SMART WEIGHING SOLUTIONS

rinstrum

C510
(C500 Series)
Digital Indicator
Reference Manual

C500-603-101

TABLE OF CONTENTS

1. Introduction

1.1. Overview

The C510 is a precision digital indicator. It uses a sigma-delta analog-to-digital (A/D) converter to ensure extremely fast and accurate weight readings. This advanced technology allows the C510 to be configured for up to 100,000 divisions with up to 100 A/D conversions per second. The C510 has extended sensitivity adjustment which can handle scales with outputs 0.2-5.0mV/V for full range. Its design is optimized to deliver precision performance on scale bases delivering above 0.5mV/V at display resolutions of up to 10000 divisions in single range mode, or 5000 divisions in dual range mode.

The C510 has a green six-digit 14mm LED display with additional indication of weighing status. The instrument also has 8 setpoints with status display on the front panel.

The C510 can either operate from mains AC supply (86-260VAC 48-62Hz) or from stable DC supplies (12-24VDC).

The setup and calibration are digital, with a non-volatile security store for all setup parameters. The built-in clock can be used to date-stamp printouts. There is an NVRAM store to ensure day to day operating settings (zero, tare, date/time, etc) are retained when power is removed.

Serial outputs are standard in the C510. These allow communication with external computers, printers and remote displays. Two RS232 Serial outputs are available. One of the outputs can also provide RS422/485 format.

2 optional accessory modules can be fitted to the C510. These provide additional hardware interface features such as:

- AC power input
- Additional serial ports
- Inputs and outputs
- Analog outputs

2. Installation

2.1. Introduction

The C510 can be used as either a desk-top or panel-mount instrument. It contains precision electronics and must not be subject to shock, excessive vibration, or extremes of temperature, either before or after installation. The operating environment must fall within the allowed temperature range and humidity.

The inputs of the C510 are protected against electrical interference, but excessive levels of electromagnetic radiation and RFI may affect the accuracy and stability of the instrument. The C510 should be installed away from any sources of electrical noise. The loadcell cable is particularly sensitive to electrical noise and should be located well away from any power or switching circuits. Termination of the loadcell shield at the C510 end (with a sound connection to the C510 case via the DB9 plug) is important for EMC immunity.

The C510 must be installed in a manner and location that is protected from impacts.

> Warning: If the equipment is not installed and used as specified by the manufacturer, the protection provided by the equipment may be impaired.

2.2. Environmental conditions

The C510 is designed for use in the following environmental conditions:
- Indoor use: Although the front of the device can be washed down (as per IP65), the rear of the device, along with cable attachments and optional accessories, must be protected from liquids and small objects (as per IP30).
- Altitude: up to 2000m
- Operating temperature range: -10°C to 40°C
- Storage temperature range: -20°C to 50°C
- Humidity: Maximum relative humidity of 80% for temperatures up to 31°C decreasing linearly to 50% at 40°C
- Mains supply voltage fluctuations: up to +/-10%.
- Pollution degree: 2

2.3. Panel mounting

The unit fits a DIN 43 700 standard 138(-0/+1) mm x 67(-0/+1)mm panel cut-out. Panel mounting is included standard. To panel mount:

1. Insert the 4 supplied M3 screws in the mounting tabs in the corners.
2. Insert the C510 into the panel and rotate the 4 tabs out from the indicator.
3. Tighten the screws to clamp the indicator into the panel. Do not over tighten.

2.4. Power connection

The C510 can be powered from DC or AC supplies.

2.4.1. DC power

The C510 requires a 12-24VDC power supply. The supply need not be regulated, if it is free of excessive electrical noise and sudden transients. The C510 can operate from

good quality plug-packs of high enough capacity to drive both the C510 and the loadcells.

The case ground connection is available via the earth stake on the rear of the unit. The resistance measured between the case of the C510 and the nearest earth point should be less than 2 ohms.

2.4.2. **AC power module**

There is an optional AC supply module which requires an AC input of: 100-240VAC, 50-60Hz, ~0.6A. Maximum supply voltage variations should not exceed +/-10% of the voltage range specified.

The AC supply module also provides a 12DC 0.5A(max) output.

2.5. **Loadcell connection**

2.5.1. **Overview**

The C510 can drive any number of full bridge strain gauge loadcells up to the equivalent of 16 x 350-ohm cells (21-ohm load).

The span range of the loadcell outputs (the change of signal from the loadcells between zero load and full gross load) must be within the range of 0.2 to 5.0 mV/V. Very low output scale bases can be used with the C510 but may induce some instability in the weight readings when used with higher resolutions. The higher the output, or the lower the number of divisions, the greater the display stability and accuracy.

When shunting loadcells use only good quality metal film resisters with high temperature stability ratings. Typical values for zero adjustment would fall within the range of 500k ohms (small effect) to 50k ohms (larger effect).

The C510 has an mV/V meter test mode which can be used to check scale base signal output levels. Refer to Section 5.8.

Warning: Sense Lines must be connected. Failure to do this will result in the C510 displaying an error message (E00040, E00080 or E000C0).

2.5.2. **Cable**

When wiring loadcells use only high quality shielded multi-core cable. The cable should be run as far away from any other cabling as possible (minimum separation distance 150mm). Do not bundle loadcell cables with power or control switching cables as interference can trigger display instability and cause unreliable operation.

The loadcell shield must be installed to connect electrically with the metal shell of the DB9 plug for the C510 to provide its full EMC resistance. Any noise absorbed by the cable shield must be conducted as quickly as possible to the C510 case via the DB9 plug shell, then direct to a solid earthing point via the earth terminal in the power input socket (or earthing lug on DC models).

2.5.3. **Six wire connection**

The connection is made using a standard DB9 male plug. The loadcell socket is wired for six wire systems as follows:

DB9 Pin	Function	Rinstrum Colour
1	Positive excitation	6 wire cable: Blue 4 wire cable: Green
2	Positive sense	Green
3	Negative excitation	Black
4	Negative sense	Grey
9	Positive signal	White
8	Negative signal	Red
5	Cable shield	Yellow

2.5.4.   **Four wire connection**

When a four wire loadcell system is connected, pins 1 and 2, and pins 3 and 4 must be joined by solder bridge or wire bridge to ensure that the excitation voltages are fed into the sense inputs (pins 2 and 4).

2.6.   **EX-I loadcell connection**

The C510 can be installed with barriers for EX-I applications. Six-wire connection is necessary in this case to achieve an acceptable performance. The C510 is not intrinsic safe and must be installed outside the hazardous area. Connections for an EX-I application are:
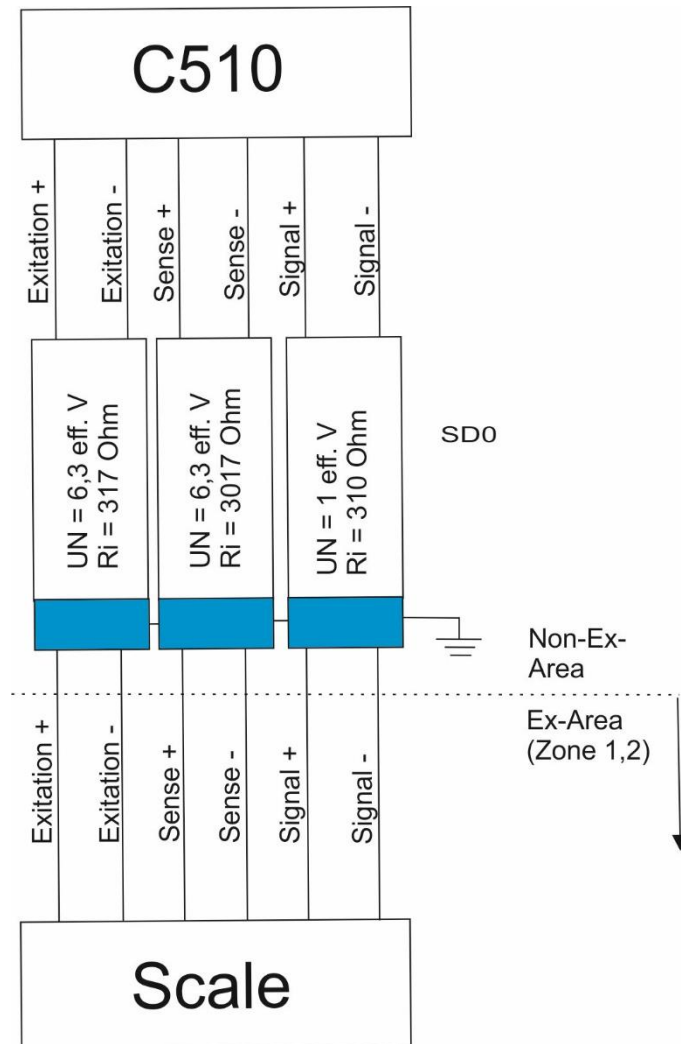
If Error E00040, E00080 or E000C0 occur in an EX-I application the check of the voltage drop over the sense lines can be turned off with the OPTION: SENS.CH setting. Thus, the C510 will accept a higher voltage drop over the sense lines but will no longer detect problems with the sense connections.

2.6.1. **Non-trade limits:**

C510 with Zener barrier SD01 (Input signal $\geq$ 0,2 µV/e, divisions 3000d, loadcells 2mV/V)		
No of loadcells	Minimum yield of the loadcells 350 Ω	Minimum yield of the loadcells 700 Ω
1	7 %	6 %
2	11 %	7 %
3	14 %	9 %
4	17 %	11 %
6	24 %	14 %
8	31 %	18 %

2.6.2. **Trade limits**

C510 with Zener barrier SD01 (Input signal $\geq$ 1,0 µV/e, divisions 3000d, loadcells 2mV/V)		
No of loadcells	Minimum yield of the loadcells 350 Ω	Minimum yield of the loadcells 700 Ω
1	36 %	28 %
2	53 %	36 %
3	70 %	45 %
4	87 %	53 %
6	-	70 %
8	-	87 %

The minimum yield of the loadcells is proportional to the divisions. E.g. at 2000d and 4 loadcells 350 Ohm the minimum yield is 58%. These calculations are valid for an overall maximum cable resistance of 3.5 Ohm per lead. Larger cable resistance increases the minimum yield.

2.7. **Serial port 1 connection**

2.7.1. **Overview**

This port has two types of output drivers: RS232 and RS422/RS485. It is generally used for connecting external computers or PLCs, or as a driver for remote displays. External devices can be connected as either RS232 or RS422/485 (4 wire).

All connections for the port are on the Serial 1 connector. This is a standard DB9 socket requiring a female DB9 plug. Since both the RS232 and RS422/485 are connected in parallel within the C510, they will both output the same message. The connections for the outputs are shown below

	Function	Description	Connect to external device
2	RX1	RS232 Receive	Transmit (usually pin 3)
3	TX1	RS232 Transmit	Receive (usually pin 2)
5	GND1	RS232 Ground	Ground (usually pin 5)
6	RA	RS422/485 Receive A (-)	If RS232 is used, do not connect pins 6..9. A null-modem cable is not suitable. These pins are connected internally to serial port 2.
7	RB	RS422/485 Receive B (+)	
8	TA	RS422/485 Transmit A (-)	
9	TB	RS422/485 Transmit B (+)	
Shield: Connect as directly as possible to the metal DB9 shell.			

2.7.2. **RS422/485 termination resisters**

The termination resistors required by RS422 or RS485 networks are built into the C510. The resisters are used to terminate the ends of the network to provide a balanced loading.

2.7.3. **RS232 connection to a PC**
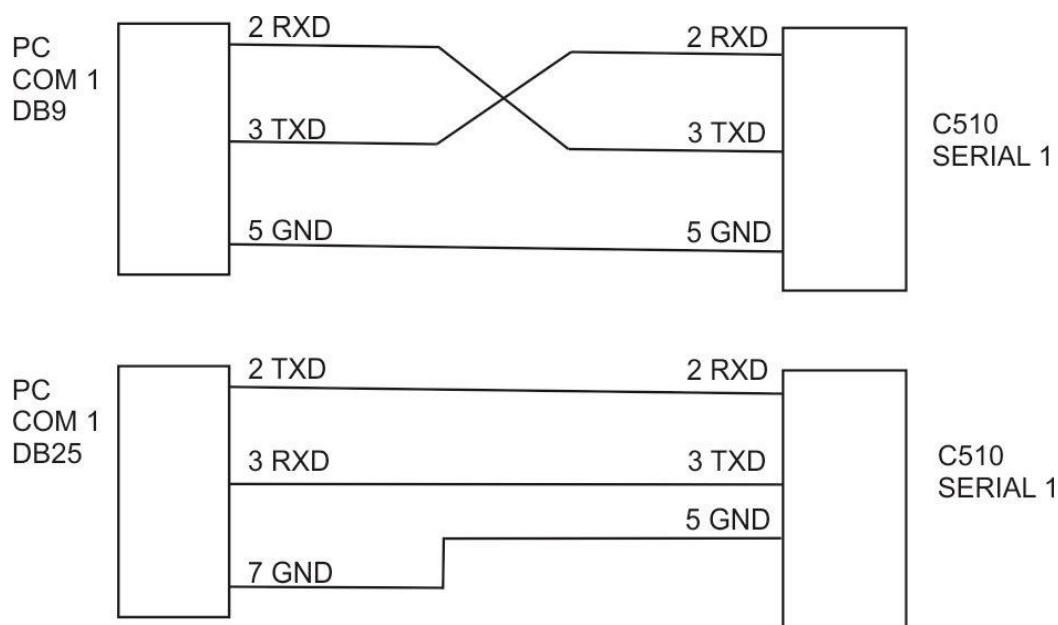
2.7.4. **RS485/RS422 bus connection**

Pins 6..9 of serial 1 are connected directly to pins 6..9 of the Serial 2 connector. This provides for convenient implementation of multi-drop RS422 or RS485 communications.
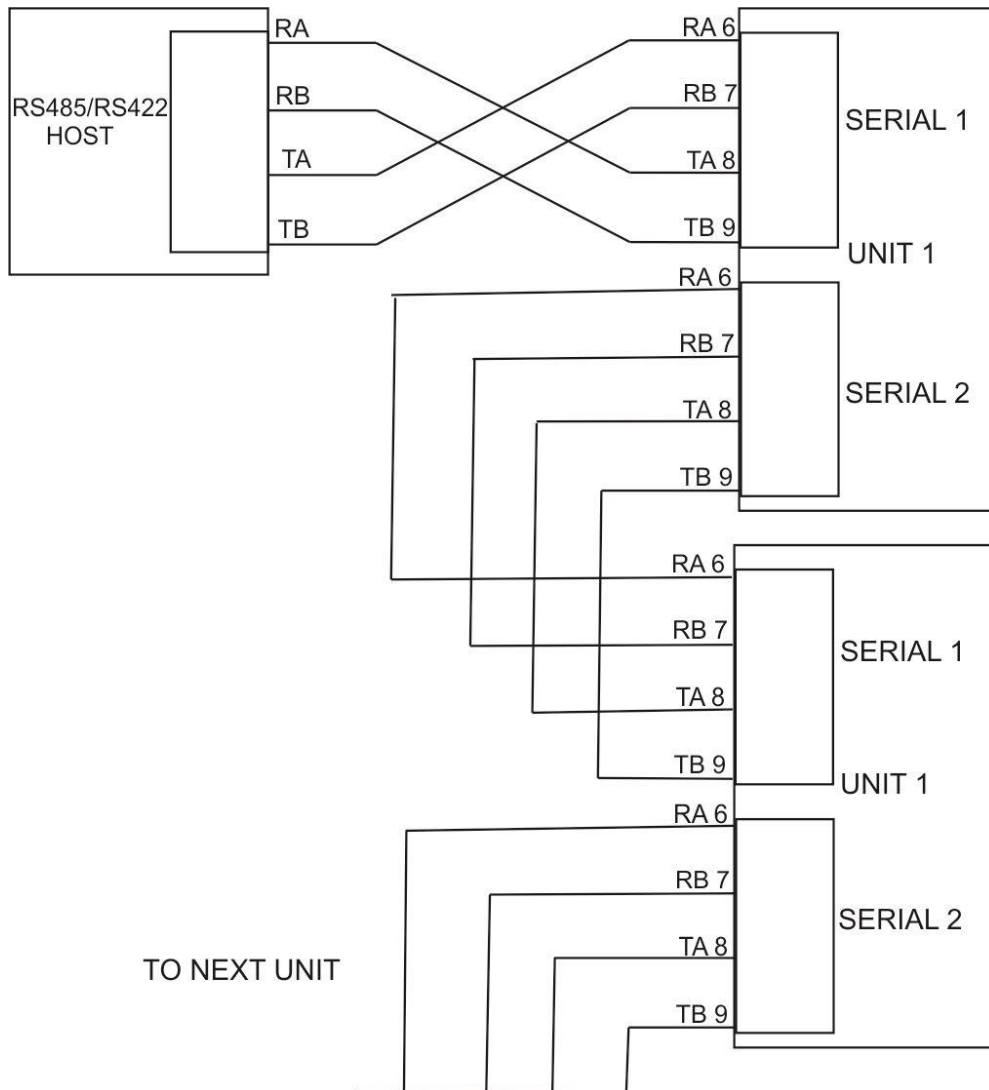
2.8. Serial port 2 connection

2.8.1. Overview

This port is generally used to drive serial printers (with DTR handshaking) and remote displays. It can also be used as a network port. Serial 2 always listens for network commands. Printing and automatic transmitting are disabled for 10 seconds after a command is received.

All connections for the port are on the Serial 2 connector. This is a standard DB9 socket requiring a female DB9 plug. The only output available from Serial 2 is RS232. The connections for this are shown below.

	Function	Description	Connect to external device
3	TX2	RS232 Transmit	Receive (usually pin 3)
4	DTR	RS232 DTR Handshake	DTR (usually pin 4)
5	GND2	RS232 Ground	Ground (usually pin 5)
6	RA	Serial 1 RS422/485 Receive A (-)	If RS232 is used, do not connect pins 6..9. A null-modem cable is not suitable. Note: These pins are connected internally to the serial port 1.
7	RB	Serial 1 RS422/485 Receive B (+)	
8	TA	Serial 1 RS422/485 Transmit A (-)	
9	TB	Serial 1 RS422/485 Transmit B (+)	
Shield: Connect as directly as possible to the metal DB9 shell.			

2.9.   Optional module connections

Two optional modules can be connected. These provide a range of external drivers and features. See section 14 and the module datasheets (for module specific connection details).

2.10. Ethernet connection

A standard 10/100 ethernet port is provided. See section 13.

2.11. USB host and device connections

A USB host and USB device interface are provided. See section 9.

3.   User interface

3.1.   General

The front panel of the C510 has a six-digit LED display and a 5-key keypad. A cover on the rear allows access to a hidden key which can be used to enter full digital setup and calibration. The diagram below shows the main elements of the front panel.

The C510 user interface includes:

1. 6-digit LED display
2. Units indicator
3. Weighing status
4. Setpoint status
5. 5-key keypad
6. Multiple range/interval status
7. Full setup key (on the rear of the indicator)

3.2.   Display functions

- Display (1): weight readings, errors, information and setup.
- Units indicator (2): units for the weight reading (grams (g), kilograms (kg), pounds (lb) and tons (t)).
- Status indicators (3), (4) and (6):The indicator bank made up of 3 groups of LEDs. The weighing status (3) shows the status of the displayed reading. The multirange status (6) shows the current multirange operation. The setpoint status set (4) shows the status of the 8 setpoints (IO).

>0<	Lit when the displayed reading is within ± ¼ of a division of true zero.
G	Lit when the display reading represents GROSS weight.
NET	Lit when the display reading represents NET weight.
MOTION	There is no LED for motion. Motion is indicated by units not being shown.
>|1|<	Range 1 (multiple range/interval modes only)
>|2|<	Range 2 (multiple range/interval modes only)
1..8	Lit to indicate when a setpoint output is active

3.3. Keys

The C510 has 5 front panel keys that control the operation of the instrument. The 6th key (SETUP) is on the rear of the instrument. The setup key can be sealed to prevent unauthorized tampering of trade critical settings and calibration.

Each of the front panel keys has two separate functions:

- a normal function that is available during normal weighing (as printed on the key)
- a setup function which is available during setup and calibration (as printed beneath the key)

3.3.1. Zero key

The range of the zero setting is limited according to settings OPTION:USE and OPTION:Z.RANGE.

	Normal function	Zero	Zero the scale. Long press to cancel all previous zero operations (not available in trade mode).
	Setup function	Select Group	Step through the list of available menu groups and return to the main menu level from anywhere in the menus. See section 5.1.4.

3.3.2. Tare key

	Normal function	Tare	Tare the scale. Long press to access the preset tare, setpoint target and inflight settings.
	Setup function	Select item	Step through the items and sub-groups within a main menu group. See section 5.1.4.

The Tare key can operate over the entire weight range.

A long press accesses the preset tare, setpoint targets and inflights. Usage:

1. Long press the Tare key to enter the setpoint settings menu.
2. Press the Tare key repeatedly until the name of the required setting is shown.
3. Press the Select key to view the value.
4. To edit the value, use the Select and Print keys.
5. Press the F key to save and exit.

3.3.3. **Select key**

	Normal function	Gross / Net	Toggle between gross and net weight. Long press to access the alibi and setup menus.
	Setup function	Select Change	Select the displayed item (or next display character) to be examined or changed. See section 5.1.4.

3.3.4. **Print key**

	Normal function	Print	Print
	Setup function	Change	Changes the flashing character or steps through available settings. See section 5.1.4.

If the manual print function selected, the print key will output the current weight reading (see 17.3.30).

3.3.5. **F key**

	Normal function		Configured in setup.
	Setup function	Accept	Start editing the current menu item. When editing: accept the current change. See section 5.1.4.

3.3.6. **Rear key**

	Normal function	Setup	Enter and exit full setup. See section 5.1.4.

4. Licensing

The C510 series uses licence codes to activate software packages installed on the indicator. All packages with names in the C510-K5xx and L9xx-5xx range will require a license to be entered.

Licence codes are unique for each indicator and can be acquired from the nearest Rinstrum office.

4.1. Unlicensed Packages

If a package requiring a license is installed but not yet licensed, a message like "C510" "K501" "NOT" "LCNSED" will be displayed when the indicator has finished start-up. In this example the package C510-K501 requires a license. Care must be taken to ensure the license entered matches the package name the indicator is displaying.

When an unlicensed package is installed, the indicator cannot be used until the package is licensed or uninstalled.

To allow temporary use of the indicator, license entry can be skipped by pressing the cancel key. The indicator will allow 5 minutes of normal operation before returning to a license entry prompt. If the license is not successfully entered at this stage the indicator will restart.

4.2. Licence Code Entry

To license a package on the C510 series, first install the required firmware (see the Install Firmware section for details). After successful start-up, the indicator will prompt the user with the text 'C510", "K501", "NOT", "LCNSED". Pressing the OK button will allow the user to enter the licence code.

Once the license code has been entered, press OK. If successful, the indicator will prompt "LCNSE" "OK" and the indicator will continue to normal operation.

Note: - The ◄ ► Keys are used to move to the next letter and the ▲▼ keys used to select the appropriate letter.

Alternatively, the network communication command LRP can be used to license packages (see Section 17.3.46).

5. Setup

5.1. General Information

5.1.1. Introduction

Setup and calibration are carried out entirely from the front panel using the setup functions on the control keys. There are 2 types of setup:

- Full setup: Allows access to all setup parameters, including calibration.
- Safe setup: Allows access to setup parameters which are not critical for trade operation of the scale.

The setup menus are a menu tree of parameters. All parameters can be edited using the C510 interface. They can also be edited using the PC configuration tool.

Note: There are several layers of menu settings. This document uses a colon to show these layers. For example, BUILD:DP refers to the DP setting (decimal point) in the BUILD menu.

5.1.2. Setup security

There are 2 types of security for unauthorised setup access:

- Passcodes:
  - o Access to the setup can be passcode protected to prevent unauthorized tampering.
  - o Safe and full setup have separate passcodes. These are set in SPEC:SAFE.PC and SPEC:FULL.PC:
  - o The full setup passcode can be used to access safe setup.
  - o The safe passcode cannot be used to access full setup.
  - o Set these passcodes to 0 to disable passcode protection. This is the default.

- Physical seals: It is possible to disable access to the full setup via the Select key (using SPEC:R.ENTRY). The rear key must then be used to access full setup. The rear key can be sealed via physical seals such as destructible labels, lead seals, etc.

5.1.3. Entry

There are 2 methods of entering the setup program:

- Safe/full setup (front keys):
  1. Long press the Select key.
  2. Press the Select key to choose which level of setup is required. Note: full setup will not be available if this has been disabled in the setup.
  3. Press the OK key.
  4. If a passcode has been set: Use the Select and Print keys to enter the passcode. Then press the OK key.

- Full setup (rear key):
  1. Press the key on the rear of the indicator. The security cover may have to be removed.
  2. If a passcode has been set: Use the Select and Print keys to enter the passcode. Then press the OK key.

5.1.4. **Navigation**

The setup menus are organised in a tree structure. Main menus are called groups. Groups contain sub-groups and items. Items are settings which can be edited. All items in a groups or sub-groups have related functions.

