

# ***DCS Series***

## ***Digital Counting Scale***

### Setup Manual

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***Transcell Technology inc.***

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# Table of Contents

Introduction .....	1
Installation and Wiring .....	1
Configuration .....	2
Setup Menu Descriptions .....	3
Calibration.....	5
Specifications .....	9
Determining Proper Span Gain .....	10

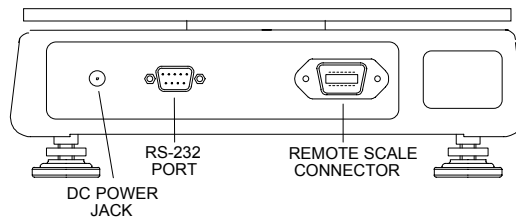
## Introduction

This document is provided for persons who wish to configure a remote platform for use with the DCS Series Dual Channel Counting Scale. The scale is setup basically like a digital indicator, allowing the number of graduations and other

parameters to be programmed and supplying enough current for up to 4-350Ω load cells. All setup parameters may be entered via the front panel keys, including calibration.

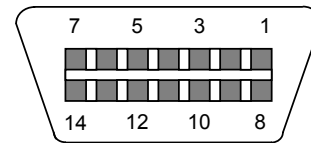
## Installation and Wiring

The DCS's back panel comes equipped with a male DSUB-9 connector for the RS-232 serial port, a female input jack for DC power, and a female 14-pin Centronics type connector for input of the 4-wire load cell or junction box cable. A 15' shielded cable pre-wired to a male type 14-pin connector is included with the unit to ease installation or you may wire your own.



Shown at right are the pin assignments for the female 14-pin load cell connector. Please wire cable to both pins listed to ensure proper operation.

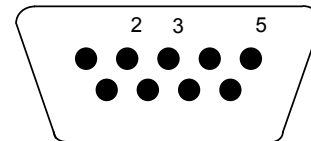
Pin Nos.	Pin Name
1/8	+Excitation
3/10	-Excitation
5/12	+Signal
7/14	-Signal



14-pin load cell connector (female)

Shown at right are the pin assignments for the female 9-pin RS-232 connector.

Pin No.	Pin Name
2	Receive Data
3	Transmit Data
5	Signal Ground



9-pin RS-232 connector (male)

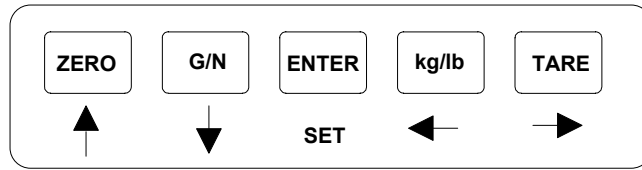
# Configuration

The DCS includes a menu which allows the second channel to be configured to any size and capacity remote platform with up to four 350Ω load cells. This menu consists of 16 separate menu selections, each with its own sub-menu of choices.

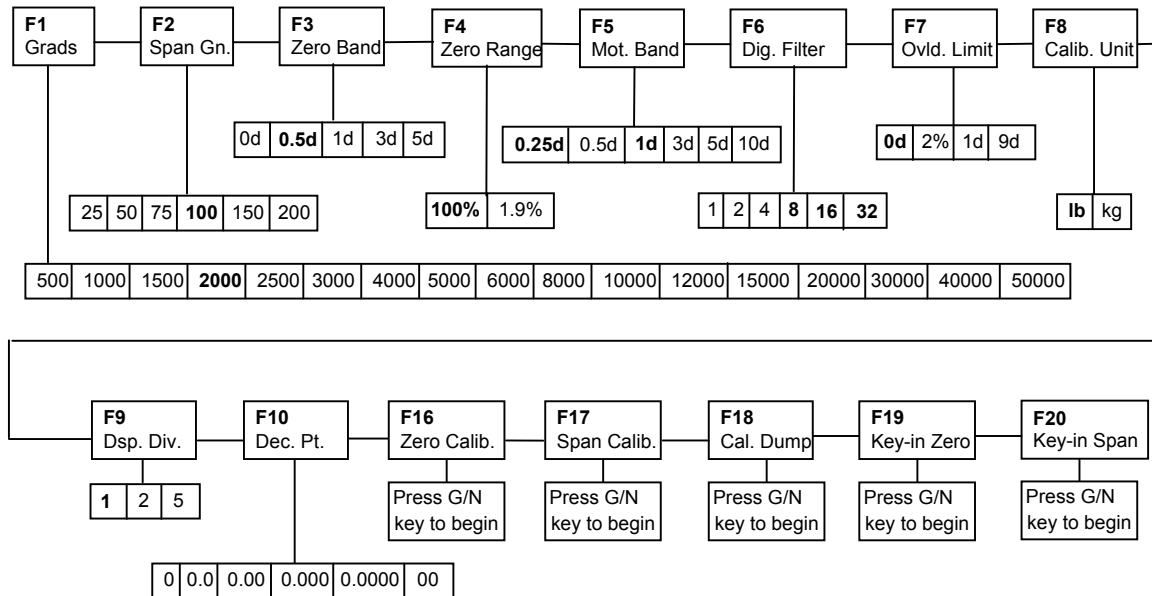
To set up the remote scale, you must first enter the setup menu mode. Once there, four of the front panel keys become directional navigators to move around in the menus, and one key is used to save or SET the selections. Complete directions start below.

