



DLCA NET-ECAT

User Manual



EN

MI 850A365 1 A

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1.0 Introduction

1.1 About these operating instructions

All of the information herein is the exclusive proprietary property of Maxcess International, and is disclosed with the understanding that it will be retained in confidence and will neither be duplicated nor copied in whole or in part nor be used for any purpose other than for which disclosed.

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Periodically there will be updates to this manual. The latest version is available on our website or by calling your regional office listed on the back page of this publication.

These digital load cell amplifiers must not be installed or used in a machine or system which does not comply with the machinery directive 2006/42/EC.

These digital load cell amplifiers were designed and manufactured to be installed as Partly Completed Machinery into a machine or partly completed machine.

The instructions must be read and used by all persons who have the responsibility of installing and maintaining this digital load cell amplifier.

These instructions must be retained and incorporated in the technical documentation for the machine or partly completed machinery into which the digital load cell amplifier is installed.

CE marking

This digital load cell amplifier is marked with the CE sign according to the EMC directive 2004/108/EC.

Conventions used in this manual

All dimensions and specifications are shown in the format mm [inches] unless specified otherwise.

Language

These are the original instructions, written in English.

1.2 Product overview

The DLCA NET-ECAT is a DIN rail-mounted digital load cell amplifier that provides excitation voltage for load cells, measures the returned force signal, and then converts this signal into a digital value that represents tension and analog output signals.

The digital tension value is available in the fieldbus data on EtherCAT. Configuration and calibration is available through the fieldbus interface.

There are two models of the DLCA NET-ECAT, one senses tension in one tension zone and the other senses tension in two tension zones. Each one has two sensor inputs. Each sensor input can have up to two load cells attached.

DLCA NET1-ECAT reads load cells from one tension zone

- Channel 1 reads a single load cell or a tension-sensing roller.
- Channels 1 and 2 read two separate load cells, respectively, in a single tension zone. This would typically be the left and right load cells.
- Tension values are sent from the load cells for the left and right inputs. Two additional values are sent on the communications interface; they are the sum and difference of the left and right inputs (channels 1 and 2).

DLCA NET2-ECAT reads load cells from two tension zones

- Channel 1 reads load cell(s) in one tension zone — one or two load cells or a single tension-sensing roller per zone.
- Channel 2 reads load cell(s) in a second tension zone — one or two load cells or a single tension-sensing roller per zone.
- Tension values are sent from the load cells for each tension zone. The sum and difference values sent on the communications interface are set to zero.

Product overview continued

The DLCA NET-ECAT has three alarm outputs. Two of the alarm outputs can be configured to sense tension limits on either of the two sensor inputs, or the total tension for the one tension zone amplifier. The third alarm output is on when there are no load cell wiring problems detected or power faults. This is essentially a 'power good' indicator.

The DLCA NET-ECAT has up to four analog outputs available that are proportional to maximum tension.

For the one tension zone amplifier, three of the outputs are both 0 to 10 V and 0 to 20 mA. The fourth output is a 0 to 1 mA meter output.

For the two tension zone amplifier, two of the outputs are both 0 to 10 V and 0 to 20 mA, and there are two 0 to 1 mA meter outputs.

The DLCA NET-ECAT has two digital inputs that allow remote zeroing of the tension reading in each tension zone. There is also a front panel "zero" button [Ø], which allows zeroing of the tension zone currently being displayed.

Load cell diagnostics run during power-up and provide information about load cell wiring problems.

The DLCA NET-ECAT has a web server interface to allow configuration and calibration from a web browser.

1.2.1 Additional tools

Two software tools can be downloaded and installed for use with the DLCA NET-ECAT:

The **DLCA NET Data Logger** software provides an easy way to record tension data on your computer without complicated programming.

The **Terminal Tool** software backs up your DLCA NET settings, which you can then upload after a reset or replacement.

The manuals for these tools are available at www.maxcessintl.com.

1.3 Model number

The model number and the serial number are shown on the enclosure. The model number consists of the base model **DLCA NET** followed by the numeral 1 or 2 to denote number of tension zones the product will read, followed by "ECAT".

Available models

DLCA NET1-ECAT - One tension zone amplifier

DLCA NET2-ECAT - Two tension zone amplifier

1.4 Serial number

Serial Number format is MMDDYYNNNL

MM = month

DD = day

YY = last two digits of the year

NNN = a sequence number

L = manufacturing location

2.0 Safety

2.1 Instructions for use

To ensure safe and problem free installation of the digital load cell amplifier, the digital load cell amplifier must be properly transported and stored, professionally installed and placed in operation. Proper operation and maintenance will ensure a long service life of the device. Only persons who are acquainted with the installation, commissioning, operation and maintenance of the system and who possess the necessary qualifications for their activities may work on the digital load cell amplifier.

Note: The safety information may not be comprehensive.

Please note the following:

- The content of these operating instructions
- Any safety instructions on the device
- The machine manufacturer's specifications
- All national, state, and local requirements for installation, accident prevention and environmental protection

2.2 Symbols used

The following safety identification symbols are used in these operating instructions.



WARNING/CAUTION – General danger or important note
Reference to general hazards that may result in bodily injuries or damage to device or material.



WARNING/CAUTION – Danger due to crushing
Reference to danger of injury caused by crushing.



WARNING/CAUTION – Danger due to cutting
Reference to danger of injury caused by cutting.



WARNING/CAUTION – Danger due to voltage, electric shock
Reference to danger of injury caused by electric shock due to voltage.



WARNING/CAUTION – Danger due to hot surfaces
Reference to risk of injury caused by burning.

2.3 Basic safety information

Proper use

The DLCA NET-ECAT load cell amplifier is intended to be used on machines or systems to amplify the signal from MAGPOWR or competitor load cells.

For indoor operation, see environmental specifications on page 69.

Improper use

- Operation outside the technical specifications
- Operation in an Ex-area or intrinsically safe area.
- Outdoor operation.
- Any other use than the proper use shall be deemed inappropriate.

Installation and commissioning

- Any digital load cell amplifier which is damaged must not be installed or put into operation.
- Only perform installation, maintenance or repair tasks on the digital load cell amplifier when the machine into which the DLCA NET-ECAT is installed has been stopped and is secured from being turned on.
- Only perform installation, maintenance or repair tasks on the digital load cell amplifier when there is no electrical power in the system.
- The digital load cell amplifier must be securely mounted before being placed in operation.
- Only replacement parts obtained from Maxcess may be used.
- No modifications may be made to the digital load cell amplifier.
- Do not place electrical cables under mechanical strain.



WARNING – Death or injury can result from static electric shocks.

Moving webs of material can produce large static voltage potentials. Protect against electric shocks by installing a conductive connection between the terminal marked with the PE symbol TB1.3 and the PE circuit of the building or machine.

SAFETY INSTRUCTIONS

Basic safety information continued



WARNING – Death or injury can result from unexpected movement of the machine into which the DLCA NET-ECAT is installed.

Protect against unexpected movement by removing electrical power from the digital load cell amplifier and the machine into which the digital load cell amplifier is being installed.

Operation

None, as tasks from the operator are generally not required.

Maintenance and repair



WARNING – Death or injury can result from unexpected movement of the machine into which the DLCA NET-ECAT is installed.

Protect against unexpected movement by removing electrical power from the digital load cell amplifier and the machine into which the digital load cell amplifier is installed.



WARNING – Danger of injury from crushing.

Maintenance and repair tasks on the digital load cell amplifier must be performed only when the machine into which the DLCA NET-ECAT has been installed has been stopped and has been secured from being turned on again.

Decommissioning

The digital load cell amplifier must be disposed of in accordance with all the applicable national, state and local regulations.

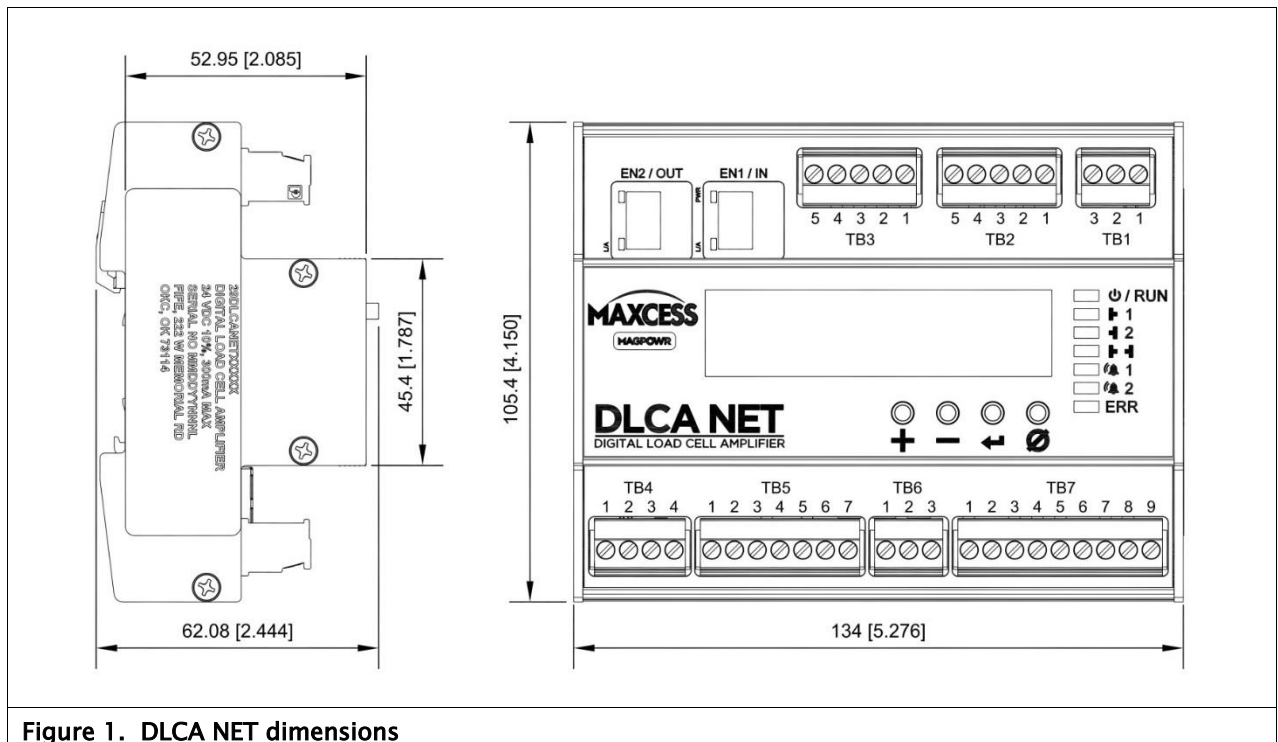
3.0 Installation



Use shielded cable for all cables except for power cable.

3.1 Mechanical

1. Mount the DLCA NET to a 35 mm DIN rail.
See Figure 1 for DLCA NET dimensions.



3.2 Electrical

1. Connect a 24 VDC $\pm 10\%$ power supply to TB1.1 (+24V) and TB1.2 (COM).
2. Connect the PE of the building or machine to terminal TB1.3 (PE).
Note: The negative power connection TB1.2 is internally connected to the PE connection TB1.3. This connection is used for EMC compliance.
3. Connect one or two load cells to each sensor input on TB2 and TB3.
4. Connect the Ethernet ports into a fieldbus network or computer.
5. Connect analog outputs, if desired.

3.3 Wiring diagrams

Figures 2 and 3: DLCA NET wiring connections using MAGPOWR load cells

Figure 4: Connecting non-MAGPOWR load cells

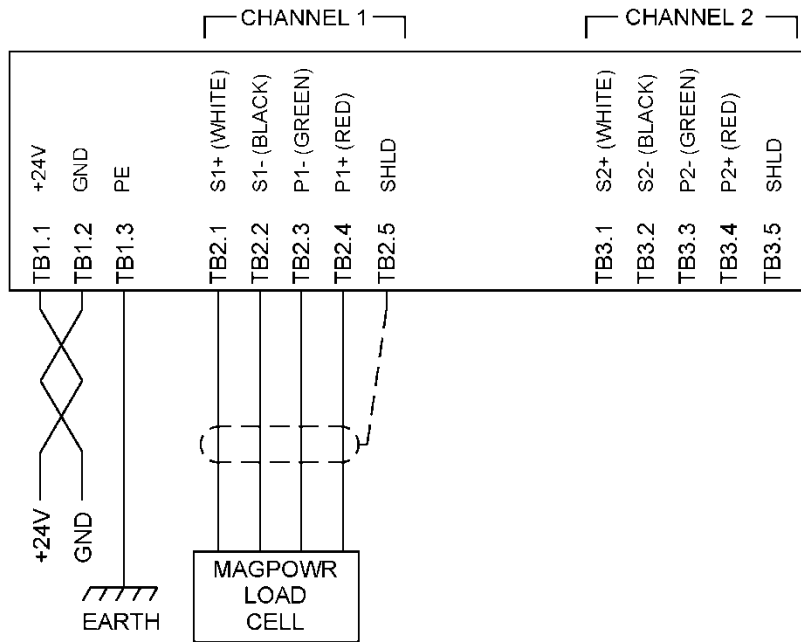
TB2 is Channel 1 or Tension Zone 1 input.

TB3 is Channel 2 or Tension Zone 2 input.

