tare, then press *enter.*	
	ᴇᴀʳᴇ 1 ↵	Tare connected Sensor 1
	ᴇᴀʳᴇ 2 ↵	Tare connected Sensor 2
	ᴇᴀʳᴇ 3 ↵	Tare connected Sensor 3
	ᴇᴀʳᴇ 4 ↵	Tare connected Sensor 4
	ᴇʸᴘᴇ	NOTE: Tare all connected Sensors simultaneously, is done using *enter* key in run mode.
		Press *enter* to toggle between ᴇʸᴘᴇ h and ᴇʸᴘᴇ 5. Most applications should use ᴇʸᴘᴇ h (or "hard tare"). If you have an application that requires very frequent tares (>10/hour), ᴇʸᴘᴇ 5 (or "soft tare") may be more appropriate. Please contact Loadstar Sensors support for more information.
Summary:	Manually Tare individual sensors. Set the type of tare command sent to the sensors.	

8.2.4 Relay Output 1 Menu

Function:	***Setup output contact 1 related parameters***		
Keystrokes:	Press *menu* till ʳᴇʟᴀʸ1 is displayed, then press *up* or *down* to select which parameter you'd like to adjust, then press *enter* to edit each entry to the desired value. These parameters affect Relay Output 1 only! Relay 1 and Relay 2 are independent, and are programmed separately.		
	ᴛʳɢʳ 1		First trigger action threshold. Select *enter* to enter the numeric entry field. *up* and *down* changes the value of the currently highlighted digit, and *menu* changes the currently highlighted digit. Press *enter* when finished
	ᴘɴᴛ 1	ᴘɴᴛ 1ᴛᴀ	Activate output 1 above this value, ie. "Trigger Above"
		ᴘɴᴛ 1ᴛb	Activate output 1 below this value, ie. "Trigger Below"
		ᴘɴᴛ 1ʳᴀ	Reset output 1 above this value, ie. "Reset Above"
		ᴘɴᴛ 1ʳb	Reset output 1 below this value, ie. "Reset Below"
	ᴛʳɢʳ 2		Second hysteresis action threshold. . Select *enter* to enter the numeric entry field. *up* and *down* changes the value of the currently highlighted digit, and *menu* changes the currently highlighted digit. Press *enter* when finished

	$P_n t 2$	$P_n t 2 t A$	Activate output 1 above this point
		$P_n t 2 t b$	Active output 1 below this point
		$P_n t 2 r A$	Reset output 1 above this point
		$P_n t 2 r b$	Reset output 1 below this point
	$5E_n 1$	5 or "."	Include Sensor 1 in Sum with other sensors "S", individually "I", or not included " " (blank).
	$5E_n 2$	5 or " "	Include Sensor 2 in Sum with other sensors "S", individually "I", or not included " " (blank).
	$5E_n 3$	5 or " "	Include Sensor 3 in Sum with other sensors "S", individually "I", or not included " " (blank).
	$5E_n 4$	5 or " "	Include Sensor 4 in Sum with other sensors "S", individually "I", or not included " " (blank).
	$dUrAt_n$	0_00, $contin$	Active trigger Duration interval (seconds), or continuous. Setting the duration to 0 causes the DS-3000 to be in continuous mode, output is active whenever the threshold conditions are satisfied.
Summary:	Contact output 1 can be used to control external equipment attached by means of the provided removable wiring connector. Contact terminals are marked [COM -- common], [NO-- normally open] and [NC – normally closed]. The contact terminal labels indicate the **inactive** contact state. Ie. [NO] contacts are OPEN when inactive, but CLOSED when active. Both [NO] or [NC] contacts are referenced to the [COM] or common terminal. Outputs may be pulsed by selection of appropriate momentary contact duration, or continuous. More details and examples programming these entries will be given in the programming examples section, following later in this document.		

8.2.5   Relay Output 2 Menu

Function:	Setup output contact 2 related parameters		
Keystrokes:	Press **menu** till $rELAY\ 2$ is displayed, then press **up** or **down** to select which parameter you'd like to adjust, then press **enter** to edit each entry to the desired value. These parameters affect Relay Output 2 only! Relay 1 and Relay 2 are independent, and are programmed separately.		
	$tr9r\ 1$		First trigger action threshold. Select **enter** to enter the numeric entry field. **up** and **down** changes the value of the currently highlighted digit, and **menu** changes the currently highlighted digit. Press **enter** when finished
	$P_n t\ 1$	$P_n t\ 1tA$	Activate output 2 above this value, ie. "Trigger Above"
		$P_n t\ 1tb$	Activate output 2 below this value, ie. "Trigger Below"
		$P_n t\ 1rA$	Reset output 2 above this value, ie. "Reset Above"
		$P_n t\ 1rb$	Reset output 2 below this value, ie. "Reset Below"
	$tr9r\ 2$		Second hysteresis action threshold. . Select **enter** to enter the numeric entry field. **up** and **down** changes the value of the currently highlighted digit, and **menu** changes the currently highlighted digit. Press **enter** when finished

Pnt2	Pnt2tA	Activate output 2 above this point	
	Pnt2tb	Active output 2 below this point	
	Pnt2rA	Reset output 2 above this point	
	Pnt2rb	Reset output 2 below this point	
SEn1	5 .	Include Sensor 1 in Sum with other sensors "S", individually "I", or not included " " (blank).	
SEn2	5 or " "	Include Sensor 2 in Sum with other sensors "S", individually "I", or not included " " (blank).	
SEn3	5 or " "	Include Sensor 3 in Sum with other sensors "S", individually "I", or not included " " (blank).	
SEn4	5 or " "	Include Sensor 4 in Sum with other sensors "S", individually "I", or not included " " (blank).	
dUrAtn	0_00, contin	Active trigger Duration interval (seconds), or continuous. Setting the duration to 0 causes the DS-3000 to be in continuous mode, output is active whenever the threshold conditions are satisfied.	
Summary:	Contact output 2 can be used to control external equipment attached by means of the provided removable wiring connector. Contact terminals are marked [COM -- common], [NO-- normally open] and [NC – normally closed]. The contact terminal labels indicate the **inactive** contact state. Ie. [NO] contacts are OPEN when inactive, but CLOSED when active. Both [NO] or [NC] contacts are referenced to the [COM] or common terminal.		
	Outputs may be pulsed by selection of appropriate momentary contact duration, or continuous. More details and examples programming these entries will be given in the programming examples section, following later in this document.		