The keys for menu operation are:

ZERO / GROUP	**Menu**: Select main group (Layer 1). **Editing**: Accept change and exit.	Menu: Steps through the list of main groups. Return to the main group from anywhere. Editing: Save and exit the editor. Return to the main group.
TARE / ITEM	**Menu**: Select sub-groups and items (Layer 2). **Editing**: Accept change and exit.	Menu: Steps through the list of group members. These may include sub-groups (sub menus) and items. Editing: The editor will be closed, and any changes will be lost.
SELECT ▶	**Menu**: Select sub-groups and items (Layer 3). **Editing**: Next character	Menu: Steps through the list of group members. These may include sub-groups (sub menus) and items. Editing: When editing numbers, this will advance the cursor.
PRINT ▲	**Menu**: Select items (Layer 4). **Editing**: Change character/option	Menu: Steps through the list of group members. These may include items only. Editing: Increase the value of the option or current character.
f OK	**Menu**: Start editing current item. **Editing**: Accept change and exit.	Menu: View or edit the current item. If the current item is a sub-group, it will open the sub-group. Editing: Save and exit the editor. If the setting is not possible (for example if it is greater than maximum), "-----" is shown.

5.1.5. **Editing option items**

Some settings allow the choice of an option from a predefined list of options. Examples are BUILD:DP or OPTION:USE.
To show/edit:

- Press the F key to show the current setting
- Press the Print key until the correct setting is shown
- Press the F key to exit the editor

5.1.6. **Editing weight/number items**

Some settings require the entry of a weight or other number. Examples are BUILD:CAP1 or OPTION:Z.BAND. The correct decimal point and units (if applicable) are shown while editing.

To show/edit:

- Press the F key to show the current setting
- Use the Select key (change digit) and the Print key (increment digit) to show the correct value
- Press the F key to exit the editor

o If the setting is not possible (for example if the value is greater than the allowed maximum), "-----"is shown and the editor will not exit.

5.1.7. **Editing string items**

Some settings require the entry of a text or token string. Examples are SERIAL:AUT.OPT:AUT.FMT or SERIAL:PRN.OPT:HEADER.

To show/edit:

- Press the F key to show the first character in the string.
  o The character is shown as *xxx.yyy*.
  o *xxx* is the character position in the string (e.g: 001, 002, 003, etc).
  o *yyy* is the ascii code for the character (e.g: 065='A', 002=STX). See the ASCII table in section 8.5.
- Use the Select key (change digit) and the Print key (increment digit) to enter the correct ASCII value.
- Use the F key to advance to the next character in the string.
- Press the Zero key to exit the editor

5.1.8. **Editing with functions**

Some settings have a special function to control their use. These are not simple settings but are more complex routines. Examples are CAL:ZERO or TEST:SCALE.

To use:

- Press the F key to start the function
- All functions are different and there are no standard keys. The user will be prompted for what is required.
- Use the Zero key to exit the function

5.1.9. **Exit**

There are several methods of exiting the setup menu.

- Method 1: Save and exit
  o Long press the Select key.
- Method 2: Save and exit
  1. Press the Zero key until –END- is shown.
  2. Press the tare key
- Method 3: Save and exit
  o Press the rear key
- Method 4: Exit without saving
  o Remove the power from the instrument.

5.2. BUILD: Scale build menu

Items in this group configure the scale build. It is important to set the build options before calibrating. Changes after calibration may invalidate the calibration.

Items		Name	Description
Scale type	⊗	Type	Selects the number of ranges used. Options are: • Single(def): Single range • Dual I: Dual interval • Dual R: Dual range • Direct: Single range with mV/V manual calibration
Decimal point position	⊗	DP	Sets the decimal point position on the display. Options are: • 000000(def) • 00000.0 • 0000.00 • 000.000 • 00.0000 • 0.00000
Range 1 scale capacity	⊗	Cap1	Sets the maximum capacity of the scale. If BUILD:TYPE=DUAL_I or BUILD:TYPE=DUAL_R, it sets the capacity of the 1st range. Default: 3000.
Range 1 verification interval	⊗	E1	Sets the minimum verification interval of the scale (as displayed). If BUILD:TYPE=DUAL_I or BUILD:TYPE=DUAL_R, it sets minimum verification interval of the 1st range. Options are: • 1(def) • 2 • 5 • 10 • 20 • 50 • 100
Range 2 scale capacity	⊗	Cap2	Sets the maximum capacity of range 2. Only used if BUILD:TYPE=DUAL_I or BUILD:TYPE=DUAL_R. Default: 6000.
Range 2 verification interval	⊗	E2	Sets the minimum verification interval of range 2. Only used if BUILD:TYPE=DUAL_I or BUILD:TYPE=DUAL_R. Options are: • 1(def) • 2 • 5 • 10 • 20 • 50 • 100
Additive tare limit	⊗	Ad.tare	Sets the additive tare limit. Default: 0. See 6.2.6 for more details
Weighed units	⊗	Units	Sets the weighing units for the scale. Options are: • None: no units. • g • kg(def)

			• lb • t

⊗ = Change only possible in FULL Setup

5.3. OPTION: Scale options menu

Items within this group set various weighing options for the scale. Changes of some items will affect certification.

Items		Name	Description
Scale trade use	⊗	Use	Set whether the scale is for trade use. Options are: • Industrial[(def)]: Scale operation is not restricted by OIML. • Trade: Scale operation will comply with OIML.
Weight averaging		Filter	Sets the number of weight readings to average before the weight is used. Options are: • 1 • 9 • 2 • 10[(def)] • 3 • 25 • 4 • 50 • 5 • 75 • 6 • 100 • 7 • 200 • 8
Anti-jitter average reset		Jitter	Sets the reset threshold for the anti-jitter filter. Options are: • Off: Anti-jitter average disabled. • Fine[(def)]: Small changes will reset the filter. • Coarse: Larger changes are required to reset the filter.
Motion Detection	⊗	Motion	Sets how trigger level for motion detection. Set in divisions per time period. For example, 0.5-1.0 means that more than 0.5 divisions in 1 second is considered motion. Options are: • None: Disable motion detection • 0.5-1.0[(def)] • 1.0-1.0 • 2.0-1.0 • 5.0-1.0 • 0.5-0.5 • 1.0-0.5 • 2.0-0.5 • 5.0-0.5 • 0.5-0.2 • 1.0-0.2 • 2.0-0.2 • 5.0-0.2
Auto-zero on start-up		Auto.z	Enable and initial zero on start. The amount of weight that can be zeroed is limited to +/-10% of scale capacity. Options are: • Off[(def)] • On

Zero tracking	⊗	Z.trac	Enable zero tracking. Set in divisions per time period. For example, 0.5-1.0 means that zero tracking will cancel no more than 0.5 divisions in 1 second whilst in the zero band. Options are: • None(def): Disable zero tracking • 0.5-1.0 • 1.0-1.0 • 2.0-1.0 • 5.0-1.0 • 0.5-0.5 • 1.0-0.5 • 2.0-0.5 • 5.0-0.5 • 0.5-0.2 • 1.0-0.2 • 2.0-0.2 • 5.0-0.2
Allowable range of zero setting	⊗	Z.range	Range around 0 where a scale zero is possible. Options are: • 02-02(def): -2% to +2% of capacity • 01-03: -1% to +3% of capacity • 20-20: -20% to +20% of capacity • 100.100: -100% to +100% of capacity
Zero Dead Band	⊗	Z.band	Range around zero which is considered zero for zero tracking, multiranging, auto-printing, etc. Default: 0.
Sense line check		Sens.ch	Enable sense checking. Useful with EX applications, see section 2.6. Options are: • Off • On(def)

⊗ = Change only possible in FULL Setup

5.4. CAL: Scale Calibration menu

Items in this group are used for scale calibration. See section 6.

Items		Name	Description
Zero calibration	⊗	Zero	Perform a zero calibration
Span calibration	⊗	Span	Perform a span calibration
Linearity calibration	⊗	Ed.lin	Perform a linearity calibration
Clear linearity points	⊗	Clr.lin	View/clear linearity points
Restore factory calibration	⊗	Fac.cal	Set the calibration and BUILD menu settings to factory default values.

⊗ = Change only possible in FULL Setup

5.5. SERIAL: Serial communications menu

Items within this Group set the serial and printing outputs.

Items		Name	Description
Serial Output 1..4		Ser1 Ser2 Ser3 Ser4	Options for serial port 1 (Rear port) Options for serial port 2 (Rear port) Options for serial port 3 (RS485 module) Options for serial port 4 (RS232 module)
	Function type	Type	Sets the function of the serial output. Options are: • Off: Disable the port • Auto.Lo: Auto transmit at 10Hz • Auto.Hi: Auto transmit at the sync frequency • Print: Enable printing • Single: Transmit once (see also 16.7) • Net[(def)]: Network port
	Baud rate	Baud	Sets the baud rate. Options are: • 300 • 600 • 1200 • 2400 • 4800 • 9600[(def)] • 19200 • 38400 • 57600 • 115200
	Parity, data bits, stop bits, termination, RS232/RS485 and duplex	Bits	Sets port transmission options. Options for each position are: 1. n/o/e: No parity, odd parity, even parity 2. 8/7: Number of data bits 3. 1/2: Number of stop bits. 4. -/t: RS485 termination resistor enable 5. 2/4: RS232 or RS485 6. -/d: DTR handshake enable Default: n81-2- Note: Not all options apply to all ports.
Serial Output 5..6		Ser5 Ser6	Options for serial port 5 (Ethernet Tx/Rx socket) Options for serial port 6 (Ethernet TX socket)
	Ethernet Port	Port	Sets the ethernet port used for the socket. Selectable from 1024 to 65535. Default: 2222 (Ser5), 2223 (Ser6).
Network options		Net.opt	Options for serial networking.
	Serial Address	Address	The serial network address. Selectable from 00 to 31. Default: 31
Auto Transmit Options		Aut.opt	This is a list of all items concerned with automatic and single serial transmission of weight data.

	Auto output	Type	The auto transmit format (see section 7). Options are: • Auto.a[(def):] Format A. Standard Rinstrum output format. • Auto.b: Format B. • Auto.c: Format C. • Auto.d: Format D. • CUSTOM: Custom format as set in SERIAL:AUT.OPT:AUT.FMT
	Auto Output Source	SrC	The weight source for the output data. Options are: • Disp[(def)]: Displayed weight • Gross: Gross weight • Net: Net weight • Total: Total weight
	Custom format	Aut.fmt	Custom format (see section 7.2.5 for more information).
	Start Character	St.chr	Sets the ascii character sent at the start of the automatic message. If set to 0, no character is sent. Default: 2 (STX)
	End Character 1	End.ch1	Sets the 1st of 2 ascii characters sent at the end of the automatic message. If set to 0, no character is sent. Default: 3 (ETX)
	End Character 2	End.ch2	Sets the 2nd of 2 ascii characters sent at the end of the automatic message. If set to 0, no character is sent. Default: 0 (none)
Printing Options		Prn.opt	This is a list of all items concerned with printing.
	Printout Type	Prnt.TP	Set the printout type (see section 8.1). Options are: • Sing[(def)]: Print a single line with no extra line feed • Doub: Print single line output but double spaced • Tic: Print full weight ticket • A.sing: Auto print a single line with no extra line feed • A.doub: Auto print single line output but double spaced • A.tic: Auto print full weight ticket • Total: Totalising printer mode • A.total: Automatic Totalising printer mode
	Ticket Header	Header	Ticket header (see section 8.2).
	Ticket Format	Tic.fmt	Ticket format (see section 8.3).
	Space Columns and rows for print	Space	Position of the printout. The 1st parameter sets the horizontal spacing. The 2nd parameter sets the vertical spacing (see section 17.3.29). Default: 00.00
Modbus Options		Mod.opt	This is a list of all items concerned with Modbus.
	Modbus TCP Port	PORT	Set the TCP port that listens for Modbus connections. Default: 502

32bit Endian	ENDIAN	This sets the endianness for 32bit Modbus registers. The Modbus specification does not specify endian for values larger than 16bits. This setting does not swap the endian for 16bit values. These are fixed. Options are: • BIG (def): Big endian, the Modbus defacto standard. Low register = data high 16bits, high register = data low 16bits. • LITTLE: Little endian. Low register = data low 16bits, high register = data high 16bits.

5.6.   ETH.NET: Ethernet menu

Items within this group set the ethernet parameters.

Items	Name	Description
DHCP enable	DHCP	Set whether ethernet setup is obtained via DHCP. Options are: • On[(def)] • Off
IP address	IP	IP address

Address byte 1
    Address byte 2
    Address byte 3
    Address byte 4
	IP.1
	IP.2
	IP.3
	IP.4
		IP address in individual bytes. Organised as 1.2.3.4.
		Read only when DHCP is enabled, displays the DHCP assigned address.

Subnet mask	Mask	Subnet mask

Mask byte 1
    Mask byte 2
    Mask byte 3
    Mask byte 4
	Mask.1
	Mask.2
	Mask.3
	Mask.4
		Subnet mask in individual bytes. Organised as 1.2.3.4.
		Read only when DHCP is enabled, displays the DHCP assigned mask.

Gateway address	Gate.w	Gateway address

Address byte 1
    Address byte 2
    Address byte 3
    Address byte 4
	Gate.w.1
	Gate.w.2
	Gate.w.3
	Gate.w.4
		Gateway address in individual bytes. Organised as 1.2.3.4.
		Read only when DHCP is enabled, displays the DHCP assigned address.

DNS address	DNS	DNS address

Address byte 1
    Address byte 2
    Address byte 3
    Address byte 4
	Dns.1
	Dns.2
	Dns.3
	Dns.4
		DNS address in individual bytes. Organised as 1.2.3.4.
		Read only when DHCP is enabled, displays the DHCP assigned address.

Host name	Hst.Nam	The indicator hostname. Defaults to <model>-<serial no>, e.g. C510-123456
MAC address	Mac	Ethernet MAC address in hexadecimal. Read only.
Ethernet Default	ETH.DEF	Continue Default Ethernet settings

5.7.   SPEC: Special settings menu

Items within this Group set the Security Code, key locking and special modes.

Items		Name	Description
Safe setup passcode	⊗	Safe.pc	Passcode required to enter safe setup. Set to 0 to allow free access. Default is 0.
Full setup passcode	⊗	Full.pc	Passcode required to enter full setup. Set to 0 to allow free access. Default is 0.
Rear entry mode	⊗	R.entry	Rear entry mode for full setup. This option can only be changed when the rear key is used to enter the menus. Options are: • Off[(def)]: Full setup is available via the Select key or rear key. • On: Full setup access is only available via the rear key.
Key enable	⊗	Button	Enable each front key (in the same order as the keys). Options are: • Y[(def)]: enabled • N: disabled • I: immediate operation (don't wait for motion, not valid for trade)
Operation of front function key and the external inputs		In.fn.0.4	Set the function of the front function key, and remote inputs 1-4 (see section 16). The leftmost setting is the front function key, followed by remote inputs. Default: -----
Operation of the external inputs		In.fn.5.8	Set the function of the remote inputs 5-8 (see section 16). Default: ----
A/D synchronisation frequency (effects calibration)	⊗	Sync	Sets the frequency of the primary anti-noise filter in Hz. This sets the rate that data is processed. It will deliver optimum noise performance in a 50Hz environment when set to 12.5, 25 or 50. Options are: 10, 12.5, 15, 20, 25, 30, 50[(def)], 60, 100
Buzzer Enable		Buzzer	Enables and disables the buzzer operation.

⊗ = Change only possible in FULL Setup

5.8. TEST: Test menu

Items within this group are used with testing.

Items		Name	Description
mV/V test mode		Scale	Show the loadcell signal in mV/V. In trade mode this test is only available for 5 seconds.
High resolution display	⊗	Hi.res	In full setup, this setting enables x10 high resolution display. Weights will be shown with 10x resolution. The options are: • Off[(def)] • On • In safe setup, this setting will display the weight in x10 mode only while the menu is active. Upon exit the x10 mode is disabled. In trade mode this test is only available for 5 seconds.
Test IO: 1 to 4 Test IO: 5 to 8		IO-1.4 IO-5.8	Test IO by testing the value of inputs and setting outputs on/off. If no IO is attached to the C510, "NO I.O." error will be displayed. The input status is: • 1..8: IO is on • -: IO off The output status is: • 1. to 8.: output is on • -.: output is off (despite being turned on) To drive an output, use the Select Change key to select the desired IO, and Change key to toggle the state of the key. The decimal point indicates the IO is being driven as an output.
Overload Counter	⊗	O.LOAD	Shows the number of times that the instrument has been overloaded to above 135% of full-scale. Use the OK key to clear the overload count in full setup.

⊗ = Change only possible in FULL Setup

5.9. SET.PTS: Setpoints menu

This section is used to set all the operational logic of the setpoint system, as well as provide for the entry of secure setpoint target and inflight values.

Items	Name	Description
Setpoint 1 Setpoint 2 Setpoint 3 Setpoint 4 Setpoint 5 Setpoint 6 Setpoint 7 Setpoint 8	Set.pt.1 Set.pt.2 Set.pt.3 Set.pt.4 Set.pt.5 Set.pt.6 Set.pt.7 Set.pt.8	Setpoint settings
Setpoint type	Type	Set setpoint type. Options are: • Off[(def)]: disabled • Active: weight setpoint • Motion: motion status • Zero: zero band status • Error: error status • Net: gross/net status • Set detailed setup. The display will show the setup in the form -GOH-[(def)]. Options are: • -/L: Lock. Disable operator access (via the Tare key). • G/N: Source (gross or net weight). Active setpoints only. • O/U: Weight direction. Active setpoints only. • H/L: Output logic. • -/S/D/C/F: Alarm. None, single beep, double beep, continuous beep, display flash.
Target	Target	Setpoint target. Only used for active setpoints.
Hysteresis	Hys	Setpoint hysteresis. Only used for active setpoints.
Inflight	Flt	Setpoint inflight. Only used for active setpoints.

5.10. ANALOG: Analog output menu

Items within this Group set the options for the optional analog output module.

Items	Name	Description
Source	Src	Select the reading source. Options are: • Disp[(def)]: Displayed weight (gross or net) • Gross: Gross weight • Net: Net weight
Type	Type	Select either voltage or current output. Options are: • Cur.[(def)]: 4-20mA output. • Abs.cur: 4-20mA output as an absolute value (used with loss in weight systems). • Volt: 0V-10V voltage output.
Calibrate Zero output	Cal.lo	Calibrate analog output at 0 weight (either 4 mA or 0V). The analog output cards are factory calibrated but this allows for any fine adjustment on site.
Calibrate Full-scale output	Cal.hi	Calibrate analog output at full-scale weight (either 4 mA or 0V). The analog output cards are factory calibrated but this allows for any fine adjustment on site.
Test Analog Output	Frc.anl	Test analogue output. Set the analogue output low (0V or 4mA) or high (10V or 20mA).

5.11. CLOC: Clock menu

This Group is used to set the clock/calendar and QA options.

Items		Name	Description
Time set		Time	Set the time in the format 00HH.MM, where: • HH: Hours (00 - 23) • MM: Minutes (00 - 59)
Date set		Date	Set the current date in EU format (DD.MM.YY), where: • DD: Day (01 - 31) • MM: Month (01 - 12) • YY: Year (1997 - 2200)
QA enable	⊗	QA.opt	Enable QA calibration due check. Options are: • Off[(def)] • On
QA date	⊗	QA.date	Set the QA check date. Set in EU format (DD.MM.YYYY), where: • DD: Day (01 - 31) • MM: Month (01 - 12) • YY: Year (1997 - 2200)

⊗ = Change only possible in FULL Setup

5.12. FILE: File menu

This group is used for saving and loading files to and from a USB disk attached to the C510. The C510 only supports USB disks formatted with the FAT32 file system.

Items		Name	Description
Upgrade firmware		Fw.Upd	Upgrade the firmware from a USB mass storage device. The upgrade file must be in the root directory of the disk and have an extension of. rpk. There must only be one .rpk file on the disk, as there is no ability to select which file to install. The menu will prompt to continue before installing the firmware. The following errors may be displayed: "No Disk": No USB disk is present, or formatted in an unsupported filesystem "No RPK": There are no .rpk files in the root directory of the USB disk "Many RPK": There is more than one .rpk file in the root directory
Save settings to USB disk		SAV.SET	Save settings to a USB mass storage device. The file will be saved in the root directory and be called C510_<serial number>_<date>_<time>_settings.rdb
Save change log to USB disk		SAV.CL	Save the change log file to a USB mass storage device. The file will be saved in the root directory and be named as follows: C510_<serial number>_<date>_<time>_changelog.csv. For example: C510_402_20120608_145951_changelog.csv

Save DSD data to USB disk	SAV.DSD	Export DSD data to a USB mass storage device. The file will be saved in the root directory and be named as follows: C510_<serial number>_<date>_<time>_dsd.csv. For example: C510_402_20120609_011556_dsd.csv
Save debug information to USB disk	SAV.DBG	Export debug information to disk. This file provides useful information to Rinstrum when trying to solve installation and setup problems. The file will be saved in the root directory and be named as follows: <model>_<serial number>_<date> <time>_debug_info.txt. For example: C510 3382100 20120609 011556_debug info.txt
Eject USB disk	EJECT	Eject the USB disk.

⊗ = Change only possible in FULL Setup

5.13. DSD: Digital Storage Device menu

This group is used for digital storage device options.

Items		Name	Description
DSD Enable	⊗	Enable	Enables and disables the DSD. Options are: • Off(def): Traceable weights are not stored in the DSD • On: Traceable weights are stored in the DSD NOTE: After enabling the DSD for the first time, it is necessary to initialise the DSD before use using the DSD:INIT menu
DSD Status		Status	Displays the current number of records in the DSD, and the total capacity of the DSD.
Auto purge	⊗	A.PURGE	Enables and disables automatic purging of the DSD. When the DSD is purged, 10% of the records are removed. Options are: • Off(def): During printing, if the DSD becomes full, the C510 will prompt the user to purge the DSD • On: During printing, if the DSD becomes full, the C510 will purge the DSD without user interaction
Manual Purge		PURGE	Manually purge 10% of the DSD records
Initialise DSD	⊗	INIT	Initialise the DSD. This option will create or re-create the DSD. All records will be lost. The user will be prompted to continue before this action will occur.

⊗ = Change only possible in FULL Setup

5.14. CHG.LOG: Changelog menu

This group is used for change log options.

Items		Name	Description
Changelog Status		STATUS	Displays the percent full of the change log
Clear Changelog	⊗	CLEAR	Clear the changelog. All records will be lost. An entry will be made in the changelog to indicate it has been cleared.

⊗ = Change only possible in FULL Setup

5.15. FACTRY: Factory menu

This group is used for factory options.

Items		Name	Description
Restore Factory default	⊗	Deflt	Restores settings to factory defaults (except calibration settings)
Printout of the C510 settings		Prn.cfg	Print all settings (on a printer connected to Serial 2).

⊗ = Change only possible in FULL Setup

6. Calibration and Trade

6.1. Introduction and Warnings

The calibration of the C510 indicator is fully digital. The calibration results are stored in permanent memory for use each time the unit is powered up.

Some of the menu settings affect calibration. The BUILD and SPEC:SYNC settings must be set before calibration. Changing these settings after calibration may alter the calibration.

All calibration operations are in the CAL menu. Calibration Routines are available in full setup only (not safe setup).

The calibration program will automatically prevent the C510 from being calibrated into an application outside its specification. If an attempt is made to calibrate the C510 outside of the permitted range, an error message will show, and the routine will be abandoned. Refer Section 17.

The C510 has a wide-range amplifier section. The non-trade calibration range of the instrument extends well beyond the Trade approved range. It should not be assumed that just because the C510 has successfully calibrated a scale, that the scale is correct for trade use. Always check the scale build against the approval specification.

6.2. General Information

6.2.1. Terminology

A knowledge of basic weighing terms is useful in setting up and calibrating the C510. These terms are used throughout the setting procedure and are defined as follows:

- Weighing range: This is the range of weights which can be measured. The C510 can be setup with 1 or 2 ranges.
- Division / count-by: The smallest unit of weight change which is displayed. This will be different for each range. This is setup in BUILD:E1 and BUILD:E2.
- Full-scale / full capacity: The maximum amount of weight used on the scale. This will be different for each range. This is setup in SCALE:CAP1 and SCALE:CAP2.
- Number of divisions: The number of divisions between 0 and full capacity. It is equal to full capacity / count-by. This might be different for each range. For example, 20000kg / 10kg = 2000 divisions.
- Units: describes the unit of measurement used for the weight (kg, t, lb, etc).
- Loadcell signal at full capacity: This is the loadcell signal at full capacity.
- Signal resolution: This is the change in loadcell signal for each division.

  Example:

- A 10000kg, 2.0mV/V loadcell is used in an application with a 5000kg capacity, displaying in 5kg steps.
- The values of each of the above terms is:
  - ○ Units = kg
  - ○ Capacity = 5000kg
  - ○ Count-by = 5kg
  - ○ Number of divisions = 1000 divisions
- The loadcell signal at full capacity = (5000kg / 10000kg) x 2.0mV/V = 1.0mV/V
- The signal at capacity = 5V excitation * 1.0mV/V = 5mV
- The signal resolution = 5mV / 1000 divisions = 5μV/division

6.2.2.   **Dual Interval and Dual Range Operation**

The C510 provides single range, dual interval and dual range modes. In non-trade operation, up to 100,000 divisions are available so it is rare for the precision of the displayed reading to be a problem. However, in Trade applications where the number of divisions that can be legally displayed is limited, the use of Dual Interval or Dual Range operation allows greater precision in the displayed readings without exceeding the maximum number of graduations available in the certification of the loadcell.

Both modes of operation allow for C510 to operate with 2 count-by settings so that it is possible to weigh for example up to 2 kg in 1g increments and then up to 5kg in 2g increments.