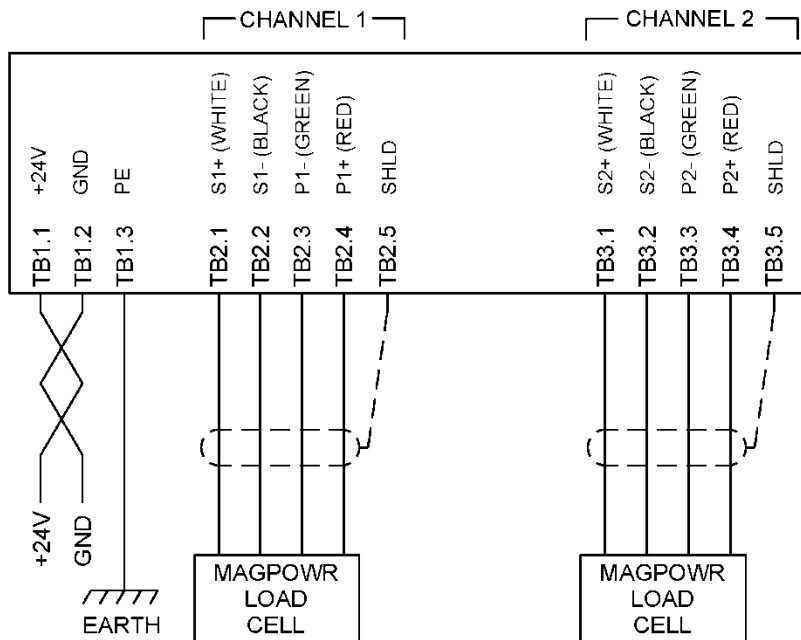
P1+ and P2+	Positive excitation
P1- and P2-	Negative excitation
S1+ and S2+	Positive signal
S1- and S2-	Negative signal

INSTALLATION

3.3.1 DLCA NET1 wiring using MAGPOWER load cells



DLCA NET1
one load cell or
tension-sensing roller
from one tension zone

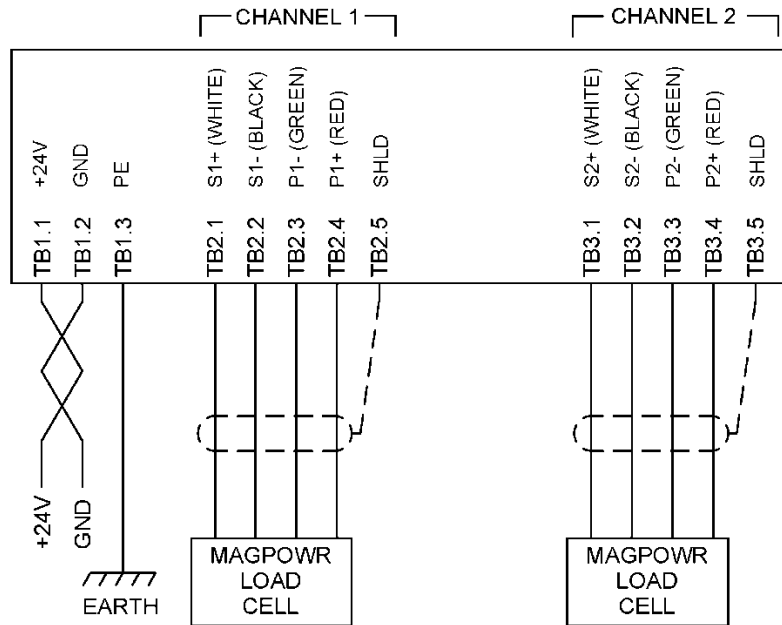


DLCA NET1
one or two load cells
from one tension zone

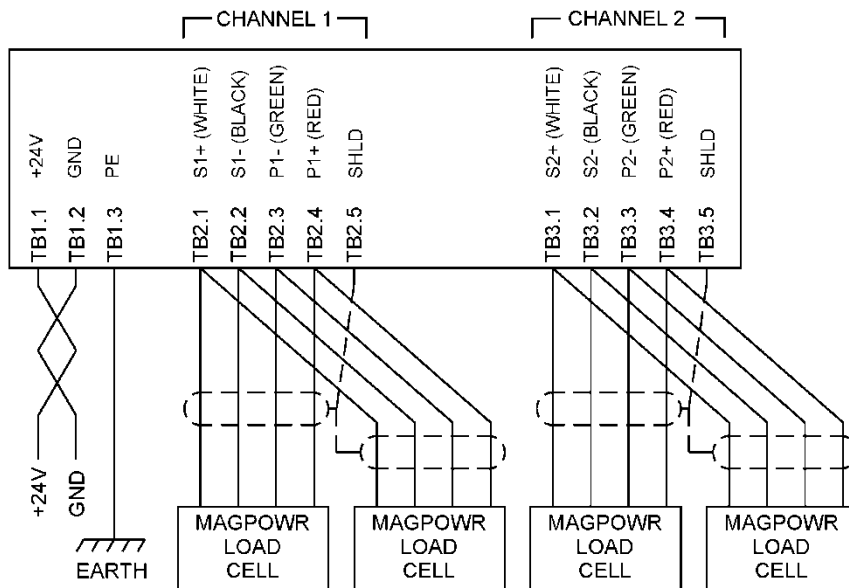
Figure 2. DLCA NET1 wiring using MAGPOWER load cells

INSTALLATION

3.3.2 DLCA NET2 wiring using MAGPOWR load cells



DLCA NET2
two tension zones,
one load cell from each zone

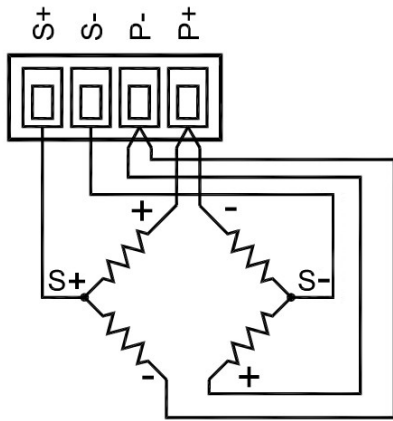


DLCA NET2
two tension zones,
one or two load cells
from each zone

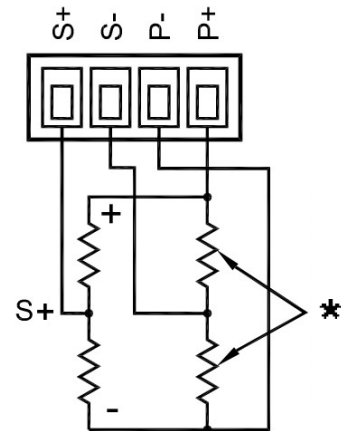
Figure 3. DLCA NET2 wiring using MAGPOWR load cells

3.3.3 Non-MAGPOWR load cell wiring

Two Half Bridge
500 mV Load Cells



One Half Bridge
500 mV Load Cells



* Precision bridge completion resistors; contact load cell manufacturer for values.

Figure 4. Non-MAGPOWR load cell wiring

3.4 Analog output and digital input connections

DLCA NET1–ECAT: One tension zone amplifier

Output 1 is channel 1. (TB7.1, TB7.2, and TB7.3)

Output 2 is channel 2. (TB7.4, TB7.5, and TB7.6)

Output 3 is the sum of channel 1 and channel 2. (TB7.7, TB7.8, and TB7.6)

The meter output is the sum tension signal. (TB6.1 and TB6.2)

Digital Input 1 will zero the tension. (TB4.2 and TB4.3)

DLCA NET2–ECAT: Two tension zone amplifier

Output 1 is Tension Zone 1. (TB7.1, TB7.2, and TB7.3)

Output 2 is Tension Zone 2. (TB7.4, TB7.5, and TB7.6)

The meter output is for Tension Zone 1. (TB6.1 and TB6.2)

The second meter output is for Tension Zone 2. (TB7.8 and TB7.6).

Digital input 1 will zero the tension in zone 1. (TB4.2 and TB4.3)

Digital input 2 will zero the tension in zone 2. (TB4.1 and TB4.3).

The digital inputs are active high. There is a parameter to set the voltage threshold for the digital inputs to either 5V or 24V logic. Alarm output 3 is used for the power good signal.

See Figures 5, 6, and 7.