8.2.6 ˌ Power Options Menu

Function:	Power Save and Power Control Options	
Keystrokes:	Press *menu* until PoᵘEr is displayed, then *up* or *down* to reach each entry	
	toUt	Time Out interval value. Press *enter,* and *up*, *down* to select power save duration in minutes. Default is 0 for continuous operation. On expiration of the time-out interval, the DS-3000 goes to sleep, shuts down attached sensors, and goes to a lower power operational mode. The unit can be "awakened" by pressing any front panel key.
	bAt	Press *enter* to toggle between bAt En (enabled) and bAt " " (blank or disabled). If you have a battery option installed in your DS-3000U the battery is set to enabled at the factory. You should only use this option if you want to disable battery power backup features or remove/disable the battery. Please note that if you do not have the battery option installed, this menu item has no effect regardless of setting
	51 52 53 or 54	Press *enter* to toggle between on and oFF. "on" means the sensor port is powered, and "off" means the sensor port is unpowered. The factory default is to power all sensors plugged in to the DS-3000U.
Summary:	Adjust the power save options.	

8.2.7 Option Menu

Function:	Miscellaneous Options Menu	
Keystrokes:	Press *menu* until oPt!on is displayed, then *up* and *down*.to select the desired field	
	LEd	Select brightness of onboard LED display. Range is 10 to 128, default value is 64. 128 is maximum brightness (and maximum power consumption) 10 is minimum brightness.
	tr9t	Set function of remote tare/trigger contacts. Use ENTER to toggle among t, r and b. The " " (blank) setting is not to be used and may lead to unexpected results. These options cause the following behavior upon closing the remote contact:
	t	"Tares all" connected sensors
	r	Reset/Restart the internal program running on Relay 1
	b	Both. i.e., tares all sensors, and restarts the internal program on Relay 1.
	u3 05	Current DS-3000U firmware revision.
	PSS'rd	Select new password for accessing programming menus. Be sure to remember any new password! Programming mode is not accessible without the current password!
	FActor	Restore factory default settings on DS-3000U. Press and hold *enter* to select
Summary:	Miscellaneous options menu.	

8.2.8 Run

Function:	Restore RUN mode
Keystrokes:	Press *menu* key till rUn is displayed, then press *enter*
Summary:	Exits DS-3000 programming mode, and returns to run mode, where the display shows the output of selected sensors.

9 DS-3000U SYSTEM PROGRAMMING EXAMPLES

9.1 Tank Fill Controller

A mining concern has a large slurry tank with 4 load-cells mounted on each of it's four legs. Before rock is added, a certain amount of water must be initially present in the tank. This is can be easily accomplished using the PLC like functionality of the DS-3000. An external trigger from the main plant process controller, triggers the process start and tares the DS3000U, then water is added under control of the DS-3000U output #1. Once the weight of tank + water exceeds the desired setpoint, the DS-3000 stops the water flow into the tank.

9.1.1 Application Requirements:

1. 4x sensors each with 10000 Lb load capacity each = 40000 Lb total scale load capacity

2. Typical empty tank "dead" weight, with no water or minerals present: 1200 Lbs.

3. Acceptable tank trigger "filled with water" weight: 3500 lbs.

4. Let Sensor 1 – Sensor 4 correspond to the four load-cells, each corresponds to one DS-3000 module input.

9.1.2 Implementation Details:

1. Connect the "water control valve" to Output #1, so when the relay is active, water flows into the tank.

2. Connect each of the four load-cells to consecutive inputs on the DS-3000.

3. Connect the process controller start contacts to the "remote" input on the DS-3000.

4. Assume units of pounds (Lbs), make sure the front panel LED is illuminated in the Lbs position.
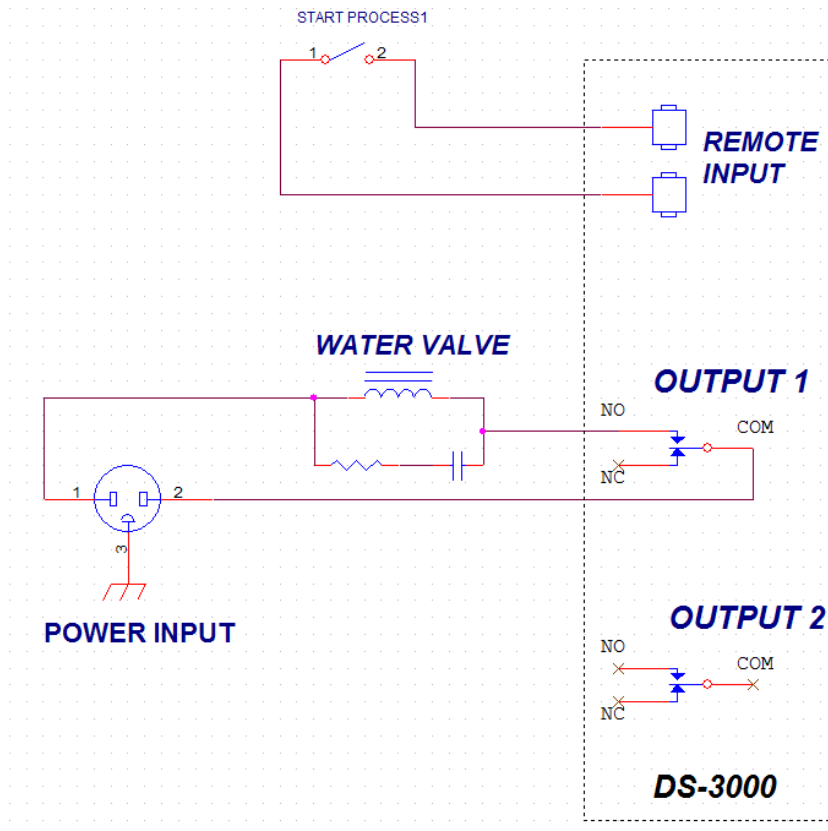
Figure 9: **Wiring for Program Example 1**

9.1.3   Programming Summary

1. Configure the DS-3000 remote input to "reset" and "tare" the displayed value at program start. "Reset" means, output #1 will be reset to it's default state, and will remain there until triggered. "Tare" means to automatically zero the results at whatever the current load value is.

2. Set the threshold to activate relay #1 at *below the tare* value say -10 lbs

3. Set the threshold to de-activate relay #1 at the desired cut-off weight: 3500 – 1200 = 2300 lbs.

4. Keep the output turned off, until the system resets the whole process and water is actually desired to flow into the tank.

9.1.4   Programming the DS-3000:

1. Press and hold *menu* until "EntEr PASS" and "000000" appear on the display

2. Press the *up* or *down* keys to select the programming mode password (default is 000001)

3. Press *enter*

4. You are now in programming mode at the dSPLAY prompt. Press *mode* until you reach the rELAY 1 menu.

5. Press *down*, to the trgr1 entry. Press *enter,* and a numeric entry field will appear. Enter the initial trigger weight of -10 Lb. Press *menu* until the digit corresponding to the 1 is highlighted, then press *up* and *down* to set the digit to 1. Press *mode* again to highlight each digit in turn, then *up* and *down* to set each one to the correct value.

