



Depth Tension Display (DTD)

User Manual



Proprietary Notice

This document contains proprietary and confidential information of DataCan Services Corp. and shall not be used, disclosed, or reproduced in whole or in part, for any purpose without the prior written consent of DataCan.

Disclaimer

DataCan has made every effort to ensure that this document contains accurate and current information, however, the document is intended to be used in conjunction with a complete training program and on-site supervisor and DataCan Services Corp. does not warrant or guarantee that the information contained herein is either complete or accurate in every respect, and the reader hereby protects, indemnifies and holds harmless DataCan Services Corp. together with its officers, employees, and agents from and against all liability for personal injury, death, or property damage to any person arising directly or indirectly from the use by the reader of the information contained in the document.

Revision 1.1b Date: September1, 2020

Table of Contents

1.0 Safety	5
1.1 General Safety.....	5
1.2 Safety Symbols.....	5
1.3 Personal Safety.....	5
1.4 Hydraulic Safety	6
1.5 Electrical Safety.....	7
1.6 Environmental Safety.....	7
2.0 System Description and Specifications	8
2.1 Overview	8
2.1.1 Depth.....	8
2.1.2 Tension.....	8
2.1.3 Options.....	9
2.2 Specifications	9
2.3 DTD Panels	10
2.3.1 Front Panel	10
2.3.2 Rear Panel	11
2.4 Menu Options	12
3.0 Operation	13
3.1 Installation Requirements.....	13
3.2 Connect the Cables	13
3.3 Power Up the Unit	13
3.4 Power Down the Unit.....	14
3.5 Configure the DTD Unit.....	14
3.6 Menu System	14
3.6.1 View Settings.....	14
3.6.2 Adjust Depth	15
3.6.3 Depth Cal.....	15
3.6.4 Tension Cal	18
3.6.5 Depth Alarm	21
3.6.6 Display Setting.....	21

- 3.6.7 Settings Lock 22
- 3.7 Set Function 22
 - 3.7.1 Zero 22
 - 3.7.2 Load Depth 22
- 4.0 Input signals 22
 - 4.1 Depth signal 22
 - 4.2 Tension Signals 23
 - 4.2.1 Millivolt Signal 23
 - 4.2.2 0-5V Signal 23
 - 4.2.3 4-20mA Signal 23
- 5.0 Output Signals 24
 - 5.1 Depth signal 24
 - 5.2 Tension Signals 24




1.0 Safety

1.1 General Safety

Safety is everyone's responsibility and should never be taken lightly. The potential for accidents or fatal injuries is always present when dealing with the high pressures of hydraulic systems, dangers of electricity, and the moving parts associated with mechanical equipment. Be sure that all personnel are aware of these dangers and take the appropriate precautions to ensure the safety and well-being of all persons. Remember: you have the right to refuse unsafe work.

Where appropriate in this manual, relevant safety notices have been highlighted to draw your attention to any possible hazards. These notices do not replace proper training on equipment or well site safety procedures. See your supervisor for a more comprehensive overview of safety information for your work site.

1.2 Safety Symbols

Symbols	Definition
	DANGER! This symbol and paragraph indicate a risk of serious injury or death to personnel
	WARNING! This symbol and paragraph indicate a risk of severe damage to equipment
	CAUTION! This symbol and paragraph indicate a risk of moderate injury to personnel or damage to equipment
	NOTE: This paragraph indicates useful information that will allow the user to complete tasks quickly and efficiently

1.3 Personal Safety

- Wear the correct personal protective equipment (PPE) for the job. This may include hard hats, fire retardant clothing, gloves, and CSA approved safety footwear. Check local and company policies for guidelines on PPE use.
- Wear safety glasses, goggles, and/or face shields when potential eye hazards exist. Airborne dust, liquids, gaseous or chemical compounds, and high-pressure air gases can be hazardous to your eyes.

- Earplugs, industrial ear muffs, and/or both are highly advised where sound levels might reach damaging levels.
- Wear a self-contained breathing apparatus (SCBA), supplied air breathing apparatus (SABA), or respirators fitted with correct cartridges when working around smoke, vapors, fumes, gases, or areas in areas with insufficient oxygen.
- Do not wear jewelry (watches, rings, necklaces), loose-fitting clothing, or anything that could be caught in the moving parts of machinery. Other items that can become caught in moving equipment include scarves, gloves, belts, and shoelaces.
- Ensure that long hair and beards are tied back and secured such that they will not fall into or be caught in moving equipment.
- Ensure that all personnel handling hazardous materials used in wireline and testing operations are aware of any possible dangers.
- Use approved equipment when handling hazardous materials. Improper handling or the incorrect equipment may cause serious injury or even death.
- All personnel must be properly trained for every job, including the proper use of equipment, knowledge of procedures, etc. Improper or insufficient training can lead to the endangerment of all persons on a job site.
- Ensure that everyone on a work site is aware of any potential dangers from equipment or the job site.

1.4 Hydraulic Safety

- Hydraulic systems are built to store energy and can generate extremely high pressures that exert force upon other pieces of equipment. Serious injuries or even death can result if any personnel do not follow appropriate safety procedures.
- Check all hoses and fittings for wear or damage before you attempt to operate any equipment. Replace any parts that seem questionable. Failure to correctly service equipment could result in serious injuries and equipment damage.
- Connect all lines and hoses correctly. An incorrect connection can cause the reverse of an intended action. A sudden, unexpected action could result in serious injury.
- Never attempt to service or adjust any piece of equipment while it is under pressure!

ALWAYS shut down the equipment and unload pressure from the system before performing any kind of maintenance.

- Never use your hands to try and detect a pinhole leak. Always use a piece of wood or cardboard, and wear safety glasses or a face shield.
- Tighten all connections before you apply system pressure. Completely relieve all pressure before disconnecting any hydraulic lines. Fluid under pressure can be strong enough to penetrate steel.
- Do not weld, solder, or use any type of torch near a pressurized line. The heat could rupture the hose and ignite the fluid within, causing serious burns.
- Be aware that even solar and ambient heat can cause thermal expansion of hydraulic fluid in a closed system. This can result in blown seals or unexpected equipment operation.

1.5 Electrical Safety

Although some tools themselves may not create high voltages, connection to test equipment can create a dangerous condition. Ensure that equipment and tools are properly grounded before proceeding.