INSTALLATION

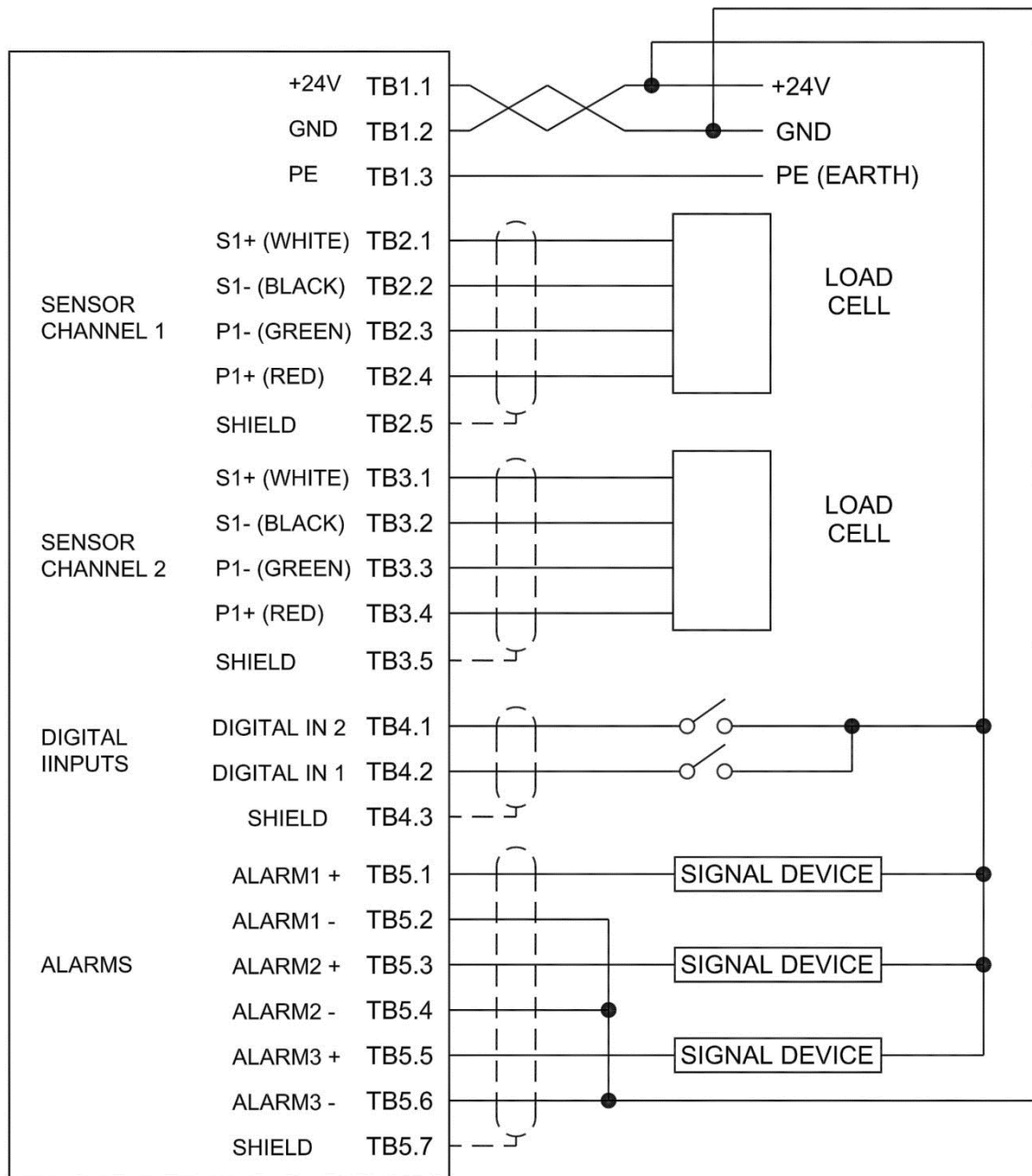


Figure 5. DLCA NET-ECAT common wiring

INSTALLATION

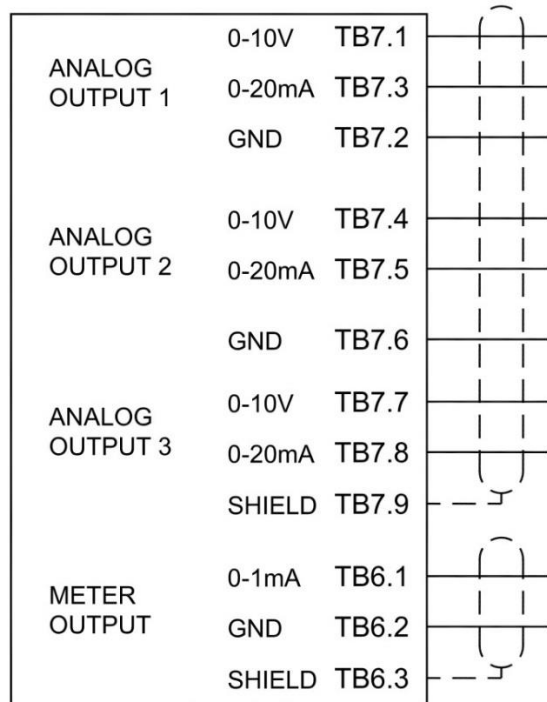


Figure 6. DLCA NET1-ECAT one tension zone analog outputs wiring

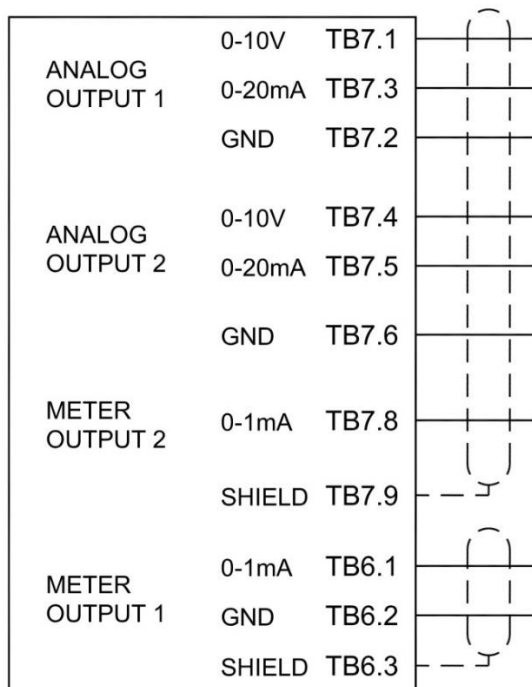
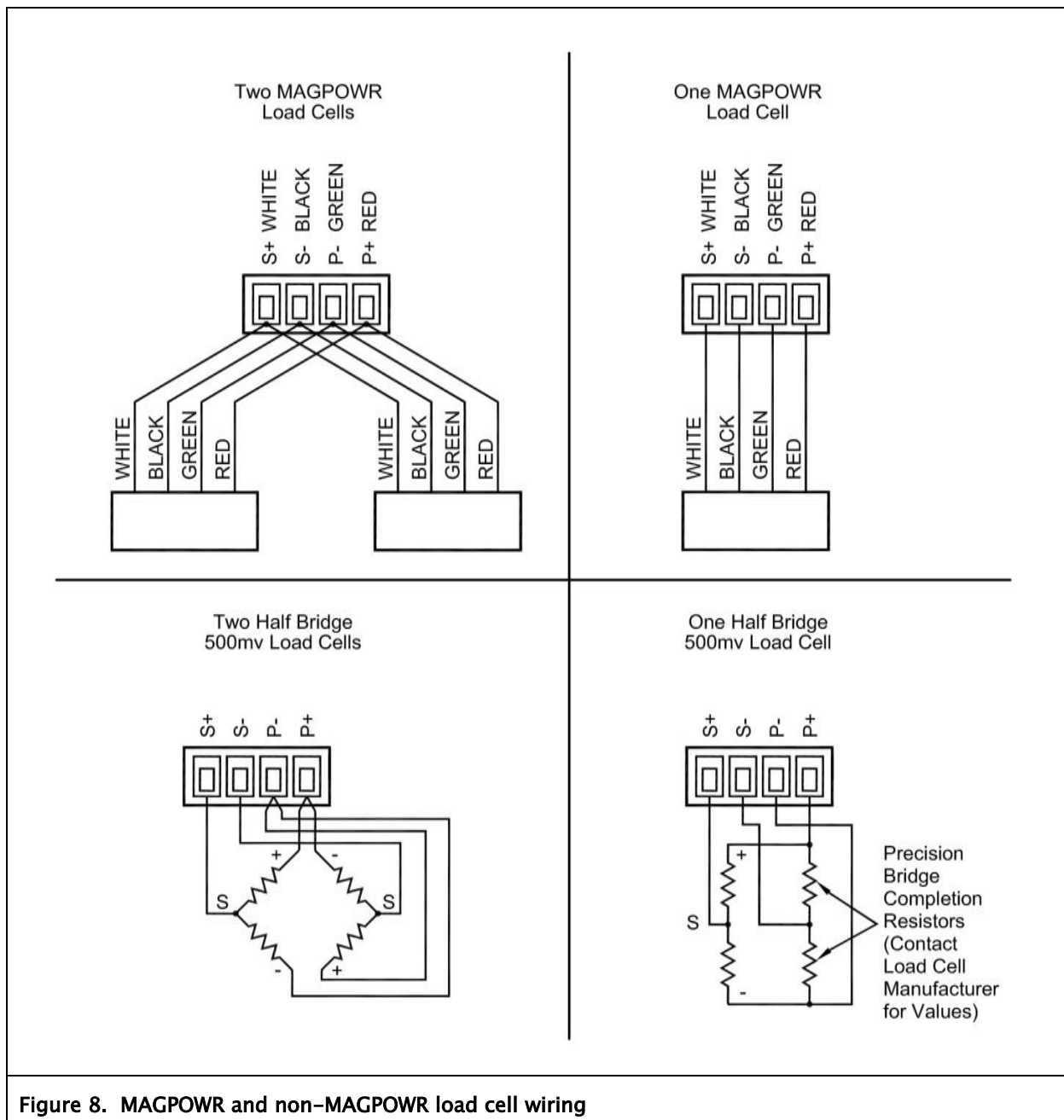
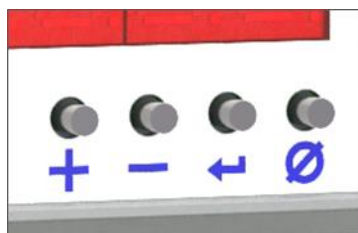


Figure 7. DLCA NET2-ECAT two tension zone analog outputs wiring



4.0 Operation

There are four control buttons on the DLCA NET.



[+] = increment

[-] = decrement

[↵] = enter or save function*

[Ø] = zero the displayed tension
(the zero button)

* For clarity, these instructions use the word [ENTER] instead of the symbol [↵].

Power On

The DLCA NET-ECAT will display the software version number when power is first applied for five seconds and then the DLCA NET-ECAT will start displaying the tension. During the software version display, diagnostics are performed on the load cells and any errors are displayed.

The load cell diagnostic errors are shown in Table 1.

To exit from the load cell diagnostic error:

- Press [Enter] and the tension will be displayed.
- The error display will be canceled after 45 seconds and then tension will be displayed.
- If no errors are detected, the tension will be displayed.

Display	Meaning	
	Sensor 1	Sensor 2
Er 1	Sensor 1 White (S+) or Black (S-) wire disconnected.	Good
Er 2	Sensor 1 Red (P+) wire disconnected.	Good
Er 3	Sensor 1 Green (P-) wire disconnected.	Good
Er 4	Sensor 1 Failure or other wiring error. Example: Green and White wire are swapped, etc.	Good
Er 8	Good	Sensor 2 White (S+) or Black (S-) wire disconnected.
Er 9	Sensor 1 White (S+) or Black (S-) wire disconnected.	Sensor 2 White (S+) or Black (S-) wire disconnected.
Er 10	Sensor 1 Red (P+) wire disconnected.	Sensor 2 White (S+) or Black (S-) wire disconnected.
Er 11	Sensor 1 Green (P-) wire disconnected.	Sensor 2 White (S+) or Black (S-) wire disconnected.

OPERATION

Er 12	Sensor 1 Failure or other wiring error. Example: Green and White wire are swapped, etc.	Sensor 2 White (S+) or Black (S-) wire disconnected.
Er 16	Good	Sensor 2 Red (P+) wire disconnected.
Er 17	Sensor 1 White (S+) or Black (S-) wire disconnected.	Sensor 2 Red (P+) wire disconnected.
Er 18	Sensor 1 Red (P+) wire disconnected.	Sensor 2 Red (P+) wire disconnected.
Er 19	Sensor 1 Green (P-) wire disconnected.	Sensor 2 Red (P+) wire disconnected.
Er 20	Sensor 1 Failure or other wiring error. Example: Green and White wire are swapped, etc.	Sensor 2 Red (P+) wire disconnected.
Er 24	Good	Sensor 2 Green (P-) wire disconnected.
Er 25	Sensor 1 White (S+) or Black (S-) wire disconnected.	Sensor 2 Green (P-) wire disconnected.
Er 26	Sensor 1 Red (P+) wire disconnected.	Sensor 2 Green (P-) wire disconnected.
Er 27	Sensor 1 Green (P-) wire disconnected.	Sensor 2 Green (P-) wire disconnected.
Er 28	Sensor 1 Failure or other wiring error. Example: Green and White wire are swapped, etc.	Sensor 2 Green (P-) wire disconnected.
Er 32	Good	Sensor 2 Failure or other wiring error. Example: Green and White wire are swapped.
Er 33	Sensor 1 White (S+) or Black (S-) wire disconnected.	Sensor 2 Failure or other wiring error. Example: Green and White wire are swapped.
Er 34	Sensor 1 Red (P+) wire disconnected.	Sensor 2 Failure or other wiring error. Example: Green and White wire are swapped.
Er 35	Sensor 1 Green (P-) wire disconnected.	Sensor 2 Failure or other wiring error. Example: Green and White wire are swapped.
Er 36	Sensor 1 Failure or other wiring error. Example: Green and White wire are swapped.	Sensor 2 Failure or other wiring error. Example: Green and White wire are swapped.

Table 1. Load cell diagnostic errors

4.1 Zeroing tension display

While displaying tension, press the [Ø] button for two seconds to zero the tension in the tension zone being displayed. The outputs will also be zeroed.

Connecting the digital input 1 or 2 (zero) to either +5V or +24V for greater than 500 ms will zero the displayed tension and output for the respective tension zone.

This function will work only when the following conditions are met:

- When displaying tension and not in the parameter menu
- When not in calibration mode via either the menu or the communications
- If zeroing has not been locked out when a password has locked the DLCA NET-ECAT.

4.2 Reset parameters to defaults

Press and hold [+] and [Ø] while turning power on to the DLCA NET-ECAT. The display will show "dEF" for four seconds while all the parameters are reset to defaults.

This does not reset the analog output calibration parameters in menus CAL0.1, CAL0.2, CAL0.3 or CAL0.4. These parameters are calibrated at the factory for the component tolerances on each board. The password and security status is not changed.

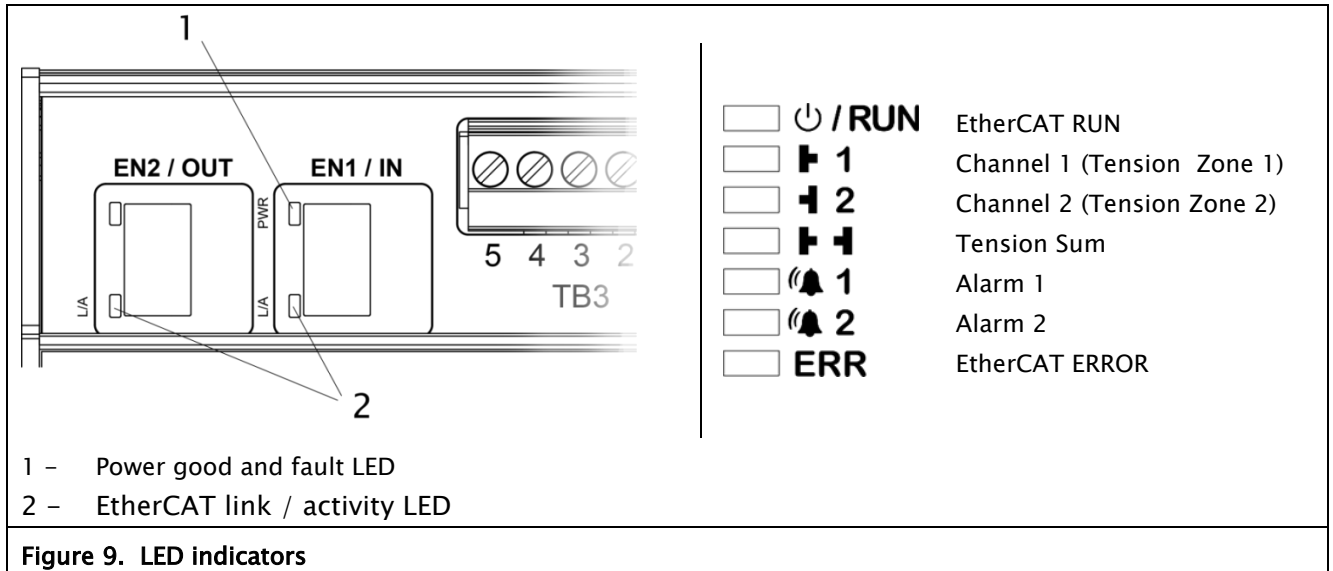
4.3 Tension over-range

The tension reading display will flash when the displayed tension exceeds the maximum tension set in parameter C11.3, C12.5, C21.3, or C22.5.

4.4 Password protection

The DLCA NET-ECAT allows a password to be set that will prevent changes to the parameters or performing a calibration. When locked, all parameters can be viewed. Only zeroing tension is allowed while the password has locked the DLCA NET-ECAT, unless zeroing has been locked out by parameter P.01.

4.5 LED indicators



Power Good (Yellow)

The Power Good status indicator shows power good or a fault. If power is good and no faults then the power good LED is ON. If there is a fault detected then the power LED is flashing. One flash per second indicates a load cell check error. Two flashes per second indicates there is a voltage error on either the load cell excitation, internal 12V or internal 5V supplies. The load cell check only runs during power-up. The voltage monitoring check runs continuously.

Tension display (Green)

The LEDs indicate which channel or sum is being displayed. While displaying tension, press [Enter] to cycle the display through the channels.

- For one tension zone, the display cycles through Channel 1, Channel 2, and Tension Sum.
- For two tension zones, the display switches between Channels 1 and 2 (Tension Zones 1 and 2, respectively).

Alarms (Red)

There are two alarm indicators showing whether each alarm is active or not.

EtherCAT Error (Red)

This indicator shows the EtherCAT error status.

EtherCAT Run (Green)

This indicator shows the EtherCAT run status.

4.6 Which sensor inputs used

Set this parameter before performing any tension calibrations.

The DLCA NET-ECAT needs to know which sensor channels are being used in order to prevent showing load cell check errors if a channel is not being used. This selection is also used during tension calibrations. The selections are 'Channel 1 only' or 'both channels' used. Use parameter P.04 to make the selection.

4.7 Load cell excitation voltage

The load cell excitation voltage can be either 5V or 7.5V.

MAGPOWR load cells use 7.5V.

5V or 7.5V can be used for competitors' non-MAGPOWR load cells. Use parameter P.03 to select voltage before performing any tension calibrations.

4.8 Programming mode

Enter the programming menu

Press and hold [+] and [-] for two seconds.

Exit the programming menu

Press and hold [+] and [-] for two seconds from a menu item other than the load cell calibrations menu items.

Also: while showing parameter P.17, you may press [Enter] to exit the menu and return to displaying the tension.

Parameter number

While in the programming mode, the display shows P.xx, where xx is the parameter number. There are also calibration and setup menus that have sub-menus. (See the menu flowchart; Appendix A.)

Press [+] or [-] to increment or decrement the parameter number to step through the main menu loop. Press [Enter] to enter the data entry mode for a parameter or to enter a sub-menu.

Use [+] or [-] to change the value of a parameter. The digit being edited will flash. Use [Ø] to change which digit position is being edited. Press [Enter] and release to cancel the data change and return to the menu. Press [Enter] and hold for two seconds (until the display starts flashing) to save the changed parameter. If the data has been changed and the data has not been saved, after five seconds of no button activity the display will flash indicating the data needs to be saved.

The sub-menus are used to step the operator through the calibration sequence or to access a group of parameters. Press [Enter] when a menu other than P.xx menu is showing to get into the sub-menu. The CALx menu automatically steps through each parameter and calibration function. The other sub-menus do not auto-step. When a sub-menu item is showing, use [+] or [-] to get to the other sub-menu parameters.

When in the programming mode and no buttons have been pressed for two minutes, the DLCA NET-ECAT exits the programming mode and returns to displaying tension. This menu time-out is not active once any of the calibration loops have been entered.

