Eilersen
The Weighing Experts

5024G User's guide StdLim

5024G LCD weighing terminal

Basic scale with automatic dosing

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Contents

Contents 2

Introduction 6

Installation 6

How to 6

– Perform basic operations 6

– Perform automatic dosing 8

– Change setpoints for automatic dosing 9

Setting Coarse and Fine limits 9

Start/Stop of dosing 9

– Change dosing parameters 10

Change registration period 10

Change afterflow status 10

Change afterflow correction 10

– Reading totals 11

Reset of totals 11

– Operate the menu system 11

– Set date and time 11

- Unlock the keyboard 12

- Unlock for parameter update 12

– Enter values 13

Entry using selection list 13

Entry of numbers 14

– Change display contrast 15

– Check the software version 16

– Activate Intelligent Setup 17

– Set up the load cell configuration 17

Load cell communication protocol type 18

Number of load cells 18

Number of supports 18

– Detect the load cell configuration 18

– Configure the weighing ranges 18

– Perform coarse taring 19
– Configure display, filtering and stability requirement 20
Interval 20
Filters 20
Steady/stability detection 20
– Configure Unbalanced Detection and LIMP Mode features 20
Unbalanced Detection 21
LIMP Mode 21
– Configure zero tracking 22
– Change reading to high resolution mode 22
– Specific gravity 24
– Perform load check 24
– Perform corner calibration 24
Corner calibration factor 25
Reset corner calibration factors 25
Corner calibration procedure 25
– Perform system calibration 26
Calibration factor 27
Calibration load 27
Perform calibration 27
– Linearization 29
– Perform linearization 30
– Zero with extended range (power-up zeroing) 31
– Configure Ethernet settings 31
Address settings 31
– Configure Ethernet TCP communication 32
Enable TCP protocol 32
Select TCP port 32
Select data output 32
– Check Ethernet communication status 33
– Configure BASIC RS485 communication settings 34
RS485 Baudrate 34
RS485 Serial Setting 34

– Configure RS485 communication protocol 35
Enable RS485 protocol 35
Select data output for BASIC RS485 protocol 36
– Check BASIC RS485 communication status 37
– Check load cell serial no., exponent and capacity 37
– Check individual load cell signals 38
– Check load cell diagnostics 39

Trouble shooting 40
– Error situations 40
– Error code display (in NORMAL screen) 41
– Error solving (in STATUS screen) 41

Appendices 43
Appendix A – Installation checklist 43
Appendix B – Electrical connections 44
Rear view 44
Power Connection 44
Load cell connection 45
Digital I/O connector 45
RS485 communication 45
Analog output connector 46
Ethernet connector 46
Jumper settings 46
Light Emitting Diodes (LED's) 46
Appendix C – Screen overview 47
Appendix D – Filters 48
Sampling filter 48
Display and steady filters 49
Appendix E – Setting of MAC Address 50
Appendix F – Software download 50
Appendix G – Advanced features 50
Appendix H – Options 50
Appendix I – Linearization procedure 51

Revision History 53

Contact 54

Security 54

Coordinated Vulnerability Disclosure Policy 54

Information 54

Introduction

This document describes the use of a 5024G LCD display terminal from Eilersen Electric, when the software version listed on the front page is installed.

With this software, the terminal can perform automatic dosing (coarse/fine) using its digital outputs and inputs. One digital output is used for coarse dosing and one digital output is used for fine dosing, while a digital input is used for start of dosing and a digital input is used for registration of dosed amount.

Unless the RS485 connection is reserved for different optional usage, the system can communicate with a controller/PLC using this connection.

Installation

The following steps must be performed before the system is used:

- Install the load cells and check mechanical installation
- Optional: Connect digital outputs and digital inputs
- Connect and apply power
- Check software version
- Optional: Activation of Intelligent Setup feature
- Set up load cell configuration
- Power cycle the unit
- Configure weighing ranges
- Perform coarse taring
- Optional: Configure display, filtering, zero tracking range, stability requirement
- Optional: Corner calibration, system calibration, linearization
- **Perform load check**

Please notice: Perform a load check before the system is used to be sure that all requirements regarding accuracy, stability etc. are met before the system is used.