Dual Interval and Dual Range are identical in many respects and can be treated the same for the purposes of setup and calibration. The difference in the two comes about in the operation of the scale. With Dual Range operation the range is determined based on the gross weight. Once the scale changes from low range to high range it may not change back to low range again until the scale is returned to a stable zero reading. Dual Interval operation however is based on the net weight and no restrictions are placed on the change from the high interval to the low interval. With Dual Interval operation it is therefore possible to weigh in the low interval with high tare weights.

The C510 is equally accurate in either mode but due to hysteresis effects with many loadcells it may not be possible to operate accurately in Dual Interval mode. In these cases, Dual Range mode ensures that the weight readings taken from the loadcell are accurately displayed during loading and unloading operations.

6.2.3.   **Direct mV/V Operation**

It is possible to calibrate C510 without test weights if the output capacity of the loadcell is known. For applications like silo weighing etc where it is impractical to use test weights this mode of operation allows the mV/V signal strength at no load, as well as the mV/V signal strength of the span to be entered directly. This type of calibration is only as accurate as the loadcell output figures but for many applications this is more than adequate. Extended features like multi-range and linearisation are not compatible with this form of calibration. For more details see 6.6.

6.2.4.   **Maintenance Date**

The C510 can indicate when it is due for recalibration or regular maintenance. This is set in CLOCK:QA.OPT and CLOCK:QA.DATE. When due, the C510 displays (CAL) (DUE). Pressing any key will hide this message temporarily. This message can only be disabled by changing the QA settings (which requires full setup).

6.2.5.   **Filtering Techniques**

The C510 has several advanced filtering options which allow it to be optimized to produce the most accurate readings possible in the shortest time. There is a trade-off between noise reduction and step response time. Note: The step response is the time between placing a weight on the scale and the correct weight reading being displayed.

FIR Filter:

- The first level of filtering provided is a FIR filter that is linked to the measurement rate. The measurement rate is set in SPEC:SYNC. This filter is a very high performance 'tuned' filter that provides up to 180 dB of attenuation at multiples of the SYNC frequency and broad band filtering of between 40 and 80 dB generally. For example,

setting the SYNC frequency at 25Hz would provide 180 dB of noise rejection at 25, 50, 75 … Hz.

- The primary noise source is usually the mains power, so the SYNC is usually set to ½ the mains frequency or the mains frequency. For example, with 50Hz mains power, use 12.5, 25 or 50Hz SYNC frequency. The FIR filter introduces a delay of 3 samples to the step response. So, for a SYNC frequency of 50Hz (i.e. readings every 20 milliseconds) there is a delay of 60 milliseconds between a weight change and the final weight reading (before averaging is applied).

Digital Averaging:

- In addition to the FIR filter the C510 has two levels of digital averaging.
- The first is a fixed length sliding window average where the average of the last 'n' readings is calculated. As each new reading is taken the oldest reading is discarded and a new average calculated. The length of the window is set in OPTION:FILTR from 1 reading to 200 readings. Increasing the average will increase the step response. For example, an average of 10 readings with a SYNC frequency of 50Hz gives a step response = (10 + 3) / 50Hz = 0.26 seconds.
- The second average is like the first but has a variable length which grows from 1 reading up to a maximum of 10 readings. If a disturbance on the scale is detected the old readings are discarded and a new average starts all over again. Each of the 10 readings is calculated over the window length of the fixed average. In this way very, long term averages are calculated without causing any delays. The amount of fluctuation that causes the average to be restarted can be selected as FINE or COARSE in OPTION:JITTER. The COARSE setting is more tolerant of weight change than the FINE.

6.2.6. **Subtractive and Additive Tare**

The C510 can operate subtractive and additive tare:

- Subtractive tare: The weight tared is subtracted from the total weight that can be measured. For example, if the scale capacity is 100kg and the tare is 40kg, then the scale can only measure a maximum 60kg NET.

- Additive tare: The weight tared is not subtracted from the total weight that can be measured. For example, if the scale capacity is 100kg and the tare is 40kg, then the scale can still measure to a maximum 100kg NET. The maximum amount of additive tare is setup in BUILD:AD.TARE.
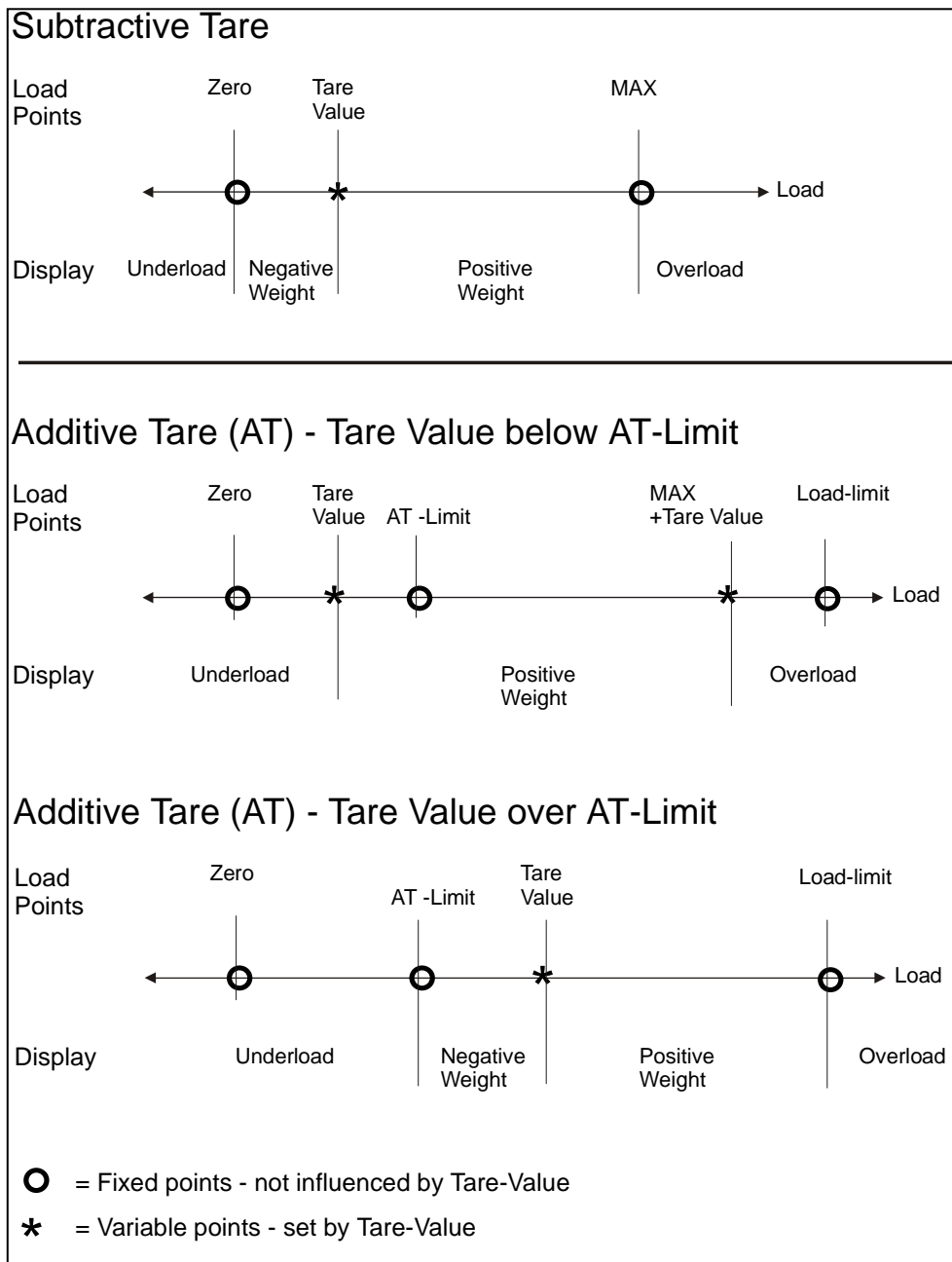
Warning: When using additive tare, ensure that the scale is rated to the additional load.

6.2.7. **Trade versus Industrial Mode**

The C510 may be operated in trade or industrial mode. The differences in operation are:

Operation	Trade mode	Industrial mode
Underload	Below zero range setting	-105% of full-scale
Overload	Full-scale + 9 divisions	105% of full-scale
Tare	Tare values must be > 0	No restriction
Preset tare	Available Long press the Tare key.	Available Long press the Tare key.
De-zero	Not available	Available Long press the Zero key.
Test modes	Limited to 5 seconds	Unlimited time
Hold, peak, livestock	Not available	Available

6.2.8. **Setup Counter**

Within the Setup program there are several parameters that can affect trade performance. If any of these steps are altered, the trade certification of the scale could be voided. These parameters are automatically blocked in safe setup.

There is a built-in setup counter to monitor the number of times the trade parameters are altered. The value of this counter is stored within the unit and can only be reset at the factory. Each time a trade parameter is altered, the counter will increase by one. Whenever the C510 is powered up or setup menus entered/exited, the current value in the counter is displayed.

6.2.9. **Security**

See section 5.1.2.

6.3. CAL:ZERO Zero calibration routine

1. Go to CAL:ZERO in the setup menus: enter full setup (see 5.1.2); press the Zero key until CAL is shown; press the Tare key to show the CAL:ZERO setting (displays ZERO).
2. Press the Select key. The display will show the current weight. Remove all weight from the scale.
3. Press the Print key to start the zero calibration. The display will show (Z.in.P) to show that calibration is in progress. When the process is complete the display will show the weight to allow the zero to be checked.
4. Press the Tare key to exit zero calibration and return to the menu.

6.4. CAL:SPAN Span calibration routine

1. A zero calibration should always be performed before a span calibration.
2. Go to CAL:SPAN in the setup menus: enter full setup (see 5.1.2); press the Zero key until CAL is shown; press the Tare key until the CAL:SPAN setting is shown (displays SPAN).
3. Press the Select key. The display will show the current weight. Add the test weight to the scale.
4. Press the Print key to enter the actual weight on the scale. Use the Select and Print keys to edit the weight if required.
5. Press the F key to start the span calibration. The display will show (S.in.P) to show that calibration is in progress. When the process is complete the display will show the weight to allow the span to be checked.
6. Press the Tare key to exit span calibration and return to the menu.

6.5. Linearisation

Up to ten linearisation points can be set independently anywhere in the operating range of the scale. Unused points may be cleared.

Linearisation is not possible with direct mV/V calibration (where BUILD:TYPE = DIRECT).

Warning: Linearisation changes the signal resolution. If this is close to the limit, it should be checked.

6.5.1. **CAL:ED.LIN Add linearity point**

1. A zero and span calibration must be done before linearisation. Zero and span are assumed to be accurately set and have no linearisation error.
2. Go to CAL:ED.LIN in the setup menus.
3. Press the Select key. The list of linearisation points will be shown.
4. Select a linearity point. Press the Select key until the correct linearity point is shown, then press the Print key. The display will show the current weight. Add the test weight to the scale.
5. Press the Print key to enter the actual weight on the scale. Use the Select and Print keys to edit the weight if required.
6. Press the F key to start the calibration. The display will show (L.in.P) to show that calibration is in progress. When the process is complete the display will show the weight to allow the calibration to be checked.
7. Press the Tare key to exit calibration and return to the menu.

6.5.2. **CAL:CLR.LIN Clear linearity point**

1. Go to CAL:CLR.LIN in the setup menus.
2. Press the Select key to view the linearity points. The percentage of full-scale where the point was entered is shown.
3. Press the Select key until the unwanted linearity point is shown.
4. Press the Print key to clear the linearity point and return to the menu. To exit without clearing, press the Zero key.

6.6. Direct mV/V calibration

It is possible to enter the mV/V values of zero and span directly. To do this, BUILD:TYPE must be set to DIRECT. The internal mV/V accuracy of the C510 has a tolerance of 0.1%. Linearisation is not available with direct calibration.

Calibration procedure:

1. Go to CAL:ZERO in the setup menus: enter full setup (see 5.1.2); press the Zero key until CAL is shown; press the Tare key to show the CAL:ZERO setting (displays ZERO).
2. Press the Select key. The display will show the current weight.
3. Press the Print key to enter the mV/V value of the scale with no load. Use the Select and Print keys to edit the mV/V value.
4. Press the F key to enter the calibration. The display will show the weight.
5. Press the Tare key to exit zero calibration and return to the menu.
6. Press the Tare key to show the CAL:SPAN setting (displays SPAN).
7. Press the Select key. The display will show the current weight.
8. Press the Print key to enter the mV/V value of span at full-scale. Use the Select and Print keys to edit the mV/V value.
9. Press the F key to enter the calibration. The display will show the weight to allow the calibration to be checked.
10. Press the Tare key to exit span calibration and return to the menu.

6.7. CAL:FAC.CAL Factory calibration

The calibration can be reset to the factory calibration using the CAL:FAC.CAL menu item.

7. Automatic weight output

7.1. Introduction

The automatic output is normally used to drive remote displays, dedicated computer connections or PLCs. The output generates a simple weight message at predefined intervals.

7.2. Formats

There are 4 standard format options plus a custom format. The start and end characters of the format strings can be set (even for the standard formats) in the SERIAL:AUT.OPT menu.

Basic format:

Start Format End1 End 2

where:

- Start: Start character (set in SERIAL:AUT.OPT:ST.CHR)
- Format: Format string (set in SERIAL:AUT.OPT:TYPE)
- End1: 1st termination character (set in SERIAL:AUT.OPT:END.CH1)
- End2: 2nd termination character (set in SERIAL:AUT.OPT:END.CH2)

7.2.1. Format A (Rinstrum format)

Format:
  Sign Weight Status
where:

- Sign (1 character): SPACE or '-'
- Weight (7 characters): The weight in 7 characters with decimal point and leading spaces.
- Status (1 character) = 'G', 'N', 'U', 'O', 'M' or 'E' for Gross, Net, Underload, Overload, Motion and Error.

7.2.2. **Format B**

Format:
Status Sign Weight Units
where:

- Status (1 character) = 'G', 'N', 'U', 'O', 'M' or 'E' for Gross, Net, Underload, Overload, Motion and Error.
- Sign (1 character): SPACE or '-'
- Weight (7 characters): The weight in 7 characters with decimal point and leading spaces.
- Units (3 characters): Weight units with leading spaces, e.g. ' kg' or ' t'. When the weight is unstable '   ' is sent.

7.2.3. **Format C**

Format:
Sign Weight S1 S2 S3 S4 Units
Where:

- Sign (1 character): SPACE or '-'
- Weight (7 characters): The weight in 7 characters with decimal point and leading spaces.
- S1 (1 character) = 'G', 'N', 'U', 'O' or 'E' for Gross, Net, Underload, Overload and Error.
- S2 (1 character) = 'M' if motion, otherwise SPACE.
- S3 (1 character) = 'Z' if centre-of-zero, otherwise SPACE.
- S4 (1 character) = If in single range mode '-', otherwise, '1' for range 1, and '2' for range 2.
- Units (3 characters): Weight units with leading spaces, e.g. ' kg' or ' t'.

7.2.4. **Format D**

Format:
Sign Weight
where:

- Sign (1 character): SPACE or '-'
- Weight (7 characters): The weight in 7 characters with decimal point and leading spaces.

7.2.5. **Custom format**

Custom formats are specified in SERIAL:AUT.OPT:AUT.FMT. The format is entered character by character in ASCII codes and format tokens:

- ASCII codes: See the ASCII table in section 8.5.
- Format tokens: See the codes in 7.3.

Up to 50 characters can be entered. If ASCII 0 needs to be sent, enter the token 128.

For example, the following format string would transmit the weight reading in a fixed 7-character field with leading zero suppression and no decimal point:

172 184 188 200 000

7.3. **Custom format tokens**

7.3.1. **Formatting**

Token	Description	Default
170	5-character weight	
171	6-character weight	
172	7-character weight	
173	8-character weight	✓
174	9-character weight	
179	No fixed length field for weight data	
180	No sign character sent	
181	Sign character send as ' ' for positive and '-' for negative	✓
182	Sign character send as '+'for positive and '-' for negative	
183	Sign character send as '0'for positive and '-' for negative	
184	No decimal point sent	
185	Decimal point sent as '.'	✓
186	Decimal point sent as ','	
187	Weight sent with leading zeros, eg 000123	
188	Weight sent without leading zeros eg 123	✓
189	Weight readings sent regardless of overload or error status	✓
190	Weight data blanked on error	
191	Weight data send as '---'on error	
192	Status characters are upper case	✓
193	Status characters are lower case	

7.3.2. **Weight**

Token	Description
200	Selected Weight (SRC)
201	Displayed Weight
202	Gross Weight
203	Net Weight
204	Tare Weight
205	Total

7.3.3. **Status**

Token	Options	Description
210	'kg', 'lb', ' t', ' g'	Weight units
211	G, N, E, O, U, M	Standard Rinstrum status
212	G, N, E, O, U	Rinstrum status without motion
213	G, N	Gross/net status
214	M, ' '	Motion status
215	M, S	Motion/Stable status
216	' ', 'kg', 'lb', ' t', ' g'	Weight units with ' ' for motion
217	M, C, ' '	Motion, over/under capacity or valid weight (' ')
218	M, I, O, ' '	Motion, invalid, over/under capacity, or valid weight (' ')
219	I, O, U	Inscale, overload, underload
220	Z, ' '	Centre of zero status
221	' ', 1, 2	Single range (' ') or range/interval 1 or 2. In Dual interval, the range printed is that of the last weight printed.
222	'ST', 'US', 'OL'	Stable, unstable, overload
230		Send time in format: Hh:mm:ss
231		Send Date in format: Dd/mm/yyyy

8. Printing

8.1. Overview

Four print formats are available. They are based on a 20 or 40 column width printer and may be printed on a 20 or 40 column tally roll serial printer, or a 80 column dot matrix serial printer.

Printing may be triggered manually by the Print key or automatically (auto-printing). Auto-printing prints when the scale reaches no motion with a weight above the zero band.

The printout will be sent to 1 printer only. If a USB printer is connected, this is used. Otherwise, the lowest serial port number which is configured as a printer is used. For example, if SERIAL:SER1:TYPE=PRINT and SERIAL:SER2:TYPE=PRINT, the printout will be sent via SER1 only.

The print format and manual/auto-printing are selected using SERIAL:PRN.OPT:PRNT.TP. The following table shows the options:

Format	Print trigger	
	Print Key	**Auto-print**
Single line printout		
SERIAL:PRN.OPT:PRNT.TP=	SING	A.SING
Example:	`0005 05/10/94 16:47    3654 kg G`	
Double line printout		
SERIAL:PRN.OPT:PRNT.TP=	DOUB	A.DOUB
Example:	`0005 05/10/94 16:47` `  3654  kg G`	
Ticket printout		
SERIAL:PRN.OPT:PRNT.TP=	TIC	A.TIC

Example:	`        WEIGHT`
	`        TICKET`
	`05/10/94    16:50:12`
	`ID: 0008`
	`T:              654 kg`
	`G:             3654 kg`
	`N:             3000 kg`
	`--------------------`	

Total printout		
SERIAL:PRN.OPT:PRNT.TP=	TOTAL	A.TOTAL

Example:	`000491 01/01/1999  10:35:08  100.2 kg G`
	`000492 01/01/1999  10:35:08  105.7 kg G`
	`000493 01/01/1999  10:35:08  124.9 kg G`
	`ITEMS:  3   TOTAL:   330.8 kg`	

8.2. Custom ticket headers

A custom header is available for ticket printouts (SERIAL:PRN.OPT:PRNT.TP=TIC or A.TIC) in the SERIAL:PRN.OPT:HEADER setting. Up to 6 lines of 30 characters can be entered.

Within this setting item, the display shows each of the heading characters in turn using the following format:
   L.CC.XXX

Where:

- L: the line number (1..6)
- CC: the position of the character in that line (01..30)
- XXX: the ASCII code for the printed character

Use the Select and Print keys to edit the ASCII code for the character. Use the F key to select the next character. Use the Zero key to exit the editor and return to the menu. Any printable ASCII codes can be used.

8.2.1.   **Example**

The following table shows the coded entry for "JOE'S FRUIT & VEG". The 'J' would be entered as 1.08.074 for line 1, column 8, ASCII Code 74.

#	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
1								J	O	E	'	S								
	32	32	32	32	32	32	32	74	79	69	39	83	32	32	32	32	32	32	32	32
2				F	R	U	I	T		&		V	E	G						
	32	32	32	70	82	85	73	84	32	38	32	86	69	71	32	32	32	32	32	32

8.3. Custom ticket format

Custom ticket formats can be entered in the SERIAL:PRN.OPT:TIC.FMT setting. Up to 250 characters can be entered to define the exact style of ticket printout.

Within this setting item, the display shows each of the characters in turn using the following format:

CC.XXX

Where:

- CC: the character number (01 to 250)
- XXX: the ASCII code for the format character

Use the Select and Print keys to edit the ASCII code for the character or token. Use the F key to select the next character. Use the Zero key to exit the editor and return to the menu. Any printable ASCII codes (see 8.5) or token (see 8.4) can be used.

8.3.1. **Example**

To print a ticket which looks like:

```
        JOE'S
    FRUIT & VEG
ID:000005
10/10/2012 10:25:30
        25.5 kg N
```

use the following characters/tokens:

Character No.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
Code	\H	I	D	:	\I	\E	\D	\E					\N	\E	\E	*End*
ASCII	136	073	068	058	137	133	132	133	32	32	32	32	142	133	133	00

Note: This uses the header defined above.

8.4. Custom format tokens

These format characters may be sent in a temporary weight string via the network communications to define the format of a single printout.

ASCII Code	Escape Sequence	Description
128	\.	Print a literal NULL character (NULL can't be entered as 00 as this is used to identify the end of the format string)
129	\A	Print lines 1-3 of the header w/o CRLF
130	\B	Print lines 4-6 of the header w/o CRLF
131	\C	Print the number of Columns of SPACE specified by the Printer Space settings
132	\D	Print Date Time field: hh:mm:ss dd:mm:yyy
133	\E	Print End of Line: literally prints CRLF (ASCII 013, 010)
134	\F	Print End of Line (CRLF) followed by 131 (print number of columns of space)
135	\G	Print Gross Weight: "weight(7) units(3) G"
136	\H	Print Custom Ticket Header
137	\I	Print ID number
142	\N	Print Net Weight: "weight(7) units(3) N"
143	\O	Print Total Weight: "weight(7) units(3) G"
146	\R	Print the number of Rows of SPACE specified by the Printer Space settings.
148	\T	Print Tare weight: "weight (7) units (3) T" (or PT or numeric Tare weight)
149	\U	Print units
151	\W	Print displayed weight. "weight (7) units (3) G" (or N)
152	\X	Print the thumbwheel IO selected text line. See Section 16.8
155	\+	Print displayed weight as with \W but add weight to total.
156	\-	Undo last \+ operation.

8.5. ASCII codes

Code	Char	Code	Char	Code	Char	Code	Char	Code	Char	Code	Char
000	NULL	022	SYN	044	,	066	B	088	X	110	n
001	SOH	023	ETB	045	-	067	C	089	Y	111	o
002	STX	024	CAN	046	.	068	D	090	Z	112	p
003	ETX	025	EM	047	/	069	E	091	[	113	q
004	EOT	026	SUB	048	0	070	F	092	\	114	r
005	ENQ	027	ESC	049	1	071	G	093	]	115	s
006	ACK	028	FS	050	2	072	H	094	_	116	t
007	BEL	029	GS	051	3	073	I	095	-	117	u
008	BS	030	RS	052	4	074	J	096	`	118	v
009	HT	031	US	053	5	075	K	097	a	119	w
010	LF	032	SPACE	054	6	076	L	098	b	120	x
011	VT	033	!	055	7	077	M	099	c	121	y
012	FF	034	"	056	8	078	N	100	d	122	z
013	CR	035	#	057	9	079	O	101	e	123	{
014	SO	036	$	058	:	080	P	102	f	124		
015	SI	037	%	059	;	081	O	103	g	125	}
016	DLE	038	&	060	<	082	R	104	h	126	~
017	DC1	039	'	061	=	083	S	105	I	127	DEL
018	DC2	040	(	062	>	084	T	106	j		
019	DC3	041	)	063	?	085	U	107	k		
020	DC4	042	*	064	@	086	V	108	l		
021	NAK	043	+	065	A	087	W	109	m		

9. USB Interface

9.1. Device interface

The USB device interface allows the C510 to be connected to a host PC as a slave device. The C510 appears as a serial port device to the PC. This requires a Rinstrum C510 Viewer to be installed on the host PC. The serial port can then be accessed in the same manner as a traditional PC serial port. This port is referred to as SER0 within the C510.

9.2. Host interface

The USB host interface allows slave devices to be connected to the C510. Supported devices include:

- Keyboard: Connecting a keyboard will permit operation of the C510 via the keyboard. Keys F1..F5 emulate the C510 front keys. The ALT key in combination with F1-F5 will emulate a long press.
- USB Mass Storage Device: Connecting a USB mass storage device will permit updating of firmware from an update file stored on the mass storage device. This will require the user to access full setup menu item under the factory menu. Only FAT32 files systems are supported.
- USB Printing: A text-based USB printer can be connected to the C510 for printing. An example of a text-based USB printer is the Custom Q1 printer (www.custom.it).

10. Change Log

10.1. Introduction

The C510 contains a change log that records trade significant events. These include changes to trade relevant settings, creation and clearing of the change log and trade relevant firmware upgrades. Only trade relevant settings are stored in the change log.

The change log records the following information about each change:

- The calibration counter at the time of the change
- The date and time of the change
- The system database name & setting name that has changed
- The menu name of the setting that has changed
- The index of the setting that has changed. This is only used for array settings, such as resolution where there is a resolution for each range
- Previous value of the setting
- New value of the setting
- The log mask

10.2. Format and Capacity

The change log is stored as a comma separated value (CSV) file. CSV files can be easily viewed in most spreadsheet programs.