### To place the unit in Setup menu mode:

1. Turn off the scale.
2. While turning the scale back on, press and hold the **F** key.
3. When the display shows "F1", the unit is in Setup menu mode, and you may release the **F** key. Shown at right are the directional and SET key assignments.



## SETUP MENU CHART



### Notes on SETUP MENU CHART:

1. Each A/D channel (local and remote) has its own set of "F" parameters. To toggle between channels, press the **LOCAL/REMOTE** key at any time.
2. Functions **F11** to **F15** are reserved for future use and do not appear when toggling from **F10** to **F16**.
3. There is also a selection **F21** (not shown) which allows exiting from the Setup Mode.
4. Detailed descriptions of the menu parameters begin on the next page of this manual.

## Setup Menu Descriptions

<b>F1</b> Graduations	Specifies number of full scale graduations. Value should be consistent with legal requirements and environmental limits on the useful system resolution.	500 1,000 1,500 2,000 2,500 3,000 4,000 5,000 6,000 8,000 10,000 12,000 15,000 20,000 30,000 40,000 50,000
<b>F2</b> Span Gain	Span Gain is related to A/D integration time. The larger the span gain, the higher the external resolution, but the slower the update speed. See Appendix C for more information.	25 50 75 100 150 200
<b>F3</b> Zero Track Band	Selects the range within which the scale will automatically zero. Note that the scale must be in standstill to automatically zero. Selections are in Display Divisions.	0d 0.5d 1d 3d 5d
<b>F4</b> Zero Range	Selects the range within which the scale may be zeroed. Note that the indicator must be in standstill to zero the scale.	100% 1.9%
<b>F5</b> Motion Band	Sets the level at which motion is detected by comparing the present display update with the previous one. If motion is not detected for two seconds or more, scale is in standstill and can process a Print or Zero command. Maximum value varies depending on local regulations.	0.25d 0.5d 1d.....3d 5d.....10d
<b>F6</b> Digital Filter	Averages weight readings to produce higher accuracy. The higher the filter number, the greater the accuracy but the slower the response time. Choose 4 or 8 unless a very fast response is needed.	1 2 4 8 16 32
<b>F7</b> Overload Limit	Selects the desired formula which determines the point at which the indicator shows overload ("□□□□"). All selections are based on the primary unit selected in F8.  "FS" = Full scale in primary units.	FS FS + 2% FS + 1d FS + 9d
<b>F8</b> Calib. Unit	Selects the primary base unit to be used in the calibration process. Also the default unit for normal operation. "1" = primary unit is lb. "2" = primary unit is in kg.	1 2
<b>F9</b> Display Divisions	Determines the desired weight increments. Value should be consistent with legal requirements.	1 2 5
<b>F10</b> Decimal Pt.	Determines location of the decimal point.	0 0.0 0.00 0.000 0.0000 00
<b>F16</b> Zero Calibration	Places indicator into the zero calibration routine. Scrolling down with the <b>G/N</b> key one level begins the procedure.	Press <b>G/N</b> key to begin sequence

## Setup Menu Descriptions / Continued

NAME / CODE	DESCRIPTION	CODE / VALUE
<b>F17</b> Span Calibration	Places indicator into the span calibration routine. Scrolling down with the <b>G/N</b> key one level begins the procedure.	Press <b>G/N</b> key to begin sequence
<b>F18</b> Dump Calibration	Actuates the function which allows user to view both the zero and span calibration value. The values displayed in this function are valid only after Calibration (F16 & F17) has been successfully completed. Scrolling down with the <b>G/N</b> key one level begins the procedure.	Press <b>G/N</b> key to begin sequence
<b>F19</b> Key-in Zero	Allows user to key-in known zero calibration value in case of memory loss in the field. Scrolling down with the <b>G/N</b> key one level begins the procedure.	Press <b>G/N</b> key to begin sequence
<b>F20</b> Key-in Span	Allows user to key-in known span calibration value in case of memory loss in the field. Scrolling down with the <b>G/N</b> key one level begins the procedure.	Press <b>G/N</b> key to begin sequence
<b>F21</b> Exit Setup Mode	Allows user to exit Setup Mode and enter Normal Operating Mode. Scrolling down with the <b>G/N</b> key one level exits Setup Mode.	Press <b>G/N</b> key to exit

## Calibration

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Both channels are calibrated by following the procedures embedded in F16 (Zero) and F17 (Span) of the Setup Menu. Each procedure enters a value into the indicator's non-volatile memory; F16 the **zero** value (deadweight) and F17 the **span** value (test weight). The minimum test weight that can be used is 10% of full scale capacity. After the two calibration procedures are executed successfully, the user should record

both calibration values, which can be viewed by entering the F18 "dump" procedure.