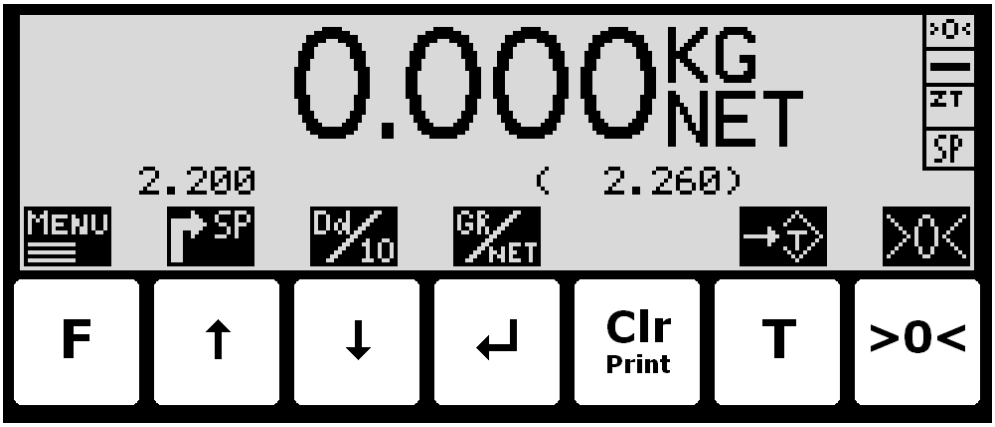
Please notice: If the Intelligent Setup feature is used, this will perform some of the subsequent points in the above list.

Details on the steps needed to install the system are explained below.

How to

– Perform basic operations

When the system is installed and power-up sequence has ended the display will look like this:



Weight reading:

- The actual weight reading is displayed in large types.
- To the right of the weight reading, the unit is indicated, like **KG**, **LB** etc.
- Below the unit gross/net selection is indicated with **GROSS** or **NET**.
- If an error condition is present the weight reading will indicate the error, like **UL**, **OL**, **- 0080 –** etc. Please see below in section Trouble shooting, page 40 for details on error codes and how to recover from various error situations.
- Above the ↓ and ↵ keys the following warnings may be shown cyclic and flashing:
  - "**UNBALANCED**" if the Unbalance Detection feature detects unbalance in system.
  - "**LIMP MODE**" if the **LIMP Mode** feature is enabled.
  - "LC OL" if one or more load cells are overloaded.

Status indications:

- **'>0<'** in the upper right corner status field indicates that the actual gross weight is zero (within ± ¼ division).
- **'--'** in the second status field indicates that the weight reading is steady/stable. If the reading is unstable **'~'** will be indicated.
- **'ZT'** in the third status field indicates that a zero tracking device is active, holding the actual gross weight at zero.
- **'SP'** in the fourth status field if automatic dosing is running.

  `R' in the fourth status field if registration is in progress.
- Above the ↑ key the actual setpoint (fine limit) is shown.
- Above the Clr Print key the last registered weight is shown in parenthesis. Also above the Clr Print key an "**OK**" icon is shown for a short period following every successful registration.

Please notice: The **net** weight is used to determine the state of the digital outputs during dosing even when the gross weight is displayed.

Please see below how automatic dosing and digital outputs are used.

Please notice: If none of the icons directly above the keys are visible as shown in the screen shot above, the keyboard is locked, since the **Keyboard unlock length** parameter in the **SETUP SYSTEM** screen has been activated. As long as the keyboard is locked, no

keyboard actions will be available. Please see below in section - Unlock the keyboard, page 12 on how to unlock the keyboard.

Keys/actions:

F	Invoke the **MAIN** menu.
↑	Select the **DOSING** screen to enter the setpoints and start/stop of dosing.
↓	Displays weight with enhanced resolution for 3 seconds. The "**Dd/10**" symbol above the key will flash when enhanced resolution is shown.
↵	Switch between Gross and Net reading.
Print	Not used.
T	Sets the net weight to zero and select Net reading.
>0<	Sets the gross weight to zero and select Gross reading.