5.0 Calibrate tension using menu

See section 9.0 to perform calibrations from the communication interface.

The DLCA NET-ECAT has two modes of calibration: Precision and Weightless. Precision calibration is used when applying a known weight with a rope in the web path to the load cells for calibration. Typically, this known weight should be 10% of the load cell rating or greater. Weightless calibration is used when a known weight is not convenient or desired.

Calibration menus

Tension zone	Calibration mode	Use menu
1	Precision	CAL1.1
1	Weightless	CAL1.2
2	Precision	CAL2.1
2	Weightless	CAL2.2

5.1 Precision calibration

When editing a number, the digit being edited will flash. Use the [Ø] button to select the digit to edit. Use the [+] and [-] buttons to increment or decrement the digit number.

Enter the programming mode by pressing and holding [+] and [-] for two seconds.

Use [+] and/or [-] to go to parameter P.02.

Press [Enter] to see the present load cell excitation voltage.

Select 7.5V if using MAGPOWR load cells.

Select either 5V or 7.5V if using non-MAGPOWR load cells

Press and hold [Enter] for two seconds (until the display starts flashing) to store the changes.

Use [+] and/or [-] to go to parameter P.04. Press [Enter] to see which load cell sensor inputs are being used. Select either 'Channel 1 only' or 'both' sensor inputs used. Press and hold [Enter] for two seconds (until the display starts flashing) to store the changes.

CALIBRATE TENSION USING MENU

Precision calibration continued

Use [+] and/or [-] to go to CAL1.1 or CAL2.1. Press [Enter] to enter the sub-menu.

Display now shows C11.1 or C21.1. Unload the load cells roller and press [Enter]. The DLCA NET-ECAT will now zero out the idler roll weight and show a wait display. After zeroing, the DLCA NET-ECAT will automatically increment to the next parameter.

Display now shows C11.2 or C21.2. Press [Enter] and select the decimal point position for tension. Press and hold [Enter] for two seconds (until the display starts flashing) to store the decimal point position. Range {000000, 000000., 00000.0, 0000.00, 000.000, 00.0000, 0.00000}.

Display now shows C11.3 or C21.3. Press [Enter] and enter the maximum tension. Press and hold [Enter] for two seconds (until the display starts flashing) to store the parameter. This value scales the output. The output will be at 10 volts or 20 mA when the measured tension matches this value. The maximum output voltage or current is set by the sub-menus OP1, OP2, OP3, and OP4.

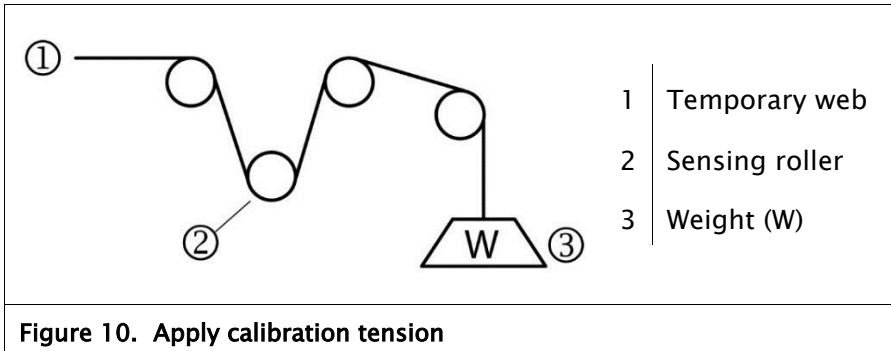
Display now shows C11.4 or C21.4. Press [Enter] and enter the calibration tension that will be applied to the load cell roller. Press and hold [Enter] for two seconds (until the display starts flashing) to store the parameter. Range {0, 999000}.

Precision calibration continued

Display now shows C11.5 or C21.5. Apply the calibration load to the load cell roller using a temporary web or rope and a known weight entered in C11.4 or C21.4. The temporary web should follow the normal web path. When using a rope, the rope should be centered on the roller (Figure 10).

Press [Enter] to start calibration. The display will show a wait screen, and then display PASS for successful calibration or an error code to indicate an issue with the calibration. Press [Enter] to return to tension display.

See the calibration errors in Table 2.



5.2 Weightless calibration

When editing a number, the digit being edited will flash. Use the [Ø] button to select the digit to edit. Use the [+] and [-] buttons to increment or decrement the digit number.

Enter the programming mode by pressing and holding [+] and [-] for two seconds.

Use [+] and/or [-] to go to parameter P.02. Press [Enter] to see the present load cell excitation voltage.

Press [Enter] to see the present load cell excitation voltage.

Select 7.5V if using MAGPOWR load cells.

Select either 5V or 7.5V if using non-MAGPOWR load cells

Press and hold [Enter] for two seconds (until the display starts flashing) to store the changes.

Use [+] and/or [-] to go to CAL1.2 or CAL2.2. Press [Enter] to enter the sub-menu.

Display now shows C12.1 or C22.2. Unload the load cell roller and press [Enter]. The DLCA NET-ECAT will now zero out the idler roll weight and show a wait display. After zeroing, the DLCA NET-ECAT will automatically increment to the next parameter.

Display now shows C12.2 or C22.2. Press [Enter] and select the decimal point position for tension. Press and hold [Enter] for two seconds (until the display starts flashing) to store the decimal point position. Range {000000, 000000., 00000.0, 0000.00, 000.000, 00.0000, 0.00000}.

Display now shows C12.3 or C22.3. Press [Enter] and enter the load cell sensitivity in 0.1 mV/V units. MAGPOWR load cells have a sensitivity of 2.1 mV/V. (Consult the manual of competitor's load cell if using non-MAGPOWR load cells.) Press and hold [Enter] for two seconds (until the display starts flashing) to store the parameter. Range {000.1, 100.0}.

CALIBRATE TENSION USING MENU

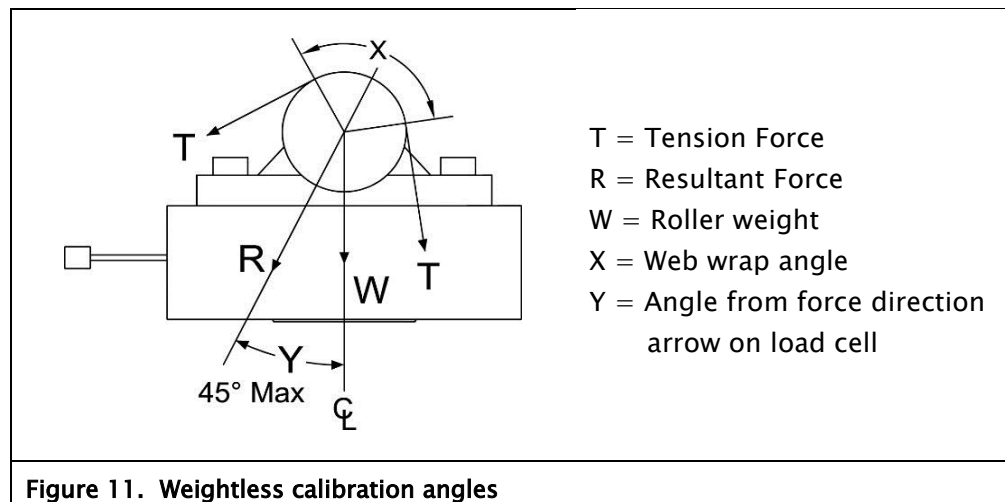
Weightless calibration continued

Display now shows C12.4 or C22.4. Press [Enter] and enter the combined load cell rating. Press and hold [Enter] for two seconds (until the display starts flashing) to store the parameter. Range {0, 999000}.

Display now shows C12.5 or C22.5. Press [Enter] and enter the maximum tension. Press and hold [Enter] for two seconds (until the display starts flashing) to store the parameter. This value scales the output. The output will be at 10V or 20 mA when the measured tension matches this value. The maximum output voltage or current is set by the sub-menus OP1, OP2, OP3, and OP4.

Display now shows C12.6 or C22.6. Press [Enter] and enter the web wrap angle in 0.1 degree units. This is the angle over which the web touches the idler roller. Press and hold [Enter] for two seconds (until the display starts flashing) to store the parameter. Refer to Figure 11 for the wrap angle "X". Range {0, 180.0}.

Display now shows C12.7 or C22.7. Press [Enter] and enter the angle from the force direction arrow or center line in 0.1 degree units. This is the angle between the resultant force from the web tension and the force direction arrow of the load cell or centerline of the load cell. The maximum value is 45 degrees. Press and hold [Enter] for two seconds (until the display starts flashing) to store the parameter. Refer to Figure 11 for the angle from force direction "Y". Range {0, 45.0}.



CALIBRATE TENSION USING MENU

Weightless calibration continued

Display now shows C12.8 or C22.8. Press [Enter] to start the weightless calibration. The display will show a wait screen, and then display PASS for a successful calibration or an error code to indicate an issue with the calibration. Press [Enter] to return to displaying tension.

See the calibration errors in Table 2.

If the display tension reads negative when force is applied to the load cell, change parameter P.06 or P.08 (Tension Polarity) to -1. The displayed tension will now read positive when force is applied.

Display	Error description and solution
PASS	Calibration was successful. No Errors found.
Er 1	Signal read by the amplifier is too large when maximum tension is applied. This is caused by maximum tension being too large. Reduce maximum tension.
Er 2	Signal read by the amplifier is too small. Too little of the load cell range is being used, thus the gain is greater than 32:1. Use more of the load cell range or set maximum tension higher.
Er 3	Roller weight too large. Roller weight exceeds 90% of the load cell rating. Make roller weight smaller.
Er 4	Calibration tension is greater than maximum tension. Make maximum tension larger than calibration tension.
Er 5	Maximum tension exceeds the load cell rating. Lower wrap angle, make roll weight smaller, get higher rated load cells, or lower maximum tension.
Table 2. Calibration errors	

6.0 Entering maximum tension

The following are examples of displaying tension that results from the value entered for maximum tension and the selection of the decimal point position. The DLCA NET-ECAT displays tension with three significant digits.

Example 1

Using two GTSD-15000M load cells:

- The rated load is 30000 kg.
- The application's maximum tension is 15000 kg.
- Enter decimal point position as **000.0**.
- Enter Maximum tension as 15.0.
- The DLCA NET-ECAT now displays tension with units of 1000 kg.
- The display will increment in 100 kg steps.

Same application but desired units are Newtons:

- The load cell's rated load is 294 kN.
- The application's maximum tension is 147 kN.
- Enter decimal point position as **0000**.
- Enter Maximum tension as 147.
- The DLCA NET-ECAT now displays tension with units of 1 kN.
- The display will increment in 1 kN steps.

Same application but desired units are Pounds:

- The load cell's rated load is 66.1 kPounds.
- The application's maximum tension is 33.0 kPounds.
- Enter decimal point position as **000.0**.
- Enter maximum tension as 33.0.
- The DLCA NET-ECAT will now display tension with units of 1 kPound.
- The display will increment in 0.1 kPound steps.

Continued next page

Entering maximum tension continued

Example 2

Using two GTSB-2200 load cells:

- The rated load is 4400 lbs.
- The application's maximum tension is 2000 lbs.
- Enter decimal point position as **00.00**.
- Enter Maximum tension as 2.00.
- The DLCA NET-ECAT now displays tension with units of 1000 lbs.
- The display will increment in 10 lb steps.

Alternatively:

- Enter decimal point position as **0000**.
- Enter maximum tension as 2000.
- The DLCA NET-ECAT will now display tension with units of 1 lbs.
- The display will increment in 10 lb steps.
- Note that the right-most zero is fixed and does not change.

7.0 Parameters

This section describes the parameters available in the DLCA NET-ECAT.

7.1 Filtering

The tension display and the analog outputs have a separate low pass filter. The communication tension values can use either the tension display filter or have no filtering.

The tension display filter response can be set from 500 Hz to 0.01 Hz.

The analog output filter response can be set from 100 Hz to 0.01Hz.

The filters are a second order low pass filter for frequencies from 0.01 Hz to 124.99 Hz.

Above 125 Hz, an average of samples is used for the filter, as defined in this table.

Frequency (Hz)	averages used
125.00 to 166.66	Four samples
166.67 to 249.99	Three samples
250.00 to 499.99	Two samples
500.00	There is no filter; current sample data is used

Parameter	Description	Units	Default	Range
Fd.1	Tension 1 display filter frequency	0.01 Hz	3.00	{00.01, 500.00}
Fd.2	Tension 2 display filter frequency	0.01 Hz	3.00	{00.01, 500.00}
FO.1	Output 1 filter frequency	0.01 Hz	40.00	{00.01, 100.00}
FO.2	Output 2 filter frequency	0.01 Hz	40.00	{00.01, 100.00}
FO.3	Output 3 filter frequency	0.01 Hz	40.00	{00.01, 100.00}
FO.4	Meter Output filter frequency	0.01 Hz	40.00	{00.01, 100.00}
P.09	Filter Communication Tension 0 = no filtering on communication tension values. 1 = use display filter frequency on communication tension values.		0	{0, 1}

PARAMETERS

7.2 Alarm setup and operation

The following parameters describe the setup and operation of the alarms.

Parameter	Description	Units	Default	Range
AL1.1 AL2.1	Tension Channel/Zone used for alarm DLCA NET 1-ECAT 0 = Channel 1 1 = Channel 2 2 = Tension Sum DLCA NET 2-ECAT 0 = Tension Zone 1 1 = Tension Zone 2		0	DLCA NET 1-ECAT {0, 2} DLCA NET 2-ECAT {0, 1}
AL1.2 AL2.2	Alarm activation type. 0 = Alarm ON when tension is above the alarm high compare value. 1 = Alarm ON when tension is below the alarm low compare value. 2 = Alarm ON when tension is either above the alarm high compare value or below the alarm low compare value. Alarm ON when tension is below the alarm high compare value and above the alarm low compare value. 3 =		0	{0, 3}
AL1.3 AL2.3	Alarm high compare value	1	500	{0, 999000}
AL1.4 AL2.4	Alarm low compare value	1	0	{0, 999000}
AL1.5 AL2.5	Alarm hysteresis percent. Hysteresis percent is a percentage of maximum tension.	0.01%	0	{0, 9999}
AL1.6 AL2.6	Alarm ON delay time. (The alarm ON output is delay by this number of seconds.)	0.01 s	0	{0, 9999}
AL1.7 AL2.7	Alarm OFF delay time. (The alarm OFF output is delay by this number of seconds.)	0.01 s	0	{0, 9999}

7.2.1 Alarm operation with hysteresis

Alarm activation type 0

Alarm turns on when tension is greater than High value.