6. Press *enter* when you are complete. Press *down* to get to the next programming entry.

7. Select *Pnt Irb* for *Pnt 1* using the **enter** key to select.

8. Press **down** to *tr9r 2*, press **enter** and a new numeric field appears. Enter 2300 Lbs. Press **enter** when completed.

9. Select *Pnt2rA* for *Pnt2* using the **enter** key to select. This will reset the output, and terminate the sequence, every time the weight rises above 2300 Lbs. The process cannot be restarted until the remote input is triggered again…

10. Press **down** to *SEn 1* corresponding to sensor 1. Press **enter** until *"S"* is displayed. This means that the trigger condition will include the sum of sensor 1.

11. Press **down** and repeat for *SEn2*, *SEn3* and *SEn4*. This way the sum of all four sensors will be used to determine the trigger criteria.

12. Finally, press **down** to *dUrAtn*, press **enter** and make sure it is set to *cont in*. This means the output will remain active during the whole time nly pulse for this interval when either the minimum or maximum condition occurs.

13. Press **enter** to leave this field

14. Now exit programming mode: Press **mode** until the *rUn* entry

15. Then press **enter** to return to run mode.

16. Once in run mode, the program is now fully functional and operating. Try it out!

9.2 Empty Tank Warning

This application uses a scale platform, made with 4 sensors mounted on the corners of a square slab of Aluminum, with a tank of liquid, in this example, a nitrogen Dewar atop the platform. Liquid Nitrogen, over time is used up and the tank slowly loses weight. At some point the weight is reduced to the point where the Dewar needs to be replaced- Since the replacement process can take a day or more, some advanced warning is appropriate.

Therefore this application has two lights, yellow, which indicates the Dewar should be scheduled for replacement, and red, which signals the Dewar is empty, and should be replaced. With both lights off, there is nothing to do.

Table 1: Dewar Replacement Chart

Relay 1	N.O.	N.C.	N.C
Relay 2	N.O.	N.O.	N.C
LAMP	RED Tank is Empty	YELLOW Reorder Tank	NONE

←————| 0 Lbs ———————| 40 Lbs ———————| 70 LBS … 250 Lbs →
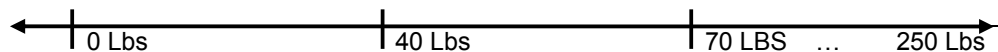
9.2.1 Application Requirements:

1. 4x sensors each with 250 Lb load capacity each = 1000 Lb total scale load capacity

2. Assume this Dewar has a full weight of 250 Lbs, and an empty weight of 40 lbs. If typical usage is 15 Lbs/day, and it takes 2 days to receive a shipment, then the yellow light should activate at 30+40=70 lbs, and the red light at 40 lbs (tank empty).

3. Let Sensor 1 – Sensor 4 correspond to the four load-cells, mounted to the measurement plate. Each is connected to one of the four DS-3000 module inputs.

9.2.2   Implementation Details:

1. Connect the red light to Output #1, NO Terminal. Connect the yellow light to Output #1 NC terminal. Connect the COM terminals for output 1 and output 2 together. Power the NO terminal of Output #2, and the remaining terminals on the lights with the source. See **Error! Reference source not found.**.

2. Set Output 2 to activate BELOW 70 lbs, and de-activate when above 70 lbs. Thus, when the Dewar weight is above 70 lbs no lights will illuminate. When less than 70 lbs Output 1 will determine which light is illuminated.

3. Set Output 1 to activate at 40 lbs, and de-activate above 40 lbs. When active, the RED light is on, when inactive the YELLOW light is on.

4. Make sure the DS-3000 is set to units of Lbs, so press the **up** key until the pounds front panel lamp is illuminated.

5.
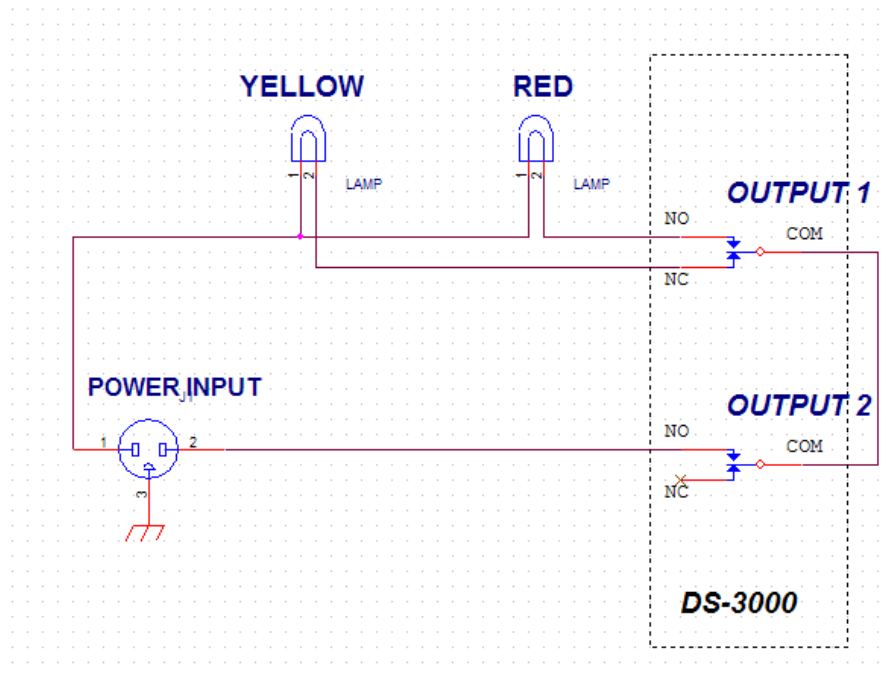
Figure 10: **Wiring diagram for program example 2**

9.2.3   Programming the DS-3000:

1. Press and hold **menu** until "EntEr PASS" and "000000" appear on the display

2. Press the **up** or **down** keys to select the programming mode password (default is 000001)

3. Press **enter**

4. You are now in programming mode at the dSPLAY prompt. Press **mode** until you reach the rELAY 1 menu.

5. Press **down**, to the trGr 1 entry. Press **enter,** and a numeric entry field will appear. Enter the Relay 1 threshold of 40 Lbs. Press **menu** until the digit corresponding to the 4 is highlighted, then press **up** and **down** to set the digit to 4. Press **mode** again to highlight each digit in turn, then **up** and **down** to set each one to the correct value. Please note the decimal point location!

6. Press **enter** when you are complete. Press **down** to get to the next programming entry.

7. Select Pnt Itb for Pnt 1 using the **enter** key to select.

8. Press **down** to ᴛr9r 2, press **enter** and a new numeric field appears. Enter the threshold of 40 Lbs. Press **enter** when completed. Although this example does not use it, it might be a good idea to choose some hysteresis to avoid the output pulsing if the weight fluctuates around the set-point.