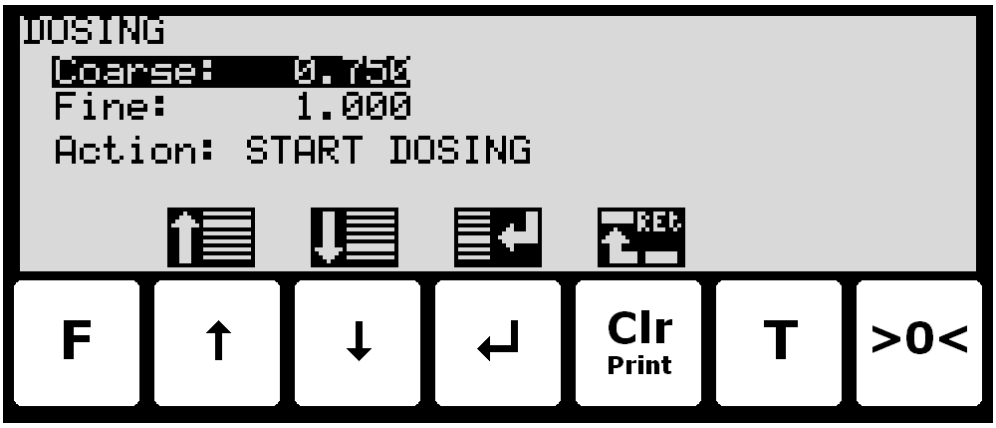
– Perform automatic dosing

To perform an automatic dosing, follow this procedure:

1. The desired Coarse and Fine setpoints must be entered. Use the ↑ key in the **NORMAL** screen to select the **DOSING** screen. Then use the **DOSING** screen to enter the desired setpoints.
2. To start a new dosing select the "**Action: START DOSING**" using the ↑ or ↓ key in the **DOSING** screen and then press the ↵ key. Alternately start a new dosing by activating the digital **START** input.
3. This will zero the net weight (automatic tare) and activate the digital **COARSE** and **FINE** dosing outputs.
4. During dosing the **COARSE** output is active as long as the net weight does not exceed the COARSE limit. An active **COARSE** output indicates dosing should be done at high speed for the first part of the dosing, followed by slow speed for the final part of the dosing where the **COARSE** output is deactivated.
5. When the net weight (positive or negative) reaches the FINE setpoint (possibly adjusted by the afterflow correction) the **FINE** output will be deactivated and dosing is stopped.
6. Hereafter the **COARSE** and **FINE** outputs will remain deactivated until a new dosing is started.
7. The dosed amount is automatically registered after the entered registration period, if the registration period is different from 0 ms. In this case a registration can be made by activating the **REGISTRATION** input. The result of the last registration can be read in the **NORMAL** screen.
8. Following a registration the totals are updated and a possible new afterflow correction may be calculated.
9. An ongoing dosing can be stopped prior to reaching the setpoint, by selecting the "**Action: STOP DOSING**" using the ↑ or ↓ key in the **DOSING** screen and then pressing the ↵ key. An ongoing dosing is also aborted if the weighing range is exceeded or if a load cell error occurs.
10. The weighing terminal is ready for start of a new dosing.

– Change setpoints for automatic dosing

In the **MAIN** screen press ↑ to select the **DOSING** screen, looking like this:



In this screen setpoints for dosing are shown and can be changed. It is also possible to start/stop a dosing.

Keys/actions:

↑	Select the previous setpoint/parameter.
↓	Select the next setpoint/parameter.
↵	Start entry of the selected setpoint or chooses the marked action.
Clr Print	Return to the **MAIN** previous screen.

Setting Coarse and Fine limits

The COARSE and FINE setpoints used for automatic dosing must be specified in the **DOSING** screen.

The COARSE limit is used to control the **COARSE** output indicating high speed dosing until the COARSE setpoint is reached. The FINE limit is used to control the **FINE** output indicating the desired amount to be dosed. The setpoints are changed by using ↑ and ↓ to select the desired setpoint ("Coarse" or "Fine") with the cursor, and then pressing ↵ to request change of the setpoint.