- Avoid working alone when using high voltage equipment.
- Never touch a tool and test equipment simultaneously. The voltage potential may be sufficient to cause shock and/or injury.
- Stand on a dry wooden platform, a rubber mat or a similar type of insulation when working on tools.
- Use grounding jumpers that are separate from the AC input lines.
- Beware of defective tools. A malfunctioning tool may create serious safety hazards.

1.6 Environmental Safety

Please dispose of all hydraulic fluids properly. Incorrect disposal of wastes can harm the environment and ecology of a given area. Your local environmental agency can advise you of the proper procedures.

Always use proper containers when draining fluids. Do not use food or beverage containers or anything that may mislead someone to drink from it. Do not pour the fluids onto the ground, down a drain, or into a stream, pond, or lake. Observe relevant environmental protection regulations when disposing of petroleum products.



DANGER!

Be Aware!

Be Alert!

Be Safe!

2.0 System Description and Specifications

2.1 Overview

The Depth Tension Display (DTD) is an electronic device that acquires and displays wireline depth, speed and tension. This device will display the depth and tension as it is being used, and will operate from a 12VDC system from a wireline truck or skid.

2.1.1 Depth

The depth is read by counting pulses that are generated by an encoder attached to measuring wheel of a measuring head, and the pulses are activated by the spinning of this measuring wheel. In order for the display to measure depth accurately, the size of the wheel or effective size of the wheel and line (if a wrap-around counter is used) must be precisely known. The speed is calculated from the rate at which these pulses are acquired. These pulses are delivered to the DTD by way of an encoder cable that connects between the DRS and a measuring head encoder.

Prior to operation, the DTD must be programmed with the following information:

- The encoder's pulses per revolution
- The circumference or effective circumference of the measuring head wheel in feet or meters

If tension is to be measured, the user will need to have a method to apply or simulate the application of a full load on sensing device or the wireline as well as a no-load condition in order for the display to accurately read the wireline tension value.

2.1.2 Tension

The tension is measured by acquiring an analog voltage and the reading of this voltage and applying a calibration to the reading to generate a value in pounds – force (lbf). This analog input can be a differential signal from a load pin, a single-ended 0-5VDC signal or a 4-20mA loop powered signal. This signal is transmitted to the Depth Tension Display through a tension cable that is wired according to the type of signal it is carrying.

In order to set up the calibration of the DTD, the user will need a method to apply a precisely known tension value to the wireline or to the sensor unit of the tension device used on the wireline unit. The user will need to know a low point (usually zero) as well. The user will simply need to enter these values into the DTD and apply the force to the sensors or simulate their application to the wireline and the user will be able to calibrate the DTD display.

2.1.3 Options

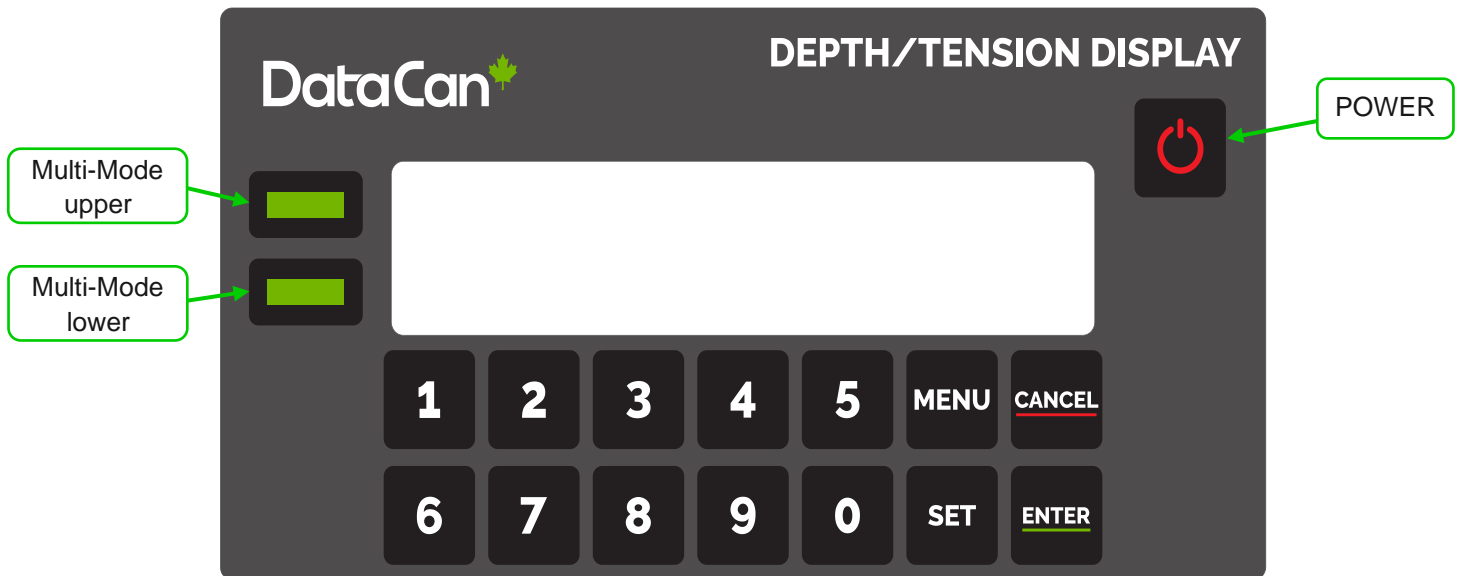
The user does have the option to exclude the tension measurement from display, as the display can also be configured to display only depth and speed and also depth and tension and finally include depth, tension and speed.