9. Select Pnᴛ2rA for Pnᴛ2 using the **enter** key to select. This will "reset" or de-activate the output, once activated, when the load rises above 40 Lbs.

10. Press **down** to 5En1 corresponding to sensor 1.   Press **enter** until *"5"* is displayed. This means that the trigger condition will include the sum of sensor 1.

11. Press **down** and repeat for 5En2, 5En3 and 5En4. This way the sum of all four sensors will be used to determine the trigger criteria.

12. Finally, press **down** to dUrAᴛn, press **enter** and make sure it is set to conᴛ in. This means the output will remain activated until reset by the Pnᴛ2 condition above, once triggered by the Pnᴛ1 condition.

13. Press **enter** to leave this field. Next we will program output 2

14. Press **mode** until you reach the rELAY 2 menu.

15. Press **down**, to the ᴛr9r 1 entry. Press **enter,** and a numeric entry field will appear. Enter the Relay 2 threshold at 70 Lbs. Press **menu** until the digit corresponding to the 7 is highlighted, then press **up** and **down** to set the digit to 7. Press **mode** again to highlight each digit in turn, then **up** and **down** to set each one to the correct value. Please note the decimal point location!

16. Press **enter** when you are complete. Press **down** to get to the next programming entry.

17. Select Pnᴛ 1ᴛb for Pnᴛ 1 using the **enter** key to select.

18. Press **down** to ᴛr9r 2, press **enter** and a new numeric field appears. Enter the threshold of 70 Lbs. Press **enter** when completed.

19. Select Pnᴛ2rA for Pnᴛ2 using the **enter** key to select. This will "reset" or de-activate the output, once activated, when the load rises above 70 Lbs.

20. Press **down** to 5En1 corresponding to sensor 1.   Press **enter** until *"5"* is displayed. This means that the trigger condition will include the sum of sensor 1.

21. Press **down** and repeat for 5En2, 5En3 and 5En4. This way the sum of all four sensors will be used to determine the trigger criteria.

22. Finally, press **down** to dUrAᴛn, press **enter** and make sure it is set to conᴛ in.

23. Press **enter** to leave this field

24. Now exit programming mode: Press **mode** until the rUn entry

25. Then press **enter** to return to run mode.

26. Once in run mode, the program is fully operational.

9.3   Go/NoGo Acceptable Weight Limit Test

In many production processes, a fully packaged product has a very specific weight. If the weight deviates above or below that value, by only a small amount, there is likely a problem with that product, and it should be shunted off the production line for further investigation.

This application monitors a remote contact which is enabled when after a product is deposited on a scale composed of a single sensor. The DS-3000 then weighs the device, and if it falls above or below a predetermined threshold, activates it's output, in turn causing a mechanical flapper to alter the path of the product off of the assembly line.

Like all manufacturing environments, the scale is subject to constant weight fluctuations due to temperature changes, material buildup, etc. And should be tared (aka. reset to zero) as frequently as possible. Ideally, the system will provide a "remote tare" signal when the scale is unloaded before every product test, and then will provide a "remote load sense" signal, when the scale is appropriately loaded, ready for test.

9.3.1　Application Requirements:

1. 1 sensor each with 100 Lb load capacity, Sensor plugged into port 1
2. Remote input used to enable testing product weight provided by system
3. Remote input used to enable scale tare, provided by system
4. Nominal product weight assumption, for this example 10 +- 0.2 Lbs

9.3.2　Implementation Details:

1. Connect the outputs as in Figure 11:　**Schematic for Program Example 3**
2. When the weight is above 10.2 lbs or below 9.8 lbs, activate the output-deactivate otherwise.
3. Lets use units of Pounds, so press the **up** key until the pounds lamp is illuminated.
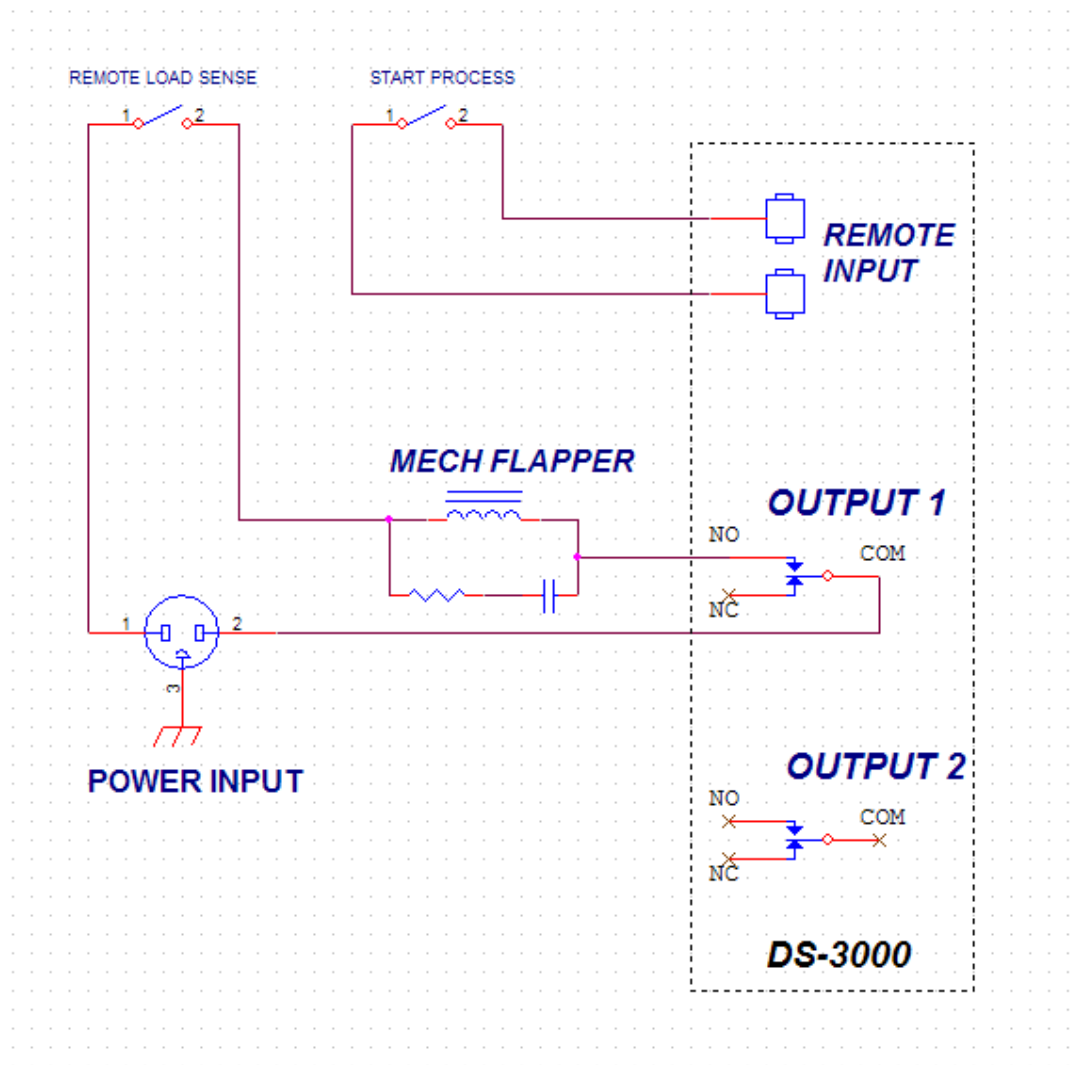