Start/Stop of dosing

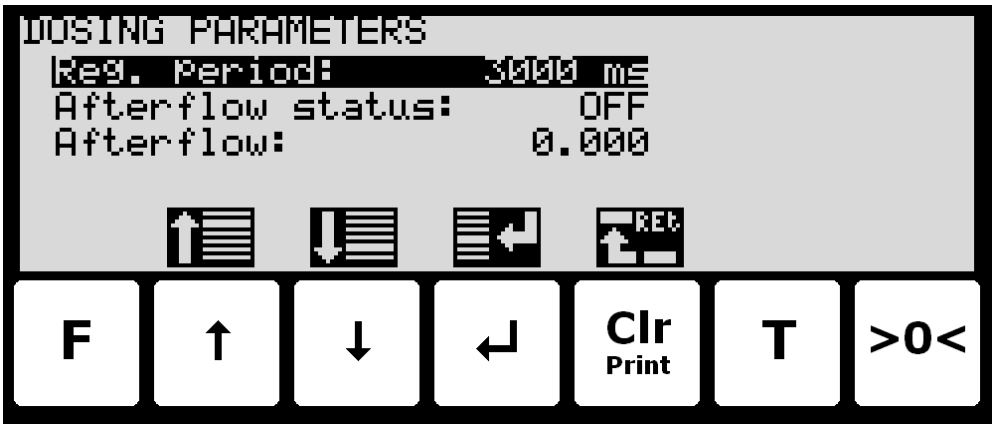
In addition to starting a dosing using the digital **START** input, a dosing can be started (or stopped if a dosing is already in progress) using the keyboard in the **DOSING** screen.

A dosing is started or stopped by using ↑ and ↓ to select the "Action" parameter with the cursor, and then pressing ↵ to request the indicated action ("START DOSING" or "STOP DOSING").

Please notice: Some other dosing parameters (such as registration period and afterflow correction) are configured in the **DOSING PAR.** screen.

– Change dosing parameters

From the menu system the **DOSING PARAMETERS** screen is selected:



In this screen dosing parameters such as registration period and afterflow correction are shown and can be changed.

Change registration period

The registration period is the time from a dosing has finished to the actual amount dosed is registered automatically. The registration period is entered in milliseconds (0 - 30000 ms). The value should be set large enough to ensure no vibrations and a stable weight indication is achieved before the automatic registration is performed. A value of 0 ms indicates that **NO** automatic registration is performed, and that a registration must be made using the **REGISTRATION** input (or the keyboard).

Change afterflow status

The afterflow status indicates whether afterflow correction is disabled (OFF), enabled using a fixed correction (ON) or enabled using an automatically adjusted correction (AUTO).

Change afterflow correction

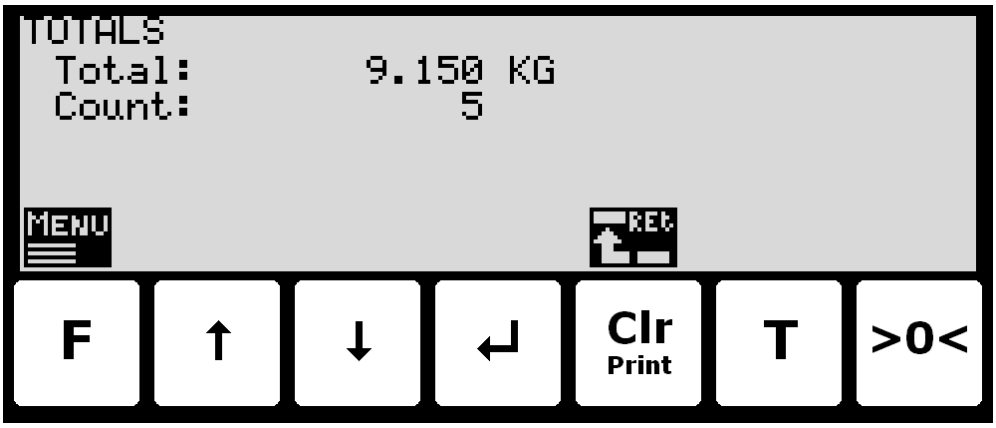
The actual afterflow correction used during dosing if enabled using the “Afterflow status” parameter (ON or AUTO), is the amount prior to the net weight reaching the FINE limit, where the dosing is assumed to be completed and the FINE and COARSE outputs are deactivated. The “Afterflow” parameter indicates the actual correction.

Please notice: The “Afterflow” parameter is not used if afterflow correction is disabled by setting the “Afterflow status” parameter to OFF.

Please notice: The “Afterflow” parameter can be changed automatically after each dosing if afterflow correction is performed automatically by setting the “Afterflow status” parameter to AUTO.