Alarm turns off when tension is less than

$$(\text{HighValue} - (\text{HysteresisPercent} * \text{MaximumTension}))$$

Alarm activation type 1

Alarm turns on when tension is less than Low value.

Alarm turns off when tension is greater than

$$(\text{LowValue} + (\text{HysteresisPercent} * \text{MaximumTension}))$$

Alarm activation type 2

Alarm turns on when tension is greater than High value or less than Low value.

Alarm turns off when tension is less than

$$(\text{HighValue} - (\text{HysteresisPercent} * \text{MaximumTension}))$$

and when tension is greater than

$$(\text{LowValue} + (\text{HysteresisPercent} * \text{MaximumTension}))$$

Alarm activation type 3

Alarm output is the complement of alarm activation type 2.

PARAMETERS

7.3 Hardware configuration parameters

These parameters configure the hardware or provide information about the hardware.

Parameter	Description	Default
P.01	Zero Tension Lock Issuing a Zero Tension Zone 1 or Zone 2 command will immediately zero the tension value. It does not do a zero calibration, but does record the current offset signal and stores it for subtraction from the reading. The zeroing of tension can be allowed or not when the security state is locked. 0 = Zeroing tension allowed when security state is locked. 1 = Zeroing tension is not allowed when security state is locked.	0
P.02	Load Cell Excitation Voltage The load cell excitation voltage can be set to 5V or 7.5V. 0 = 5 V 1 = 7.5 V	1
P.03	Digital Input level Select Sets the threshold for the digital inputs for either 5 V or 24 V logic. 0 = 5 V logic threshold 1 = 24 V logic threshold When set for 5 V, the threshold between on and off is 2.5 volts with 20% hysteresis. When set for 24 V, the threshold between on and off is 12 volts with 20% hysteresis.	1
P.04	Which Sensor Inputs Used This selects which sensor inputs are being used. If only channel 1 is being used then the load cell check at power-up will fail because no load cell is connected to channel 2. To prevent this failure indication this parameter tells software to only check channel 1. This parameter is also used during tension calibrations. 0 = Only channel 1 used. 1 = Both channels used.	1
P.15	Program Number The current program number of the software in this product	Set by factory
P.16	Program Version The current version of software in this product	Set by factory

PARAMETERS

	Product Type (only available on communications and web server) (Communication parameter 0x204) 1 = DLCA NET1 2 = DLCA NET2 3 = DLCA NET-SLIM1 4 = DLCA NET-SLIM2 5 = DLCA NET-IP651 6 = DLCA NET-IP652	Set by factory
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PARAMETERS

7.4 Miscellaneous parameters

Parameter	Description	Default
P.05	Decimal Point Position, Tension Zone 1 Set the decimal point position to show when displaying tension. 0 = 000000 1 = 000000. 2 = 00000.0 3 = 0000.00 4 = 000.000 5 = 00.0000 6 = 0.00000	0
P.06	Tension Polarity, Tension Zone 1 Set to -1 to show positive tension when the force is acting in the direction opposite the force direction arrow on the load cells. Set automatically by Precision calibration. 0 = -1, 1 = +1	+1
P.07	Decimal Point Position, Tension Zone 2 Set the decimal point position to show when displaying tension. 0 = 000000 1 = 000000. 2 = 00000.0 3 = 0000.00 4 = 000.000 5 = 00.0000 6 = 0.00000	0
P.08	Tension Polarity, Tension Zone 2 Set to -1 to show positive tension when the force is acting in the direction opposite the force direction arrow on the load cells. Set automatically by Precision calibration. 0 = -1, 1 = +1	+1

PARAMETERS

7.5 Analog output scaling

Each analog output's output values for zero tension and maximum tension can be set by the following parameters. The default for the 0 to 20mA outputs is 0 and 20mA. Use these parameters to scale the 0 to 20mA output to be 4 to 20mA.

Parameter	Description	Units	Default	Range
Output 1				
OP1.1	Sets the 0 to 10V output voltage when the tension is zero.	0.01 volts	00.00	{00.00, 10.00}
OP1.2	Sets the 0 to 10V output voltage when the tension is equal to maximum tension.	0.01 volts	10.00	{00.00, 10.00}
OP1.3	Sets the 0 to 20mA output current when the tension is zero.	0.01 mA	04.00	{00.00, 20.00}
OP1.4	Sets the 0 to 20mA output current when the tension is equal to maximum tension.	0.01 mA	20.00	{00.00, 20.00}
Output 2				
OP2.1	Sets the 0 to 10V output voltage when the tension is zero.	0.01 volts	00.00	{00.00, 10.00}
OP2.2	Sets the 0 to 10V output voltage when the tension is equal to maximum tension.	0.01 volts	10.00	{00.00, 10.00}
OP2.3	Sets the 0 to 20mA output current when the tension is zero.	0.01 mA	04.00	{00.00, 20.00}
OP2.4	Sets the 0 to 20mA output current when the tension is equal to maximum tension.	0.01 mA	20.00	{00.00, 20.00}
Output 3				
OP3.1	Sets the 0 to 10V output voltage when the tension is zero.	0.01 volts	00.00	{00.00, 10.00}
OP3.2	Sets the 0 to 10V output voltage when the tension is equal to maximum tension.	0.01 volts	10.00	{00.00, 10.00}
OP3.3	Sets the 0 to 20mA output current when the tension is zero.	0.01 mA	04.00	{00.00, 20.00}
OP3.4	Sets the 0 to 20mA output current when the tension is equal to maximum tension.	0.01 mA	20.00	{00.00, 20.00}
Meter Output				
OP4.1	Sets the 0 to 1 meter output 1 current when the tension is zero.	0.01 mA	00.00	{00.00, 01.00}

PARAMETERS

OP4.2	Sets the 0 to 1mA meter output 1 current when the tension is equal to maximum tension.	0.01 mA	01.00	{00.00, 01.00}
OP4.3	Sets the 0 to 1 meter output 2 current when the tension is zero.	0.01 mA	00.00	{00.00, 01.00}
OP4.4	Sets the 0 to 1mA meter output 2 current when the tension is equal to maximum tension.	0.01 mA	01.00	{00.00, 01.00}

7.6 Calibrate the analog outputs (not normally changed)

These parameters set the offset and gain for the analog outputs to calibrate the outputs to real volts or real current. The parameters compensate for component tolerances on each DLCA NET-ECAT. These parameters are calibrated at the factory and are not reset by the power-up function reset parameters to default.

If these need to be changed, connect a voltmeter or current meter (as appropriate to the output that is being calibrated) and adjust the number until the voltage or current reads the proper value.

Parameter	Description	Range
Output 1		
CO.11	Sets the 0 to 10V output to 0%. Change the value until the meter reads 0.00 volts.	{0, 9999}
CO.12	Sets the 0 to 10V output to 100% Change the value until the meter reads 10.00 volts.	{0, 9999}
CO.13	Sets the 0 to 20mA output to 0%. Change the value until the meter reads 0.00 mA.	{0, 9999}
CO.14	Sets the 0 to 20mA output to 100%. Change the value until the meter reads 20.00 mA,	{0, 9999}
Output 2		
CO.21	Sets the 0 to 10V output to 0%. Change the value until the meter reads 0.00 volts.	{0, 9999}
CO.22	Sets the 0 to 10V output to 100% Change the value until the meter reads 10.00 volts.	{0, 9999}
CO.23	Sets the 0 to 20mA output to 0%. Change the value until the meter reads 0.00 mA.	{0, 9999}
CO.24	Sets the 0 to 20mA output to 100%. Change the value until the meter reads 20.00 mA,	{0, 9999}
Output 3		
CO.31	Sets the 0 to 10V output to 0%. Change the value until the meter reads 0.00 volts.	{0, 9999}
CO.32	Sets the 0 to 10V output to 100% Change the value until the meter reads 10.00 volts.	{0, 9999}

PARAMETERS

CO.33	Sets the 0 to 20mA output to 0%. Change the value until the meter reads 0.00 mA.	{0, 9999}
CO.34	Sets the 0 to 20mA output to 100%. Change the value until the meter reads 20.00 mA,	{0, 9999}
Meter Output		
CO.41	Sets the meter output 1 to 0%. Change the value until the meter reads 0.00 mA.	{0, 9999}
CO.42	Sets the meter output 1 to 100%. Change the value until the meter reads 1.00 mA.	{0, 9999}
CO.43	Sets the meter output 2 to 0%. Change the value until the meter reads 0.00 mA	{0, 9999}
CO.44	Sets the meter output 2 to 100%. Change the value until the meter reads 1.00 mA	{0, 9999}

7.7 Password

Parameter	Description	Range
P.00	Password When the DLCA NET-ECAT is locked, all parameters will be viewable but cannot be changed and no calibrations can be performed. To lock or unlock the DLCA NET-ECAT press [Enter] to show the lock and unlock status, displayed as ULOC for unlocked and LOC for locked. To lock the DLCA NET-ECAT the password must be entered twice. To unlock the DLCA NET-ECAT the password only needs to be entered once. To lock the DLCA NET-ECAT Press [Enter] again and the display will show PAS1, press [Enter] and enter the password using the [+] and [-] buttons. Press and hold [Enter] for two seconds to enter the password. The display now shows PAS2. Press [Enter] and enter the same password using the [+] and [-] buttons. Press and hold [Enter] for two seconds to enter the password. The display now shows LOC for locked. Press [Enter] to return to displaying tension. To unlock the DLCA NET-ECAT Press [Enter] again and the display shows PAS1. Press [Enter] and enter the password using the [+] and [-] buttons. Press and hold [Enter] for two seconds to enter the password. The display now shows ULOC if the correct password was entered. Press [Enter] to return to displaying tension. If the password was incorrect, the display shows LOC and the DLCA NET-ECAT is still locked. Press [Enter] to return to displaying tension, and then repeat the unlock procedure. The backdoor code is 6195.	{0, 9999}

8.0 Communications interface

Electronic datasheets are available for EtherCAT.

8.1 Cyclic parameters

The cyclic parameters are available to read tension and status from the DLCA NET-ECAT and to send commands and parameters to the DLCA NET-ECAT.

RO = Read only

WO = Write only

uint16 = unsigned 16-bit integer

int32 = signed 32-bit integer

uint32 = unsigned 32-bit integer.

Parameter	Data Type
Input Data (Cyclic)	
Command Request	uint32 - WO
Command Request Parameter	uint32 - WO
Output Data (Cyclic)	
Command Response	uint32 - RO
Command Response Parameter	uint32 - RO
Tension 1	int32 - RO
Tension 2	int32 - RO
Tension Sum (T1+T2)	int32 - RO
Tension Diff (T1-T2)	int32 - RO
Security State	uint16 - RO
Status	uint16 - RO
Alarm	uint16 - RO

8.2 Actual tension data

Tension is read from the DLCA NET-ECAT in the four cyclic parameters Tension 1, Tension 2, Tension Sum, and Tension Difference.

The tension value is a 32-bit signed integer and is scaled to be 160 times the Maximum Tension value ignoring the decimal point position set by parameter 0x207 or 0x217.

The tension reading will be at least 14-bit resolution when the maximum tension is 3 significant digits. Lower resolution will result if maximum tension is less than 3 significant digits.

In a One Tension Zone amplifier:

Tension 1 is the value of tension read on tension channel 1,

Tension 2 is the value of tension read on tension channel 2.

Tension Sum is the summation of the tension on channels 1 and 2

Tension Difference is the tension on channel 1 minus the tension on channel 2.

In a Two Tension Zone amplifier:

Tension 1 is the value of tension read on tension channel 1.

Tension 2 is the value of tension read on tension channel 2.

The Tension Sum and Tension Difference are always 0.

	Maximum Tension of the application in pounds	The number that should be entered at the DLCA NET as Maximum Tension during calibration	The value that will be transmitted when Maximum Tension is being measured (Max Tension entered X 160)	If Max Tension entered is a single digit, the PLC should be scaled to do a "floating point divide by 16,000" (100 X 160)	If Max Tension entered is two digits, the PLC should be scaled to do a "floating point divide by 1,600" (10 X 160)	If Max Tension entered is three or more digits, the PLC should be scaled to do a "floating point divide by 160"
1	100	16,000	16,000	-	-	-
5	500	80,000	16,000	-	-	-
9	900	144,000	16,000	-	-	-
10	100	16,000	-	1,600	-	-
50	500	80,000	-	1,600	-	-
99	990	158,400	-	1,600	-	-
100	100	16,000	-	-	160	-
999	999	159,840	-	-	-	160
1,000	1,000	160,000	-	-	-	160
2,200	2,200	352,000	-	-	-	160
4,400	4,400	704,000	-	-	-	160
9,999	9,999	1,599,840	-	-	-	160
10,000	10,000	1,600,000	-	-	-	160

Examples of:

- Maximum Tension values and how they should be entered into the DLCA NET, and
- How to scale a PLC or drive input to achieve 14 bit resolution at high or low tensions.

8.3 Security state

The status of security is shown in the Security State cyclic parameter.

Value	Status
0	System is unlocked and changes can be made.
1	System is locked and changes cannot be made.

8.4 Status

The Status cyclic parameter shows power good, power failure errors, and load cell check errors.

The lower 8 bits show power good or the power error. The upper 8 bits show the type of load cell check error that occurred. The power LED also shows power good or a fault. If power is good and no faults, then the power LED is ON.

If there is a fault detected then the power LED is flashing. One flash per second means the load cell check has failed. Two flashes per second means there is a voltage error.

The load cell check only runs during power-up. The voltage monitoring check runs continuously.