The change log has a maximum size of 512 kilobytes. Records vary in length, but are generally in the order of 80bytes, giving approximately 6500 records maximum of the change log. Once the change log is full, the C510 will refuse to save any setting changes until the change log has been cleared. This can be performed from the change log setup menu.

10.3. Changelog Security

The change log is stored on the internal C510 filesystem which is not accessible, and hence cannot be tampered with. The C510 application is the only means by which to access the change log. The C510 contains Alibi software which allows the change log to be viewed. The Alibi change log viewer is part of the trade approval.

When a USB disk is attached to the C510, a copy of the change log can be made to the USB disk. This copy of the change log can always be verified against internal change log, via the Alibi change log viewer.

11. Digital Storage Device (DSD)

11.1. Introduction

The C510 contains a Digital Storage Device (DSD) to record traceable readings. The DSD records the following information about each entry:

- The print ID
- The weight reading
- The tare weight
- The date and time

11.2. Format and Capacity

The DSD is stored in a binary format internally. The DSD has a maximum size of 512 kilobytes and can contain approximately 11900 records. The C510 can be configured to either prompt the user to purge 10% of records from the DSD, or automatically purge 10% of records, once the DSD is full. Records can also be manually purged from the DSD from the DSD:PURGE setup menu.

11.3. Changelog Security

The DSD is stored on the internal C510 filesystem which is not accessible, and hence cannot be tampered with. The C510 application is the only means by which to access the DSD. The C510 contains Alibi software which allows the DSD records to be viewed. The Alibi DSD viewer is part of the trade approval.

When a USB disk is attached to the C510, the DSD can be exported to the USB disk in a comma separated value (CSV) file. CSV files can be easily viewed in most spreadsheet programs. This copy of the DSD can always be verified against internal DSD, via the Alibi DSD viewer.

11.4. Configuring the DSD

The DSD is not enabled by default. To prepare the DSD for use:

- Enter the full setup menus
- Set DSD:ENABLE to On
- Initialise the DSD with DSD:INIT. NOTE: performing this step will mean any existing DSD records will be lost.
- Configure DSD purging with A.PURGE
- After this all traceable printouts will be recorded in the DSD

11.5. Writing Records

A record will be stored in the DSD whenever a traceable weight is generated. A traceable weight is only generated for a single, double or ticket printout. For more information on print setup see section 8. The DSD will also be written when a print occurs in alibi mode.

11.6. Reading Records

The records can be viewed in Alibi mode or exported to a USB disk in comma separated value (CSV) format from the File menu. CSV files can be easily viewed in most spreadsheet programs. For more information on viewing DSD records in Alibi mode see section 12. DSD records exported in CSV format are formatted as follows:
Print ID, Reading, Units, Status, Tare Weight, Units, Status, Valid, Timestamp
3, 223.5, kg, G, 223.5, kg, T, Yes, 2012-06-13 05:43:47

12.   Alibi Application

12.1. Introduction

The Alibi application is part of the trade approval and makes it possible to verify scale readings, view DSD and Change log entries. It can be accessed from the main application by a long press of the Select key, and then selecting Alibi from the list. On starting, it displays the following information:

- "Alibi" to identify that the Alibi application is running
- ADC library version (this is listed on the trade approval)
- ADC library checksum (this is listed on the trade approval)
- Current calibration counter value

12.2. Changing Modes

In all Alibi modes, a long press of the Select key will access the mode menu. Pressing the Select key will advance through each mode, and the Print or Function keys will enter that mode. The "Quit" entry will exit Alibi mode and return to the main application.

12.3. Weighing & Counting Modes

The following keys apply in Alibi Weighing & Counting modes:

ZERO GROUP	**Short Press**	Zero	Zero the scale
	Long Press	(none)	
TARE ITEM	**Short Press**	Tare	Tare the scale
	Long Press	Preset Tare	Enter a preset tare
SELECT ▶	**Short Press**	Gross / Net	Toggle between gross and net weight.
	Long Press	Alibi Mode	Long press to access the Alibi mode menu

PRINT ▲	**Short Press**	Print	Print a simple traceable printout:
			`00000039 2012\06\16 07:04:08`
			`    50.0  kg G`
			`    50.0  kg N`
			`     0.0  kg T`

	Long Press	(none)	
f OK	**Short Press**	Enter Pieces	Enter pieces (only in counting mode)
	Long Press	(none)	Cancel pieces display and return to weight display (only in counting mode)

12.4. DSD & Change log Viewer Modes

The following keys apply in DSD and Change log Viewer modes:

ZERO GROUP	**Short Press**	Prev record	Go to the previous record
	Long Press	First record	Go to the first (oldest) record
TARE ITEM	**Short Press**	Next record	Go to the next record
	Long Press	Last record	Go to the last (newest) record
SELECT ▶	**Short Press**	Search	Search for print ID (DSD viewer), or calibration counter value (Change log viewer)
	Long Press	Alibi Mode	Long press to access the Alibi mode menu
PRINT ▲	**Short Press**	Prev item	Go to the previous item within the current record
	Long Press	First item	Go to the first item within the current record
ƒ OK	**Short Press**	Next item	Go to the next item within the current record
	Long Press	Last item	Go to the last item within the current record

In the DSD viewer, the following items are shown for each record:

- Prn.Id: Print identifier
- Weight: Print weight
- Tar.Wgt: Tare weight
- Date: Date stamp of print (yy.mm.dd)
- Time: Time stamp of print (hh.mm.ss)

In the Change log viewer, the following items are shown for each record:

- Name: Name of parameter that has changed (will scroll if longer than 6 digits)
- Index: Index of parameter that has changed (only shown for parameters with indexes such as full-scale & resolution)
- Old.Val: The old value prior to the change (will scroll if longer than 6 digits)
- New.Val: The new value after the change (will scroll if longer than 6 digits)
- Date: Date stamp of parameter change (yy.mm.dd)
- Time: Time stamp of parameter change (hh.mm.ss)
- Cal.Cnt: The calibration counter value at the parameter change

13. Ethernet Interface

13.1. Overview

The Ethernet interface provides connectivity via a standard 802.3 network. The C510 contains a 100MBit Ethernet interface. This interface allows connectivity to other networked devices, such as PCs. The C510 IP network settings can be configured from the menus under ETH.NET. Fixed or DHCP assigned addresses can be used. When DHCP is used, the IP settings are read-only so the device's IP address can be determined.

13.1.1. Web interface

The C510 provides a simple web interface that can be accessed from a web browser on a PC. The web interface allows new firmware to be uploaded to the C510.

13.1.2. TCP socket interfaces

The C510 provides two TCP socket interfaces for extracting data from the indicator.

1. Referred to as SER5 within the C510, provides a single bi-directional TCP socket connection over which the standard C510 serial command set can be used. The C510 viewer (C500-510) uses this interface when using a TCP connection.
2. Referred to as SER6 within the C510, provides a single uni-directional TCP socket connection over which the C510 can transmit Automatic Output data.

14.   Accessory Modules

14.1. Introduction

The C510 can be expanded by the installation of optional accessory modules. Several modules are available:

- Analogue output module with 2 digital I/O (M5401)
- 8 digital I/O module (M5301)
- AC power module (M5104)
- RS232 Serial communications module (M5201)
- RS485 Serial communications module (M5203)

A maximum of 2 modules can be installed in the C510. Only 1 module of each type may be installed.

14.2. Installation

Isolate the C510 from the power before installing any module. Each module is installed onto the back panel of the C510 and attached by captive mounting screws.

14.3. Configuration

Modules are configured using the C510 setup menus. See section 5.10.

14.4. Digital IO Setpoint Mapping for M5401 & M5301 Modules

The following describes how the setpoints are mapped to the physical IO on the various IO modules (M5301 and M5401):

- When only a M5301 card is fitted, all 8 setpoints are mapped to the M5301 modules
- When only a M5401 card is fitted, setpoints 1 & 2 are mapped to the M5401 module
- When both a M5301 and M5401 card is fitted, all 8 setpoints are mapped to the M5301 card, and the 2 IO on the M5401 do not operate

14.5. Details

See the datasheet for your module.

15.   Setpoints

15.1. Introduction

The C510 has 8 setpoints. The mapping of the setpoints to physical IO is described in section 14.4.

The status of the setpoints is shown on the display (see section 3.2). An optional output driver module can be fitted to allow the setpoints to drive external devices. The lamps then show the status of the output drivers.

Each of the setpoints provides a comparator function that can be modified in the digital setup for switching direction, hysteresis, logic, etc. These settings are all that are required to configure normal level or limit operation. Free-flight (free-fall) functions can be enabled to configure the C510 for weight-batching applications.

Weight target and inflight settings can be pre-set in the digital setup. This method is used where the settings are changed infrequently and are to be as tamper-proof as possible. Optionally, weight target and inflight settings can be set from the front panel keys. This allows settings to be changed much more readily by the operator.

15.2. Connection

Refer to the module datasheet for physical connection details.

15.3. Example 1 (filling a bag)

Settings:Direction = Over, Logic = High, Source = Gross, Target = 2000kg, Inflight = 50 kg, Hysteresis = 5 kg. Initial weight = 0 kg.
Trip point = target - inflight = 2000 - 50 = 1950 kg.
The output will switch ON at a weight over 1950 kg and switch OFF again at a weight under 1945 kg.
If the Logic is changed to Low, the output will be ON at 0 kg, switch OFF at a weight over 1950 kg and switch ON again at a weight under 1945 kg.

15.4. Example 2 (loss in weight system)

Direction = Under, Logic = High, Source = Gross, Target = -100kg, Inflight = 5 kg, Hysteresis = 1 kg. Initial weight = 0 kg.
Trip point = target + inflight = -100 + 5 = -95 kg.
The output will switch ON at a weight under -95 kg and switch OFF again at a weight over -94 kg.

16. Remote Input Functions

16.1. Introduction

The F key (on the front of the C510) can be set to a variety of functions depending on the application. There are also 8 external key inputs (connected to the optional IO modules).

16.2. Functions

Function	F key	Remote Functions	Description
		Availability	
-			No function
0		✓	Zero key (see 16.3)
t		✓	Tare key (see 16.3)
G		✓	Select key (see 16.3)
P		✓	Print key (see 16.3)
b		✓	Blank the display (see 16.4)
L		✓	Lock the C510 (see 16.5)
S	✓	✓	Show total (see 16.6)
C	✓	✓	Clear total (see 16.6)
u	✓	✓	Undo last print (see 16.6)
1, 2, 3, 4	✓	✓	Single transmission from serial port *x* (see 16.7)
H	✓	✓	Hold/unhold the current weight. The units will flash while the weight is held.
E	✓	✓	Show/hide the peak weight reading. The units will flash while the peak weight is shown. A long press will clear the current peak weight. This is available in industrial mode only.
F	✓	✓	Acquire and show livestock weight. Display shows "------"until the livestock weight is held. The units will flash while the weight is held. A long press will cancel livestock operation and show the current weight on the scale.
8		✓	Use this IO as part of thumbwheel input to select text line to print when custom print format contains token 152 (see 16.8).

16.3. Remote access

The function of 4 fixed function keys may be implemented with the remote keys. The Front Panel keys are designated "0TGP" to match Zero, Tare, Select and Print.

16.4. Blanking

When this input is active, the front display is blanked to "------"and the operation of the front keys is blocked. This function is intended for use with tilt sensors on mobile weighing platforms to block operation of the weight indicator if the scale is not level. This function may also be used to block operation of the instrument pending authorization or payment etc.

16.5. Locking

When this input is active, all keys including the remote keys, are blocked. This may be used with a keylock switch to lock the instrument when not in use.

16.6. Totalising

Totalising keys are only available if SERIAL:PRN.OPT:PRNT.TP=TOTAL or SERIAL:PRN.OPT:PRNT.TP=A.TOTAL.

Add-to-total is performed by the print function before printing. There are 3 additional other functions are available remotely:

- Show Total: The total weight is displayed.
- Clear Total: Prints the total weight and clears it.
- Undo last print: Subtract the last item added to totals, and prints "Last Entry Cancelled".

16.7. Single serial transmission

4 functions (1 .. 4) will transmit the weight once to the corresponding serial port. SERIAL:SER*x*:TYPE must be set to SINGLE. See Section 0 for details.

The format of the message is setup in the SERIAL:AUT.OPT menu.

The single serial transmission functions are a convenient way to implement simple PLC communications and logging without the complexity of setting up two-way communications on the serial ports.

16.8. Thumbwheel IO selection of printer text line

This allows a thumbwheel connected to several IO to select one of nine text strings to be printed via the print token 152 (see Section 8.4). The text to be printed can be set using the TXT command (see Section 17.3.41).

All IOs configured for thumbwheel are combined to select the string from lowest IO giving the least significant bit to highest IO giving the most significant bit.

17.   Network Commands

17.1. Basic command set

The C510 supports two levels of networking, Basic and Extended. The Basic level allows for simple weight acquisition by PLC or computer from several C510 on a simple RS232 or RS422 network. The extended network language allows for full control over all functions of the instrument. The section here describes only the basic command structure. For the Extended structure refer to section 17.2.

The C510 may be set to respond to commands sent via the serial port from a PLC or PC. The command structure is:

STX K Command Poll ETX

where:

- STX (1 byte): 02_H
- K (1 byte): $4B_H$
- Command (1 byte): 1-character command (defined below)
- Poll (2 bytes): the network address (set in SERIAL: NET.OPT: ADDRESS). 00 is the broadcast address
- ETX (1 byte): 03_H

Command	Description
z	Zero key press
Z	Zero key long press
T, t	Tare key press
G, g	Select key press
P, q	Print key press
Q	Print key long press
p	Print. This triggers the transmission of the current weight using the format as set in the (Type. A) item of the (SERIAL) group. Use this command to request weight readings on serial port 1. Use the 'P' command to trigger printing from serial port 2.
S, s	Show total
C, c	Clear total
U, u	Undo last print
1, 2, 3, 4	Single transmit on serial 1, 2, 3 or 4
H, h	Hold key press
e	Peak hold key press
E	Peak hold long key press
f	Livestock hold key press
F	Livestock hold long key press

17.1.1. **Examples:**

- To zero the scale of unit 1, send: STX Kz01 ETX
- To print, send: STX KP01 ETX

17.2. Extended command set: overview

17.2.1. Command

Commands consist of three ASCII-characters (e.g. ADR).

The C510 responds with 0CRLF to indicate that a command has been accepted, or ?CRLF to indicate that the command was either not understood or could not be performed. Only the Sxx command and RES command do not have a response.

Some commands will respond with additional failure codes to help diagnose the problem (e.g : CDL, TAR, TAV, TAS and PRN):

Response of the commands:	
?*CRLF*	Command not understood
0*CRLF*	Command correctly operated
1*CRLF*	Command failed: Scale in motion
2*CRLF*	Command failed: Parameter or scale out of range
3*CRLF*	Command failed: System error
4*CRLF*	Command failed: Device not ready

Note: *CRLF* represents 2 bytes: carriage return ($0D_H$) followed by line feed ($0A_H$).

17.2.2. Query

A query consists of 3 ASCII characters plus a question mark (e.g. IDN?).

Normally, a query is a request for information. In this case, the C510 will respond with the information requested. If the query was not understood, the C510 will respond with ?CRLF.

17.2.3. Parameters

A command or query can be followed by one or more parameters.

Parameters are either numeric (e.g. 3000) or strings (e.g. "Otto").

String parameters are delimited by quote characters ("" ASCII 34). They are taken literally so that "AbC d" is not the same as "abcd".

Numeric parameters are variable and leading and trailing spaces are ignored. As a result, 003 03 and 3 are identical.

Parameters are separated by a comma character (',' ASCII 44).

Parameters may be left out completely so that it is possible to change one parameter without altering the others. For example IAD1,,2; will change the position of the decimal point only.

17.2.4. **Termination**

Termination characters define the end of a command, query or response.

Permissible termination characters are ';' (ASCII 59), LF (ASCII 10), CRLF (ASCII 13 10), LFCR (ASCII 10 13).   E.g. ADR?; is the same as ADR? CRLF

The C510 always uses CRLF as the termination of its responses.

17.2.5. **Initial sequence to start communication**

The first command to the C510 should be the select command (see 17.3.35). This should be sent even if only one unit is connected. Note: S99; will select all connected indicators.

17.2.6. **Trade Counter**

The C510 does not check to see if new data is different from the old data before incrementing the trade counter, so sending IAD1,6000 will increment the counter even if the C510 is setup with a full-scale of 6000 kg already.

Query the trade counter with command TDD? (see 17.3.40).

17.3. Extended command set: details

17.3.1. ACL: Auto calibration

The C510 proceeds ca. every second an auto-calibration routine (ca. 200ms) in standstill and ca. every 10 seconds in motion. During that procedure measurement is impossible. The C510 attempts to fill in the missing readings by sending the last readings available. At fast processes it might be of advantage to switch auto-calibration off.

Important:

- ACL only valid in INDUSTRIAL mode
- Power loss resets the C510 i.e. ACL1,1 is valid
- Without auto-calibration the accuracy of the instrument will drop over longer periods

General

No. of parameters	2
Save changes.	not possible
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	Default
1	auto-calibration at standstill	0,1	1
2	auto-calibration at motion	0,1	1

17.3.2. **ADR: Network address**

Set the address of a unit.

General

No. of parameters	2
Save changes.	with TDD1
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	Default
1	Address	0 .. 31	31
2	Serial Number	"0000001" .. "9999999"	"xxxxxxx" factory set

Each C510 must be assigned a unique address to enable the implementation of a multi-drop network. This address can be set using the digital setup menus as described in the reference manual. It is also possible to use the network itself to set the unit addresses. The ADDRESS COMMAND is used to assign the unit address via the communications network,

Example 1:
Change address of unit from 1 to 2

Command	Answer	Description
S01;		Select unit 1
ADR2;	0 *CRLF*	Set address to 2
TDD1;	0 *CRLF*	Save change
S02;		Select new unit 2
IDN?;	WE,"C510","123456",P52 *CRLF*	ask for ID

Example 2:

Two units with unknown addresses are configured using their serial numbers.

Command	Answer	Description
S99;		
ADR01,"123456";	0 *CRLF*	unit with serial no. "123456" gets address 01
ADR02,"123457";	0 *CRLF*	unit with serial no. "123457" gets address 02
TDD1;	0 *CRLF*	save address against power loss
S01;		select the new unit 1
ADR?;	1 *CRLF*	address is 1
IDN?;	WE"C510","123456",P52*CRLF*	ask for ID

17.3.3. **AFT:Custom auto format**

Alters the programmable auto format string. This is the output format used when automatic printing and custom auto format have been selected via the PRS command.

General

No. of parameters	1
Save changes	With TDD1
Increment Trade Counter	No

Parameter Details

Parameter	Description	Range	Default
1	Format String (up to 50 printed chars) Backslash followed by a three digit number for special ASCII characters. See 7.2.5 for details	" string up to 250 chars "	""

Note that this command accepts up to 250 characters, but will truncate the printed string to 50 characters. This allows for long escaped characters to be given (e.g. '\002' requires 4 character input of the 250, but will only print a single STX character in the 50 available to print) See Sections 8.4 and 8.5 for printable characters

Example:

S01;		Select unit 1
AFT?;	""*CRLF*	Empty format string.
AFT"Weight = \200\210 \213";	0 *CRLF*	New auto format would look like: Weight = 628 kg G
TDD1;	0 *CRLF*	Save setting.

Note that the auto output single start and two end characters are printed at each end of the auto output format. Refer to the section above on Auto Transmit Formatting for the full list of formatting tokens.

17.3.4. **ASFFiltering**

Set the filtering characteristics of a unit.

General

No. of parameters	2
Save changes.	with TDD1
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range		Default
1	Number of consecutive readings to average	0	1	9
		1	2	
		2	3	
		3	4	
		4	5	
		5	6	
		6	7	
		7	8	
		8	9	
		9	10	
		10	25	
		11	50	
		12	75	
		13	100	
		14	200	
2	Anti-Jitter Setting	0	off	0
		1	fine	
		2	coarse	

Example:

Command	Answer	Description
S01;		Select unit 1
ASF?;	9,0*CRLF*	Query filtering setting
ASF4,1;	0 *CRLF*	Changed to a 5 reading average with fine anti-jitter setting.
TDD1;	0 *CRLF*	Save new settings.

17.3.5. **BDR: Serial port settings**

Replaced by BDX. Set the communication parameters, baud rate, parity, etc.

General

No. of parameters	4
Save changes.	with TDD1
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range		Default
1	Baud Rate	1	300	
		2	600	
		3	1200	6
		4	400	
		5	4800	
		6	9600	
		7	19200	
2	Parity	0	none	
		1	odd	0
		2	even	
3	Data Bits	7,8		8
4	Stop Bits	1,2		1
5	Termination Resistors	0	OFF	0
		1	ON	

Example:

Change baud rate settings of unit 1.

Command	Answer	Description
S01;		Select unit 1
BDR?;	6,0,8,1,0 *CRLF*	Query baud rate setting
BDR4,1,7,1,1;	0 *CRLF* (Note that the reply is sent using the new settings)	Settings changed to 2400 baud, odd parity, 7 data bits, 1 stop bit, termination on.
TDD1;	0 *CRLF*	Save new settings.

17.3.6. **BDX: Serial port settings**

Set the communication parameters, baud rate, parity, etc.

General

No. of parameters	7
Save changes.	with TDD1
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range		Default
1	Port	1 2 3 4 5 6	Ser 1 Ser 2 Ser 3 Ser 4 Ser 5 Ser 6	1
2	Type	0 1 2 3 4 5	Off Auto Lo Auto Hi Print Single Network	Depends on port
3	Baud Rate	1 2 3 4 5 6 7 8 9 10	300 600 1200 2400 4800 9600 19200 38400 57600 115200	6
4	Parity	0 1 2	None Odd Even	0
5	Data Bits	7,8		8
6	Stop Bits	1,2		1
7	Termination Resistors	0 1	Off On	0
8	DTR	0 1	Off On	0
9	Switch RS232/RS485	0 1	RS485 RS232	1
10	TCP Port	1024..32767		Ser 5:2222, Ser 6:2223

Example:

Change baud rate settings of Unit 1, SER1 to 19200.

Command	Answer	Description
S01;		Select unit 1
BDX?1;	1,6,0,8,1,0,0 *CRLF*	Query SER1 settings
BDX1,7;	0 *CRLF*	Baud rate changed
TDD1;	0 *CRLF*	Save new settings

17.3.7. **BUZ: Buzzer**

Enable/disable the buzzer.

General

No. of parameters	1
Save changes.	with TDD1
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range		Default
1	enable	0	Off	1
		1	On	

Example:

Disable buzzer.

Command	Answer	Description
S01;		Select unit 1
BUZ?;	1 *CRLF*	Query setting
BUZ0;	0 *CRLF*	Buzzer disabled
TDD1;	0 *CRLF*	Save new settings.

17.3.8. **CDL: Zero**

Set the zero dead load cancellation. This is analogous with pressing the Zero key on the front of the instrument.

General

No. of parameters	0
Save changes.	At input
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Example:

Set zero dead load of unit 1.

Command	Answer	Description
S01;		Select unit 1
CDL;	0 *CRLF*	Zero dead load set successfully.
	< load disturbed>	
CDL;	? *CRLF*	Command not understood

Table of possible answers:

?CRLF	Command not understood
0CRLF	Command correctly operated
1CRLF	Scale in motion
2CRLF	Range out – e.g. zero setting out of range
3CRLF	System error
4CRLF	Device not ready – e.g. printer not ready

17.3.9. **CLK: Date and time**

Set the time and date.

General

No. of parameters	6
Save changes.	At input
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	Default
1	Hour	0..23	-
2	Minute	0..59	-
3	Second	0..59	-
4	Date	1..31	-
5	Month	1..12	-
6	Year	0..99	-

Example:

Command	Answer	Description
S01;		Select unit 1
CLK?;	9,20,10,22,6,97 *CRLF*	Query current time & date
CLK10,0,0,23,6,97;	0 *CRLF*	Change to 10 am 23/6/97

17.3.10. **COF: Output format**

Set the output format of the MSV? Query.

General

No. of parameters	1
Save changes.	with TDD1
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	Default
1	Format setting	0..11	3

Binary Formats

Format	Data	Order
0	4 Byte (binary) CRLF	MSB before LSB(=00h)
2	2 Byte (binary) CRLF	MSB, LSB
4	4 Byte (binary) CRLF	LSB(=00h) before MSB
6	2 Byte (binary) CRLF	LSB, MSB
8	4 Byte (binary) CRLF	MSB before LSB (=Status)

Detect end of answer only by length. CR and LF can be part of the weighing data.

ASCII Formats

Format	Parameter 1	Parameter 2	Parameter 3	Parameter 4	
1 & 3	Weight (8)				CRLF
5 & 7	Weight (8)	Address (2)			CRLF
9 & 10	Weight (8)	Address (2)	Status (3)		CRLF
11	Weight (8)	Address (2)	Extended Status (3)		CRLF
12	Weight (8)	Address (2)	Extended Status (3)	Output Status (3)	CRLF

Values in brackets signify the number of characters in the fixed length response.

The weight format is the sign (space or minus), followed by 7 digits 0..9 including the decimal point if used. Format 12 is only available in software versions P60m+.