– Reading totals

In the **MAIN** screen [F] is pressed to select the **TOTALS** screen from the menu:



In this screen the totals are shown. Whenever a registration is performed the total weight is updated with the registered amount and the total count is incremented.

Reset of totals

Totals are reset by pressing [F] to show the **TOTALS** menu, where the "**RESET TOTALS**" item is selected with the cursor using the [↑] and [↓] keys and then pressing the [↵] key.

Please notice: Reset of totals can **NOT** be undone.

– Operate the menu system

The installation and service of the system is operated by a series of menus and screens. Please see below in section Appendix C – Screen overview, page 47, for an overview on all screens. When using setup and maintenance screens these keys are used:

- [F] Select a menu depending on the actual screen.
- [↑] Increase a value, select previous parameter or move cursor up in a menu.
- [↓] Decrease a value, select next parameter or move cursor down in a menu.
- [↵] Select entry or accept of a value, or select an action from a menu.
- [Clr Print] Return to previous screen. Exit menu without action.

Please notice: Parameters cannot be changed and actions not performed when the system is powered on. Before such operations are possible the parameters must be unlocked as explain below in section - Unlock for parameter update, page 12.

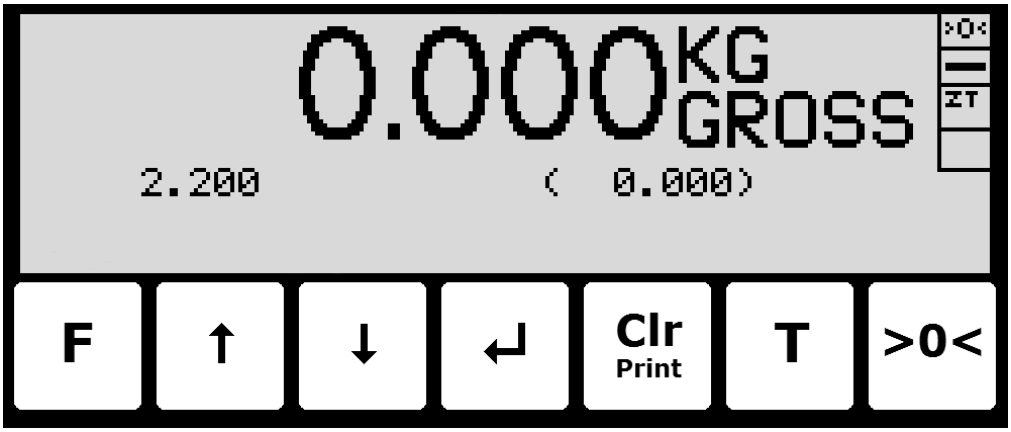
– Set date and time

It is possible to set the date and/or time of the internal clock by use of the **SETUP** menu. To set date and/or time from the **SETUP** screen perform the following:

- [F] Press once to select the **SETUP** menu.
- [↓] Press several times to select the "**SET DATE**" or "**SET TIME**" entry from the **SETUP** menu.
- [↵] Press once to start entry of the selected parameter (date or time).

- Unlock the keyboard

The terminal is equipped with a keyboard lock feature, which can be enabled or disabled using the **Keyboard unlock length** parameter in the **SYSTEM** screen as described below. If the keyboard lock is disabled, then the keyboard functions will always be active. If the keyboard lock is enabled, and the terminal is in the **NORMAL** screen without any key activation for 10 minutes (or directly after power-on), the keyboard will automatically lock. When the keyboard is locked, the **NORMAL** screen will appear as follows without any icons above the keys:



To unlock the keyboard:

- Press any key to start the keyboard unlock sequence.
- Press the indicated keys one at a time until the required sequence (specified by the **Keyboard unlock length** parameter) is completed without error.

Please notice: This feature is disabled by setting the **Keyboard unlock length** parameter in the **SYSTEM** screen to 0. Any other value specifies the length of the key sequence that must be pressed correctly to unlock a locked keyboard.