In the unlikely event that either value is lost while in the field, the setup menu makes provisions for re-entering these values via F19 and F20, thus eliminating the need for re-calibration with test weights.

### To calibrate the zero point using the F16 zero calibration procedure:

1. If the unit is not in the Setup mode, enter the Setup mode as follows: Turn the power off to the unit. Press and hold the **F** key while turning the scale back on. When "**F 1**" shows on the display, the scale is in Setup mode, and you may release the **F** key. Allow a 20 minute warm-up period for the load cell(s) and indicator to become thermally stable.
2. Select the desired input channel (local or remote) by pressing the **LOCAL/REMOTE** key.
3. While in the Setup mode, scroll to "**F 16**", then scroll down once using the **G/N** key to enter zero calibration menu.
4. The display will momentarily show "**C 0**" followed by a value. After making sure that there are no test weights on the platform, press **ZERO** to zero the value.
5. Press the **ENTER** key to save the zero point value.
6. The display will show "**EndC0**" momentarily, then revert back up to F16. At this time, proceed to the F17 span calibration to complete scale calibration.

## Calibration / Continued

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### To calibrate the span using the F17 span calibration procedure:

1. While in the Setup mode, scroll to "**F 17**", then scroll down once using the **G/N** key to enter span calibration menu.
2. Select the desired input channel (local or remote) by pressing the **LOCAL/REMOTE** key.
3. The display will prompt for the span calibration value. Place the test weight on the platform.
4. Key-in the calibration test weight using the numeric and decimal point keys. You do not need to enter a decimal point if the test weight value is in whole units.
5. After setting the exact value, press the **ENTER** key to save the value.
6. If the calibration was successful, the display will show "**EndC1**" momentarily, then revert back up to F17. At this time it is suggested that the calibration values be recorded for future use (see next page).
7. If the calibration was *not* successful, one of the error messages below will appear. Take the indicated action to correct the problem, then perform a new calibration.

**"Err0"** - The calibration test weight or the adjusted keyed-in weight is larger than the full capacity of the scale. Change the calibration test weight or check the input data.

**"Err1"** - The calibration test weight or the adjust keyed-in weight is smaller than 10% of the full capacity of the scale. Change the calibration test weight or check the input data.

**"Err2"** - The internal resolution of the scale is not high enough to accept the calibration value. Select a larger parameter for the Span Gain (F2).



## Calibration / Continued

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### To record the calibration values using the F18 Dump Procedure:

**Note:** The values displayed in this procedure are valid only after a successful calibration has been performed using F16 and F17.

1. If the unit is not in the Setup mode, enter the Setup mode as follows: Turn the power off to the unit. Press and hold down the **F** key while turning the scale back on, until "**F 1**" shows on the display.
2. Select the desired input channel (local or remote) by pressing the **LOCAL/REMOTE** key.
3. While in the Setup mode, scroll to "**F 18**", then scroll down once using the **G/N** key to enter dump calibration menu.
4. The display will momentarily show "**CAL 0**" followed by a value. This value is the **zero calibration value** and should be recorded in the table below. Press any key to continue.
5. The display will momentarily show "**CAL 1**" followed by another value. This value is the **span calibration value** and should also be recorded in the table below. Press any key to return to upper level (F18).

DCS SCALE	ZERO CALIBRATION VALUE	SPAN CALIBRATION VALUE
S/N:		

*DCS Calibration Value Table*

### To key-in the zero calibration value using the F19 Key-in Procedure:

**Note:** This procedure is intended for emergency use only in the case of non-volatile memory loss. A valid zero calibration value, obtained from a successful F16 calibration procedure, must be used.

1. If the unit is not in the Setup mode, enter the Setup mode as follows: Turn the power off to the unit. Press and hold down the **F** key while turning the scale back on, until "**F 1**" shows on the display.
2. Select the desired input channel (local or remote) by pressing the **LOCAL/REMOTE** key.
3. While in the Setup mode, scroll to "**F 19**", then scroll down once using the **G/N** key.
4. The scale will prompt for the zero calibration count. Key-in the zero calibration count using the numeric keys.
5. After setting the exact value, press the **ENTER** key to save the value.
6. The display will show "**E CAL 0**" momentarily, then revert back up to F19.