Lower 8-bits:

0xXX00 = Power On, No Faults

0xXX01 = 5V power failure

0xXX02 = 12V power failure

0xXX04 = Load Cell power failure

Upper 8-bits

0x00XX = No Error

0x01XX = Sensor 1, white or black wire disconnected

0x02XX = Sensor 1, red wire disconnected

0x03XX = Sensor 1, green wire disconnected

0x04XX = Sensor 1, Failure (check wiring or load cell damaged)

0x08XX = Sensor 2, white or black wire disconnected

0x10XX = Sensor 2, red wire disconnected

0x18XX = Sensor 2, green wire disconnected

0x20XX = Sensor 2, Failure (check wiring or load cell damaged)

8.5 Alarm

The Alarm cyclic parameter shows the Alarm 1 and Alarm 2 state.

Bit 0 is the status of alarm 1.

Bit 1 is the status of alarm 2.

Bit = 0, Alarm OFF

Bit = 1, Alarm ON

8.6 Command interface

Commands are entered into the *Command Request* register. Parameters are read or written by a value in the *Command Request Parameter*. To write a parameter value, the value must be set in the Command Request Parameter before the Command Request is entered. See section 8.6.1 for all available commands and parameters.

After a *Command Request* has been entered the interface will respond with a reply in the *Command Response*. When reading a parameter the *Command Response Parameter* will contain the value of the parameter. See section 8.6.2 for the command response messages.

The *Command Response* will show a busy status while executing commands and once the command processing is complete, the *Command Response* will show either an error message or a completed message. Once the command has returned with either an error or completed message then a command of 0 must be sent in the *Command Request* before sending another command.

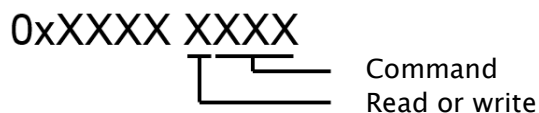
The commands are used to perform calibrations and zeroing of tension and also to get and set the value of the parameters in the DLCA NET-ECAT.

8.6.1 Command request

Commands start at 0x0 and continue to 0x1FF.

Parameters start at 0x200 and continue to 0x3FF.

For parameters, add 0x1000 for a Write and 0x0000 for a Read to the parameter number.



Command/parameter list

WO = Write Only, RO = Read only, RW = Read and Write

The parameter Class specifies which group this parameter belongs to in the DLCA NET-ECAT. The class can be communication (Comm), parameter (Parm), load cell calibration (LC Cal), or output calibration (Out Cal). This classification is used when resetting parameters to defaults with the NV Reset commands.

Data types

int16 = signed 16-bit integer

uint32 = unsigned 32-bit integer

int32 = signed 32-bit integer

float = 32-bit single precision floating point number

Some commands and parameters are not useful for the two tension zone DLCA NET-ECAT.

Command/ Parameter Number		Function or Parameter	Type	Class	Data Type and R/W	Explanation
Hex	Decimal					
0x000	0	Idle	Function	None	WO	
0x001	1	Zero Calibrate Zone 1	Function	None	WO	See 9.1 or 9.2
0x002	2	Precision Calibrate Zone 1	Function	None	WO	See 9.1
0x003	3	Weightless Calibrate Zone 1	Function	None	WO	See 9.2
0x004	4	Zero Calibrate Zone 2	Function	None	WO	See 9.1 or 9.2
0x005	5	Precision Calibrate Zone 2	Function	None	WO	See 9.1
0x006	6	Weightless Calibrate Zone 2	Function	None	WO	See 9.2
0x007	7	Cal Output 0, 10V, 0%	Function	None	WO - int16	See 8.7.4
0x008	8	Cal Output 0, 10V, 100%	Function	None	WO - int16	See 8.7.4
0x009	9	Cal Output 0, 20mA, 0%	Function	None	WO - int16	See 8.7.4
0x00A	10	Cal Output 0, 20mA, 100%	Function	None	WO - int16	See 8.7.4
0x00B	11	Cal Output 1, 10V, 0%	Function	None	WO - int16	See 8.7.4
0x00C	12	Cal Output 1, 10V, 100%	Function	None	WO - int16	See 8.7.4
0x00D	13	Cal Output 1, 20mA, 0%	Function	None	WO - int16	See 8.7.4
0x00E	14	Cal Output 1, 20mA, 100%	Function	None	WO - int16	See 8.7.4

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0x00F	15	Cal Output 2, 10V, 0%	Function	None	WO – int16	See 8.7.4
0x010	16	Cal Output 2, 10V, 100%	Function	None	WO – int16	See 8.7.4
0x011	17	Cal Output 2, 20mA, 0%	Function	None	WO – int16	See 8.7.4
0x012	18	Cal Output 2, 20mA, 100%	Function	None	WO – int16	See 8.7.4
0x013	19	Cal Output Meter, 1mA, 0%	Function	None	WO – int16	See 8.7.4
0x014	20	Cal Output Meter, 1mA, 100%	Function	None	WO – int16	See 8.7.4
0x015	21	Cal Output Meter 2, 1mA, 0%	Function	None	WO – int16	See 8.7.4
0x016	22	Cal Output Meter 2, 1mA, 100%	Function	None	WO – int16	See 8.7.4
0x017	23	Password 1 Entry	Parameter	None	WO – int16	See 8.7.1
0x018	24	Password 2 Entry	Parameter	None	WO – int16	See 8.7.1
0x019	25	Reset NV Parameters Only	Function	None	WO	See 8.7.2
0x01A	26	Reset NV Load Cell Calibrations Only	Function	None	WO	See 8.7.2
0x01B	27	Reset NV Output Calibrations Only	Function	None	WO	See 8.7.2
0x01C	28	Reset NV Communications Only	Function	None	WO	See 8.7.2
0x01D	29	Reset NV All	Function	None	WO	See 8.7.2
0x01E	30	Zero Tension Zone 1	Function	None	WO	See 8.7.3
0x01F	31	Zero Tension Zone 2	Function	None	WO	See 8.7.3
		Configuration Hardware				
0x200	512	Zero Tension Lock Active	Parameter	Parm	RW – int16	See 7.3
0x201	513	Load Cell Excitation Voltage	Parameter	LC Cal	RW – int16	See 7.3
0x202	514	Digital Input Level Select	Parameter	Parm	RW – int16	See 7.3
0x203	515	Which Sensor Inputs Used	Parameter	LC Cal	RW – int16	See 7.3
0x204	516	Product Type	Parameter	None	RO – int16	See 7.3
0x205	517	Program Version	Parameter	None	RO – int16	See 7.3
0x206	518	Program Number	Parameter	None	RO – int32	See 7.3
		Configuration Tension 1 (Tension Zone 1)				
0x207	519	DP Position	Parameter	Parm	RW – int16	See 7.4
0x208	520	ADC PGA Gain	Parameter	LC Cal	RW – int16	See 9.0
0x209	521	Tension 1A Zero Offset	Parameter	LC Cal	RW – int32	See 9.0
0x20A	522	Tension 1B Zero Offset	Parameter	LC Cal	RW – int32	See 9.0
0x20B	523	Tension 1A Normalization	Parameter	LC Cal	RW – float	See 9.0
0x20C	524	Tension 1B Normalization	Parameter	LC Cal	RW – float	See 9.0
0x20D	525	Cal Tension	Parameter	LC Cal	RW – int32	See 9.0
0x20E	526	Tension Scale	Parameter	LC Cal	RW – int32	See 9.0
0x20F	527	Tension Number Format	Parameter	LC Cal	RW – int16	See 9.0
0x210	528	Tension Filter Frequency	Parameter	Parm	RW – uint16	See 7.1
0x211	529	Maximum Tension	Parameter	LC Cal	RW – int32	See 9.0
0x212	530	Load Cell Rating	Parameter	LC Cal	RW – int32	See 9.0
0x213	531	Wrap Angle	Parameter	LC Cal	RW – int16	See 9.0
0x214	532	Angle From Force Direction	Parameter	LC Cal	RW – int16	See 9.0
0x215	533	Load Cell Sensitivity	Parameter	LC Cal	RW – int16	See 9.0

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0x216	534	Tension Polarity	Parameter	LC Cal	RW - int16	See 9.0
		Configuration Tension 2 (Tension Zone 2)				
0x217	535	DP Position	Parameter	Parm	RW - int16	See 7.4
0x218	536	ADC PGA Gain	Parameter	LC Cal	RW - int16	See 9.0
0x219	537	Tension Zero Offset	Parameter	LC Cal	RW - int32	See 9.0
0x21A	538	Cal Tension	Parameter	LC Cal	RW - int32	See 9.0
0x21B	539	Tension Scale	Parameter	LC Cal	RW - int32	See 9.0
0x21C	540	Tension Number Format	Parameter	LC Cal	RW - int16	See 9.0
0x21D	541	Tension Filter Frequency	Parameter	Parm	RW - uint16	See 7.1
0x21E	542	Maximum Tension	Parameter	LC Cal	RW - int32	See 9.0
0x21F	543	Load Cell Rating	Parameter	LC Cal	RW - int32	See 9.0
0x220	544	Wrap Angle	Parameter	LC Cal	RW - int16	See 9.0
0x221	545	Angle From Force Direction	Parameter	LC Cal	RW - int16	See 9.0
0x222	546	Load Cell Sensitivity	Parameter	LC Cal	RW - int16	See 9.0
0x223	547	Tension Polarity	Parameter	LC Cal	RW - int16	See 9.0
		Configuration Alarm 1				
0x224	548	Tension Zone	Parameter	Parm	RW - int16	See 7.2
0x225	549	Activation Type	Parameter	Parm	RW - int16	See 7.2
0x226	550	High Value	Parameter	Parm	RW - int32	See 7.2
0x227	551	Low Value	Parameter	Parm	RW - int32	See 7.2
0x228	552	Hysteresis Percent	Parameter	Parm	RW - int16	See 7.2
0x229	553	On Delay Time	Parameter	Parm	RW - int16	See 7.2
0x22A	554	Off Delay Time	Parameter	Parm	RW - int16	See 7.2
		Configuration Alarm 2				
0x22B	555	Tension Zone	Parameter	Parm	RW - int16	See 7.2
0x22C	556	Activation Type	Parameter	Parm	RW - int16	See 7.2
0x22D	557	High Value	Parameter	Parm	RW - int32	See 7.2
0x22E	558	Low Value	Parameter	Parm	RW - int32	See 7.2
0x22F	559	Hysteresis Percent	Parameter	Parm	RW - int16	See 7.2
0x230	560	On Delay Time	Parameter	Parm	RW - int16	See 7.2
0x231	561	Off Delay Time	Parameter	Parm	RW - int16	See 7.2
		Output 1				
0x232	562	0 to 10V Zero Offset	Parameter	Out Cal	RW - int16	See 8.7.4
0x233	563	0 to 10V Gain	Parameter	Out Cal	RW - int16	See 8.7.4
0x234	564	0 to 10V Zero Offset User	Parameter	Parm	RW - int16	See 8.9
0x235	565	0 to 10V High Limit User	Parameter	Parm	RW - int16	See 8.9
0x236	566	0 to 20mA Zero Offset	Parameter	Out Cal	RW - int16	See 8.7.4
0x237	567	0 to 20mA Gain	Parameter	Out Cal	RW - int16	See 8.7.4
0x238	568	0 to 20mA Zero Offset User	Parameter	Parm	RW - int16	See 8.9
0x239	569	0 to 20mA High Limit User	Parameter	Parm	RW - int16	See 8.9
0x23A	570	Output Filter Frequency	Parameter	Parm	RW - uint16	See 7.1

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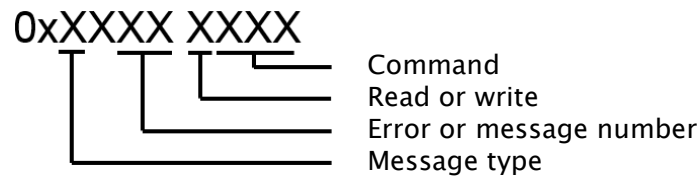
		Output 2				
0x23B	571	0 to 10V Zero Offset	Parameter	Out Cal	RW - int16	See 8.7.4
0x23C	572	0 to 10V Gain	Parameter	Out Cal	RW - int16	See 8.7.4
0x23D	573	0 to 10V Zero Offset User	Parameter	Parm	RW - int16	See 8.9
0x23E	574	0 to 10V High Limit User	Parameter	Parm	RW - int16	See 8.9
0x23F	575	0 to 20mA Zero Offset	Parameter	Out Cal	RW - int16	See 8.7.4
0x240	576	0 to 20mA Gain	Parameter	Out Cal	RW - int16	See 8.7.4
0x241	577	0 to 20mA Zero Offset User	Parameter	Parm	RW - int16	See 8.9
0x242	578	0 to 20mA High Limit User	Parameter	Parm	RW - int16	See 8.9
0x243	579	Output Filter Frequency	Parameter	Parm	RW - uint16	See 7.1
		Output 3				
0x244	580	0 to 10V Zero Offset	Parameter	Out Cal	RW - int16	See 8.7.4
0x245	581	0 to 10V Gain	Parameter	Out Cal	RW - int16	See 8.7.4
0x246	582	0 to 10V Zero Offset User	Parameter	Parm	RW - int16	See 8.9
0x247	583	0 to 10V High Limit User	Parameter	Parm	RW - int16	See 8.9
0x248	584	0 to 20mA Zero Offset	Parameter	Out Cal	RW - int16	See 8.7.4
0x249	585	0 to 20mA Gain	Parameter	Out Cal	RW - int16	See 8.7.4
0x24A	586	0 to 20mA Zero Offset User	Parameter	Parm	RW - int16	See 8.9
0x24B	587	0 to 20mA High Limit User	Parameter	Parm	RW - int16	See 8.9
0x24C	588	Output Filter Frequency	Parameter	Parm	RW - uint16	See 7.1
		Meter Output				
0x24D	589	0 to 1mA Zero Offset 1	Parameter	Out Cal	RW - int16	See 8.7.4
0x24E	590	0 to 1mA Gain 1	Parameter	Out Cal	RW - int16	See 8.7.4
0x24F	591	0 to 1mA Zero Offset User 1	Parameter	Parm	RW - int16	See 8.9
0x250	592	0 to 1mA High Limit User 1	Parameter	Parm	RW - int16	See 8.9
0x251	593	Meter Output Filter Frequency	Parameter	Parm	RW - uint16	See 7.1
0x252	594	0 to 1mA Zero Offset 2	Parameter	Out Cal	RW - int16	See 8.7.4
0x253	595	0 to 1mA Gain 2	Parameter	Out Cal	RW - int16	See 8.7.4
0x254	596	0 to 1mA Zero Offset User 2	Parameter	Parm	RW - int16	See 8.9
0x255	597	0 to 1mA High Limit User 2	Parameter	Parm	RW - int16	See 8.9
		Communication				
0x256	598	IP Address	Parameter	Comm	RW - uint32	N/A on ECAT
0x257	599	Subnet Mask	Parameter	Comm	RW - uint32	N/A on ECAT
0x258	600	Communication Tension Filtered	Parameter	Parm	RW - int16	See 7.1
0x259	601	Communications Type	Parameter	Comm	RW - int16	N/A on ECAT
0x25A	602	Web Page Refresh Rate	Parameter	Parm	RW - uint32	N/A on ECAT

8.6.2 Command response

A command response will be returned in the *Command Response* register.