- Unlock for parameter update

Parameters cannot be changed and actions not performed when the system is powered on. Before such operations are possible the parameters must be unlocked:

- Press F to invoke the menu system.
- Press ↓ to highlight the **SERVICE MODE** menu item.
- Press ↵ to select the **SETUP** screen.
- Press F to invoke the menu where the **SYSTEM** menu item is highlighted.
- Press ↵ to select the **SYSTEM** screen.
- Press ↓ to highlight the **Parameters** entry.
- Press ↵ to select the **ENTER UNLOCK PARAM** parameter entry.
- Enter the password 1357 and press ↵. Parameters are now unlocked and can be changed. Press Clr Print once to return to the **SETUP** screen or twice to return to the **NORMAL** screen. Please see below in section – Enter values, page 13, for details on how to enter values (like the password).

The status automatically returns to **LOCKED** after 5 minutes without keyboard activity in **NORMAL** screen or when the terminal is power-cycled.

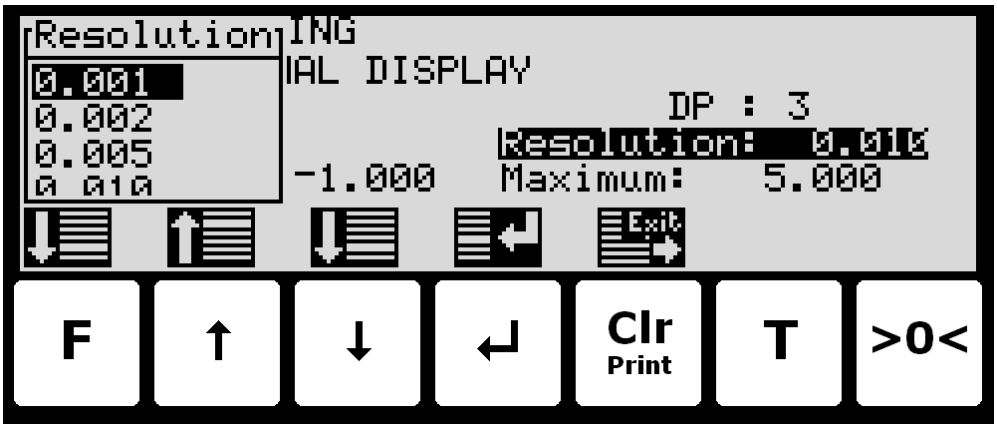
– Enter values

Perform these steps to enter a new parameter value:

- Unlock parameters as described in the above section.
- Use the menus to select the screen where the value is displayed.
- Use ↑ and/or ↓ to highlight the parameter.
- Press ↵ to start entering a new value.

Entry using selection list

Some parameters (such as resolution and decimal point position) are entered using a selection list. When change of this type of parameter is requested, a special pull-down menu will appear with a list of possible values as shown:



The keys can be used as follows:

F	Move the cursor down in this selection list.
↑	Move the cursor up in this selection list.
↓	Move the cursor down in this selection list.
↵	Accept the selected/marked value as the new desired value.
Clr Print	Abort the entry without change of parameter. This can also be done by selecting the “CANCEL” entry form the selection list.

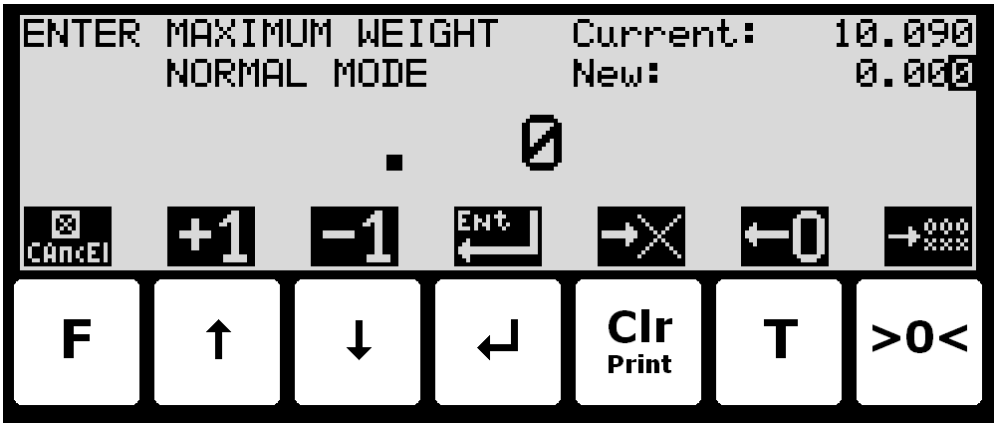
Example - Changing resolution from 0.050 to 0.010:

The screen shown above appears once change of resolution is requested from the **SETUP WEIGHING** screen by moving the cursor using ↑ and ↓ so the **Resolution** parameter is selected and then pressing ↵. In order to change the “Resolution” parameter to 0.010 perform the following:

- Press ↑ and/or ↓ repeatedly until **0.010** is selected in the list.
- Press ↵ to accept the selection.