Figure 11:　**Schematic for Program Example 3**

9.3.3　Programming the DS-3000:

1. Press and hold **menu** until "EntEr PASS" and "000000" appear on the display
2. Press the **up** or **down** keys to select the programming mode password (default is 000001)

3. Press **enter**

4. You are now in programming mode at the dSPLAY prompt. Press **mode** until you reach the rELAY 1 menu.

5. Press **down**, to the tr9r 1 entry. Press **enter,** and a numeric entry field will appear. Enter 10.2 Lbs. Press **menu** until the digit corresponding to the 2 is highlighted, then press **up** and **down** to set the digit to 2. Press **mode** again to highlight each digit in turn, then **up** and **down** to set each one to the correct value.

6. Press **enter** when you are complete. Press **down** to get to the next programming entry.

7. Select Pnt 1tA for Pnt 1 using the **enter** key to select. This will activate the output when above this threshold.

8. Press **down** to tr9r 2, press **enter** and a new numeric field appears. Enter 9.8 Lbs. Press **enter** when completed.

9. Select Pnt2tb for Pnt2 using the **enter** key to select. This will activate the output when it drops below this threshold.

10. Press **down** to SEn 1 corresponding to sensor 1.   Press **enter** until "i" is displayed. This means that the trigger condition will only look at sensor 1

11. Finally, press **down** to dUrAtn, press **enter** and make sure it is set to cont in.

12. Press **enter** to leave this field

13. Press **menu** till oPt ion page is displayed

14. Press **down** to tr9t, press **enter** until tr9t t is displayed. This enables the remote input to tare the DS-3000 whenever the external contacts are closed.

15. Now exit programming mode: Press **mode** until the rUn entry

16. Then press **enter** to return to run mode.

17. Once in run mode, the program is now operational.

9.4   Automated Fertilizer Bag Fill Dispense system

At a "green" marketing company, they offer organic fertilizer, steer manure and other soil enrichment products for sale by weight. In order to minimize costs, customers are allowed to bring their own containers, which vary in weight, and place them on a scale, placed under a fill chute. After selecting the chosen product, they may then purchase a fixed weight (amount) of the chosen product.

This application uses a scale platform with a single load sensor, and a system contact which provides a contact closure once the customer has paid, and placed an appropriate container on the scale. The DS-3000 then activates output contact #1, enabling material to pass down the chute- until the product weight exceeds a preset value. After which the contact opens, shutting off the material flow. The system is then automatically reset for the next customer, after the material and container is removed from the terminal.

9.4.1   Application Requirements:

1. 1 sensor each with 100 Lb load capacity, Sensor plugged into port 1

2. Remote input used to start process

3. Nominal product weight assumption, for this example 25 Lbs

9.4.2   Implementation Details:

1. Connect the outputs as in Figure 11: **Schematic for Program Example 3**

2. Once the output activates, it remains activated until the weight is greater than 25 lbs.

3. After the scale weight drops to less than 1 lb, it is assumed the customer has removed the fertilizer and container, and the DS-3000 resets for the next cycle.

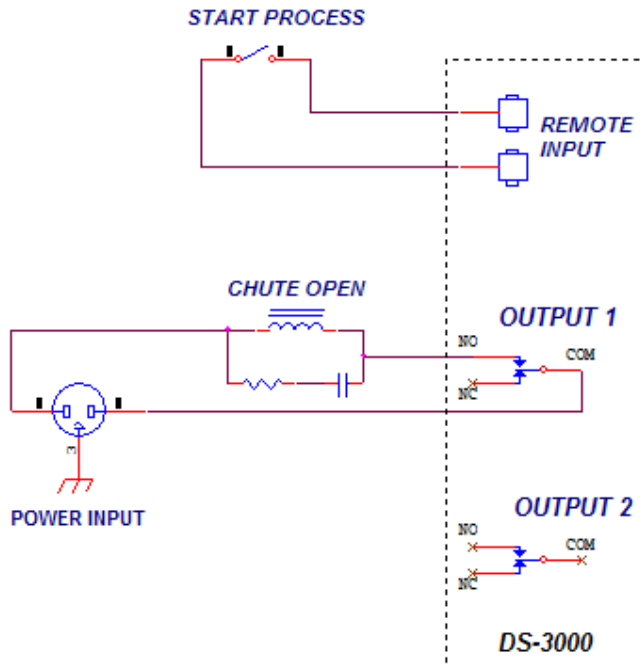4. Lets use units of Pounds, so press the **up** key until the pounds lamp is illuminated.

Figure 12: **Schematic for Program Example 4**

9.4.3   Programming the DS-3000:

1. Press and hold **menu** until "EntEr PASS" and "000000" appear on the display

2. Press the **up** or **down** keys to select the programming mode password (default is 000001)

3. Press **enter**

4. You are now in programming mode at the dSPLAY prompt. Press **mode** until you reach the rELAY 1 menu.

5. Press **down**, to the tr9r 1 entry. Press **enter**, and a numeric entry field will appear. Enter 25 Lbs. Press **menu** until the digit corresponding to the 5 is highlighted, then press **up** and **down** to set the digit to 5. Press **mode** again to highlight each digit in turn, then **up** and **down** to set each one to the correct value.

6. Press **enter** when you are complete. Press **down** to get to the next programming entry.

7. Select Pnt IrA for Pnt I using the **enter** key to select. This will activate the output when above this threshold.

8. Press **down** to tr9r 2, press **enter** and a new numeric field appears. Enter 1.0 Lbs. Press **enter** when completed.

9. Select Pnt2rb for Pnt2 using the **enter** key to select. This will reset the output once it drops below this threshold.

10. Press **down** to SEn I corresponding to sensor 1.   Press **enter** until *"i"* is displayed. This means that the trigger condition will only look at sensor 1

11. Finally, press **down** to dUrAtn, press **enter** and make sure it is set to cont in.

12. Press *enter* to leave this field

13. Press *menu* till ѻРᵗ ıѻn page is displayed

14. Press *down* to ᵗ⌐ᵍᵗ, press *enter* until ᵗ⌐ᵍᵗ ᵬ is displayed. This enables the remote input to tare the DS-3000 whenever the external contacts are closed, and reset the measurement state machine at the beginning of each new cycle.