2.2 Specifications

Specification	Details
Box Length	6.25 in (15.87 cm)
Box Width	2.95 in (7.49 cm)
Box Height	2.67 in (6.78 cm)
Front Panel Length	5.3 in (13.36 cm)
Front Panel Height	2.735 in (6.95 cm)
Weight	2 lb (0.91 kg)
Power	12 – 25 VDC, 300mA max
Input Signals	Millivolt level: 0 – 40 mV differential
	0-5 V : single ended 5.25V max
	Current input: 21mA max
Depth Signal	Quadrature, 5V – 15VDC max

2.3 DTD Panels

2.3.1 Front Panel



Key	Function
Power	Turns the DRS on and off. Press “power” to power the unit up or to shut the unit off. A beep will sound to indicate the DRS is powering down.
SET	Allows you to set an arbitrary depth for the counter, or reset the depth counter display to 0 (zero).. The arbitrary value can be negative or positive, and will be confined to however many decimal places the unit is configured to display. NOTE: The depth value can be adjusted by way of the ADJUST DEPTH function located in MENU options, or by using the Upper Multi-mode button
Menu	Access menu options. When you first press the button, a message about how to use the arrow key appears for a second, then the first menu item appears. Use the Upper Multi-Mode button to scroll through the menu options. Use the numeric keypad to select the menu option.
Enter	Press to accept the value that you have entered.
Cancel	Exits current function without performing any functions or accepting any values entered.
Numeric Keys	Allows selection of menu options and entering values.
Multi-Mode upper	In standard operating mode, allows adjustment of current depth, other functions are dependent on the display’s mode.
Multi-Mode lower	With tension displayed, allows user to set tare weight, other functions are dependent on the display’s mode.

2.3.2 Rear Panel

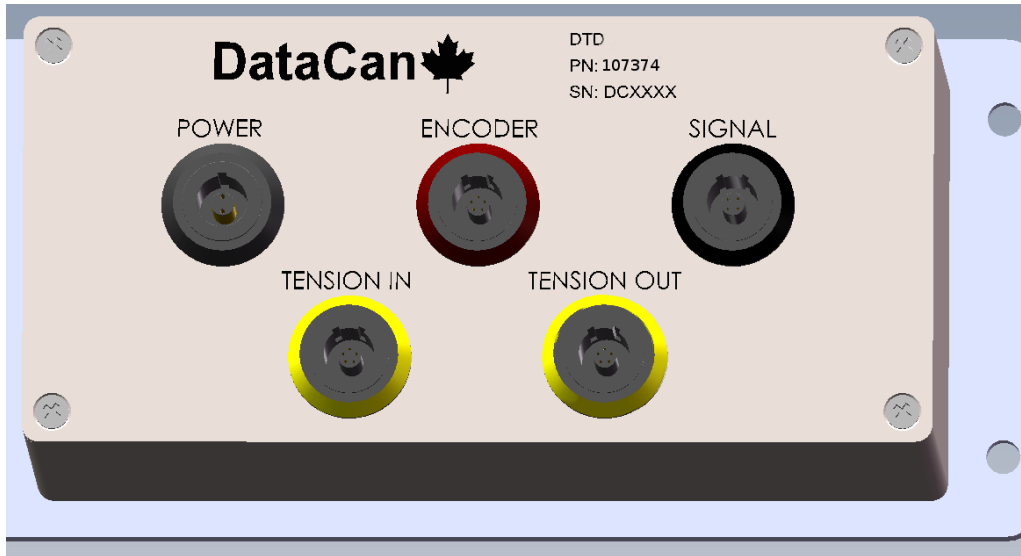


Figure 1 - Rear Panel

Part	Function
POWER	The 2-pin grey receptacle connects to a 12 volt power supply.
ENCODER	The 5-pin red encoder receptacle supplies power to the encoder and receives signals from the encoder.
SIGNAL	The black 4-pin receptacle transmits encoder signals to external systems. This connection provides signals from the DTS into another system capable of reading encoder information, such as a LineWise system.
TENSION OUT	This yellow Redel Connector provides a signal output for a 0-5V and the differential (mV) signal. The mv level signal is amplified to a 0-5VDC level.

2.4 Menu Options

Option	Specification	Value	
1	View Settings	Displays the current calibration settings. This feature will display the wheel size in the units that were entered originally, regardless of the current display units. This feature also displays the number of pulses per revolution for the encoder, the current wear factor, and the current rotation orientation of the encoder. Use the up arrow (^) to scroll through the list.	
2	Adjust Depth	Displays the current depth. To change this value: 1. Press Enter to continue with adjustment 2. Use Multi-Mode Upper to increase depth, Multi-Mode Lower to decrease depth 3. Press the “enter” button to set the depth	
3	Depth Cal	1. Wheel size	Configures the wheel size (circumference), units can be chosen as imperial or metric
		2. Encoder Pulses	Sets the number of pulses per revolution for the encoder
		3. Display Units	Defines the default units for the display, Metric or Imperial
		4. Reverse Dir	Defines which direction of encoder rotation counts up and which counts down
		5. Decimal Place	Defines how many decimal places the DTD unit will display for depth - 0, 1, or 2 decimal places
		6. Wear Factor	Defines a wear factor for the wheel.
4	Tension Cal	1. Complete Cal	Do a complete calibration of low point and high point
		2. Low Point Cal	Set and read the Low point (zero) Calibration
		3. High Pnt Cal	Read the High Calibration point
		4. Tare Weight	Set the current reading to zero – applies a shift to the calibration
		5. Reset Tare	Reset the Tare to zero

5	Depth Alarm	Enables or disables the depth alarm and defines the value for the alarm
6	Display setng	Select the information to display: Depth/Speed, Depth/Tension or Depth/Tension/Speed
7	Lock Settings	Locks the calibration settings. The unit must be unlocked before you can change settings. No password required.

3.0 Operation

3.1 Installation Requirements

The DTD unit requires a rectangular cut-out in a dash or a face plate/bracing with the following dimensions:

5.40 in x 2.57 in (137 mm x 65 mm)

Mounting of the unit also requires four #10-32 screws as shown in the technical diagram for the enclosure

The enclosure for the DTD unit requires a minimum of 4 in (10 cm) of clearance behind the back of the unit. This will allow sufficient room for you to connect cables to the back of the DTD.

NOTE: The technical diagram contains an installation template and instructions.

There will need to be a supply of 12 – 15VDC in the area where the DTD is mounted, this supply will need to supply approximately 1A of current.

3.2 Connect the Cables

1. Connect the power cable to the gray "POWER" receptacle located on the back of the DRS.
2. Connect an encoder cable between the DTD red "ENCODER" receptacle and the measuring head encoder.
3. Connect a patch cable from the black "SIGNAL" receptacle to an external system capable of reading encoder data (eg - DataCan Services' Linewise System).
4. If tension is being used, connect the cable between the load sensor or load pin and the TENSION IN connector.
 - a If a system is being used that requires a tension output, then connect that cable to the TENSION OUT connector.

3.3 Power Up the Unit

Press and hold the "POWER" button on the keypad until the display lights up.