Status Details

Status	Description	Bit	Comment
001	Overload	0	Weight reading out of range overload or underload
002	Standstill	1	
004	Gross	2	
008	Range 2 active	3	Only with multi-range or multi-interval
016	Limit Value 1 active	4	Always 0 in format 12. See Output Status Details below for Output status.
032	Limit Value 2 active	5	
064	Limit Value 3 active	6	

128	Limit Value 4 active	7	
256	Centre of Zero	8	This status bit is only available in the extended status - Format 11 only.

Note that the status bits are added together. For example, a status of 6 (4+2) means the weight reading is a Gross value with no motion, range 1, and all limit values are inactive.

Output Status Details

Status	Description	Bit
001	Limit Value 1 active	0
002	Limit Value 2 active	1
004	Limit Value 3 active	2
008	Limit Value 4 active	3
016	Limit Value 5 active	4
032	Limit Value 6 active	5
064	Limit Value 7 active	6
128	Limit Value 8 active	7

Example:

Command	Answer	Description
S01;		Select unit 1
COF?;	3 *CRLF*	Query format
MSV?;	-00001.0 *CRLF*	Query weight reading
COF9;	0 *CRLF*	Change to format 9
TDD1;	0 *CRLF*	Save new setting
MSV?;	-00001.0,01,006 *CRLF*	Query weight reading using the new format

17.3.11. **CWT: Calibration weight**

Set the calibration weight to be used for span calibration. This must be set before using the LWT; span calibration command.

General

No. of parameters	1
Save changes.	with TDD1
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	Default
1	Calibration Weight	2% - 100% of full scale weight. *(Send IAD? to read full scale setting)*	3000

Example:

Command	Answer	Description
S01;		Select unit 1
CWT?;	3000 *CRLF*	Query calibration weight setting
CWT4000;	0 *CRLF* *(Note that weight is sent without any decimal point. So 400.0 kg is send as 4000 not 400.0)*	Change calibration weight to 4000.
TDD1;	0 *CRLF*	Save new setting.

17.3.12. **DFT: Default values**

Reset the user database, runtime database, calibration, or ethernet settings.

General

No. of parameters	1
Save changes.	At input
Increment Trade Counter	Yes (only Calibration)
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	
0	command	0	User database
		1	Runtime database
		2	Calibration
		3	Ethernet

Example:

Command	Answer	Description
S01;		Select unit 1
DFT1;	0 *CRLF*	Reset the user database.

17.3.13. **DPF, DPS: Passcodes**

The Safe Passcode protects against misuse by the operator and prevents access to Safe Setup without entering the correct passcode. It does not block changes to settings from the serial ports. The Full Setup can be accessed normally.

The Full Passcode protects against the access to the Full setup through the keys and blocks the change of all trade relevant items through the serial ports. To prevent attempts to crack the full passcode via the serial ports, the unit will only permit 5 unsuccessful attempts. After this any further attempts to enter the full passcode will be ignored until the unit has been restarted.

Sending the passcode in the free stage defines the passcode and locks the unit, sending the passcode in locked stage opens the unit again until it is deselected.

General

No. of parameters	1
Save changes.	With TDD1
Increment Trade Counter	No
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	Default
1	Passcode	000000 - 999999	000000

Note that 0 is not a valid passcode and should instead be written to the parameter to clear the existing passcode.

Example:

Command	Answer	Description
S01;		Select unit 1
DPF?;	0 *CRLF*	No passcode set
DPF123456;	0 *CRLF*	Full passcode set to "123456". The device is now locked.
DPF?;	1 *CRLF*	Unit is locked
DPF666666;	? *CRLF*	"Wrong passcode sent"
DPF123456;	0 *CRLF*	Open unit with passcode "123456".
ENU2;	0 *CRLF*	Weighing unit set to kg
TDD1;	0 *CRLF*	Save new setting.
S02;		Select unit 2- deselect unit 1
S01;		Select unit 1
ENU1;	? *CRLF*	Unit #1 is locked.
DPF123456;	0 *CRLF*	Full passcode set to "123456". The device is now locked.
ENU1;	0 *CRLF*	Weighing unit set to g
TDD1;	0 *CRLF*	Save new setting.

17.3.14. **ENU: Weight units**

Set the units of weight to be displayed and printed.

General

No. of parameters	1
Save changes.	with TDD1
Increment Trade Counter	yes
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range		Default
1	Weight units	0	none	
		1	g	
		2	kg	2
		3	lb	
		4	t	

Example:

Command	Answer	Description
S01;		Select unit 1
ENU?;	2 *CRLF*	Query units setting.
ENU1;	0 *CRLF*	Change units to grams
TDD1;	0 *CRLF*	Save new setting.

17.3.15. **ESR?: Status**

Query the error status of the instrument.

General

No. of parameters	1
Save changes.	-
Increment Trade Counter	-
Response Time of command	-
Response Time of query	

Parameter Details

Parameter	Description	Range	Default
1	select type of status information	0..1	0

The C510 contains both current and latched error status flags. The latched errors are only cleared by resetting the unit (RES command or power off).   The response string is 5 hexadecimal characters representing the 16 error bits. See section 20.4.

Example:

Command	Answer	Description
S01;		Select unit 1
ESR?;	0000 *CRLF*	No current errors.
ESR?1;	00C0 *CRLF*	Positive and Negative Sense lines were not connected at sometime in the past.

17.3.16. **ETH: Ethernet**

Set the ethernet parameters.

General

No. of parameters	7
Save changes.	With TDD1
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	Default
1	DHCP Enable	0..1	1
2	IP address	0.0.0.0 – 255.255.255.255	
3	Subnet mask	0.0.0.0 – 255.255.255.255	
4	Gateway address	0.0.0.0 – 255.255.255.255	
5	DNS1 address	0.0.0.0 – 255.255.255.255	
6	DNS2 address	0.0.0.0 – 255.255.255.255	
7	MAC address	(read only)	
8	Hostname	0..64 characters from a-z, 0-9, -	we2111-<serial number>

Example:

Command	Answer	Description
S01;		Select unit 1
ETH?;	1,"172.17.1.110", "255.255.255.0", "172.17.1.1", "172.17.1.2", "0.0.0.0", "70:4A:E4:00:00:01", "we2111-3382121" *CRLF*	Read Ethernet settings
ETH0;	0 *CRLF*	Disable DHCP
TDD1;	0 *CRLF*	save settings.

17.3.17. **IAD: Scale build**

Set the scale build parameters including max1,e1,max2,e2,decimal point etc.

General

No. of parameters	5
Save changes.	With TDD1
Increment Trade Counter	yes
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range			Default
1	Range	1..2			1
2	Maximum Load (max1 or max2)	100 .. 999999			Range 1: 3000 Range 2: 6000
3	No. of right-side digits. (decimal point position)	0..5			0
4	Resolution (e1 or e2)	1 2 3 4 5 6 7		1 2 5 10 20 50 100	Range 1: 1 Range 2: 2
5	x10 mode	0 1	off on		0
6	Additive Tare	0..full scale			0

Note that the full-scale weight of the instrument is set to Nominal Load 1 for single range installations, and Nominal Load 2 for dual-range and dual-interval installations. In single range installations Nominal Load 2 is not used.

Example:

Command	Answer	Description
S01;		Select unit 1
IAD?1;	1,3000,0,1,0 *CRLF*	
IAD1,4000,1,2,0;	0 *CRLF*	max1 = 4000, e1 = 2 with 1 digit after decimal point on range 1. x10 mode is off.
TDD1;	0 *CRLF*	save setting.

If IAD? is issued without the range parameter, then the returned data is range 1 for single range setup or range 2 for dual interval or dual range setup. In this way it is possible to query the maximum load without the need to issue a WMD? Command to determine the weighing mode.

17.3.18. **ICR: Measurement rate**

Set the fundamental measurement frequency of the instrument.

General

No. of parameters	1
Save changes.	With TDD1
Increment Trade Counter	Yes
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range		Default
1	Measurement Rate in Hz.	10	10Hz	50
		12	12.5Hz	
		15	15Hz	
		20	20Hz	
		25	25Hz	
		30	30Hz	
		50	50Hz	
		60	60Hz	
		100	100Hz	

Note: Frequencies other than those listed above will be accepted but the C510 will operate at the nearest frequency in the table.

Example:

Command	Answer	Description
S01;		Select unit 1
ICR?;	50 *CRLF*	Query current measurement rate
ICR60;	0 *CRLF*	Change to 60 Hz
TDD1;	0 *CRLF*	Save setting.

17.3.19. **IDN: Identification**

Set the unit identification string.

General

No. of parameters	1
Save changes.	With TDD1
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	Default
1	Identification string. (15 bytes max).	" string "	"C510"
2	Serial Number string	"0000001" .. "9999999"	factory set, unique to each unit
3	Version string	P60a – P69z	

Note that only the identification string may be changed. The serial number and version are fixed at the factory and are available for information only by using the IDN? Query.

Example:

Command	Answer	Description
S01;		Select unit 1
IDN?;	WE"C510","1234567",P62x *CRLF*	Query current identification.
IDN"Site A";	0 *CRLF*	Change identification string to "Site A"
TDD1;	0 *CRLF*	save setting.

17.3.20. **LBT: Key locking**

Set the operation status of each of the 5 front panel keys.

General

No. of parameters	2
Save changes.	With TDD1
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range		Default
1	Key	0	Zero	-
		1	Tare	
		2	Select	
		3	Print	
		4	F	
2	Operation	0	LOCK	1
		1	NORMAL	
		2	IMMEDIATE	

Operation of each of the 5 front panel keys may be set independently. NORMAL is obviously the normal function of the key. LOCK means that the key is locked, and its' normal operation is blocked. IMMEDIATE allows for the key function to operate without waiting for stable readings. Select (2) and F keys (4) do not support IMMEDIATE.

Example:

Command	Answer	Description
S01;		Select unit 1
LBT?0;	1 *CRLF*	ZERO is currently set to NORMAL Operation
LBT0,0;	0 *CRLF*	Block operation of the Zero key
TDD1;	0 *CRLF*	save setting.

17.3.21. **LDW: Zero calibration**

Calibrate the zero dead weight of the scale. Note there are two different way of calibration either with standard weight or direct input of mV/V.

General

No. of parameters	0 (1 if mV/V calibration)
Save changes.	With TDD1
Increment Trade Counter	yes
Response Time of command	
Response Time of query	

a.) Calibration with weight

This way of calibration is required if the weighing mode is 1,2 or 3 (see section 17.3.21). The calibration process takes some time to complete. As a result, it is necessary to monitor the calibration process to determine when it is finished. To do this issue an LDW? Query. Following is a list of the possible calibration status responses.

Calibration Status

Status Value	Description
0	Calibration finished successfully
1	Calibration in process (Busy)
101	Error Zero too high (> 2 mV/V), Calibration aborted.
102	Error Zero too low (<-2 mV/V), Calibration aborted.

Example:

Command	Answer	Description
S01;		Select unit 1
LDW;	0 *CRLF*	Start zero calibration.
LDW?;	1 *CRLF*	Query status of the zero-calibration process
LDW?;	1 *CRLF*	still busy
LDW?;	0 *CRLF*	zero calibration finished
TDD1;	0 *CRLF*	save setting.

b.) Calibration in mV/V

This way of calibration is required if the weighing mode is 4 (see section 17.3.44)

Parameter Details

Parameter	Description	Range	Default
1	Zero signal in mV/V 20000 = 2 mV/V	-20000 … 20000	-

Example (Calibration in mV/V):

Command	Answer	Description
S01;		Select unit 1
VAL?;	5076*CRLF*	Current reading is 0,5076 mV/V
LDW5076;	0 *CRLF*	Zero set to 0,5076 mV/V
LDW?;	5076*CRLF*	Zero is 0,5076 mV/V
TDD1;	0 *CRLF*	save setting.

17.3.22. **LIC:Linearisation**

This command gives access to the dual-point linearisation functions of the C510.   A special query LIC? is available to verify the linearisation correction.

Important: The linearisation changes the entire scale sensitivity without zero and end point. Therefore, please double check the scale in critical load ranges.

General

No. of parameters	2
Save changes.	With TDD1
Increment Trade Counter	yes
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	Default
1	Linearisation Point	1..5	1
2	Test Weight Value without decimal point (none = cancel lin. of this point)	0..999999	-

Query Details

Parameter	Description	Range
1	Percentage of Full-Scale reading (this value is given as integer - i.e. 24,999 is given as 24)	-100..100
2	Correction (weight value without decimal point x10)	-100000 .. 100000

To clear one of the Linearisation points leave the test weight value off.

Example: Scale Build is max1 = 500.0 kg,   e1 = 0.1 kg

Command	Answer	Description
S01;		Select unit 1
LIC1;	0 *CRLF*	Clear Linearisation Point 1.
LIC?1;	0,0 *CRLF*	No correction for point 1
MSV?;	120.5 *CRLF*	
LIC1,1200;	0 *CRLF*	Set Linearisation Point 1 to correct for the current test weight of 120.0 kg. *(Note that weight is sent without any decimal point. So, 400.0 kg is send as 4000 not 400.0)*
LIC?1;	24,-50 *CRLF*	Current linearisation is approx. -0.5 kg at approx. 24% of full-scale reading.
TDD1;	0 *CRLF*	save setting.

17.3.23. **LIV: Setpoints**

Set the parameters for the eight setpoints.

General

No. of parameters	10
Save changes.	With TDD1
Increment Trade Counter	No
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range		Default
1	setpoint number	1..8		-
2	Active	0	off	0
		1	on	
		2	motion	
		3	zero indication	
		4	error indication	
		5	Net indication	
3	Data source		gross	1
		2	net	
4	Switching direction		over	1
		2	under	
5	Target Weight	-999999 .. 999999		0
6	Inflight Weight	0 .. 999999		0
7	Hysteresis Weight	0 .. 999999		0
8	Logic	1	Active High	1
		2	Active Low	
9	Lock	0	off	0
		1	on	
10	Alarm	0	off	
		1	single	
		2	dual	0
		3	continuous	
		4	flashing	

Example:

Command	Answer	Description
S01;		Select unit 1
LIV?1;	1,0,1,1,0,0,0,1,0,0 *CRLF*	Query setpoint 1 parameters
LIV1,1,1,1,1000, 100,10,1,0,0;	0 *CRLF*	Change to: active, gross, over switching, target = 1000,inflight = 100, hysteresis = 10,active high logic, no lock, alarm off
TDD1;	0 *CRLF*	save setting.

17.3.24. **LWT: Span calibration**

Calibrate the span of the scale. Note there are two different way of calibration either with standard weight or direct input of mV/V.

General

No. of parameters	0 (if mV/V calibration)
Save changes.	With TDD1
Increment Trade Counter	yes
Response Time of command	
Response Time of query	

a.) Calibration with weight

The calibration process takes some time to complete. As a result, it is necessary to monitor the calibration process to determine when it is finished. To do this issue an LWT? Query. Following is a list of the possible calibration status responses.

Calibration Status

Status Value	Description
0	Calibration finished successfully
1	Calibration in process (Busy)
103	Error Span too Low (< 0.1mV/V), Calibration aborted.
104	Error Span too high (> 3.0 mV/V), Calibration aborted.
105	No Zero calibration

Example:

Command	Answer	Description
S01;		Select unit 1
LWT;	0 *CRLF*	Start span calibration.
LWT?;	1 *CRLF*	Query status of the span calibration process
LWT?;	1 *CRLF*	still busy
LWT?;	0 *CRLF*	span calibration finished
TDD1;	0 *CRLF*	save setting.

b.) Calibration in mV/V

This way of calibration is required if the weighing mode is 4 (see section 17.3.44)

Parameter Details

Parameter	Description	Range	Default
1	Span signal in mV/V 20000 = 2 mV/V	-32000 … 32000	-

Example:

Command	Answer	Description
S01;		Select unit 1
LWT15000;	0 *CRLF*	Span set to 1,5000 mV/V
LWT?;	15000*CRLF*	Span is 1,5000 mV/V
TDD1;	0 *CRLF*	save setting.

17.3.25. **MSV?: Current weight**

Query weight readings.

General

No. of parameters	2
Save changes.	-
Increment Trade Counter	-
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range		Default
1	Type of reading	1	displayed weight	1
		2	gross weight	
		3	net weight	
		4	number of items in	
		5	Total weight	
		6	-	
		7	Peak weight	
2	Number of consecutive readings	0..60000 (0 means continuous output)		1

Example:

Command	Answer	Description
S01;		Select unit 1
COF3;	0 *CRLF*	set output format 3
MSV?;	00200.0 *CRLF*	query displayed weight
MSV?2;	00400.0 *CRLF*	query gross weight
MSV?2,5;	00400.0 *CRLF* 00400.1 *CRLF* 00400.2 *CRLF* 00400.3 *CRLF* 00400.4 *CRLF* *CRLF*	query the next 5 consecutive gross weight readings.
MSV?,0	00400.0 *CRLF* 00400.1 *CRLF* 00400.2 *CRLF*	Enable continuous output
STP;		Stop continuous output

Note that the CRLF is sent after each reading for the ASCII formats but not for the binary formats. With the binary formats a single CRLF is sent at the end of the response regardless of the number of readings requested.

To stop continuous output, send a STP; command. During continuous output the C510 will not respond to other commands.

17.3.26. **MTD: Motion**

Alter the Motion Option settings.

General

No. of parameters	1
Save changes.	With TDD1
Increment Trade Counter	yes
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range		Default
1	Motion Setting	0	OFF	1
		1	0.5d in 1sec	
		2	1.0d in 1 sec	
		3	2.0d in 1 sec	
		4	5.0d in 1 sec	
		5	0.5d in 0.5 sec	
		6	1.0d in 0.5 sec	
		7	2.0d in 0.5 sec	
		8	5.0d in 0.5 sec	
		9	0.5d in 0.2 sec	
		10	1.0d in 0.2 sec	
		11	2.0d in 0.2 sec	
		12	5.0d in 0.2 sec	

Example:

Command	Answer	Description
S01;		Select unit 1
MTD?;	1 *CRLF*	Current Motion detection is 0.5 divisions in 1 second.
MTD2;	0 *CRLF*	Set Motion detection to 1.0 divisions in 1 second.
TDD1;	0 *CRLF*	save setting.

17.3.27. **PFT: Custom print format**

Set the customer ticket format.

General

No. of parameters	1
Save changes.	With TDD1
Increment Trade Counter	No
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	Default
1	Format String (Max 50 printed characters)	" string up to 250 chars "	""

Note that this command accepts up to 250 characters, but will truncate the printed string to 50 characters. This allows for long escaped characters to be given (e.g. '\002' requires 4 character input of the 250, but will only print a single STX character in the 50 available to print) See Sections 8.4 and 8.5 for printable characters

Example:

Command	Answer	Description
S01;		Select unit 1
PFT?;	"" *CRLF*	Query string
PFT"Weight = \W \E";	0 *CRLF*	New print ticket looks like: Weight = 127.8 kg G CRLF
TDD1;	0 *CRLF*	save setting.

17.3.28. **POR: External IO**

Force digital outputs on or off. This is only enabled for IO lines not configured as setpoints. POR? replies with the status of the 8 digital IO lines.

General

No. of parameters	8
Save changes.	With TDD1
Increment Trade Counter	No
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	Default
1 - 8	Output 1 - 8	0 or 1	-

Example:

Command	Answer	Description
S01;		Select unit 1
POR1,1,1,1,1,1,1,1;	0 *CRLF*	IO 1 – 8 set as outputs and set to on
TDD1;	0 *CRLF*	Save setting.
LIV1,1;	0 *CRLF*	Setpoint 1 is active.
POR1,1,1,1;	? *CRLF*	Not possible as POR not enabled for setpoint 1
POR,1,1,1;	0 *CRLF*	Ok, only deactivated setpoint changed
POR?;	1,1,1,1,0,0,0,0 *CRLF*	IO 1- 4 are on, IO 5-8 are off

17.3.29. **PRS: Serial port 2**

General

No. of parameters	6
Save changes.	With TDD1
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range		Default
1	Mode of Operation	0 1 2 3 4 5	OFF AUTO LOW PRINT SINGLE AUTO HI NETWORK	2
2	Printing Function	1 2 3 4 5 6 7 8	Single Double Ticket Automatic Single Automatic Double Automatic Ticket Total Automatic Total	1
3	Auto Transmit Format	1 2 3 4 5	Auto A Auto B Auto CAuto D Custom	1
4	No. of Columns to Pad	0..20		0
5	No. of Rows to Pad	0..10		0
6	Auto Transmit Source	1 2 3 4	Display Gross Net Total	1

Example:

Command	Answer	Description
S01;		Select unit 1
PRS?;	0,1,1,0,0 *CRLF*	Currently Serial 2 is OFF.
PRS2,3,,2,3;	0 *CRLF*	Set for Ticket Printing with two columns and 3 rows padding.
TDD1;	0 *CRLF*	save setting.

17.3.30. **PRT: Print**

Force the instrument to print using serial 2. This is analogous with pressing the Print key on the front of the instrument. Sending a String to the C510 allows free layout of the printout. If the printout could not be performed the reply of the C510 is? CRLF.

General

No. of parameters	2
Save changes.	-
Increment Trade Counter	-
Response Time of command	
Response Time of query	

Command Parameter Details

Parameter	Description	Range		Default
1	Mode of Operation	0	Normal print	0
		1	Print with response of ID, Date, Time and Displayed Weight to serial 1 (For Date and Time format see CLK? command)	
		2	As 1, but Gross weight	
		3	As 1, but Net weight	
		4	As 1, but Tare weight	
2	String to be printed 1:1 (up to 250 characters) Backslash followed by a three-digit number for special ASCII characters Backslash followed by a letter for fields \G or \g makes no difference See 8.3 for more details	\010 = LF \013 = CR \094 = Backslash self \T = Tare weight \G = Gross weight \N = Net weight \D = Date and Time \I = Printout \U = Unit \H = Standard Header \R = Free rows from PRS command \C = Free columns from PRS command \E = Prints end of line (CRLF) \W = Prints displayed weight \+ = as \W but add to total \- = Undo last print		-

Table of possible answers:

?CRLF	Command not understood
0CRLF	Command correctly operated
1CRLF	Scale in motion
2CRLF	Range out – e.g. zero setting out of range
3CRLF	System error
4CRLF	Device not ready – e.g. printer not ready

Query Parameter Details

Parameter	Description	Range		Default
1	Data selection		ID of last printout Next line of printout as a string in quotation marks. E.g. : " WEIGHT " A 2000-byte buffer is used to store printouts. This command returns a single line of a printout where lines longer than 100 characters are cut into pieces. Each line is discarded after it is sent. An empty string is sent when the buffer is empty. Hint: Poll PRT?0 to determine when new data is available, then use PRT?1 for each line of the printout until an empty string is returned. Non-printable characters are sent using \xxx format. E.g. : CRLF is "\013\010".	0

Example for PRT:

Command	Answer	Description
S01;		Select unit 1
PRT;	0 CRLF	Force unit to print using the printer port. This is the same as pushing the print key.
PRT?;	38CRLF	ID number of the last printout is 38
PRT0,"Weight = \G\010\013";	0 CRLF	Prints: Weight = 100.0 kg G
PRT1,"Weight = \G\010\013";	40, 9,20,10,22,6,97, 00100.0 CRLF	Prints: Weight = 100.0 kg G Returns to serial 1: Printout ID = 40 Hour = 9Minute = 20 Second = 10 Date = 22 Month = 6 Year = 97 Displayed Weight = 100.0
PRT;	? CRLF	Printout was not successful
PRT;	0 CRLF	Standard Printout
PRT?1; PRT?1; PRT?1; PRT?1; PRT?1; PRT?1; PRT?1; PRT?1; PRT?1;	" WEIGHT\013\010" " TICKET\013\010" "05/10/94 16:50:12\013\010" "ID: 0008\013\010" "T: 654 kg\013\010" "G: 3654 kg\013\010" "N: 3000 kg\013\010" "-------------------\013\010" ""	This enables the entire contents of the printout to be collected line by line.

17.3.31. **PST: Print header**

Set the 6-line header for printed tickets.

General

No. of parameters	2
Save changes.	With TDD1
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	Default
1	Line number	1..6	1
2	Line contents (Max 30 characters)	"string up to 30 chars "	"WEIGHT " "TICKET"

Note that while the input may be up to 30 characters, the string returned from this command will be padded with trailing spaces to exactly 30 characters.

Example:

Command	Answer	Description
S01;		Select unit 1
PST?1;	" Weight " *CRLF*	Query line 1 data
PST?2;	" Ticket " *CRLF*	Query line 2 data
PST1,"Joe Bloggs Pty Ltd";	0 *CRLF*	Change line 1
PST2,"ph 3312 1234";	0 *CRLF*	Change line 2
TDD1;	0 *CRLF*	save setting.

17.3.32. **QAF: Maintenance date**

General

No. of parameters	4
Save changes.	With TDD1
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	Default
1	Off = 0, On = 1	0 .. 1	0
2	Day	01 .. 31	
3	Month	01 .. 12	
4	Year	00 .. 99 or 1998 .. 2097	

Example:

Command	Answer	Description
S01;		Select unit 1
QAF?;	0,15,6,99 CRLF	QA-function off, date set to 15.6.99
QAF1,21,6,1999	0 *CRLF*	QA-function on, date set to 21.6.99
TDD1;	0 *CRLF*	save setting.

17.3.33. **RBT: Remote keys**

Setup the functions of each of the 8 remote inputs or artificially force the execution of the function. This may be used to implement the extended features w/o external keys and no need of the option cards.