15. Now exit programming mode: Press *mode* until the ⌐Ս∩ entry

16. Then press *enter* to return to run mode.

17. Once in run mode, the program is now operational.

10 REMOTELY CONNECTING TO THE DS-3000.

The optional programmable relay and external trigger capability of the DS-3000U make it a very powerful and versatile instrument to control laboratory experiments, process control equipment, production test systems etc. In addition to the DS-3000s stand-alone control abilities, additional remote programming and monitoring capability also come standard. This chapter introduces how to connect your PC to the DS-3000, and subsequent chapters will document the remote capabilities.

The DS-3000U is accessed by your host PC using a standard virtual com port mechanism provided by your OS. Either your custom application, or the LoadVUE software application available from LoadStar Sensors, uses this same interface. In this chapter we use as example the most common computer configuration, a windows based PC OS, running hyper-terminal such is found in all Windows XP PCs. If this does not describe your PC, an equivalent product may be available for your operating system.

The approach demonstrated here, may be easily adapted to other terminal programs, and other Operating Systems. The same data can be sent and received to the DS-3000 whether the application is a terminal program, or any other user-written programs in high level programming languages or in virtualized programming applications such as LabView, MATLAB, or EXCEL VBA.

10.1 Installing Virtual com port drivers

The DS-3000 is attached to your PC using a standard USB-Type A to USB Type B cable. This cable is included in your DS-3000 package. Once connected to the USB port on your PC, you may find your PC requires additional drivers. We recommend you download the latest driver version for your particular operating system. They can be found at:

http://www.ftdichip.com/Drivers/VCP.htm

additional information on installing these drivers can be found at:

http://www.ftdichip.com/Documents/InstallGuides.htm

10.2 Communicating with the DS-3000 using Hyper-terminal

HyperTerminal is the most popular terminal program available on Windows PC's since a basic version comes preloaded with Windows XP. If you use a different OS, many terminal emulator programs are available that support your OS. One such program is TeraTerm Pro that can be downloaded as freeware from many locations on the Internet.

Before connecting your DS-3000 to your PC, open device manager and review the ports currently available on your computer:

After connecting the DS-3000U a new port should appear, after the correct drivers have been installed:

This new serial port corresponds to the virtual port of the DS-3000U device.

Next step, open hyper-terminal and create a new connection corresponding to your newly attached DS-3000 device:
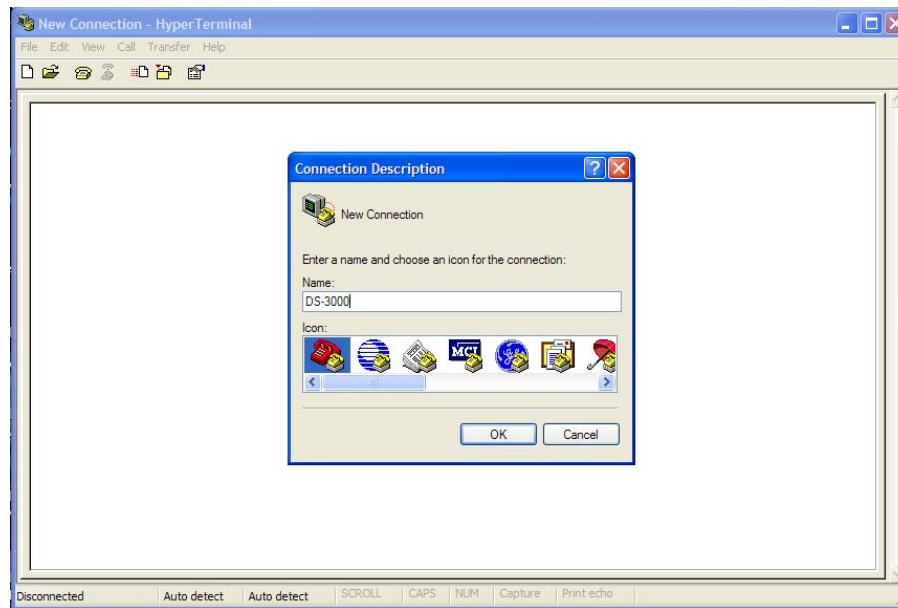
Select the virtual comport:
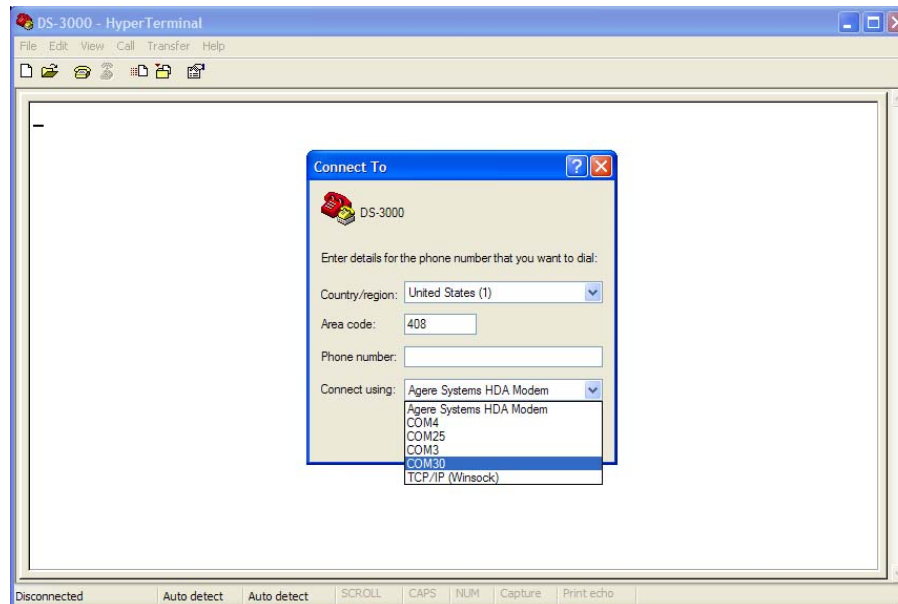
and the default baud rate and communication settings…
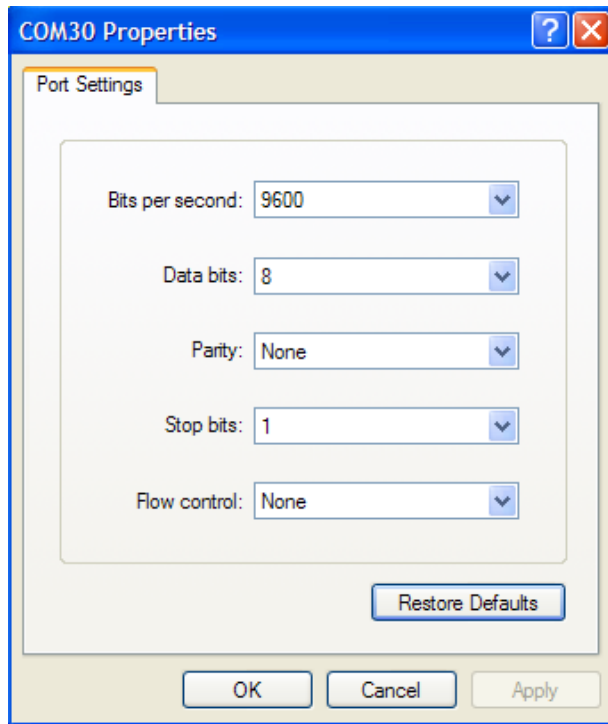
Press OK, to connect to the DS-3000

Pressing "enter" on your keyboard should be acknowledged by the DS-3000 with "A":

You may type "? enter" to get a list of all commands:

Note that it is planned that nearly every command accessible by the front panel interface will be accessible remotely. The next section will describe each of these commands in detail.