If the unit has been calibrated previously, then the main display will appear, and will display according to the settings previously entered.

If the unit was not previously calibrated, then the unit will display the message “Press Menu to Calibrate”. The unit will display messages prompting you to enter unit values, the number of encoder pulses, and the wheel size. The option to perform a tension calibration or skip the tension calibration is also given.

3.4 Power Down the Unit

Press the “POWER” button to shut down the unit.

NOTE: The unit will proceed through its power down routine, which includes data storage and self-test routines. A beep will sound when the routine is complete. If you power up the unit before the beep sounds, this can interrupt the power down routine. If this occurs, the display screen will show “DataCan Services” and no other options will be available. Power down the unit completely, then power up normally.

3.5 Configure the DTD Unit

If the DTD Depth has been calibrated previously, then the depth, speed and/or tension main display will appear.

If the unit has not been calibrated previously, then the unit will display the message “Press Menu to Calibrate”. The unit will automatically display messages to prompt the user to enter unit values, the number of encoder pulses, and the wheel size. Once this has been done initially, the wheel size and encoder pulses must be entered separately.

The configuration of the DTD is accessed through the menu of the unit. This is accessed during normal operation by pressing the MENU key. Note that the pressing of the ENTER key will activate the option that is at the top line of the screen.

3.6 Menu System

The Menu system in the DTD is accessed by pressing the MENU key. The options can be viewed by scrolling up and down the menu list by using the Upper and Lower Multi-Mode keys. A press of the CANCEL key will exit the menu, and pressing ENTER will activate the option that is on the top line of the screen.

3.6.1 View Settings

To access the View Settings option, press the menu key, then press 1.

The View Settings option is a set of displays that the user can scroll through to view the settings of the display. Again the Multi-Mode buttons can be used to scroll the display lines to show the various options. If there is not an arrow showing beside a line of the display, then pressing that Multi-Mode key will exit the settings viewer.

The first screen of View Settings contains the Wheel size and the number of pulses entered per revolution.

The second screen displays the Wear Factor and the count direction used by the encoder.

The third screen shows the input type used by the tension measurement system and the low value in pounds-force. The low value is entered by the user during calibration. If the value is not initialized, the value will read -1. Note that if the tension input system has not been initialized the system will default to a differential input.

The fourth screen shows the low reading value as read by the ADC in Volts and the high point value as entered by the user during calibration. If the input is differential, the low reading voltage value is what is generated by the internal amplifier. If the system is set to a 4- 20mA input, the value show will be after the internal current to voltage conversion. Note that if the high point value is not initialized, the value will read -1.

The fifth screen shows the high read value as read by the ADC in Volts and the Tare value in pounds-force. The different inputs are read from the same source as the low reading value as described above.

Pressing any key other than the Multi-Mode keys at the appropriate times will exit the View Settings display.

3.6.2 Adjust Depth

To access the Adjust Depth mode, press either the Upper Multi-mode button while the display is in regular mode (displaying depth), or press Menu to access the Menu mode, then press 2.

The Adjust Menu function allows the user to adjust the depth reading of the display. This mode of adjustment is convenient for small adjustments of the depth. The depth value is adjusted up or down by presses of the Multi-mode keys to change the value up or down. The keys can also be held for 5 seconds and the rate of change of the numbers will step up to a higher rate to allow for a larger range of depth value changes.

Once the desired depth value is displayed, press Enter and the displayed value will be accepted into the main depth counter.

3.6.3 Depth Cal

To access the Depth Calibration Menu, press Menu then 3.

The Depth Calibration Menu consists of options to set the wheel size, set the pulse count per revolution of the encoder, change the display units, reverse the counter direction, set the decimal place and enter a wheel wear factor.

The wheel size as referred to in this manual is the circumference of the wheel, the effective distance the wireline will travel through the measuring head when the wheel does one complete

revolution. If the diameter is known, the circumference can be calculated by using the following formula:

$$\text{Wheel size(circumference)} = \pi * \text{Diameter}$$

3.6.3.1 Wheel Size

To access the Wheel Size setting function, press Menu, then press 3 to access the Depth Calibration Menu, then Press 1.

The user will then be prompted to select the units of measure for the wheel size or circumference (effective circumference) to be entered. The entry is next confirmed, then the user is prompted to enter the numerical value up to 4 decimal places. The user can press Enter at any point during the entering of the wheel size, and the current number will be accepted as the wheel size for the system. Entering of 4 decimal places will also automatically load the wheel size value. The wheel size entered will be displayed briefly before proceeding to the standard display as the user selected.

3.6.3.2 Encodr Pulses

To access the Encoder pulses setting function, press Menu, then press 3 to access the Depth Calibration Menu, then Press 2.

This menu screen will allow the user to enter the number of pulses generated by the encoder per revolution of the measuring wheel. The number must be whole number between 1 and 9999, ie. - a four digit number. If the maximum number digits for the pulse count is entered, the pulse count is automatically loaded. Otherwise the user can press enter to accept the value entered. The pulse count is displayed briefly before proceeding to the standard display as the user selected.

3.6.3.3 Display Units

To access the Display Units selection screen, press Menu, then press 3 to access the Depth Calibration Menu, then Press 3.

This screen allows the user to toggle between metres and feet as the display units on the main display. These units can be changed without needing to alter any other settings such as the wheel size.

The display will prompt the user to select either metres or feet using the Multi-mode buttons. If the user selects the same units are currently displayed, the message "No Unit Changed" will briefly appear, and if the units are changed the message "Current Units" and display of the selected unit will show and then the display will change to the standard display as the user selected.

3.6.3.4 Reverse Dir

To access the Count direction selection screen, press Menu, then press 3 to access the Depth Calibration Menu, then Press 4.

This screen allows the user to reverse the counts in the case that the counter is showing depth increasing when the wireline is travelling out of the well. This setting will simply toggle between a normal count direction and a reversed count based on the current setting and whether the user pressed Enter at the prompt to enable the change. The change is confirmed on the display before the standard readout is display as per the user selection.

3.6.3.5 Decimal Place

To access the Decimal Place selection screen, press Menu, then press 3 to access the Depth Calibration Menu, then Press 5.

The decimal place selection menu allows the user to select how many decimal places are displayed. They can display none, one or two decimal places. The message “Decimal Places: Enter 0, 1, or 2” appears at the selection menu, then the desired value can be selected using the numerical keys. The selection will be verified on the display before the standard readout is activated.