General

No. of parameters	3
Save changes.	With TDD1
Increment Trade Counter	No
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range		Default
1	Input number	0 (front function key), 1..8 (remote inputs)		1
2	Operation (front function key)	0 1 2 3 4 5 6 7 8 9 10	None Show Total Clear Total Undo Print Single Tx Serial 1 Single Tx Serial 2 Manual Hold Show Peak Livestock Hold Single Tx Serial 3 Single Tx Serial 4	-
2	Operation (remote inputs)	0 1 2 3 4 5 6 7 8 9 10 11 11 12 13 14 15 16	None Zero Tare Select Print Blank Lock Show Total Clear Total Undo Print Single Tx Serial 1 Single Tx Serial 2 Manual Hold Show Peak Livestock Hold Thumbwheel Single Tx Serial 3 Single Tx Serial 4	-

		1 7		
3	Duration of key press	0 1	Short press Long press	0

Example:

Command	Answer	Description
S01;		Select unit 1
RBT?1;	*0 CRLF*	Get current operation of input 1 – none at the moment
RBT1,1;	0 *CRLF*	Set input 1 to "Zero"
TDD1;	0 *CRLF*	save setting.
RBT1;	0 *CRLF*	Simulate "Zero"
RBT1,,1;	0 *CRLF*	Simulate "De-Zero" – Long press of Zero key

17.3.34. **RES: Reset**

Use this command to simulate a power-on reset.

General

No. of parameters	0
Save changes.	-
Increment Trade Counter	-
Response Time of command	
Response Time of query	

Example:

Command	Answer	Description
S01;		Select unit 1
RES		Reset unit.

17.3.35. **Sxx: Select address**

The Sxx command is used to select one or more units with which to communicate. It should be used under all circumstances as **first command** to the C510 even if only one instrument is connected.

S00 to S31 selects a single unit with the matching address 00 to 31.

S96 to S99 have special functions:

S96: de-select all units.

S97 & S98: All units are selected but none reply to commands. This mode is very useful for blanket commands for an entire network of units.

S99 selects all units and all respond. S99 is useful when a single unit is connected to the network as it is possible to select this unit regardless of its address setting.

Example:

Command	Answer	Description
S01;		Select unit 1
MSV?;	00400.0 *CRLF*	Query current weight
S02;		Select unit 2
MSV?	00623.5 *CRLF*	Query current weight.
S96;		De-select all units

17.3.36. **STP: Stop continuous data**

Stop continuous weight transmission started by MSV?,0; command.

General

No. of parameters	0
Save changes.	-
Increment Trade Counter	-
Response Time of command	
Response Time of query	

Example:

Command	Answer	Description
S01;		Select unit 1
MSV?,0;	00400.0 *CRLF* 00400.1 *CRLF* 00400.2 *CRLF* *…*	Start continuous data transmission.
STP		Stop continuous data transmission.

17.3.37. **TAR: Tare**

Force a Tare operation.

General

No. of parameters	0
Save changes.	At input
Increment Trade Counter	no
Response Time of command	
Response Time of query	

This command is the same as pressing the Tare key on the front of the instrument except that the C510 does not wait for no motion. If the current weight reading is not stable the C510 will return '?' and ignore the TAR command.

Table of possible answers:

?CRLF	Command not understood
0CRLF	Command correctly operated
1CRLF	Scale in motion
2CRLF	Range out – e.g. zero setting out of range
3CRLF	System error
4CRLF	Device not ready – e.g. printer not ready

Example:

Command	Answer	Description
S01;		Select unit 1
MSV?;	00400.0 *CRLF*	Query current weight
TAR;	0 *CRLF*	Tare
MSV?;	00000.0 *CRLF*	Query current weight reading.
MSV?1	00400.0 *CRLF*	Query gross weight

17.3.38. **TAS: Gross / net**

Select Gross or Net weight display.

General

No. of parameters	1
Save changes.	At input
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range		Default
1	Gross or Net	0	net	-
		1	gross	

Table of possible answers:

?CRLF	Command not understood
0CRLF	Command correctly operated
1CRLF	Scale in motion
2CRLF	Range out – e.g. zero setting out of range
3CRLF	System error
4CRLF	Device not ready – e.g. printer not ready

Example:

Command	Answer	Description
S01;		Select unit 1
MSV?;	00200.0 *CRLF*	Query current weight
TAS?;	0 *CRLF*	unit is is net mode
TAS1;	0 *CRLF*	Switch to Gross weight
MSV?;	00400.0 *CRLF*	Query current weight
TAS?;	1 *CRLF*	unit is in gross mode

17.3.39. **TAV: Tare value**

Set a numeric tare value directly.

General

No. of parameters	1
Save changes.	At input
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	Default
1	Tare value	0 .. full scale	-

Table of possible answers:

?CRLF	Command not understood
0CRLF	Command correctly operated
1CRLF	Scale in motion
2CRLF	Range out – e.g. zero setting out of range
3CRLF	System error
4CRLF	Device not ready – e.g. printer not ready

Example:

Command	Answer	Description
S01;		Select unit 1
MSV?2;	00300.0 *CRLF*	Query net weight
TAV?;	1000 *CRLF*	Tare value is 100.0
TAV2000;	0 *CRLF*	Set Tare value to 200.0
MSV?2;	00200.0 *CRLF*	Query net weight
TAV?;	2000 *CRLF*	Tare value is 200.0

17.3.40. **TDD: Save/load setup**

Save or restore instrument settings. Query trade counter

General

No. of parameters	1
Save changes.	-
Increment Trade Counter	yes (TDD0 only)
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	
1	command	0	Load ROM default values
		1	Save current settings
		2	Reload previous settings

Example:

Command	Answer	Description
S01;		Select unit 1
IDN"Site A"	0 *CRLF*	Set ID string
TDD1;	0 *CRLF*	Save settings
TDD?;	123 *CRLF*	Trade counter is 123

17.3.41. **TXT: Thumb wheel text strings**

Store or read text strings for printing with token 152 when selected by IOs configured for thumbwheel operation.

General

No. of parameters	2
Save changes.	At input
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	Default
1	line	1..9	
2	string	0..40 printable ASCII characters	"TXT LINE n"

Example:

Command	Answer	Description
S01;		Select unit 1
TXT?1;	1,"TXT LINE 1" CRLF	Read text line 1
TXT2,"new text";	0 *CRLF*	Set text line 2

17.3.42. **VAL?: mV/V value**

Reads the current signal in mV/V.

General

No. of parameters	1
Save changes.	
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	Default
1	Current signal in mV/V 20000 = 2.0000 mV/V	-50000 … 50000	-

Example:

Command	Answer	Description
S01;		Select unit 1
VAL?;	5076*CRLF*	Current reading is 0,5076 mV/V

17.3.43. **WFP: Which serial port is this**

Determine which serial port this connection is on.

General

No. of parameters	1
Save changes.	-
Increment Trade Counter	no
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range	
1	Port	1	Serial 1
		2	Serial 2
		3	Serial 3 (RS422 Module)
		4	Serial 4 (RS232 Module)
		5	Serial 5 (TCP Network)
		6	Serial 6 (TCP Auto Output)
		7	Serial 7 (USB Slave)

Example:

Command	Answer	Description
S01;		Select unit 1
WFP?;	5 *CRLF*	Connected to the TCP network port (usually TCP port 2222)
WFP?;	1 *CRLF*	Connected to serial 1

17.3.44. **WMD: Weighing mode**

Set the weighting mode of the instrument. This selects between single range, dual range and dual interval weighing modes.

General

No. of parameters	2
Save changes.	With TDD1
Increment Trade Counter	yes
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range		Default
1	Weighing mode	1	single range	1
		2	dual range	
		3	dual interval	
		4	direct mV/V calibration	
2	Trade mode	0	Trade,	0
		1	Industrial	

Use the WMD command to setup the weighing mode of the instrument. This setting is a fundamental scale build parameter and should be used along with the IAD and ICR commands before the unit is calibrated.

Example:

Command	Answer	Description
S01;		Select unit 1
WMD?;	1,0 *CRLF*	Query current weighing mode
WMD2,1;	0 *CRLF*	change to dual range, industrial mode
WMD?;	2,1 *CRLF*	weighing mode is dual range, industrial
TDD1;	0 *CRLF*	save settings

17.3.45. **ZST: Zero settings**

Set the various options associated with zero balance.

General

No. of parameters	4
Save changes.	With TDD1
Increment Trade Counter	depends on parameter
Response Time of command	
Response Time of query	

Parameter Details

Parameter	Description	Range		Default	Trade Counter
1	Zero on Start up		OFF ON	0	No
2	Zero Tracking		OFF 0.5d in 1sec 1.0d in 1 sec 2.0d in 1 sec 5.0d in 1 sec 0.5d in 0.5 sec 1.0d in 0.5 sec 2.0d in 0.5 sec 5.0d in 0.5 sec 0.5d in 0.2 sec 1.0d in 0.2 sec 2.0d in 0.2 sec 5.0d in 0.2 sec	0	Yes
3	Zero setting Range		-20% .. 20% -100% .. 100% -2% .. 2% -1% .. 3%	3	Yes
4	Zero Dead Band	0..100000		0	Yes

Example:

Command	Answer	Description
S01;		Select unit 1
ZST?;	0,0,3,0 *CRLF*	Query current zero settings
ZST1;	0 *CRLF*	Change to zero on start up
ZST,,,10;	0 *CRLF*	Change Zero Dead Band to 10
ZST?;	1,0,3,10 *CRLF*	Query new settings
TDD1;	0 *CRLF*	save settings

17.3.46. **LRP: License Packages**

License and unlicense packages and query package licence status.

To prevent attempts to crack the licensing via the serial ports, the unit will only permit 3 unsuccessful attempts.

After this any further attempts to license a package will be ignored until the unit has been restarted.

General

No. of parameters	5
Save changes	With TDD1
Increment Trade Counter	No

Parameter	Description	Range	Default
1	Package Index	0 .. 49	0
2	Number of Installed Packages	0 .. 50	-
3	Name of Package		-
4	Package Licensed	0 = Package is not licensed 1 = Package is not licensed	-
5	Licence Code	AAAAAA .. ZZZZZZ	-

Command	Answer	Description
S01;		Select unit 1
LRP?0;	0,1,"C510-K501",1,"SCHFPB"CRLF	Package 0 is C510-K501, it is licensed with code SCHFPB. There is 1 package installed.
LRP?1;	1,2,"L900-500",1,"IAHUZA"CRLF	Package 1 is L900-500, it is licensed with code IAHUZA.
LRP,"L900-500",0;	0 CRLF	Unlicensed package L900-500.
LRP?1;	1,2,"L900-500",0,""CRLF	Package 1 is L900-500, it is not licensed.
LRP,"L900-500",1,"IAHUZA";	0 CRLF	License package L900-500 with code IAHUZA.
LRP?1;	1,2,"L900-500",1,"IAHUZA"CRLF	Package 1 is L900-500, it is licensed with code IAHUZA.
TDD1;	0 CRLF	Save settings

18. Modbus TCP

The C510 supports a fully featured Modbus implementation which exposes most legacy serial communication commands (see Section 17.2) as Modbus registers.

The following Modbus protocol is supported:

- Modbus TCP: Available on the Ethernet port. The TCP port listening for connections can be configured via SERIAL: MOD.OPT: PORT.

For legacy 5000 replacement installations using Modbus, please refer to the legacy Modbus documentation (see Section 19).

The details of underlying communications protocol are generally looked after by the PLC directly. Please refer to the official Modbus documentation available from http://modbus.org/specs.php for more information on the protocol.

Registers listed below refer to the Modbus Data Model (MDM), which offsets each register by one in relation to the Protocol Data Unit (PDU). Most PLCs will use MDM to specify registers, whilst PDU is used for the underlying data transfer. For an explanation of these terms, please refer to the Modbus protocol documentation available via the URL above.

<div style="border:1px solid red; color:red">
Warning – Be sure to correctly configure the indicator address in SERIAL: NET. OPT: ADDRES. The indictor will not reply to messages that do not match its address.
</div>

18.1. Register Sizes

When accessing parameters that span more than a single Modbus register (16bits), the read or write MUST consist of enough Modbus registers to accommodate the data. If the read or write does not contain enough registers, the indicator will return a Modbus error.

- When reading an SINT32 or UINT32, the read or write must consist of two 16bit Modbus registers. For example, when reading the displayed weight (register 6201), two Modbus registers must be read (6201 and 6202).
- When reading a STR (size), the read or write must consist of ((size + 1) / 2) Modbus registers. For example, when reading the unit ID (register 6101), ((15 + 1) / 2) = 8 Modbus registers must be read (6101 to 6109). The first 15 bytes will be the register data, and the last byte will be zero. When writing a string register, unused bytes should be set to zero. In the register table, strings are given a length in bytes in the following way: STR (bytes).

It is possible to read more than one sequential register in a single read or write.

18.2. Modbus Holding Registers

The following Modbus functions are implemented for holding registers:

- Read holding registers (function code 0x03)
- Write single register (function code 0x06)
- Write multiple registers (function code 0x10)

The following table lists the translation for each Modbus holding register into the corresponding serial communication command:

Regist	Name	Type	Write	Read	Read Response	Description
1108	ANALOG_OUT_ABSOLUTE	UINT16	AOC,,,,,<value>;	AOC?;	,,,,,<value>	Analog output absolute
1109	ANALOG_OUT_CLIP	UINT16	AOC,,,,,,<value>;	AOC?;	,,,,,,<value>	Analog output clip
2001	ADDRESS	UINT16	ADR<value>;	ADR?;	<value>	Device network address
2002	PRINT_MODE	UINT16	PRS,<value>;	PRS?;	,<value>	Printer mode
2003	AUTO_OUT_FMT	UINT16	PRS,,<value>;	PRS?;	,,<value>	Automatic output format
2004	PRINT_COLUMNS	UINT16	PRS,,,<value>;	PRS?;	,,,<value>	Printer ticket columns
2005	PRINT_ROWS	UINT16	PRS,,,,<value>;	PRS?;	,,,,<value>	Printer ticket rows
2006	AUTO_OUT_SOURCE	UINT16	PRS,,,,,<value>;	PRS?;	,,,,,<value>	Automatic output source
2101	SER0_M1A_TYPE	UINT16	BDX0,<value>;	BDX?0;	0,<value>	Serial module 1A port type
2102	SER0_M1A_BAUD	UINT16	BDX0,,<value>;	BDX?0;	0,,<value>	Serial module 1A port baud
2103	SER0_M1A_PARITYBITS	UINT16	BDX0,,,<value>;	BDX?0;	0,,,<value>	Serial module 1A port parity bits
2104	SER0_M1A_DATABITS	UINT16	BDX0,,,,<value>;	BDX?0;	0,,,,<value>	Serial module 1A port data bits
2105	SER0_M1A_STOPBITS	UINT16	BDX0,,,,,<value>;	BDX?0;	0,,,,,<value>	Serial module 1A port stop bits
2106	SER0_M1A_TERMINATIONS	UINT16	BDX0,,,,,,<value>;	BDX?0;	0,,,,,,<value>	Serial module 1A port use terminations
2107	SER0_M1A_CTS	UINT16	BDX0,,,,,,,<value>;	BDX?0;	0,,,,,,,<value>	Serial module 1A port use CTS
2111	SER1_M1B_TYPE	UINT16	BDX1,<value>;	BDX?1;	1,<value>	Serial module 1B port type
2116	SER1_M1B_TERMINATIONS	UINT16	BDX1,,,,,,<value>;	BDX?1;	1,,,,,,<value>	Serial module 1B port use terminations
2117	SER1_M1B_CTS	UINT16	BDX1,,,,,,,<value>;	BDX?1;	1,,,,,,,<value>	Serial module 1B port use CTS
2121	SER2_M2A_TYPE	UINT16	BDX2,<value>;	BDX?2;	2,<value>	Serial module 2A port type
2122	SER2_M2A_BAUD	UINT16	BDX2,,<value>;	BDX?2;	2,,<value>	Serial module 2A port baud
2123	SER2_M2A_PARITYBITS	UINT16	BDX2,,,<value>;	BDX?2;	2,,,<value>	Serial module 2A port parity bits
2124	SER2_M2A_DATABITS	UINT16	BDX2,,,,<value>;	BDX?2;	2,,,,<value>	Serial module 2A port data bits
2125	SER2_M2A_STOPBITS	UINT16	BDX2,,,,,<value>;	BDX?2;	2,,,,,<value>	Serial module 2A port stop bits
2126	SER2_M2A_TERMINATIONS	UINT16	BDX2,,,,,,<value>;	BDX?2;	2,,,,,,<value>	Serial module 2A port use terminations
2127	SER2_M2A_CTS	UINT16	BDX2,,,,,,,<value>;	BDX?2;	2,,,,,,,<value>	Serial module 2A port use CTS
2131	SER3_M2B_TYPE	UINT16	BDX3,<value>;	BDX?3;	3,<value>	Serial module 2B port type
2136	SER3_M2B_TERMINATIONS	UINT16	BDX3,,,,,,<value>;	BDX?3;	3,,,,,,<value>	Serial module 2B port use terminations
2137	SER3_M2B_CTS	UINT16	BDX3,,,,,,,<value>;	BDX?3;	3,,,,,,,<value>	Serial module 2B port use CTS
2141	SER4_TCPPORT	UINT16	BDX4,,,,,,,,<value>;	BDX?4;	4,,,,,,,,<value>	Serial network TCP listen port
2151	SER5_TCPPORT	UINT16	BDX5,,,,,,,,<value>;	BDX?5;	5,,,,,,,,<value>	Serial auto output TCP listen port
2161	SER6_USBSLAVE_TYPE	UINT16	BDX6,<value>;	BDX?6;	6,<value>	Serial USB slave port type
2171	SER7_USBHOST_TYPE	UINT16	BDX7,<value>;	BDX?7;	7,<value>	Serial USB host port type
2172	SER7_USBHOST_BAUD	UINT16	BDX7,,<value>;	BDX?7;	7,,<value>	Serial USB host port baud
2173	SER7_USBHOST_PARITYBITS	UINT16	BDX7,,,<value>;	BDX?7;	7,,,<value>	Serial USB host port parity bits
2174	SER7_USBHOST_DATABITS	UINT16	BDX7,,,,<value>;	BDX?7;	7,,,,<value>	Serial USB host port data bits
2175	SER7_USBHOST_STOPBITS	UINT16	BDX7,,,,,<value>;	BDX?7;	7,,,,,<value>	Serial USB host port stop bits
2177	SER7_USBHOST_CTS	UINT16	BDX7,,,,,,,<value>;	BDX?7;	7,,,,,,,<value>	Serial USB host port use CTS
2191	MODBUS_ENDIAN	UINT16	MBS<value>;	MBS?;	<value>	Modbus endian
2192	MODBUS_TCP_PORT	UINT16	MBS,<value>;	MBS?;	,<value>	Modbus TCP port
2201	AUTO_OUT_FMT_CUSTOM	STR(246)	AFT<value>;	AFT?;	<value>	Auto output format
2401	DHCP_ENABLE	UINT16	ETH<value>;	ETH?;	<value>	Ethernet DHCP enable
2402	IP_ADDR	STR(15)	ETH,<value>;	ETH?;	,<value>	Ethernet IP address
2410	NETMASK	STR(15)	ETH,,<value>;	ETH?;	,,<value>	Ethernet network mask

2418	DEFGW	STR(15)	ETH,,,<value>;	ETH?;	,,,<value>	Ethernet default gateway
2426	DNS	STR(15)	ETH,,,,<value>;	ETH?;	,,,,<value>	Ethernet DNS server
2434	MAC_ADDR	STR(17)		ETH?;	,,,,,,<value>	Ethernet MAC address
2443	HOSTNAME	STR(64)	ETH,,,,,,,<value>;	ETH?;	,,,,,,,<value>	Ethernet hostname
2501	PRINT_FORMAT	STR(246)	PFT<value>;	PFT?;	<value>	Printer format
2701	PRINT_HDR1	STR(30)	PST1,<value>;	PST?1;	<value>	Printer header line 1
2716	PRINT_HDR2	STR(30)	PST2,<value>;	PST?2;	<value>	Printer header line 2
2731	PRINT_HDR3	STR(30)	PST3,<value>;	PST?3;	<value>	Printer header line 3
2746	PRINT_HDR4	STR(30)	PST4,<value>;	PST?4;	<value>	Printer header line 4
2761	PRINT_HDR5	STR(30)	PST5,<value>;	PST?5;	<value>	Printer header line 5
2776	PRINT_HDR6	STR(30)	PST6,<value>;	PST?6;	<value>	Printer header line 6
2801	TEXT_STR1	STR(40)	TXT1,<value>;	TXT?1;	1,<value>	Text string 1 (thumbwheel)
2821	TEXT_STR2	STR(40)	TXT2,<value>;	TXT?2;	2,<value>	Text string 2 (thumbwheel)
2841	TEXT_STR3	STR(40)	TXT3,<value>;	TXT?3;	3,<value>	Text string 3 (thumbwheel)
2861	TEXT_STR4	STR(40)	TXT4,<value>;	TXT?4;	4,<value>	Text string 4 (thumbwheel)
2881	TEXT_STR5	STR(40)	TXT5,<value>;	TXT?5;	5,<value>	Text string 5 (thumbwheel)
2901	TEXT_STR6	STR(40)	TXT6,<value>;	TXT?6;	6,<value>	Text string 6 (thumbwheel)
2921	TEXT_STR7	STR(40)	TXT7,<value>;	TXT?7;	7,<value>	Text string 7 (thumbwheel)
2941	TEXT_STR8	STR(40)	TXT8,<value>;	TXT?8;	8,<value>	Text string 8 (thumbwheel)
2961	TEXT_STR9	STR(40)	TXT9,<value>;	TXT?9;	9,<value>	Text string 9 (thumbwheel)
3001	ENABLE	UINT16	BUZ<value>;	BUZ?;	<value>	Buzzer enable
3002	MSV_FORMAT	UINT16	COF<value>;	COF?;	<value>	MSV output format
3011	HOUR	UINT16	CLK<value>;	CLK?;	<value>	Clock hour
3012	MINUTE	UINT16	CLK,<value>;	CLK?;	,<value>	Clock minute
3013	SECOND	UINT16	CLK,,<value>;	CLK?;	,,<value>	Clock second
3014	DAY	UINT16	CLK,,,<value>;	CLK?;	,,,<value>	Clock day of month
3015	MONTH	UINT16	CLK,,,,<value>;	CLK?;	,,,,<value>	Clock month
3016	YEAR	UINT16	CLK,,,,,<value>;	CLK?;	,,,,,<value>	Clock year
3021	FULL_PASS	UINT32	DPF<value>;	DPF?;	<value>	Full passcode
3023	SAFE_PASS	UINT32	DPS<value>;	DPS?;	<value>	Safe passcode
3031	PERMIS_KEY_ZERO	UINT16	LBT0,<value>;	LBT?0;	<value>	Zero key permissions
3032	PERMIS_KEY_TARE	UINT16	LBT1,<value>;	LBT?1;	<value>	Tare key permissions
3033	PERMIS_KEY_GROSSNET	UINT16	LBT2,<value>;	LBT?2;	<value>	Select key permissions
3034	PERMIS_KEY_FUNC1	UINT16	LBT3,<value>;	LBT?3;	<value>	Function key 1 permissions
3035	PERMIS_KEY_FUNC2	UINT16	LBT4,<value>;	LBT?4;	<value>	Function key 2 permissions
3036	PERMIS_KEY_FUNC3	UINT16	LBT5,<value>;	LBT?5;	<value>	Function key 3 permissions
3042	KEY_REM1_FN	UINT16	RBT1,<value>;	RBT?1;	<value>	Remote button 1 function
3043	KEY_REM2_FN	UINT16	RBT2,<value>;	RBT?2;	<value>	Remote button 2 function
3044	KEY_REM3_FN	UINT16	RBT3,<value>;	RBT?3;	<value>	Remote button 3 function
3045	KEY_REM4_FN	UINT16	RBT4,<value>;	RBT?4;	<value>	Remote button 4 function
3046	KEY_REM5_FN	UINT16	RBT5,<value>;	RBT?5;	<value>	Remote button 5 function
3047	KEY_REM6_FN	UINT16	RBT6,<value>;	RBT?6;	<value>	Remote button 6 function
3048	KEY_REM7_FN	UINT16	RBT7,<value>;	RBT?7;	<value>	Remote button 7 function
3049	KEY_REM8_FN	UINT16	RBT8,<value>;	RBT?8;	<value>	Remote button 8 function