The response consists of a message type, an error or message number and the request command code all OR'ed together. When reading a parameter the value of the parameter will be returned in the *Command Response Parameter* register. The *Command Response Parameter* is an uint32; you will need to cast this to the appropriate data type for the parameter as listed in the command/parameter chart in section 8.6.1.

Command response register



The Message type can be one of the following:

- 0x0XXX XXXX = Idle
- 0x1XXX XXXX = Complete, no errors
- 0x2XXX XXXX = Error
- 0x4XXX XXXX = Message
- 0x8XXX XXXX = Busy

The Error number can be one of the following:

- 0xFF00 XXXX = No Error
- 0xFF01 XXXX = Signal too large at maximum tension
- 0xFF02 XXXX = Signal too small
- 0xFF03 XXXX = Roll Weight exceeds 90 percent of ADC value
- 0xFF04 XXXX = Calibration tension greater than maximum tension
- 0xFF05 XXXX = Maximum tension exceeds load cell rating
- 0xFF06 XXXX = not used
- 0xFF07 XXXX = not used
- 0xFF08 XXXX = Another command is running
- 0xFF09 XXXX = Invalid command request
- 0xFF0A XXXX = Not Displaying Tension
- 0xFF0B XXXX = Passwords not equal
- 0xFF0C XXXX = Passwords do not match stored password or backdoor
- 0xFF0D XXXX = System Locked by password
- 0xFF0E XXXX = Invalid password, range = 0 - 9999
- 0xFF0F XXXX = Parameter not in range

8.7 Function information

This section describes how the functions are used.

8.7.1 Security

The DLCA NET-ECAT can be locked out to prevent parameter changes and calibrations from being performed.

Setting or clearing security

To set or clear the security state, two identical passwords must be entered using the command Password 1 Entry and Password 2 Entry.

1. Enter the password into the *Command Request Parameter* register and enter the command 0x17 (Password 1 Entry) in the *Command Request* register. A response of 0x4003 0017 will be returned in the *Command Response Parameter* register showing a message that only one password has been entered.
2. Enter the same password in the *Command Request Parameter* register and enter the command 0x18 (Password 2 Entry) in the *Command Request* register. A response of 0x40010018 will be returned showing a message that the system has been locked or unlocked in the *Command Response Parameter*.

This same procedure needs to be executed to unlock the system. When the system is unlocked the returned message will be 0x40020018. If the passwords entered do not match, or the passwords do not match the stored password used to lock the system, an error message will be returned.

The password range is from 0000 to 9999.

An attempt to change a parameter or execute a calibration while the system is locked will return an error message stating the System Locked by Password 0x200D00xx.

The factory back door password is 6195.

8.7.2 Reset non-volatile (NV) memory to defaults

These commands will reset the specified parameters to factory defaults.

Command	Function	Explanation
0x019	Reset NV Parameters Only	Reset parameters belonging to the Parameter class.
0x01A	Reset NV Load Cell Calibrations Only	Reset parameters belonging to the Load Cell Calibration class.
0x01B	Reset NV Output Calibrations Only	Reset parameters belonging to the Output Calibration class.
0x01C	Reset NV Communications Only	Reset parameters belonging to the Communication class.
0x01D	Reset NV All	Reset all the parameters.

8.7.3 Zeroing the tension

The tension can be zeroed by entering the command Zero Tension Zone 1 (0x01E) or Zero Tension Zone 2 (0x01F).

8.7.4 Calibrate the analog outputs (not normally used)

These parameters set the offset and gain for the analog outputs to calibrate the outputs to real volts or real current. The parameters compensate for component tolerances on each DLCA NET-ECAT. These parameters are calibrated at the factory and are not reset during the power-up function 'reset parameters to default'.

If these need to be changed, connect a voltmeter or current meter (as appropriate to the output that is being calibrated) and adjust the value of the parameter until the voltage or current reads the proper value.

Put the new value of the parameter into the **Command Request Parameter** before issuing the command.

The output will go into calibration mode only while the command is active. Once the **Command Request** is returned to 0, the DLCA NET-ECAT will exit from calibration mode.

COMMUNICATIONS INTERFACE

Command	Description	Range
Output 1		
0x007	Sets the 0 to 10V output to 0%. Change the value until the meter reads 0.00 volts.	{0, 9999}
0x008	Sets the 0 to 10V output to 100% Change the value until the meter reads 10.00 volts.	{0, 9999}
0x009	Sets the 0 to 20mA output to 0%. Change the value until the meter reads 0.00 mA.	{0, 9999}
0x00A	Sets the 0 to 20mA output to 100%. Change the value until the meter reads 20.00 mA,	{0, 9999}
Output 2		
0x00B	Sets the 0 to 10V output to 0%. Change the value until the meter reads 0.00 volts.	{0, 9999}
0x00C	Sets the 0 to 10V output to 100% Change the value until the meter reads 10.00 volts.	{0, 9999}
0x00D	Sets the 0 to 20mA output to 0%. Change the value until the meter reads 0.00 mA.	{0, 9999}
0x00E	Sets the 0 to 20mA output to 100%. Change the value until the meter reads 20.00 mA,	{0, 9999}
Output 3		
0x00F	Sets the 0 to 10V output to 0%. Change the value until the meter reads 0.00 volts.	{0, 9999}
0x010	Sets the 0 to 10V output to 100% Change the value until the meter reads 10.00 volts.	{0, 9999}
0x011	Sets the 0 to 20mA output to 0%. Change the value until the meter reads 0.00 mA.	{0, 9999}
0x012	Sets the 0 to 20mA output to 100%. Change the value until the meter reads 20.00 mA,	{0, 9999}
Meter Output		
0x013	Sets the meter output 1 to 0%. Change the value until the meter reads 0.00 mA.	{0, 9999}
0x014	Sets the meter output 1 to 100%. Change the value until the meter reads 1.00 mA.	{0, 9999}
0x015	Sets the meter output 2 to 0%. Change the value until the meter reads 0.00 mA	{0, 9999}
0x016	Sets the meter output 2 to 100%. Change the value until the meter reads 1.00 mA	{0, 9999}

8.8 Get or set parameters

8.8.1 Get a parameter

To get the value of a parameter, enter the parameter number in the **Command Request**. The **Command Response Parameter** returned will contain the value of the parameter.

8.8.2 Set a parameter

To set the value of a parameter, enter the value of the parameter into the **Command Request Parameter**. Then enter the parameter number OR'ed with 0x1000 (Write) into the **Command Request**. The **Command Response** returned will be either success or an error code. A common reason for getting an error is the value is not in range.

8.9 Analog outputs scaling

Each analog output's values for zero tension and maximum tension can be set by the following parameters. The default for the 0 to 20mA outputs is 0 and 20mA. Use these parameters to scale the 0 to 20mA output to be 4 to 20mA. Put the new value of the parameter into the **Command Request Parameter** before issuing the parameter number OR'ed with Write (0x1000) in the **Command Request**.

Parameter	Description	Units	Default	Range
Output 1				
0x234	Sets the 0 to 10V output voltage when the tension is zero.	0.01 volts	0	{0000, 1000}
0x235	Sets the 0 to 10V output voltage when the tension is equal to maximum tension.	0.01 volts	1000	{0000, 1000}
0x238	Sets the 0 to 20mA output current when the tension is zero.	0.01 mA	0400	{0000, 2000}
0x239	Sets the 0 to 20mA output current when the tension is equal to maximum tension.	0.01 mA	2000	{0000, 2000}
Output 2				
0x23D	Sets the 0 to 10V output voltage when the tension is zero.	0.01 volts	0000	{0000, 1000}
0x23E	Sets the 0 to 10V output voltage when the tension is equal to maximum tension.	0.01 volts	1000	{0000, 1000}

COMMUNICATIONS INTERFACE

0x241	Sets the 0 to 20mA output current when the tension is zero.	0.01 mA	0400	{0000, 2000}
0x242	Sets the 0 to 20mA output current when the tension is equal to maximum tension.	0.01 mA	2000	{0000, 2000}
Output 3				
0x246	Sets the 0 to 10V output voltage when the tension is zero.	0.01 volts	0000	{0000, 1000}
0x247	Sets the 0 to 10V output voltage when the tension is equal to maximum tension.	0.01 volts	1000	{0000, 1000}
0x24A	Sets the 0 to 20mA output current when the tension is zero.	0.01 mA	0400	{0000, 2000}
0x24B	Sets the 0 to 20mA output current when the tension is equal to maximum tension.	0.01 mA	2000	{0000, 2000}
Meter Output				
0x24F	Sets the 0 to 1 meter output 1 current when the tension is zero.	0.01 mA	0000	{0000, 0100}
0x250	Sets the 0 to 1mA meter output 1 current when the tension is equal to maximum tension.	0.01 mA	0100	{0000, 0100}
0x254	Sets the 0 to 1 meter output 2 current when the tension is zero.	0.01 mA	0000	{0000, 0100}
0x255	Sets the 0 to 1mA meter output 2 current when the tension is equal to maximum tension.	0.01 mA	0100	{0000, 0100}

9.0 Calibrate tension through the fieldbus procedure

The DLCA NET-ECAT has two modes of calibration: Precision and Weightless. Precision calibration is used when applying a known weight with a rope in the web path to the load cells for calibration. Typically this known weight should be 10% of the load cell rating or greater. Weightless calibration is used when a known weight is not convenient or desired.

The *Command Interface* is used to perform the calibrations. A command request is entered in the *Command Request*. The *Command Response* will show the progress of the command and when the command is complete. Errors will also be shown.

Parameters for Tension Zone 1 can be accessed in the group *Configuration Tension 1* and those for Tension Zone 2 can be accessed in the group *Configuration Tension 2*.

9.1 Precision calibration procedure

Enter values into the calibration parameters shown below. These parameters are available for Tension Zone 1 and Tension Zone 2.

Parameter	Name and description	Default	Range
0x207 0x217	Decimal Point Position Sets the decimal point position for the tension display. 0 = 000000 1 = 000000. 2 = 00000.0 3 = 0000.00 4 = 000.000 5 = 00.0000 6 = 0.00000	0	{0, 6}
0x20D 0x21A	Calibration Tension Calibration tension is the force of the known weight hanging on the rope over the load cells.	500	{0, 999000}
0x211 0x21E	Maximum Tension Maximum tension is the maximum tension expected for the application. Do not exceed the rating of the load cells.	500	{0, 999000}

Precision calibration procedure continued

When performing a calibration, both the zero and precision calibrate steps must be done in sequence before a calibration is valid.

If only zeroing the tension is required, use the 0x1E or 0x1F command.

1. Unload the load cell(s) for Tension Zone 1.
2. Enter the command 0x01 (Zero Calibrate Zone 1) in the **Command Request** register. The DLCA NET-ECAT immediately responds with 0x8000 0001 (Busy) in the **Command Response**.

If the calibrate zero is successful, the DLCA NET-ECAT will respond with 0x1000 0001 after ten to twenty seconds. Otherwise, an error message will be returned 0x20XX 0001.

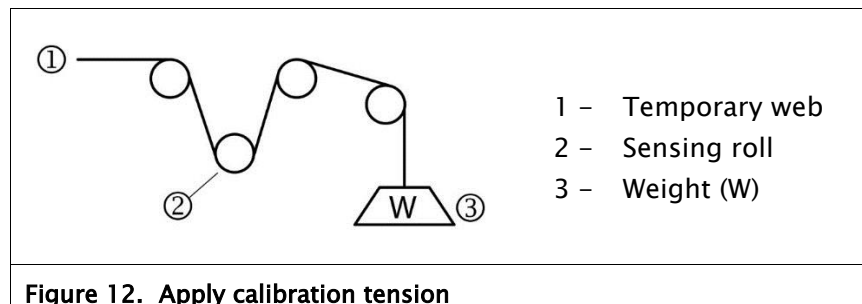
3. Clear the **Command Request** register by entering the command 0x00.
4. Hang the known weight and rope over the load cell(s) in Tension Zone 1. See Figure 12.
5. Enter the command 0x02 (Precision Calibrate Zone 1) in the **Command Request**. The DLCA NET-ECAT immediately responds with 0x8000 0002 (Busy) in the **Command Response**.

If the calibrate precision is successful, the DLCA NET-ECAT will respond with 0x1000 0002 after 10 to 20 seconds. Otherwise an error message will be returned 0x20XX 0002.

6. Clear the **command request** register by entering the command 0x00.

Clearing the command request is necessary to prevent starting multiple calibrations, such as zero and precision, before the first entered request is finished.

Precision Calibration is now complete.



CALIBRATE TENSION THROUGH FIELDBUS

Precision calibration procedure continued

If the calibration is successful, then **Tension Polarity**(0x216 or 0x223) will automatically be set to show positive tension when force is applied in the direction of the calibration force.