3.6.3.6 Wear Factor

To access the Wear factor setting screen, press Menu, then press 3 to access the Depth Calibration Menu, then Press 6.

The wear factor is used when the reading of the depth value is known to be consistently incorrect by approximately the same amount. This is usually caused by wear of the measuring wheel through usage over time.

3.6.3.6.1 Calculation

To correct for wear, the correct factor must be calculated. this correction can be done either with comparison of theoretical depth with measured depth, or by use of measured wheel size (actual wheel size) compared to theoretical wheel size. The calculation is as follows:

$$\text{Wear Factor} = \frac{\text{Measured Depth}}{\text{Theoretical Depth}} \quad \text{or} \quad \text{Wear Factor} = \frac{\text{Measured Wheel Size}}{\text{Theoretical Wheel Size}}$$

The user can enter a value between 0 and 1.9999. The user can press enter when they have completed entering the value, or they can enter all 4 decimal places, at which point the value entered is automatically loaded. The “Wear Entered” message appears once the wear factor is entered, and the value is displayed below it.

3.6.4 Tension Cal

To access the Tension Calibration sub-menu, press Menu, then number 4.

The tension calibration menu allows the user to perform either a complete calibration of the tension, recalibrate the lower limit or recalibrate just the upper limit. The Depth/Tension display calibration is a two-point linear calibration that is realized on the values that are read in on the analog to digital converter of the display. The current version of the display will only display in units of lbf (pounds-force). If other units are needed, please contact the DataCan Services.

The tension calibration menu contains the options to enter a Tare weight, to reset the Tare weight, to perform a complete recalibration, to enter a calibration point at the low point or the high point calibration.

3.6.4.1 Tare Weight

The Tare weight screen is accessed by pressing Menu, then pressing 4 to access the Tension Calibration sub-menu, then by pressing 1.

The Tare weight can be used to place an offset on the weight that the system displays, generally it is used to offset a zero load weight when a specific added weight is to be measured.

Once this option has been selected, the user needs to confirm the setting of the tare weight by pressing Enter, and the system will automatically add an offset to the measurement to cause the weight at the time the Tare was enabled to be shown as zero weight. When the user presses enter, the display will confirm with the message "Tare set", then return to the standard display.

3.6.4.2 Reset Tare Weight

The Reset Tare weight screen is accessed by pressing Menu, then pressing 4 to access the Tension Calibration sub-menu, then by pressing 2.

The Reset Tare weight is used to remove the offset created by using the Tare weight function on the weight that the system displays. A tare weight must have been placed on the system reading, otherwise this function will have no effect.

Once this option has been selected, the system will automatically remove any offset to the measurement added by the Tare function.

3.6.4.3 Complete Cal

The Complete Calibration process is accessed by pressing Menu, then pressing 4 to access the Tension Calibration sub-menu, then by pressing 3.

The Complete calibration process will guide the user through the needed steps to perform the complete tension calibration on the display.

NOTE: In order to complete the entire process of the calibration, the user must be able to apply the conditions of the high point of the calibration to the wireline or to the sensor, be it simulated or otherwise. This should either apply or simulate the application of the rated working tension of the wireline to the tension sensor.

Once this option has been selected, the user will need to indicate the type of tension input they will be using, either millivolt (Differential), 0-5 (single ended) or current (4-20mA). The user will need to select the input type, either 1, 2 or 3 respectively.

Once the input type has been selected, the user is prompted to enter the low point value. This value can be any number between 0 and 9999 but it must be lower than the high point calibration value. Also, note that the greater the difference between the high point value and the low point value, the calibration accuracy will be much higher.

When the low point value has been entered, then the display will prompt the user to apply the low load conditions to the input of the display. When the low load condition has been applied to the input, the user can press Enter and the display will read the input value at that time and store the value in its internal memory. The display will take four readings, spaced one second apart each, and then take the average of the four samples and use it as the value stored in its memory. During the process of sampling and averaging the values, the display will show a series of dots marking its progress. Once the low value has been read, the display will confirm this with the message "Low point read", and then the process will continue to the next step.

The next step in the process is to calibrate the high tension point value.



Be sure to operate all wireline and equipment within their rated load values to avoid causing any damage from over tension, and to avoid placing any personnel in danger from breaking equipment.

The process for calibrating the high point is the same as for the low point. To begin, the user is prompted to enter the high point value. This value can be between 0 and 65000 but it must be higher than the low point calibration value. Also, note that the greater the difference between the high point value and the low point value, the calibration accuracy will be greater.

When the high point value has been entered by the user using the keypad, then the display will confirm the value in lbf and then prompt the user to apply the high load conditions to the input of the display. The display will stay at the message "Press Enter to Read High Point" until the user presses Enter to start the reading process. When the high load condition has been applied to the input, the user can press Enter and the display will read the input value at that time and store the value in its internal memory. The display will take four readings, spaced one second apart each, and then average the four samples and use it as the value stored in its memory. During the process of sampling and averaging the values, the display will read the message "Reading High Point" and show a series of dots marking its progress. Once the high value has been read, the display will confirm this with the message "High point read", and then the process will continue to the next step.

The next step in the calibration process is to select the information that is to be displayed. The user can select between [1] Depth and Speed, [2] Depth and Tension or [3] Depth, Tension and Speed. The user can make this selection by pressing the appropriate number based on their preference. After the selection is made, the display will proceed to the main display.

3.6.4.4 Read Low Val

The Read Low Value process is accessed by pressing Menu, then pressing 4 to access the Tension Calibration sub-menu, then by pressing 4.

The process to read the low calibration value will allow the user to re-enter the low point calibration value and read its input value from the currently selected input. If this option is selected and the overall tension system has not been set up, the display will automatically perform a complete tension calibration (see Section 3.6.4.3)

To begin, the user is prompted to enter the low point value. This value can be any number between 0 and 9999 but it must be lower than the high point calibration value. When the low point value has been entered, then the display will prompt the user to apply the low load conditions to the input of the display. When the low load condition has been applied to the input, the user can press Enter and the display will read the input value at that time and store the value in its internal memory. The display will take readings for four seconds, and then take the average of the four samples and use it as the value stored in its memory. During the process of sampling and averaging the values, the display will show “Reading Low Point” and a series of dots will mark its progress. Once the low value has been read, the display will confirm this with the message “Low point read”, and then the display will continue to the main screen.