3051	QA_ENABLE	UINT16	QAF<value>;	QAF?;	<value>	Quality assurance enable
3052	QA_DATE	UINT16	QAF,<value>;	QAF?;	,<value>	Quality assurance day of month
3053	QA_MONTH	UINT16	QAF,,<value>;	QAF?;	,,<value>	Quality assurance month
3054	QA_YEAR	UINT16	QAF,,,<value>;	QAF?;	,,,<value>	Quality assurance year
3061	KEY_FUNC1_FN	UINT16	FBT1,<value>;	FBT?1;	<value>	Function key 1 function
3062	KEY_FUNC2_FN	UINT16	FBT2,<value>;	FBT?2;	<value>	Function key 2 function
3063	KEY_FUNC3_FN	UINT16	FBT3,<value>;	FBT?3;	<value>	Function key 3 function
4001	USER_ZERO	UINT16	CDL;			Perform User zero
4002	TARE	SINT32	TAR;	TAR?;	<value>	Perform semi-automatic tare
4004	SWITCH_GROSS_NET	UINT16	TAS<value>;	TAS?;	<value>	Switch gross and net
4005	PRESET_TARE	SINT32	TAV<value>;	TAV?;	<value>	Perform preset tare
4101	DEFAULT_USERDB	UINT16	DFT0;			Default user database
4102	DEFAULT_RTDB	UINT16	DFT1;			Default runtime database
4103	DEFAULT_CAL	UINT16	DFT2;			Default calibration
4104	DEFAULT_ETH	UINT16	DFT3;			Default ethernet settings
4151	SAVE_LOAD_DEFAULT_SETTINGS	UINT32	TDD<value>;	TDD?;	<value>	Save settings/load settings/set defaults/read cal count
4201	DISPLAY	STR(32)		FPL?;	<value>	Read display buffer
4222	KEY_REM1_PRESS	UINT16	RBT1,,<value>;			Remote button 1 press (0 short, 1 long)
4223	KEY_REM2_PRESS	UINT16	RBT2,,<value>;			Remote button 2 press (0 short, 1 long)
4224	KEY_REM3_PRESS	UINT16	RBT3,,<value>;			Remote button 3 press (0 short, 1 long)
4225	KEY_REM4_PRESS	UINT16	RBT4,,<value>;			Remote button 4 press (0 short, 1 long)
4226	KEY_REM5_PRESS	UINT16	RBT5,,<value>;			Remote button 5 press (0 short, 1 long)
4227	KEY_REM6_PRESS	UINT16	RBT6,,<value>;			Remote button 6 press (0 short, 1 long)
4228	KEY_REM7_PRESS	UINT16	RBT7,,<value>;			Remote button 7 press (0 short, 1 long)
4229	KEY_REM8_PRESS	UINT16	RBT8,,<value>;			Remote button 8 press (0 short, 1 long)
4231	KEY_ZERO	UINT16	FPL1,<value>;			Zero key press (0 short, 1 long)
4232	KEY_TARE	UINT16	FPL2,<value>;			Tare key press (0 short, 1 long)
4233	KEY_GROSSNET	UINT16	FPL3,<value>;			Select key press (0 short, 1 long)
4234	KEY_FUNC1	UINT16	FPL4,<value>;			Function 1 key press (0 short, 1 long)
4235	KEY_FUNC2	UINT16	FPL5,<value>;			Function 2 key press (0 short, 1 long)
4236	KEY_FUNC3	UINT16	FPL6,<value>;			Function 3 key press (0 short, 1 long)
4241	KEY_FUNC1_PRESS	UINT16	FBT1,,<value>;			Function key 1 press (0 short, 1 long)
4242	KEY_FUNC2_PRESS	UINT16	FBT2,,<value>;			Function key 2 press (0 short, 1 long)
4243	KEY_FUNC3_PRESS	UINT16	FBT3,,<value>;			Function key 3 press (0 short, 1 long)
4251	DISPLAY_BRIGHTNESS	UINT16	BRT<value>;	BRT?;	<value>	Display brightness
4301	RESET_UNIT	UINT16	RES;			Reset unit
5001	DOUT1	UINT16	FOP<value>;	FOP?;	<value>	Digital output 1 state
5002	DOUT2	UINT16	FOP,<value>;	FOP?;	,<value>	Digital output 2 state
5003	DOUT3	UINT16	FOP,,<value>;	FOP?;	,,<value>	Digital output 3 state
5004	DOUT4	UINT16	FOP,,,<value>;	FOP?;	,,,<value>	Digital output 4 state
5005	DOUT5	UINT16	FOP,,,,<value>;	FOP?;	,,,,<value>	Digital output 5 state
5006	DOUT6	UINT16	FOP,,,,,<value>;	FOP?;	,,,,,<value>	Digital output 6 state
5007	DOUT7	UINT16	FOP,,,,,,<value>;	FOP?;	,,,,,,<value>	Digital output 7 state
5008	DOUT8	UINT16	FOP,,,,,,,<value>;	FOP?;	,,,,,,,<value>	Digital output 8 state

5011	DOUT1	UINT16	POR<value>;	POR?;	<value>	Digital output 1 state
5012	DOUT2	UINT16	POR,<value>;	POR?;	,<value>	Digital output 2 state
5013	DOUT3	UINT16	POR,,<value>;	POR?;	,,<value>	Digital output 3 state
5014	DOUT4	UINT16	POR,,,<value>;	POR?;	,,,<value>	Digital output 4 state
5015	DOUT5	UINT16	POR,,,,<value>;	POR?;	,,,,<value>	Digital output 5 state
5016	DOUT6	UINT16	POR,,,,,<value>;	POR?;	,,,,,<value>	Digital output 6 state
5017	DOUT7	UINT16	POR,,,,,,<value>;	POR?;	,,,,,,<value>	Digital output 7 state
5018	DOUT8	UINT16	POR,,,,,,,<value>;	POR?;	,,,,,,,<value>	Digital output 8 state
5101	SP1_TYPE	UINT16	LIV1,<value>;	LIV?1;	1,<value>	Setpoint 1 type
5102	SP1_SOURCE	UINT16	LIV1,,<value>;	LIV?1;	1,,<value>	Setpoint 1 source
5104	SP1_TARGET	SINT32	LIV1,,,,<value>;	LIV?1;	1,,,,<value>	Setpoint 1 target
5106	SP1_INFLIGHT	SINT32	LIV1,,,,,<value>;	LIV?1;	1,,,,,<value>	Setpoint 1 inflight
5108	SP1_HYSTERESIS	SINT32	LIV1,,,,,,<value>;	LIV?1;	1,,,,,,<value>	Setpoint 1 hysteresis
5110	SP1_LOGIC	UINT16	LIV1,,,,,,,<value>;	LIV?1;	1,,,,,,,<value>	Setpoint 1 logic inversion
5111	SP1_LOCK	UINT16	LIV1,,,,,,,,<value>;	LIV?1;	1,,,,,,,,<value>	Setpoint 1 lock
5112	SP1_ALARM	UINT16	LIV1,,,,,,,,,<value>;	LIV?1;	1,,,,,,,,,<value>	Setpoint 1 alarm
5113	SP1_TIMING	UINT16	LIV1,,,,,,,,,,<value>;	LIV?1;	1,,,,,,,,,,<value>	Setpoint 1 timing
5114	SP1_RESET	UINT16	LIV1,,,,,,,,,,,<value>;	LIV?1;	1,,,,,,,,,,,<value>	Setpoint 1 reset
5121	SP2_TYPE	UINT16	LIV2,<value>;	LIV?2;	2,<value>	Setpoint 2 type
5122	SP2_SOURCE	UINT16	LIV2,,<value>;	LIV?2;	2,,<value>	Setpoint 2 source
5124	SP2_TARGET	SINT32	LIV2,,,,<value>;	LIV?2;	2,,,,<value>	Setpoint 2 target
5126	SP2_INFLIGHT	SINT32	LIV2,,,,,<value>;	LIV?2;	2,,,,,<value>	Setpoint 2 inflight
5128	SP2_HYSTERESIS	SINT32	LIV2,,,,,,<value>;	LIV?2;	2,,,,,,<value>	Setpoint 2 hysteresis
5130	SP2_LOGIC	UINT16	LIV2,,,,,,,<value>;	LIV?2;	2,,,,,,,<value>	Setpoint 2 logic inversion
5131	SP2_LOCK	UINT16	LIV2,,,,,,,,<value>;	LIV?2;	2,,,,,,,,<value>	Setpoint 2 lock
5132	SP2_ALARM	UINT16	LIV2,,,,,,,,,<value>;	LIV?2;	2,,,,,,,,,<value>	Setpoint 2 alarm
5133	SP2_TIMING	UINT16	LIV2,,,,,,,,,,<value>;	LIV?2;	2,,,,,,,,,,<value>	Setpoint 2 timing
5134	SP2_RESET	UINT16	LIV2,,,,,,,,,,,<value>;	LIV?2;	2,,,,,,,,,,,<value>	Setpoint 2 reset
5141	SP3_TYPE	UINT16	LIV3,<value>;	LIV?3;	3,<value>	Setpoint 3 type
5142	SP3_SOURCE	UINT16	LIV3,,<value>;	LIV?3;	3,,<value>	Setpoint 3 source
5144	SP3_TARGET	SINT32	LIV3,,,,<value>;	LIV?3;	3,,,,<value>	Setpoint 3 target
5146	SP3_INFLIGHT	SINT32	LIV3,,,,,<value>;	LIV?3;	3,,,,,<value>	Setpoint 3 inflight
5148	SP3_HYSTERESIS	SINT32	LIV3,,,,,,<value>;	LIV?3;	3,,,,,,<value>	Setpoint 3 hysteresis
5150	SP3_LOGIC	UINT16	LIV3,,,,,,,<value>;	LIV?3;	3,,,,,,,<value>	Setpoint 3 logic inversion
5151	SP3_LOCK	UINT16	LIV3,,,,,,,,<value>;	LIV?3;	3,,,,,,,,<value>	Setpoint 3 lock
5152	SP3_ALARM	UINT16	LIV3,,,,,,,,,<value>;	LIV?3;	3,,,,,,,,,<value>	Setpoint 3 alarm
5153	SP3_TIMING	UINT16	LIV3,,,,,,,,,,<value>;	LIV?3;	3,,,,,,,,,,<value>	Setpoint 3 timing
5154	SP3_RESET	UINT16	LIV3,,,,,,,,,,,<value>;	LIV?3;	3,,,,,,,,,,,<value>	Setpoint 3 reset
5161	SP4_TYPE	UINT16	LIV4,<value>;	LIV?4;	4,<value>	Setpoint 4 type
5162	SP4_SOURCE	UINT16	LIV4,,<value>;	LIV?4;	4,,<value>	Setpoint 4 source
5164	SP4_TARGET	SINT32	LIV4,,,,<value>;	LIV?4;	4,,,,<value>	Setpoint 4 target
5166	SP4_INFLIGHT	SINT32	LIV4,,,,,<value>;	LIV?4;	4,,,,,<value>	Setpoint 4 inflight
5168	SP4_HYSTERESIS	SINT32	LIV4,,,,,,<value>;	LIV?4;	4,,,,,,<value>	Setpoint 4 hysteresis
5170	SP4_LOGIC	UINT16	LIV4,,,,,,,<value>;	LIV?4;	4,,,,,,,<value>	Setpoint 4 logic inversion

5171	SP4_LOCK	UINT16	LIV4,,,,,,,,<value>;	LIV?4;	4,,,,,,,,<value>	Setpoint 4 lock
5172	SP4_ALARM	UINT16	LIV4,,,,,,,,,<value>;	LIV?4;	4,,,,,,,,,<value>	Setpoint 4 alarm
5173	SP4_TIMING	UINT16	LIV4,,,,,,,,,,<value>;	LIV?4;	4,,,,,,,,,,<value>	Setpoint 4 timing
5174	SP4_RESET	UINT16	LIV4,,,,,,,,,,,<value>;	LIV?4;	4,,,,,,,,,,,<value>	Setpoint 4 reset
5181	SP5_TYPE	UINT16	LIV5,<value>;	LIV?5;	5,<value>	Setpoint 5 type
5182	SP5_SOURCE	UINT16	LIV5,,<value>;	LIV?5;	5,,<value>	Setpoint 5 source
5184	SP5_TARGET	SINT32	LIV5,,,,<value>;	LIV?5;	5,,,,<value>	Setpoint 5 target
5186	SP5_INFLIGHT	SINT32	LIV5,,,,,<value>;	LIV?5;	5,,,,,<value>	Setpoint 5 inflight
5188	SP5_HYSTERESIS	SINT32	LIV5,,,,,,<value>;	LIV?5;	5,,,,,,<value>	Setpoint 5 hysteresis
5190	SP5_LOGIC	UINT16	LIV5,,,,,,,<value>;	LIV?5;	5,,,,,,,<value>	Setpoint 5 logic inversion
5191	SP5_LOCK	UINT16	LIV5,,,,,,,,<value>;	LIV?5;	5,,,,,,,,<value>	Setpoint 5 lock
5192	SP5_ALARM	UINT16	LIV5,,,,,,,,,<value>;	LIV?5;	5,,,,,,,,,<value>	Setpoint 5 alarm
5193	SP5_TIMING	UINT16	LIV5,,,,,,,,,,<value>;	LIV?5;	5,,,,,,,,,,<value>	Setpoint 5 timing
5194	SP5_RESET	UINT16	LIV5,,,,,,,,,,,<value>;	LIV?5;	5,,,,,,,,,,,<value>	Setpoint 5 reset
5201	SP6_TYPE	UINT16	LIV6,<value>;	LIV?6;	6,<value>	Setpoint 6 type
5202	SP6_SOURCE	UINT16	LIV6,,<value>;	LIV?6;	6,,<value>	Setpoint 6 source
5204	SP6_TARGET	SINT32	LIV6,,,,<value>;	LIV?6;	6,,,,<value>	Setpoint 6 target
5206	SP6_INFLIGHT	SINT32	LIV6,,,,,<value>;	LIV?6;	6,,,,,<value>	Setpoint 6 inflight
5208	SP6_HYSTERESIS	SINT32	LIV6,,,,,,<value>;	LIV?6;	6,,,,,,<value>	Setpoint 6 hysteresis
5210	SP6_LOGIC	UINT16	LIV6,,,,,,,<value>;	LIV?6;	6,,,,,,,<value>	Setpoint 6 logic inversion
5211	SP6_LOCK	UINT16	LIV6,,,,,,,,<value>;	LIV?6;	6,,,,,,,,<value>	Setpoint 6 lock
5212	SP6_ALARM	UINT16	LIV6,,,,,,,,,<value>;	LIV?6;	6,,,,,,,,,<value>	Setpoint 6 alarm
5213	SP6_TIMING	UINT16	LIV6,,,,,,,,,,<value>;	LIV?6;	6,,,,,,,,,,<value>	Setpoint 6 timing
5214	SP6_RESET	UINT16	LIV6,,,,,,,,,,,<value>;	LIV?6;	6,,,,,,,,,,,<value>	Setpoint 6 reset
5221	SP7_TYPE	UINT16	LIV7,<value>;	LIV?7;	7,<value>	Setpoint 7 type
5222	SP7_SOURCE	UINT16	LIV7,,<value>;	LIV?7;	7,,<value>	Setpoint 7 source
5224	SP7_TARGET	SINT32	LIV7,,,,<value>;	LIV?7;	7,,,,<value>	Setpoint 7 target
5226	SP7_INFLIGHT	SINT32	LIV7,,,,,<value>;	LIV?7;	7,,,,,<value>	Setpoint 7 inflight
5228	SP7_HYSTERESIS	SINT32	LIV7,,,,,,<value>;	LIV?7;	7,,,,,,<value>	Setpoint 7 hysteresis
5230	SP7_LOGIC	UINT16	LIV7,,,,,,,<value>;	LIV?7;	7,,,,,,,<value>	Setpoint 7 logic inversion
5231	SP7_LOCK	UINT16	LIV7,,,,,,,,<value>;	LIV?7;	7,,,,,,,,<value>	Setpoint 7 lock
5232	SP7_ALARM	UINT16	LIV7,,,,,,,,,<value>;	LIV?7;	7,,,,,,,,,<value>	Setpoint 7 alarm
5233	SP7_TIMING	UINT16	LIV7,,,,,,,,,,<value>;	LIV?7;	7,,,,,,,,,,<value>	Setpoint 7 timing
5234	SP7_RESET	UINT16	LIV7,,,,,,,,,,,<value>;	LIV?7;	7,,,,,,,,,,,<value>	Setpoint 7 reset
5241	SP8_TYPE	UINT16	LIV8,<value>;	LIV?8;	8,<value>	Setpoint 8 type
5242	SP8_SOURCE	UINT16	LIV8,,<value>;	LIV?8;	8,,<value>	Setpoint 8 source
5244	SP8_TARGET	SINT32	LIV8,,,,<value>;	LIV?8;	8,,,,<value>	Setpoint 8 target
5246	SP8_INFLIGHT	SINT32	LIV8,,,,,<value>;	LIV?8;	8,,,,,<value>	Setpoint 8 inflight
5248	SP8_HYSTERESIS	SINT32	LIV8,,,,,,<value>;	LIV?8;	8,,,,,,<value>	Setpoint 8 hysteresis
5250	SP8_LOGIC	UINT16	LIV8,,,,,,,<value>;	LIV?8;	8,,,,,,,<value>	Setpoint 8 logic inversion
5251	SP8_LOCK	UINT16	LIV8,,,,,,,,<value>;	LIV?8;	8,,,,,,,,<value>	Setpoint 8 lock
5252	SP8_ALARM	UINT16	LIV8,,,,,,,,,<value>;	LIV?8;	8,,,,,,,,,<value>	Setpoint 8 alarm
5253	SP8_TIMING	UINT16	LIV8,,,,,,,,,,<value>;	LIV?8;	8,,,,,,,,,,<value>	Setpoint 8 timing
5254	SP8_RESET	UINT16	LIV8,,,,,,,,,,,<value>;	LIV?8;	8,,,,,,,,,,,<value>	Setpoint 8 reset

6001	ERROR_SYS	UINT32		ESM?0;	<value>	Error status system (equivalent of ESR)
6003	ERROR_LATCH	UINT32		ESM?1;	<value>	Error status latched (equivalent of ESR)
6101	UNIT_ID	STR(15)	IDM<value>;	IDM?;	<value>	Unit identification (equivalent of IDN)
6109	SERIAL_NO	UINT32		IDM?;	,<value>	Unit serial number (equivalent of IDN)
6111	SW_VERSION	STR(10)		IDM?;	,,<value>	Unit software version (equivalent of IDN)
6116	UNIT_MODEL	STR(7)		IDM?;	,,,,<value>	Unit model (equivalent of IDN)
6201	WEIGHT_DISPLAYED	SINT32		MSM?1;	<value>	Measured displayed weight (equivalent of MSV)
6203	WEIGHT_STATUS_DISPLAYED	UINT32		MSM?1;	,<value>	Measured displayed weight status
6205	WEIGHT_GROSS	SINT32		MSM?2;	<value>	Measured gross weight (equivalent of MSV)
6207	WEIGHT_STATUS_GROSS	UINT32		MSM?2;	,<value>	Measured gross weight status
6209	WEIGHT_NET	SINT32		MSM?3;	<value>	Measured net weight (equivalent of MSV)
6211	WEIGHT_STATUS_NET	UINT32		MSM?3;	,<value>	Measured net weight status
6213	WEIGHT_TOTAL_ITEMS	SINT32		MSM?4;	<value>	Measured total number of items (equivalent of MSV)
6215	WEIGHT_STATUS_TOTAL_ITEMS	UINT32		MSM?4;	,<value>	Measured total number of items weight status
6217	WEIGHT_TOTAL	SINT32		MSM?5;	<value>	Measured total weight (equivalent of MSV)
6219	WEIGHT_STATUS_TOTAL	UINT32		MSM?5;	,<value>	Measured total weight status
6221	WEIGHT_PEAK_MAX	SINT32		MSM?6;	<value>	Measured peak maximum weight (equivalent of MSV)
6223	WEIGHT_STATUS_PEAK_MAX	UINT32		MSM?6;	,<value>	Measured peak maximum weight status
6225	WEIGHT_LIVEWEIGH	SINT32		MSM?7;	<value>	Measured live weigh weight (equivalent of MSV)
6227	WEIGHT_STATUS_LIVEWEIGH	UINT32		MSM?7;	,<value>	Measured live weigh status
6251	MILLI_VOLT_PER_VOLT	SINT32		VAL?;	<value>	Millivolt per volt reading
6301	PRINT_ID	UINT32		PRT?0;	<value>	Print ID
6303	PRINT	UINT16	PRT;			Print standard printout
6351	PRINT_BUFFER	STR(100)		PRT?1;	<value>	Print buffer
6401	PRINT_SUPPLIED_FORMAT	STR(246)	PRT,<value>;			Print using supplied format string

18.3. Modbus Input Register

The following Modbus functions are implemented for input registers:

- Read input registers (function code 0x04)

The following table lists the translation for each Modbus input register into the corresponding serial communication command:

Register	Name	Type	Write	Read	Read Response	Description
1	INPUT_WEIGHT_GROSS	SINT32		MSM?2;	<value>	Measured weight gross (equivalent of MSV)
3	INPUT_WEIGHT_NET	SINT32		MSM?3;	<value>	Measured weight net (equivalent of MSV)
5	INPUT_WEIGHT_DISPLAYED	SINT32		MSM?1;	<value>	Measured weight displayed (equivalent of MSV)
7	INPUT_WEIGHT_STATUS	UINT32		MSM?1;	,<value>	Measured weight status (equivalent of MSV)
9	INPUT_ERROR	UINT32		ESM?0;	<value>	Error status (equivalent of ESR)

19. 5000 Legacy Modbus ASCII Networking

This section details the 5000 legacy Modbus communications provided by the C510. This has been provided to enable existing 5000 applications using Modbus to be replaced by the C510.

It is recommended that new installations use the better featured Modbus implementation (see Section 18).

The Modbus protocol was originally developed for use by Modicon programmable controllers but has been adopted by many manufacturers as a common protocol standard.

The original Modicon standard specifies two transmissions modes: ASCII or RTU.

The C510 legacy Modbus supports the ASCII transmission mode only.

The details of underlying communications protocol are generally looked after by the PLC directly. Please refer to the official Modbus documentation available from http://modbus.org/specs.php for more information on the protocol.

All that is normally required for setup is to specify the addresses of the registers of interest to your application. Much of the data from the C510 is implemented as 2 consecutive registers to make up a complete 32 bits of data. Unless the C510 has been set up with a full-scale of more than 30000 units it is possible to only access the lower order 16 bits contained in a single register.

Warning – Be sure to correctly configure the indicator address in SERIAL:NET.OPT:ADDRES. The indicator will not reply to messages that do not match its address.

19.1. Connection of the C510 Network

19.1.1. RS232 and RS422 Connection

Please refer to the documentation supplied with your accessory module (see Section 14).

19.2. Modbus Register Definitions for the 5000

The C510 legacy Modbus implements several holding registers, input registers and coils. Generally, all that is required to configure your Modbus master to work with the C510 is to specify the address of the C510 unit, and the addresses of the registers that you are interested in.

Following is a list of the C510 Modbus registers.

19.2.1. Holding Registers

Holding registers in the C510 are as follows. Please note that the C510 supports additional setpoints to the 5000. These are accessible via registers 40017 to 40032.

Register	Contents
40001	Target 1 32 bits
40003	Inflight 1 32 bits
40005	Target 2 32 bits

40007	Inflight 2 32 bits
40009	Target 3 32 bits
40011	Inflight 3 32 bits
40013	Target 4 32 bits
40015	Inflight 4 32 bits
40017	Target 5 32 bits
40019	Inflight 5 32 bits
40021	Target 6 32 bits
40023	Inflight 6 32 bits
40025	Target 7 32 bits
40027	Inflight 7 32 bits
40029	Target 8 32 bits
40031	Inflight 8 32 bits

19.2.2. **Input Registers**

Input Registers in the C510 are as follows:

Register	Contents
30001	Unused (always 0)
30002	Reading Status
30003	Reading Error 32 bits
30005	Displayed Reading 32 bits
30007	Gross Reading 32 bits
30009	Net Reading 32 bits
30011	Number of items in the total 32 bits
30013	Total 1 32 bits
30015	Total 2 32 bits
30017	Peak Displayed Reading 32 bits

19.2.3. **Commands (implemented as coils)**

Modbus coils are used in the C510 to implement specific operator commands. A single coil is set to trigger the function. These coils are self-clearing once the function has been executed. It is possible to configure the operation of the 4 remote keys (See the Reference Manual for details of the available functions). Each of the remote keys has a normal function triggered by a single press and a second function which is triggered by a long 2 second key press. Coils 5.12 simulate the operation of these physical buttons. In this way it is possible to operate these extended functions of the C510 without the need for the setpoint accessory card or the physical buttons.

The C510 commands available as coils are as follows:

Coil	Function
00001	Zero
00002	Tare
00003	Gross/Net
00004	Print
00005	Remote Key 1 function single press
00006	Remote Key 2 function single press
00007	Remote Key 3 function single press

00008	Remote Key 4 function single press
00009	Remote Key 1 function long press
00010	Remote Key 2 function long press
00011	Remote Key 3 function long press
00012	Remote Key 4 function long press

20.   Error Messages

Number of error messages may be displayed to warn of operation outside of acceptable limits. These messages are given below. Short messages will appear as a single message on the display. Longer massages will appear on the display in two parts, shown alternately.

20.1. Weighing errors

These messages show status messages or errors that have occurred during the normal weighing operation.

Error message	Description
U-----	Trade mode: The weight is below the zero range (see setting SCALE: OPTION: Z. RANGE). Industrial mode: The weight is less than -105% of scale capacity.
O-----	Trade mode: The weight is more than 9 divisions over scale capacity. Industrial mode: The weight is more than 105% of scale capacity.
ZERO ERROR	The weight reading is beyond the limit set for Zero setting. The operation of the Zero key is limited in the setup during installation. Zero cannot be done at this weight. Use Tare instead.
STABLE ERROR	Scale motion has prevented a Zero, Tare or Print operation from occurring on command. Try the operation again once the scale is stable.
PRINT ERROR	A printer problem has prevented the printout from being completed. Look for loss of printer power, no paper or cable fault.
CAL DUE	Maintenance required. See Section 6.2.4.
SAVING	Saving data to the EEPROM
PRINT	Currently operating a print command

20.2. Setup errors

These messages warn of setup entries that are not acceptable to the program.