The following parameters in the group **Configuration Tension 1** or **Configuration Tension 2** are set by the calibration procedure:

Parameter	Name	Default	Range
0x208 or 0x218	ADC PGA Gain 1	5	{0, 7}
0x209 or 0x219	Display Tension 1A Zero Offset	0	{-0xFFFFFFFF, 0xFFFFFFFF}
0x20A	Display Tension 1B Zero Offset (DLCA NET 1 only)	0	{-0xFFFFFFFF, 0xFFFFFFFF}
0x20B	Tension 1A Normalization (DLCA NET 1 only)	1.0	{-FLT_MAX, FLT_MAX}
0x20C	Tension 1B Normalization (DLCA NET 1 only)	1.0	{-FLT_MAX, FLT_MAX}
0x20E or 0x21B	Display Tension 1 Scale	623	{0, 999000}
0x20F or 0x21C	Display Tension 1 Number Format	0x10	{0, 0xFF}
0x216 or 0x223	Tension Polarity 0 = -1 1 = +1	1	{0, 1}

The above parameter set is determined by the DLCA NET-ECAT during calibration. Do not modify the value of these parameters. The parameters above, along with those in the following list, may be read from a DLCA NET-ECAT and can be sent to the same DLCA NET-ECAT to restore a corrupted calibration if needed.

Decimal Point Position	Load Cell Excitation Voltage
Maximum Tension	Which Sensor Inputs Used
Calibration Tension	

Tension Zone 2 can be calibrated in the same way by substituting the commands 0x04 (Zero Zone 2) and 0x05 (Precision Zone 2) when performing a calibration.

CALIBRATE TENSION THROUGH FIELDBUS

9.2 Weightless calibrate tension procedure

Enter values into the calibration parameters shown below.
Refer to Figure 13 for the meaning of wrap angle and angle from force direction.

Parameter	Name and description	Default	Range
0x207 0x217	Decimal Point Position Sets the decimal point position for the tension display. 0 = 000000 1 = 000000. 2 = 00000.0 3 = 0000.00 4 = 000.000 5 = 00.0000 6 = 0.00000	0	{0, 6}
0x211 or 0x21E	Maximum Tension Maximum tension is the maximum tension expected for the application. Do not exceed the rating of the load cells.	500	{0, 999000}
0x212 or 0x21F	Load Cell Rating Enter the load cell(s) combined maximum force rating.	500	{0, 999000}
0x213 or 0x220	Web Wrap Angle (units 0.1 degrees) This is the angle over which the web touches the idler roller. To enter 10.0 degrees, enter the value of 100.	600	{1, 1800}
0x214 or 0x221	Angle From Force Direction (units 0.1 degrees) This is the angle between the resultant force from the web tension and the force direction arrow of the load cell or the centerline of the load cell. The maximum value is 45.0 degrees. To enter 10.0 degrees, enter value of 100.	0	{0, 450}
0x215 or 0x222	Load Cell Sensitivity (units 0.1 mV/V) Enter the load cell sensitivity in mV/V. MAGPOWER load cells have a sensitivity of 2.1 mV/V. To enter 2.1 enter value of 21.	21	{0, 1000}

Set the Load Cell excitation voltage 0x201 and which sensor inputs are used 0x203.
See section 7.3.

Weightless calibration procedure continued

When performing a calibration, both the zero and WEIGHTLESS calibrate steps must be done in sequence before a calibration is valid.

If only zeroing the tension is required, use the 0x1E or 0x1F command.

1. Unload the load cell(s) for Tension Zone 1.
2. Enter the command 0x01 (Zero Calibrate Zone 1) in the **Command Request**. The DLCA NET-ECAT immediately responds with 0x8000 0001 (Busy) in the **Command Response**.

If the calibrate zero is successful, the DLCA NET-ECAT will respond after ten to twenty seconds with 0x1000 0001. Otherwise, error message 0x20XX 0001 will be returned.

3. Clear the **Command Request** by entering the command 0x00.
4. Enter the command 0x03 (Weightless Calibrate Zone 1) in the **Command Request**. The DLCA NET-ECAT will immediately respond with success message 0x1000 0003 or error message 0x20XX 0003 in the **Command Response**.
5. Clear the **Command Request** register by entering the command 0x00.

Clearing the command request is necessary to prevent starting multiple calibrations, such as zero and precision, before the first entered request is finished.

Weightless Calibration is complete.

Note:

If the returned tension values in the cyclic data are negative you will need to manually set the **Tension Polarity** parameter (0x216 or 0x223) so the tension values are positive.

CALIBRATE TENSION THROUGH FIELDBUS

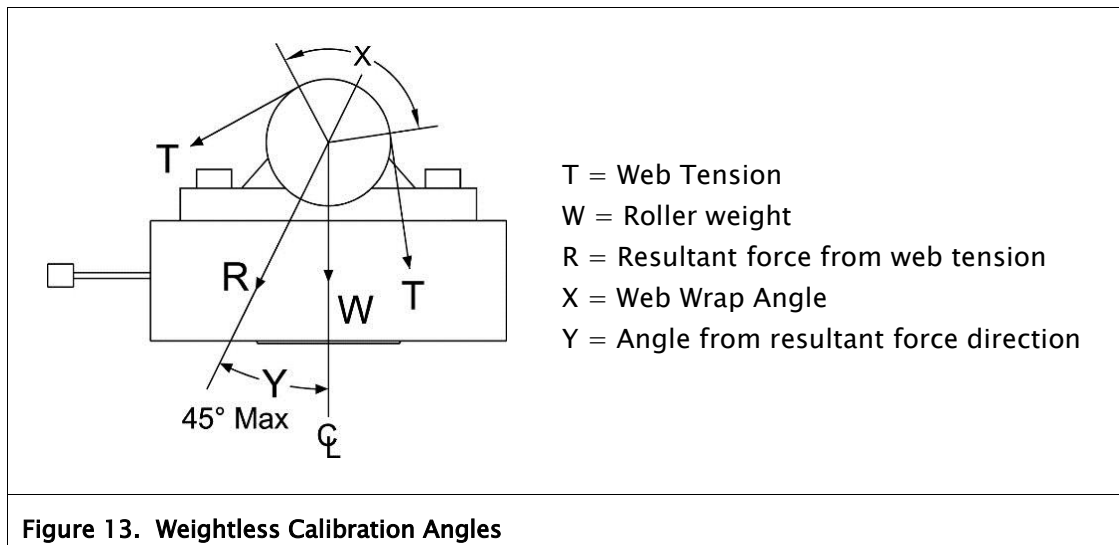
Weightless calibration procedure continued

The following parameters in the group **Configuration Tension 1** or **Configuration Tension 2** are set by the calibration procedure.

Parameter	Name	Default	Range
0x208 or 0x218	ADC PGA Gain 1	5	{0, 7}
0x209 or 0x219	Display Tension 1A Zero Offset	0	{-0xFFFFFFFF, 0xFFFFFFFF}
0x20A	Display Tension 1B Zero Offset (DLCA NET 1 only)	0	{-0xFFFFFFFF, 0xFFFFFFFF}
0x20E or 0x21B	Display Tension 1 Scale	623	{0, 0x7FFFFFFF}
0x20F or 0x21C	Display Tension 1 Number Format	0x10	{0, 0xFF}

The above parameter set is determined by the DLCA NET-ECAT during calibration. Do not modify the value of these parameters. The parameters above, along with those in the following list, can be read from a DLCA NET-ECAT, and can be sent to the same DLCA NET-ECAT to restore a corrupted calibration if needed.

Decimal Point Position	Load Cell Sensitivity
Maximum Tension	Tension Polarity
Load Cell Rating	Load Cell Excitation Voltage
Web Wrap Angle	Which Sensor Inputs Used
Angle from Force Direction	



9.3 Calibration errors returned

Value	Error description and solution
0x00	Calibration was successful. No Errors found.
0x01	Signal read by the amplifier is too large when maximum tension is applied. This is caused by maximum tension being too large. Reduce maximum tension.
0x02	Signal read by the amplifier is too small. Too little of the load cell range is being used, thus the gain is greater than 32:1. Use more of the load cell range or set maximum tension higher.
0x03	Roller weight too large. Roller weight exceeds 90% of the load cell rating. Make roller weight smaller.
0x04	Calibration tension is greater than Maximum tension. Make Maximum tension larger than Calibration tension.
0x05	Maximum tension exceeds the load cell rating. Lower wrap angle, make roll weight smaller, get higher rated load cells, or lower maximum tension.
Table 3. Calibration errors	

10.0 Web server

Access the web server in the DLCA NET-ECAT

An Ethernet connection must be made to Ethernet Port 2 only. The DLCA NET-ECAT must be disconnected from the EtherCAT network and then power must be cycled.

The DLCA NET-ECAT will allow non-EtherCAT traffic on Ethernet Port 2 after restarting as long as no EtherCAT traffic is detected on either Ethernet port.

Open a browser and type into the address bar: <http://10.0.0.113>

This is the default IP Address for the DLCA NET-ECAT. The IP Address is not changeable for the DLCA NET- ECAT.

The DLCA NET-ECAT will show a web page similar to below. Navigate to other pages using the links in the left menu area. The other pages will show parameters and provide links to allow editing parameters and performing calibrations.

The tension is displayed as a real number with the decimal point position included from parameter P.05 and P.07 in section 7.4.



DLCA NET

Status

Security

Hardware

Tension Zone 1

Alarm 1

Alarm 2

Output 1

Output 2

Output 3

Output Meter

Commands 1

Commands 2

Commands 3

Status

Parameter Name	Value	Units	Parameter Class
Actual Tension 1	311.63		None
Actual Tension 2	311.63		None
Actual Tension Sum	623.31		None
Actual Tension Difference	0.00		None
Security State	Unlocked		None
Alarm Status	Alarm 1 = Off Alarm 2 = Off		None
Fault Status	Sensor 1 White/Black Disconnect Sensor 2 White/Black Disconnect Power Good		None
Program Number	100551		None
Program Version	01.03		None
Product Type	DLCA NET1		None

Figure 14. Sample web server page

10.1 Tension calibration from web pages

To calibrate tension from the web pages, edit the parameters below in the proper tension zone before performing the calibration commands.

10.1.1 Precision calibration from web pages

For Precision Calibrate enter these parameters:

Load Cell Excitation voltage (on Hardware web page)
Which Sensor Inputs Used (on Hardware web page)
Maximum Tension
Calibration Tension
Decimal Point Position

Procedure

1. Unload the load cells.
2. Click on the link to "Zero Calibrate Tension Zone x".
Wait for the calibration to complete.
3. Apply the calibration weight to the temporary web.
4. Click on the link to "Precision Calibrate Tension Zone x".
Wait for the calibration to complete.
5. The DCLA NET-ECAT will return either that the calibration is complete or return an error message.

10.1.2 Weightless calibration from web pages

For Weightless Calibrate enter these parameters:

Load Cell Excitation voltage (on Hardware web page)
Which Sensor Inputs Used (on Hardware web page)
Load Cell Sensitivity
Load Cell Rating
Maximum Tension
Web Wrap Angle
Angle from Force Direction
Decimal Point Position

Procedure

1. Unload the load cells.
2. Click on the link to "Zero Calibrate Tension Zone x".
Wait for the calibration to complete.
3. Click on the link to "Weightless Calibrate Tension Zone x".
4. The DCLA NET-ECAT will return that the calibration is complete or return an error message.

10.2 Zero tension from web pages

To zero the tension in a tension zone:

1. Unload the load cells.
2. Click on the link "Zero Tension Zone x". This is the same as pressing the [Ø] button on the front panel.

11.0 Specifications

General

- Supply voltage range – 24 VDC $\pm 10\%$
 Proper earth grounding is required.
 Note that the negative supply and earth ground are interconnected on the product.
 The power supply must have an SELV output, such as Puls ML15.241, Mean Well MDR-20 to 24 or equivalent.
 The Mean Well MDR-20 to 24 can be purchased from Fife as part number 93157-024.
- Supply current – 250 mA, maximum
- Internal fuse – 6.3 A, fast blow
- Display – 6-digit LED, 3 digit tension resolution.
- Display decimal point – Selectable position
- Maximum gain – 32:1
- Tare adjustment – 90% of load cell rating.
- Tension update rate – 2 ms
- Tension resolution – 14-Bit
- Ethernet – 2 ports
 10/100 Mbps
- Fieldbus support – EtherCAT®
 EtherCAT is a registered trademark and patented technology licensed by Beckhoff Automation, GmbH, Germany
- Temperature range
 - Operating – 0° to 60°C (32° to 140°F)
 - Storage – -20° to 80°C (-4° to 176°F)
- Climatic Class – 3K3 (EN60721)
- Pollution Degree – 2 (IEC664-1)
- Relative Humidity – 5% to 85%, non-condensing
- Enclosure – IP20

SPECIFICATIONS

Inputs and Outputs

Load cell excitation voltage	-	5 or 7.5 VDC, 200 mA maximum
Load cell input	-	1.5 mV/V to 100 mV/V
0 to 10V analog output	-	0 to 10 VDC, 2k maximum load
0 to 20ma analog output	-	0 to 20 mADC, 450 ohm maximum load
Meter 1, 0 to 1mA or 0 to 10V analog output	-	0 to 1 mADC, 100 ohm maximum load 0 to 10 VDC, open circuit
Meter 2, 0 to 1 mA analog output	-	0 to 1 mADC, 1k maximum load
Alarm outputs	-	30 VDC maximum, 0.4 ADC maximum 40 VDC isolation
Digital inputs (zero tension)	-	24 VDC maximum, 5V or 24V selectable threshold.

Temperature effect on zero

Zero temperature coefficient	-	0.01% of full scale per °C
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Certifications and environmental compatibility

Product certifications	-	CE TUV Rheinland of North America to UL61010-1 and CAN/CSA-C22.2 No. 61010-1 and CB Certificate to IEC61010-1 RoHS
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12.0 Service

To request service or to get replacement parts, contact one of the following addresses or your regional office.

Fife

222 West Memorial Rd.
Oklahoma City, OK, 73114
USA

Phone: 1.405.755.1600
Fax: 1.405.755.8425
Web: www.maxcessintl.com

Fife-Tidland GmbH

Max-Planck-Strasse 8
65779 Kelkheim
Deutschland

Telefon: +49.6195.7002.0
Fax: +49.6195.7002.933
Web: www.maxcess.eu

When ordering replacement parts, please indicate, where possible, part number, drawing number and model description.

If it is necessary to return the product for service, take care to properly package the unit to prevent damage during shipment. If possible, use the original shipping containers.



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