3.6.4.5 Read High Val

The Read High Value process is accessed by pressing Menu, then pressing 4 to access the Tension Calibration sub-menu, then by pressing 5.

The process to read the high calibration value will allow the user to re-enter the high point calibration value and read its input value from the currently selected input. If this option is selected and the overall tension system has not been set up, the display will automatically perform a complete tension calibration (see Section 3.6.4.3)



Since this step involves applying a maximum rated tension to the wireline, be sure to operate all wireline and equipment within their rated load values to avoid causing any damage from over tension, and to avoid placing any personnel in danger from breaking equipment.

To begin the process for calibrating the high point, the user is prompted to enter the high point value. This value can be between 0 and 65000 but it must be higher than the low point calibration value. Also, note that the greater the difference between the high point value and the low point value, the calibration accuracy will be greater.

When the high point value has been entered by the user using the keypad, then the display will confirm the value in lbf and then prompt the user to apply the high load conditions to the input of the display. The display will stay at the message “Press Enter to Read High Point” until the user presses Enter to start the reading process. When the high load condition has been applied to the input, the user can press Enter and the display will read the input value at that time and it will store the value in its internal memory. The display will read the value for four seconds, and then average the those readings and use it as the value stored in its memory. During the process of sampling and averaging the values, the display will read the message “Reading High Point” and show a series of dots marking its progress. Once the high value has been read, the display will confirm this with the message “High point read”, and then the display will continue to the main screen.

3.6.5 Depth Alarm

To access the Depth Alarm setting screen, press Menu, then number 5.

The DTD is equipped with a depth- to-surface alarm that is designed to provide warning when the tool string is approaching the surface to help avoid any collisions of the tool string with surface equipment.

If the Depth Alarm has not been set up, the user will be asked to enter the depth for the alarm. This is the depth at which the alarm will begin to sound, and the alarm will change its indicator sound the closer it gets to the surface. The maximum depth that can be entered for this alarm is 100m or 300ft. This value can be entered through the numeric keypad, after which the user can set the alarm on or turn it off.

If the depth alarm has been set up, or if the user has altered the alarm beginning depth, the first screen allows the user to select their preference to either change the alarm’s start depth or to enable or disable the alarm. The user is prompted to choose by pressing 1 to alter the depth or 2 to enable the alarm. If 2 is selected to enable the alarm, the user must press enter to confirm the activation of the alarm, and then the display will confirm the activation along with the beginning depth, and then return to the main display.

3.6.6 Display Setting

To access the Display Settings screen, press Menu, then number 6.

The Display Settings screen allows the user to select the information that is shown on their main screen. They can display depth on one line and speed or tension or speed and tension on the second line of the display.

The user can select between [1] Depth and Speed, [2] Depth and Tension or [3] Depth, Tension and Speed. The user can make this selection by pressing the appropriate number based on their preference. After the selection is made, the display will proceed to the main display.

3.6.7 Settings Lock

To access the Settings Lock screen, press Menu, then number 7.

The Settings Lock Screen allows the user to Lock the settings of the display so that they cannot be altered by accident. This is not intended to be a security system, it simply prevents accidental modification of the settings. This screen allows the user to toggle the state of the lock for the settings.

In the menu to change the lock setting, the user simply needs to press Enter at the menu prompt when sked to press enter or cancel. The system will simply toggle the state of the lock on the settings as the user presses enter at this point in the menu.

3.7 Set Function

The Set function is directly accessed from the keypad, and allows the user to directly either set the depth to zero or enter a numerical value to be loaded as the current depth.

When the Set button is pressed, the display allows the user to press the upper Multi-mode button to set the counter to zero, and the lower Multi-mode button allows the user to enter the screen that allows the entering of the value for the depth.

3.7.1 Zero

To Zero the counter, after pressing Set, press the Upper Multi-Mode button and then press Enter. The depth value will be set to zero.

3.7.2 Load Depth

To load the depth value, the user can press the Set button, and then either press the lower Multi-mode button or Enter. The display will then instruct the user that the Upper Multi-mode button will allow the user to make the value entered negative and the lower Multi-mode button will allow the user to enter a decimal place. After this, the user can enter the value of the depth using the numerical keys and then press enter when they have the correct value. The display will also automatically load the value when the correct number of decimal places has been entered. When the value is loaded, the display returns to the main display.

4.0 Input signals

The DTD can accept four kinds of signals, one type for Depth and three for Tension.

4.1 Depth signal

The depth signal is a square-wave quadrature type signal that must be between 5 and 15V in amplitude. The maximum speed that the counter can calculate depth will depend on many factors including the length of the cable to the encoder, the number of pulses generated per encoder

revolution and the type of output of the encoder. An encoder with a line-driver style of output is preferred, while an encoder with an open collector or open emitter output or an open-drain style output will require modification to the standard input circuitry. If this type of encoder is to be used with the DTD, please notify DataCan of this before ordering the display so that the necessary changes can be made.

The pinout for the depth input signal connector can be seen in Figure 3.

4.2 Tension Signals

The DTD accepts three different types of input signals, a millivolt level signal that is a differential type of signal, a 0-5V single-ended signal and a loop powered signal that varies the current draw as its signal and the range varies from 4mA to 20mA.

4.2.1 Millivolt Signal

This input signal is expected to be in the range of 0-50 mV and is amplified internally before it is sampled by the DTD. This type of signal is expected from a strain bridge type of sensor, and it is by default powered by an internal 5V reference. If a higher voltage level supply is needed, contact DataCan at the time of ordering. The pinout of the input connector is shown in Figure 3 below.

4.2.2 0-5V Signal

This input signal is expected to be in the range of 0-5V and is directly sampled by the DTD. This type of signal is expected from a powered type of sensor, and it is by default powered by an internal 5V regulator. If a higher voltage level supply is needed, contact DataCan at the time of ordering. The pinout of the input connector is shown in Figure 3 below.

4.2.3 4-20mA Signal

This input signal is expected to be in the range of 4-20 mA and is converted to a voltage signal before it is sampled by the DTD. This type of signal is expected from a loop powered type of sensor, and it is expected to be powered by an external power supply. If this external supply is needed, or a 4-20 mA type signal input is needed, notify DataCan at the time of ordering. The DTD input is a loop-ending type of input for the current loop of the sensor, there is no output signal provided for this type of input. The pinout of the input connector is shown in Figure 3 below.