Error message	Description
RES LO	The scale build is configured for less than 100 intervals. Check the interval and capacity settings
RES HIGH	The scale build is configured for more than 100,000 intervals. Check the interval and capacity settings.
CHEC TRADE #	At least one parameter is not acceptable to OIML requirements. Check the trade relevant items. This is only checked in the TRADE mode when leaving setup. Error numbers: 1 = Verification interval e1 or e2 >50 2 = Graduations >10000d 3 = No weighing unit selected 4 = Motion detection is set to NONE 5 = Zero tracking not OFF or 0.5d/s 6 = Zero setting range not ± 2% or -1% +3% 7 = Zero dead band not set to 000000 8 = Keys set for instant operation 9 = Direct mV/V calibration selected

20.3. Calibration errors

These messages warn of incorrect calibration technique, or of attempts to calibrate the indicator beyond its specification.

Error message	Description
ZERO HI	The loadcell output is beyond allowable zero calibration range. Check for incorrect scale connection. Reduce the dead load or shunt the loadcells.
ZERO LO	The loadcell output is below allowable zero calibration range. Check for incorrect scale connection. Increase the dead load or shunt the loadcells.
SPAN LO	The loadcell signal range (span) is too small for these settings. Incorrect span weight entered. Scale wiring incorrect. Wrong loadcell capacity (too large). Wrong or no calibration weight added to scale.
SPAN HI	The loadcell signal range (span) is too large for these settings. Incorrect span weight entered. Scale wiring incorrect. Loadcell capacity too small for application.
NO ZERO	Zero must be calibrated before span calibration can be attempted.

20.4. System errors

The condition of the internal circuits is continuously monitored. Faults or out-of-tolerance conditions are shown on the display as an E type error message.

Errors are added together in hexadecimal:

- Example 1: If the power supply voltage is low which causes a low excitation voltage, the error message will be E00005 (00001$_H$ + 00004$_H$).
- Example 2: The loadcell is not connected (i.e. both sense lines are disconnected). This will cause error E000CO (00080$_H$ + 00040$_H$).

The numbers add in hexadecimal as follows:

1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - A - B - C - D - E - F

(For example, 2$_H$ + 4$_H$ = 6$_H$
4$_H$ + 8$_H$ = C$_H$
A$_H$ + 2$_H$ = C$_H$)

Error	Description	Action
E00001	The power supply voltage is too low	Check power supply and cables
E00002	The power supply voltage is too high	
E00004	The positive sense line is not connected	Check the loadcell connection. This error can be deactivated for EX-I applications with OPTION: SENS.CH.
E00008	The negative sense line is not connected	Check the loadcell connection. This error can be deactivated for EX-I applications with OPTION: SENS.CH.
E00010	The temperature is too hot or cold	Check the location
E00020	Accessory module failure	Restart. Replace faulty module
E00080	Resolution error	Recalibrate indicator with valid resolution
E00100	The real time clock has failed	Return for service
E00200	The setup and calibration information has been lost	lost Recalibrate and reconfigure the unit
E00400	The factory information has been lost	Return for service
E00800	The loadcell excitation voltage is too low	Check the scale
E01000	The loadcell excitation voltage is too high	Check the scale
E02000	The ADC input is out of range	Check the scale
E04000	The runtime information has been los	Check the scale

E08000	Incorrect software has been installed on the unit	Return for service
E10000	The ADC hardware has failed	Return for service
E20000	Board has not passed factory testing	Return for service

21. Troubleshooting

Symptom	Solution
The weight is not stable	• Check the connection to the loadcells • Ensure that the C510 is connected properly • Check that the resolution is OK • Check the OPTION: FILTER setting
There is no communication with a PC using RS232	• Check the port settings in the SERIAL:SERx menu • Check that a null modem cable is not used. Pins 6..9 should be disconnected • Ensure that a select (Sxx) command is sent before a command/query
There is no bus communication using RS485	• Ensure that a select (Sxx) command is sent before a command/query • Check that connection is 4 wire • Check the port settings in the SERIAL:SERx menu • Check the cable and converter (if used)
Keys do not work	A successful operation of a key is signalled by a short beep. An unsuccessful operation is signalled by a long beep. If a key beep to acknowledge the press, but does not appear to trigger the desired action, check: 1. The key has been disabled in setup (in the SPEC:KEY setting). 2. The weight is outside of limits permitted for that key operation. An error message will be shown. 3. The operation is being blocked by scale instability. • Zero, Tare and Print functions require a stable weight. If the scale is not stable when these keys are pressed, the C510 will wait for stability for a maximum of 15s before cancelling the operation and displaying an error message. • In industrial mode, it is possible to force these functions to be performed immediately upon key press using the SPEC:KEY setting.

22. Upgrading Firmware

The C510 firmware is field upgradable. There are two ways to upgrade the firmware. The first is via the web interface, and the second is via USB disk and the full setup menus. Please note that if the trade firmware is upgraded, this will cause an increment of the calibration counter, and an entry to be made in changelog.

22.1. Upgrading firmware via web interface

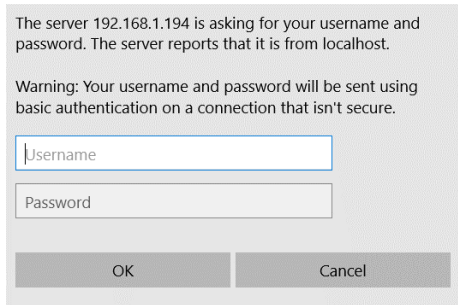Follow the instructions below to upgrade the firmware via the C510 web interface:

1. Connect the C510 to the network and power up

2. Use the ETH.NET setup menu (see Section 5.6), or Viewer device finder to determine the IP address of the indicator:
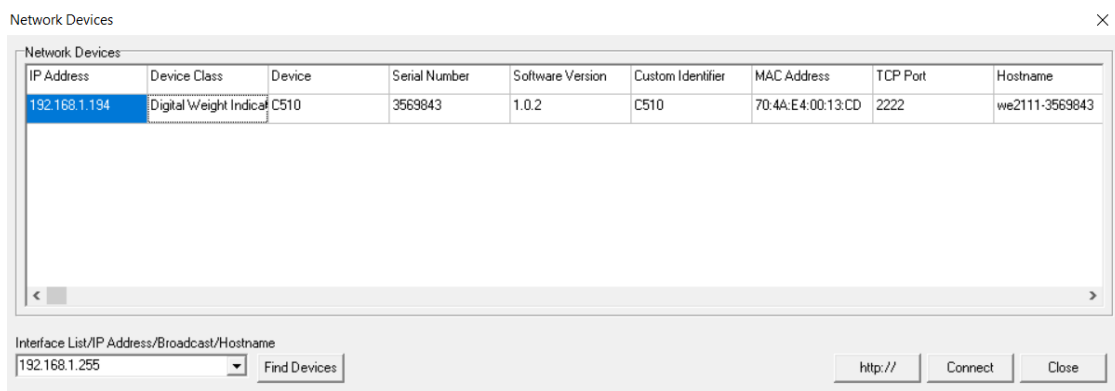
3. Open the IP address in your web brower (clicking the http:// button in the Viewer will do this, otherwise enter it manually in the browser:
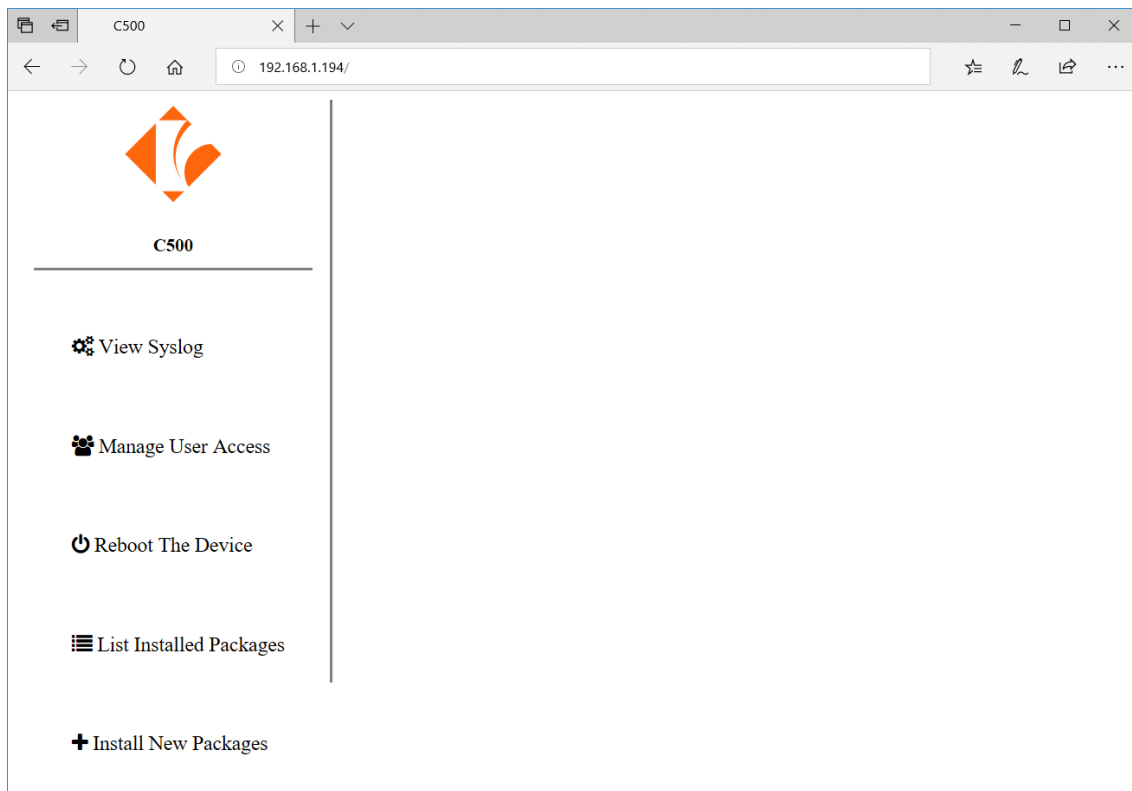
4. Click on the "Install New Packages" link, and you will be prompted to enter a username and password. The default username is "user", and the default password is "password". These can be changed from the "Manage User Access" page, and it recommended that this be done as part of any installation.

The server 192.168.1.194 is asking for your username and password. The server reports that it is from localhost.
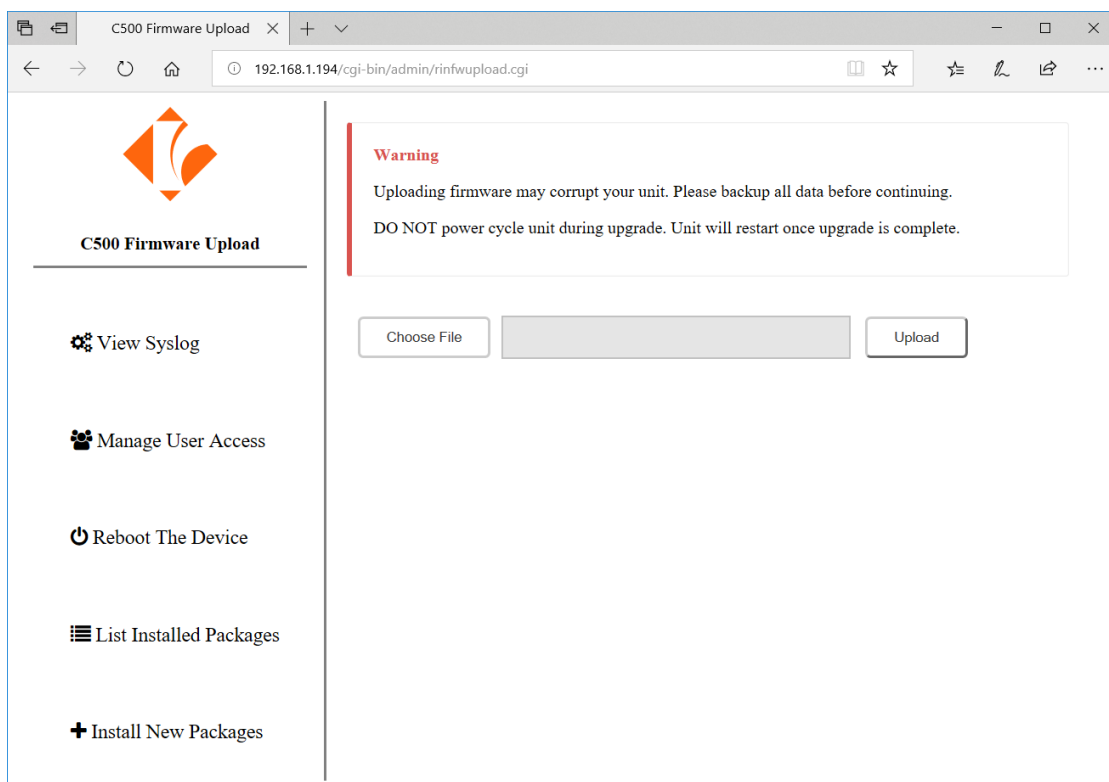
Warning: Your username and password will be sent using basic authentication on a connection that isn't secure.

| Username |
| Password |

| OK | Cancel |

5. The following page will display:

C500 Firmware Upload
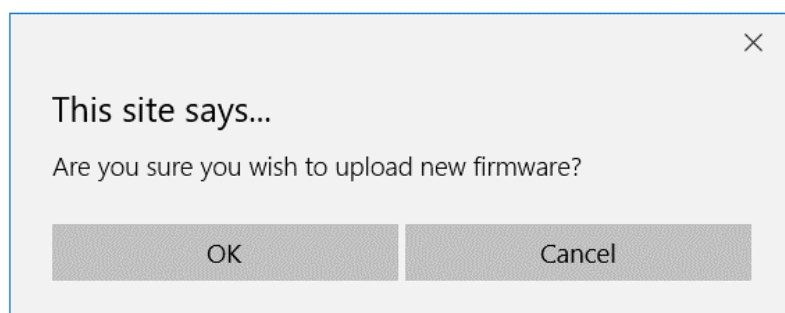
Warning

Uploading firmware may corrupt your unit. Please backup all data before continuing.

DO NOT power cycle unit during upgrade. Unit will restart once upgrade is complete.

Choose File   Upload

⚙ View Syslog

👥 Manage User Access

⏻ Reboot The Device

☰ List Installed Packages

➕ Install New Packages

6. Click "Choose File…" and select the new firmware file to upload. The file is named as follows: C510-K501-<version>-M02.rpk, for example C510-K501-1.0.2-M02.rpk.
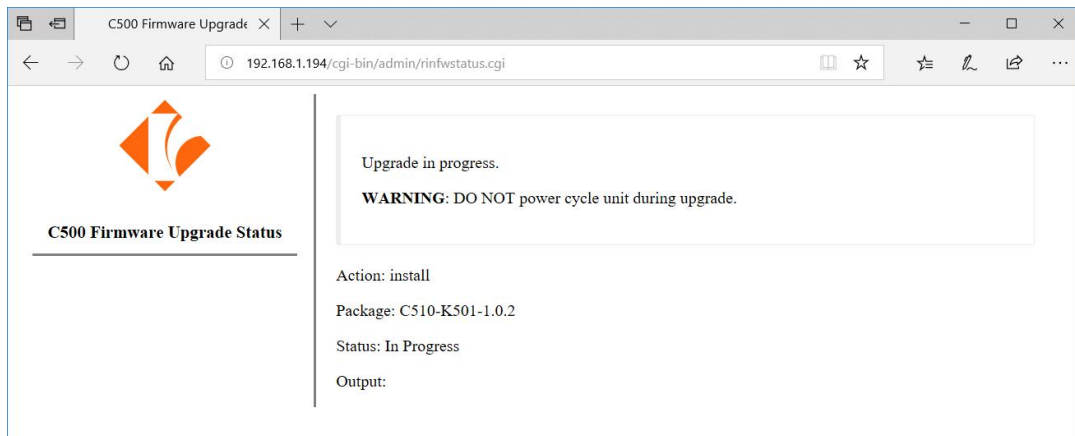
7. Click Open, then click the "Upload" button:

This site says...

Are you sure you wish to upload new firmware?

| OK | Cancel |

8. Click "Ok" to confirm you wish to upload the new firmware, the following page will display. Do not disconnect power while the upgrade is in progress. The C510 will display "UPLOAD", "PROG" during this process.

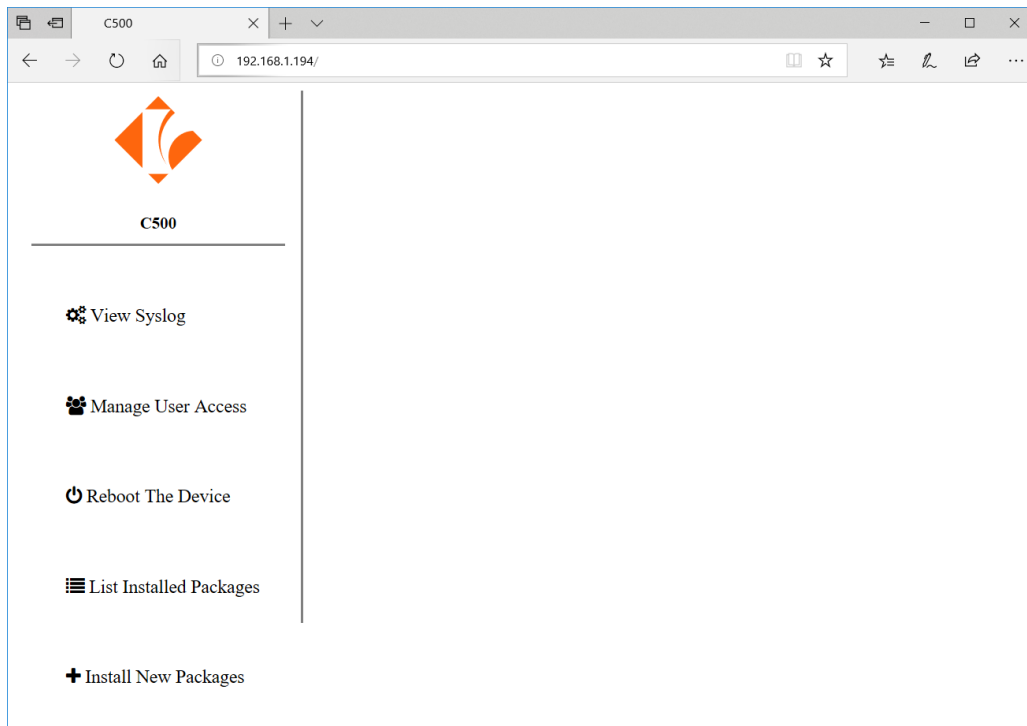9. Once the upgrade is complete, the following page will display, and the C510 will display "P.DONE":
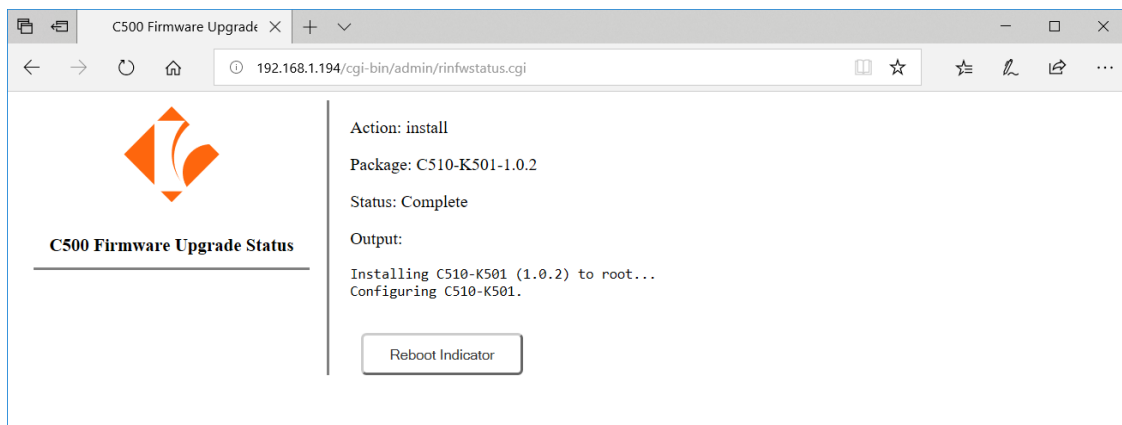
10. You should now click "Reboot" to reboot the indicator, and start the upgraded firmware.
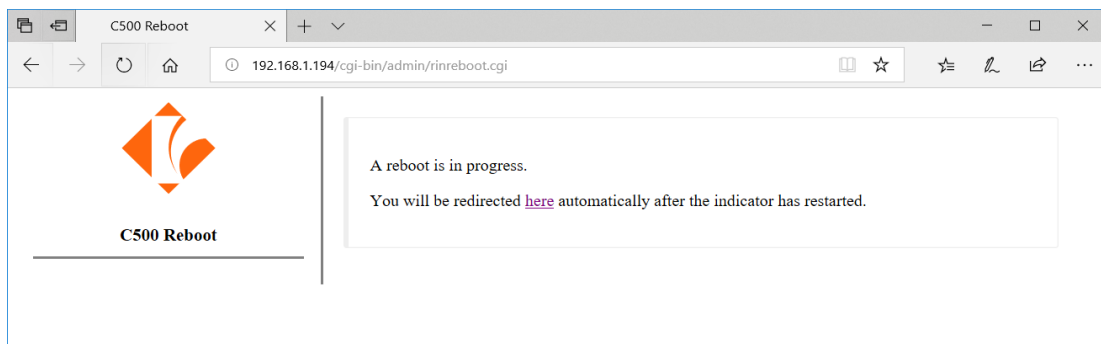
11. Once the indicator has restarted, the following page will display, and the upgrade is complete:

22.2. Upgrading firmware via the USB host interface

Follow the instructions below to upgrade the firmware via the C510 full setup menus:
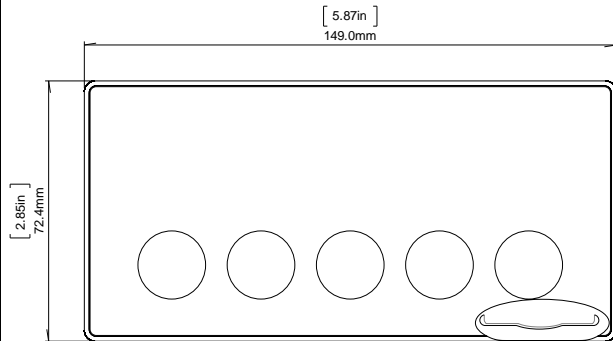
1. Copy the firmware file to a USB flash disk formatted with FAT32 file system. The file must be placed in the root (top level) folder of the disk. There must only be one file with a ". rpk" extension on the disk, as there is no way to select between multiple files in the C510 setup menus. The file is named as follows: C510-K501-<version>-M02.rpk, for example C510-K501-1.0.2-M02.rpk.

2. Connect the USB disk to the C510

3. Enter full setup on the C510

4. Go into the "FILE" menu

5. Select "FW.UPD"

6. The following errors could occur:

   a. If there is no USB disk connected, or it is not formatted as FAT32 the C510 will display "No", "Disk"

   b. If there is no ". rpk" file on the disk, the C510 will display "No", "RPK"

   c. If there is more than one ". rpk" file on the disk, the C510 will display "Many", "RPK"

7. Change to "Cont Y", and press Ok

8. The C510 will display "SAVING" and then "HALTED"

9. Whilst the firmware update is taking place the C510 will display "PROG"

10. Once the firmware update is complete, the C510 will display "P. DONE"

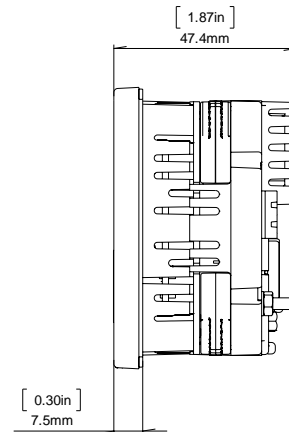11. You should now restart the indicator, and start the upgraded firmware

23.   Appendix

23.1. Dimentions

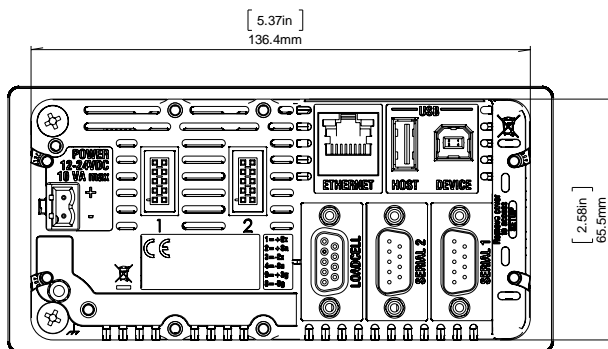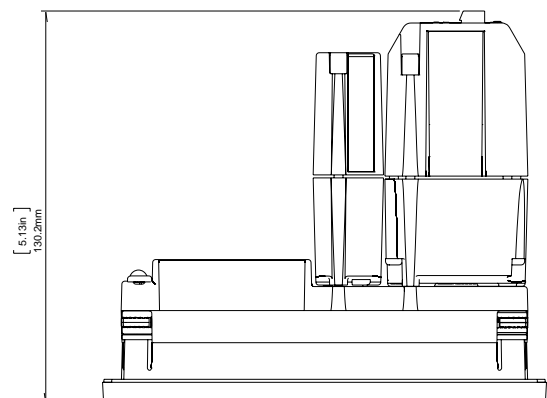| Weight Indicator	
Front View	**Side View**
5.87in / 149.0mm 2.85in / 72.4mm	1.87in / 47.4mm 0.30in / 7.5mm
Back View	**Plan View**
5.37in / 136.4mm POWER 12-24VDC 10 VA max ETHERNET HOST DEVICE USB LOADCELL SERIAL 2 SERIAL 1 2.58in / 65.5mm	5.13in / 130.2mm *With AC Module and Analogue Module fitted*

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