11 REMOTELY PROGRAMMING THE DS-3000

It is planned for nearly every command to be programmed into the DS-3000U remotely. The variable "n" corresponds to relay 1 or 2, and the variable "x" corresponds to a port 1 – 4. In the commands which follow, the "n" and "x" should be replaced with the correct relay/port information.

PC Control Command Overview

11.1 o0W0, o0W1, o0X1⏎

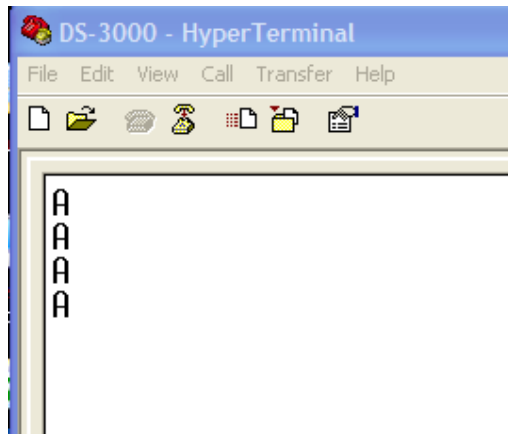| Function:	Output Weight Commands	
Keystrokes:	Output Weight commands return the currently displayed weight on the DS-3000U to the host PC. If the displayed weight is modified by DS3000 programming to exclude some sensor inputs- that modified value is returned by default. o0X1 will output all sensors, regardless of programming settings.	
	o0W0 ⏎	Output gross weight continuously in the currently selected units.
	o0W1 ⏎	Output gross weight once in the currently selected units.
	o0X1 ⏎	Output all sensors individually, including the sum
Summary:	Output current gross weight to host PC. These outputs are read-only values.	

11.2 SLC⏎

Function:	Show Load Capacity
Summary:	Normally the DS-3000 automatically calculates the load capacity, based on the load capacity of connected sensors. For example, the load capacity of a single sensor, is the load capacity of that sensor. The load capacity of two sensors, is the sum of the load-capacities of each. In general, the SLC command returns the sum of the load capacities of all connected sensors. This is a read only value.

11.3 CS0, CS1, SS0, SS1

Function:	User Strings	
Keystrokes:	These commands set and read user programmable text strings. String CS0 Is typically used for the DS-3000 Serial Number, and CS1 is used for an easy to remember text name used to differentiate this DS-3000 from others that may be present in your system.	
	CS0 12345 ⏎	Program Serial Number to 12345
	CS1 BOX1 ⏎	Program Device Name to BOX1.
	SS0 ⏎	Display current Serial Number
	SS1⏎	Display current Device Name
Summary:	Set and read user programmable text strings.	

11.4 CT0 ⏎

Function:	**TARE all currently connected sensors simultaneously**
Summary:	This remote command tares all connected sensors at the same time.

11.5 ETT ⏎ (Future Command, not yet implemented)

Function:	**Set function of external input**
Keystrokes:	These commands remotely control the ₒPᵗ ᵢₒₙ5 mode page ᵗᵣ9ᵣ entry.
	ETT D⏎ Remote equivalent to ᵗᵣ9ᵣ ETT T⏎ Remote equivalent to ᵗᵣ9ᵣ ᵗ. ETT R⏎ Remote equivalent to ᵗᵣ9ᵣ ᵣ ETT B⏎ Remote equivalent to ᵗᵣ9ᵣ b
Summary:	Configure the function of external input.

11.6 TTS, TTH ⏎

Function:	**Set tare type**
Keystrokes:	These commands tell the DS-3000 how to handle default tare requests.
	TTS⏎ Soft tare attached sensors, equivalent to programming mode page ᵗᴬᵣᴱ, field ᵗᵞPᴱ 5. TTH⏎ Hard tare attached sensors, equivalent to programming mode page ᵗᴬᵣᴱ, field ᵗᵞPᴱ ʰ
Summary:	Tell the DS-3000 how to handle user tare requests (both front panel and remote).

11.7 SST ⏎

Function:	**Read Sensors internal status code**
Keystrokes:	This is a debug command.
	SST ⏎ Returns internal status code.
Summary:	Returns internal status code. This is a read only value.

11.8 LED⏎ (Future Command, Not yet Implemented)

Function:	**Sets intensity of display LED**
Keystrokes:	This command sets the brightness of the display LED. The range is from 10 to

	128, with 128 the brightest, and the highest power consumption.	
	LED xxx ⏎	Remotely set the LED brightness, replace xxx with your desired brightness
Summary:	Remotely set current display brightness. This value is R/W.	

11.9 ST⏎ (Future Command, Not yet Implemented)

Function:	*Sets sleep timeout*	
Keystrokes:	This command sets the time from the last front panel key-press, until the DS-3000 goes to sleep. Sleep mode reduces power consumption about 20 - 50%, which may prolong the operating time when operating in a limited power system, such as from a battery. Default is disabled. Power save mode shuts off connected sensors	
	ST xxx ⏎	Set the sleep time, in seconds. "0" is disabled.
Summary:	Set the timeout interval until the DS-3000 drops into power save mode.	

11.10 RnTPx⏎ (Future Command, Not yet implemented)

Function:	*Relay 1 and Relay 2Trigger Points*	
Keystrokes:	This command remotely sets the programmed trigger points of each relay.	
	R1TP1 10.1⏎	Sets Relay 1 threshold 1 to 10.1 of the currently selected unit.
	R1TP2 5.5 ⏎	Sets Relay 1 threshold 2, to 5.5 of the currently selected unit.
	R2TP1 nnnn ⏎	Sets Relay 2 threshold #1 to nnnn
	R2TP2 nnnn ⏎	Sets Relay 2 Threshold #2 to nnnn
Summary:	Allows remote programming of the setpoints of both relay 1 and relay 2 setpoint values.	