NOTE: In order to enable the 4-20mA input, the jumper P3 on the internal circuit board must be set. This can be found on the circuit board as shown in the image below.

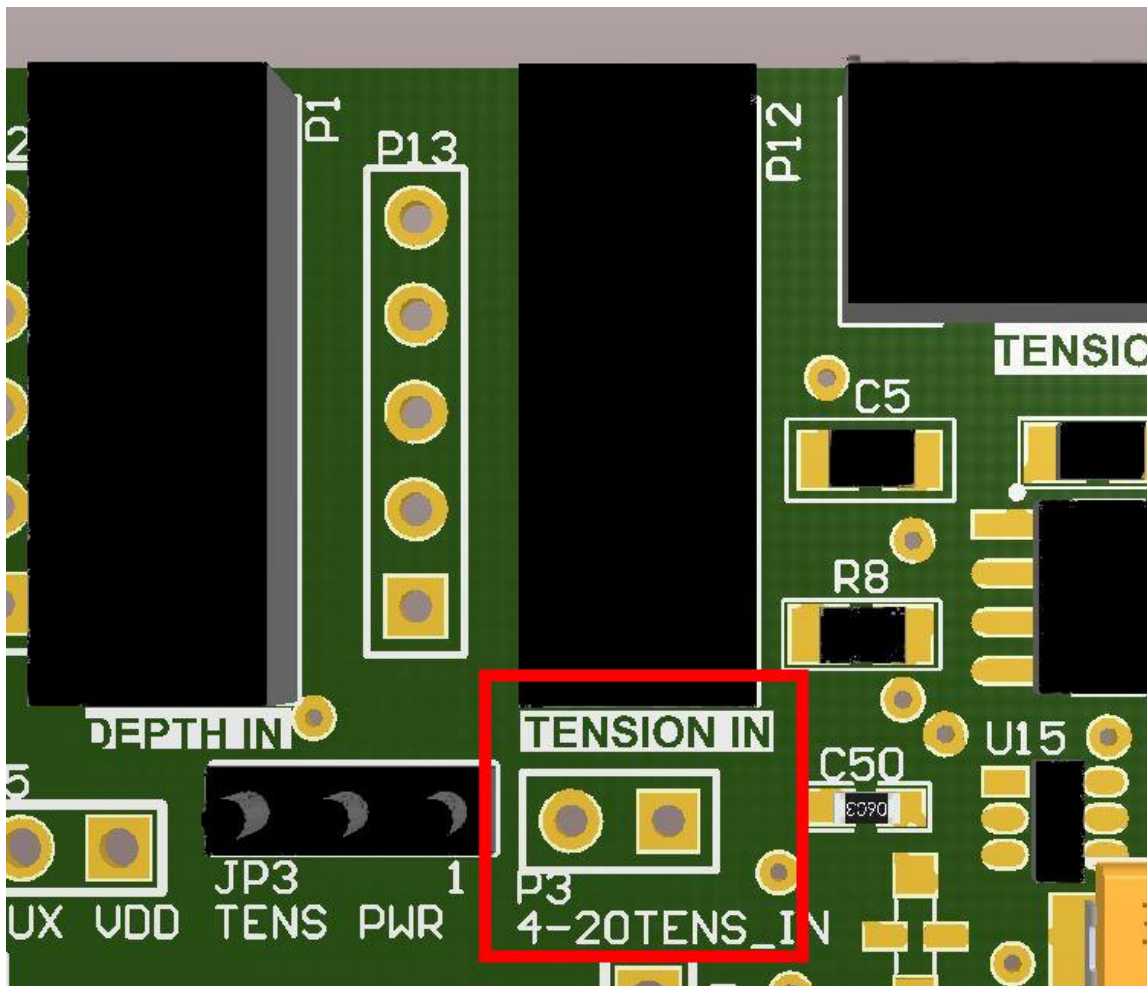


Figure 2 - Tension 4-20mA Jumper

5.0 Output Signals

5.1 Depth signal

The depth signal is split directly from the input signal provided to the DTD. The output signal, however, will not provide any connection to the power provided to the encoder. The pinout for the depth output signal connector can be seen in Figure 4.

5.2 Tension Signals

The DTD provides two types of output signal, a 0-5V single-ended signal and a 4-20mA signal. The source for the 0-5V signal can be either the incoming 0-5V signal that is simply buffered and sent to the output, or the signal could also be amplified from the millivolt level signal and then buffered and provided to the output. The source of the 4-20mA signal is set to be the differential input signal, if the 0-5V signal is needed to be the source, please contact DataCan Services. The pinout of the Tension output connector can be seen below in Figure 3.