## Calibration / Continued

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### To key-in the span calibration value using the F20 Key-in Procedure:

**Note:** This procedure is intended for emergency use only in the case of non-volatile memory loss. A valid span calibration value, obtained from a successful F17 calibration procedure, must be used.

1. If the unit is not in the Setup mode, enter the Setup mode as follows: Turn the power off to the unit. Press and hold down the **F** key while turning the scale back on, until "**F 1**" shows on the display.
2. Select the desired input channel (local or remote) by pressing the **LOCAL/REMOTE** key.
3. While in the Setup mode, scroll to "**F 20**", then scroll down once using the **G/N** key.
4. The scale will prompt for the span calibration count. Key-in the span calibration count using the numeric keys.
5. After setting the exact value, press the **ENTER** key to save the value.
6. The display will show "**E CAL 1**" momentarily, then revert back up to F20.

### To place the unit back into the Normal Operating mode:

1. Turn off the scale Turn the scale back on without holding down any keys.
2. The display will go through a digit check, then settle into Normal Operating mode.
3. All front panel keys will now return to their normal mode of operation.

# Specifications

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## ***ANALOG SPECIFICATIONS***

Full Scale Input Signal	30mV, including dead load
Input Impedance	30M $\Omega$ , typical
Internal Resolution	Approximately 260,000 counts
Display Resolution	50,000 dd
Measurement Rate	10 Meas/sec, nominal
System Linearity	Within 0.02% of FS
Calibration Method	Software Calibration, with long term storage in EEPROM
Excitation Voltage	+10VDC, 4 x 350 $\Omega$ load cells

## ***DIGITAL SPECIFICATIONS***

Microcomputer	Intel 80C32
	Program Memory: 32K x 8, external to $\mu$ C
	EEPROM: 64 x 16, external to $\mu$ C
Digital Filtering	Software selectable

## ***SERIAL COMMUNICATIONS***

Serial Port	Full Duplex, 1200, 2400, 4800, 9600 Baud
	8 data bits, no parity
	7 data bits, odd parity
	7 data bits, even parity

## ***OPERATOR INTERFACE***

Display	Dual Row 20 character, alphanumeric VFD
Keyboard	28-key flat membrane panel

## ***POWER***

AC Adapter	12 VDC @ 500mA
Power Consumption	300mA, with 4 x 350 $\Omega$ Load Cells

## ***ENVIRONMENTAL***

Operating Temperature	0° to +40° C
Storage Temperature	-25° to +70° C

## Determining Proper Span Gain

The Span Gain parameter specified in F2 of the Setup Menu is directly related to the A/D integration time. Therefore, the lower the number, the higher the measurements per second. Disregarding digital filter length, a span gain of **25** produces about 20 to 25 measurements per second, while a span gain of **200** produces only about 3 or 4 measurements per second.

There are two steps to determining the proper

span gain value to use in the Setup Menu for F2. The first involves looking up a value in the table below, saving that value, then calibrating the system.

If the first step does not yield a successful calibration, then the second step allows the technician to view the actual internal count to determine the proper value for the span gain and check the system for linearity.

### **To determine the initial value for span gain in the setup menu:**

1. Determine the number of desired external graduations and choose the corresponding value under the number closest to your full scale input range in millivolts.
2. Enter the Setup Menu and save this number for the Span Gain parameter in F2.
3. Perform a complete calibration. If the calibration proves unsuccessful, or you wish to view the internal count, proceed to the next set of instructions.

### **To view the internal count during the calibration procedure:**

1. Enter the zero calibration menu (F16) and follow steps 1 to 3, **but do not save the zero point**.
2. After pressing **ZERO** to zero the offset, you may place the test weight(s) on the weighing mechanism.
3. The displayed count is the internal count. At full scale, the displayed count should be a minimum of 2 times the desired external graduations. However, for maximum stability, a factor of 5:1 or higher is recommended.
4. If the displayed count is large enough, remove the test weight(s), re-zero the indicator if necessary, and proceed with the calibration. If the displayed number is *not* large enough, increase the Span Gain to the next highest choice in the Setup Menu and re-calibrate.

# of External Grads	Full Scale Input Range (mV/V)							
	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00
500	25	25	25	25	25	25	25	25
1000	50	25	25	25	25	25	25	25
1500	50	25	25	25	25	25	25	25
2000	75	50	25	25	25	25	25	25
2500	100	50	50	25	25	25	25	25
3000	100	50	50	25	25	25	25	25
4000	150	75	50	50	25	25	25	25
5000	200	100	75	50	50	50	25	25
6000	200	100	75	50	50	50	50	25
8000	–	150	100	75	50	50	50	50
10000	–	200	150	100	75	75	50	50
12000	–	200	150	100	75	75	75	50
15000	–	200	150	100	75	75	75	50

*Recommended Minimum (5:1) Span Gain Table*