11.11 RnTPxT⏎ (Future Command, Not yet implemented)

Function:	*Relay trigger point type*	
Keystrokes:	This command sets the type of trigger point for each of the programmable thresholds. Choices are "Trigger Above", or TA, "Trigger Below",TB, "Reset Above", RA, or "Reset Below", RB.	
	R1TP1T TA⏎	Set Relay 1, Trigger Point1 to "Trigger Above."
	R1TP2T TA⏎	Set Relay 1, Trigger Point2 to "Trigger Above."
	R2TP1T TA⏎	Set Relay 2, Trigger Point1 to "Trigger Above."

	R2TP2T TA⏎	Set Relay 2, Trigger Point2 to "Trigger Above."
Summary:	Remotely set Trigger Type for each programmable set-point.	

11.12 RnSx⏎ (Future Command, Not yet implemented)

Function:	***Sets sensor x relationship to Relay n***	
Keystrokes:	This command sets which sensors are associated with which relays. For example, Relay one may be used with one sensor, and Relay two may be used with a pair of others. Options are SUM "S"(Relay n reacts to the SUM of all associated inputs), INDIVIDUAL "I", (Relay n reacts only to this individual sensor),or NONE "N" (this relay does not respond to this sensor)	
	R1S1 S ⏎	Set Relay 1 trigger points to sum with sensor 1
	R1S2 S⏎	Set Relay 1 trigger points to sum with sensor 2
	R1S3 N⏎	Set Relay 1 trigger points to ignore sensor 3
	R1S4 N⏎	Set Relay 1 trigger points to ignore sensor 4
	R2S1 S⏎	Set Relay 2 trigger points to sum with sensor 1
	R2S2 S⏎	Set Relay 2 trigger points to sum with sensor 2
	R2S3 S⏎	Set Relay 2 trigger points to sum with sensor 3
	R2S4 S⏎	Set Relay 2 trigger points to sum with sensor 4
Summary:	Set which sensor is used to determine the threshold conditions	

11.13 RnD⏎ (Future Command, Not yet Implemented)

Function:	***Relay n duration***	
Keystrokes:	This command sets the duration of the output contact, once a trigger condition is detected. The duration is in seconds, and 0.0 seconds = continuous. Default is continuous.	
	R1D 0.0 ⏎	Set Relay1 duration to continuous.
	R2D 0.0⏎	Set Relay2 duration to continuous.
Summary:	Set output contact duration.	

11.14 ASx⏎, RSx ⏎ (Future Command, Not yet implemented)

Function:	***Adds or Removes sensor from current display sum***	
Keystrokes:	Add or Remove Sensor x sum from the current display.	
	AS1 ⏎	Display sum includes sensor 1
	AS2⏎	Display sum includes sensor 2
	AS3⏎	Display sum includes sensor 3
	AS4⏎	Display sum includes sensor 4

RS1↵	Remove sensor 1 from displayed sum.
RS2↵	Remove sensor 2 from displayed sum.
RS3↵	Remove sensor 3 from displayed sum.
RS4↵	Remove sensor 4 from displayed sum.
Summary:	Determine which input sensors are summed in the current display.

11.15 MODEL↵

Function:	*Returns model number of connected device*
Keystrokes:	This command returns the current model number of the device connected to this virtual serial interface.
	MODEL↵	Request the model of the currently attached device to this virtual COM port.
Summary:	Returns DS3000<CRLF>

11.16 UNIT↵ (Future Command, Not yet implemented)

Function:	*Sets currently active display units*
Keystrokes:	This command sets the currently selected weight unit.
	UNIT MLB ↵	Set UNITS to Milli-pounds.
	UNIT N ↵	Set UNITS to Newtons
	UNIT KG ↵	Set UNITS to Kilograms
Summary:	Remotely sets current measurement units

11.17 SETTINGS↵

Function:	*Returns current configuration settings*
Keystrokes:	This command returns the current system configuration and programming settings.
	SETTINGS↵	

Summary:	Returns current configuration settings:
	`A`
	`settings`
	`DS3000 Settings V3.05`

```
SS0:12345            SS1:DAVID

DISPLAY S1:On:   S2:On   S3:On   S4:On

Tare Type Soft

Units MLB

LED Brightness [10-125] 64

Relay 1:

    Trigger Point 1:ra 0.200000000E1

    Trigger Point 2:rb 0.400000000E0

    Using Sensors S1:sum:sum S3:sum S4:sum

    Duration 0.100000008E-2 seconds [0=continous]


Relay 2:

    Trigger Point 1:ra 0.0E0

    Trigger Point 2:rb 0.0E0

    Using Sensors S1:S2:    S3:    S4:

    Duration 0.100000008E-2 seconds [0=continous]


Sleep Time Out 0 seconds [0=disabled]

External Tare : both
```

12 DS-3000 TECHNICAL SPECIFICATIONS

Performance

Resolution	+/- 999,999 total counts
Displayed Resolution	Dynamic, Sensor Dependent
Update Speed	10 display updates/second
Display Sensitivity	Sensor dependent
Software Filter	None
Temp Coefficient	N/A (Sensor dependent)

Environment

Operating Temperature	-10 to 55C (15 to 131F) (no battery)
	-10 to 45C (15 to 113F) (with internal battery)
Storage Temperature	-20 to 85C (-5 to 185F) (no battery)
	-20 to 60C (-5 to 140F) (with internal battery)

> WARNING: Never exceed -20C to +60C when the internal battery is installed. Explosion may result! Loadstar Sensors is not responsible for any damage caused through negligence of this kind!

Humidity	5 to 85% RH Non Condensing
Voltage	6 to 32 VDC
Power	Up to 6 W
Vibration	Not to exceed 4 mm displacement at 16.7 Hz, for greater than 60 mins.
Shock	Not greater than a 20 cm drop onto a hard wooden surface

Enclosure

Construction Material	ABS Plastic
Bezel	Acrylic
Dimensions	4.7 in (120 mm) x 1.4 in (38 mm) x 2.8 in (80 mm)

Display

Type	7-Segment RED LED
Active Digits	6 Digits (0.4" high) + Minus indicator and decimal points

Remote TARE Contacts

Closed contacts	"logic low" or active input to the unit
Open contacts	"logic high," or inactive input to the unit
Cable Length	100 feet, 20 Gauge wire

Remote RELAY OUT contacts

Surge withstand voltage	Meets FCC Part 68 and Telcordia 2.5 kV Specifications
Maximum Resistive Load	10A at 125 VAC
Maximum Inductive Load	4A at 125 VAC (snubber highly recommended)
Maximum contact voltage	250 VAC, or 220 VDC (at reduced current)
Abs. Max. contact carry current	15A
Maximum contact switching	50 VA capacity

Special Interfaces

Host Interface	USB (virtual COM)
Sensor Interface	USB host

CE Marking

EMI	EN5022
EMC	EN55024
Safety	EN60950, EN60950-1