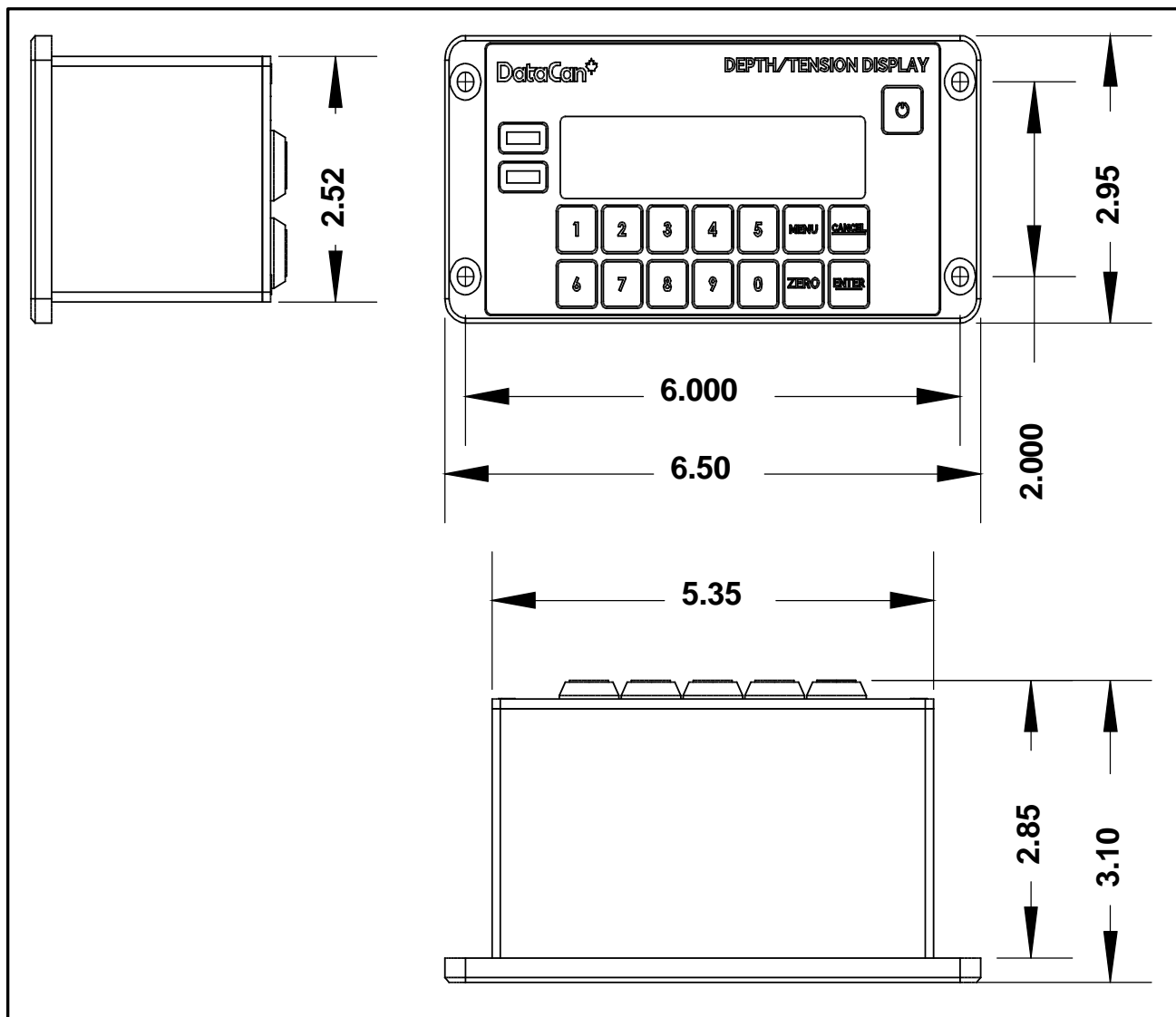


Figure 3 - DTD Enclosure and mounting Dimensions

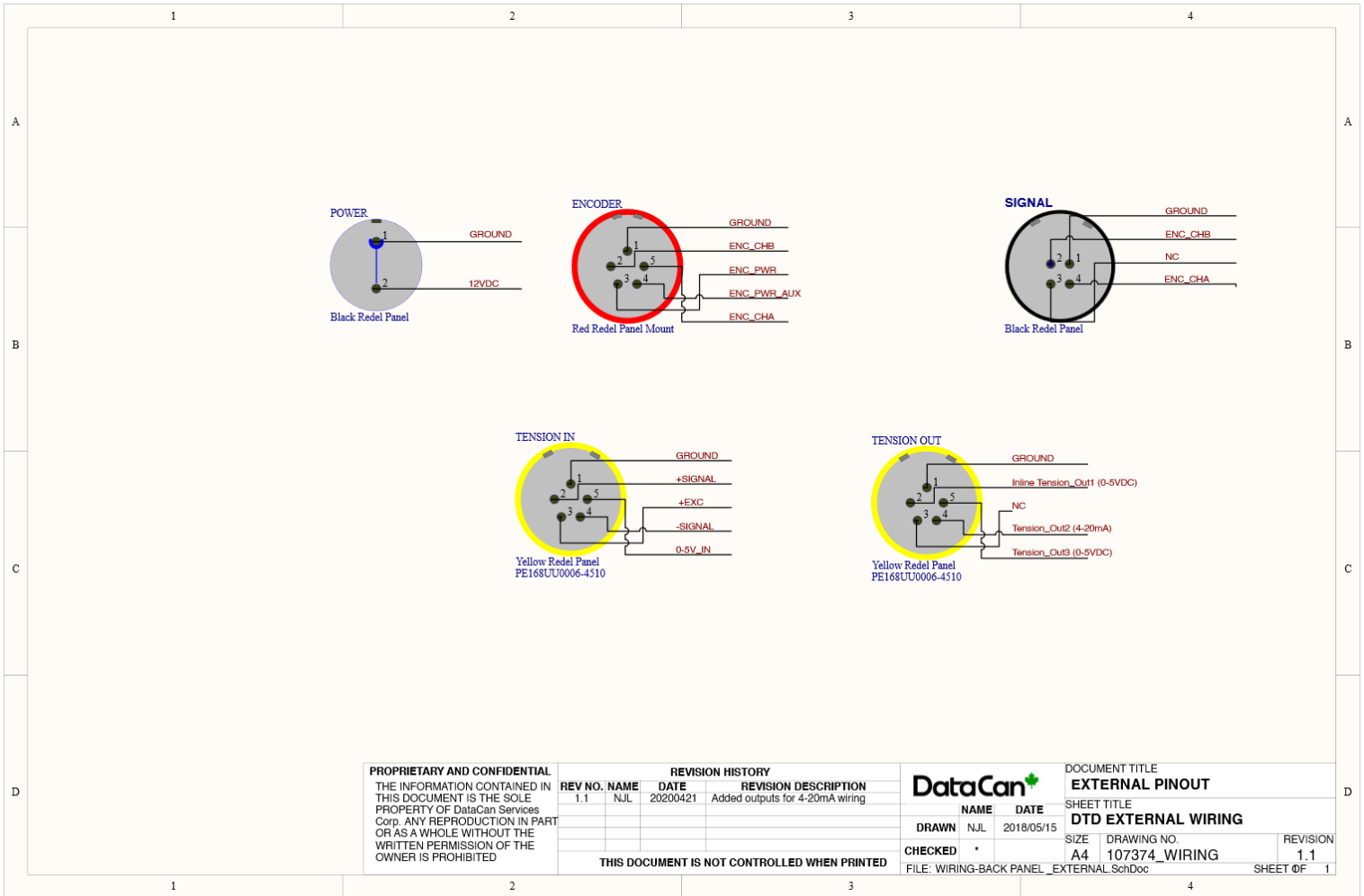


Figure 4 - EXTERNAL PINOUT