Entry of numbers

Some parameters (such as minimum and maximum weight of the weighing range) are entered using a data entry screen. When change of this type of parameter is requested, a data entry screen will appear. Please note the layout of the data entry screen may vary slightly depending on the actual parameter to be changed. The data entry screen could look as shown:



The actual parameter changed is indicated in the upper left part of the display. The current parameter value and the currently entered value is shown in the upper right part of the display. The currently entered value is also shown in the middle of the display in large font.

The keys can be used as follows:

- [F] Abort the entry without change of parameter.
- [↑] Increase the value of the digit currently being entered (digit to the right).
- [↓] Decrease the value of the digit currently being entered (digit to the right).
- [↵] Accept the entered value as the new desired value.
- [Clr] Delete rightmost digit and moves all remaining digits one position to the right.
- [T] Move digits one position to the left and inserts a zero on the rightmost position. This new digit can subsequently be changed using [↑] and [↓].
- [>0<] Clears all entered digits setting them to zero as if the data entry screen has just been entered.

When entering a value the digits are entered left to right. This means that leftmost digit is entered first. The active digit is changed by [↑] and [↓]. When the correct value is entered press [T] to advance to the next digit. If an error is made, press [Clr] to return to the previous digit. When the complete value is entered press [↵] to accept it. To abort without any changes press [F].

Example - Changing maximum weight from 10.000 to 10.090:

The screen shown above appears once change of maximum weight is requested from the **SETUP WEIGHING** screen by moving the cursor using [↑] and [↓] so the "Maximum" weight parameter is selected and then pressing [↵].

In order to change the "Maximum" weight parameter to 10.090 perform the following:

- [↑] Press once until " . 1" is shown in the display.
- [T] Press three times until " 1.000" is shown in the display.

↓	Press once until	″ 1.009″ is shown in the display.
T	Press once until	″ 10.090″ is shown in the display.
↵	Press to accept	″ 10.090″ as the new desired value.

Example - Changing minimum weight from -1.000 to -0.090:

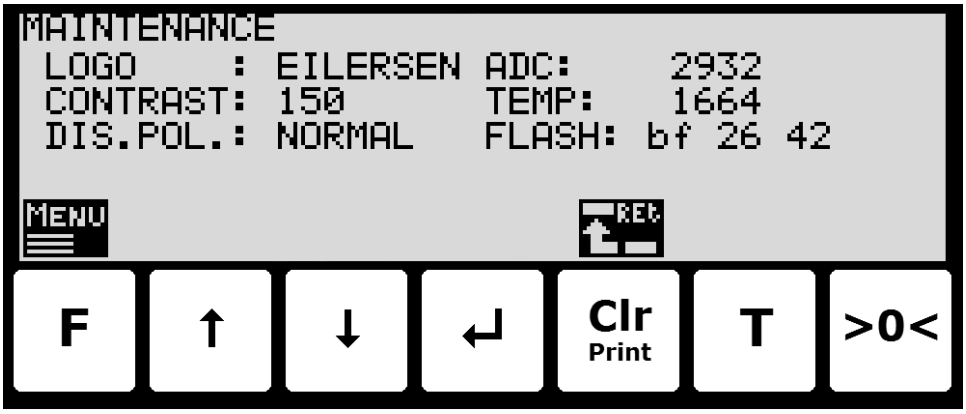
A similar screen to the screen shown above appears once change of minimum weight is requested from the **SETUP WEIGHING** screen by moving the cursor using ↑ and ↓ so the "Minimum" weight parameter is selected and then pressing ↵.

In order to change the "Minimum" weight parameter to -0.090 perform these steps:

↓	Press once until	″- . 9″ is shown in the display.
T	Press once until	″- . 90″ is shown in the display.
↵	Press to accept	″- 0.090″ as the new desired value.

– Change display contrast

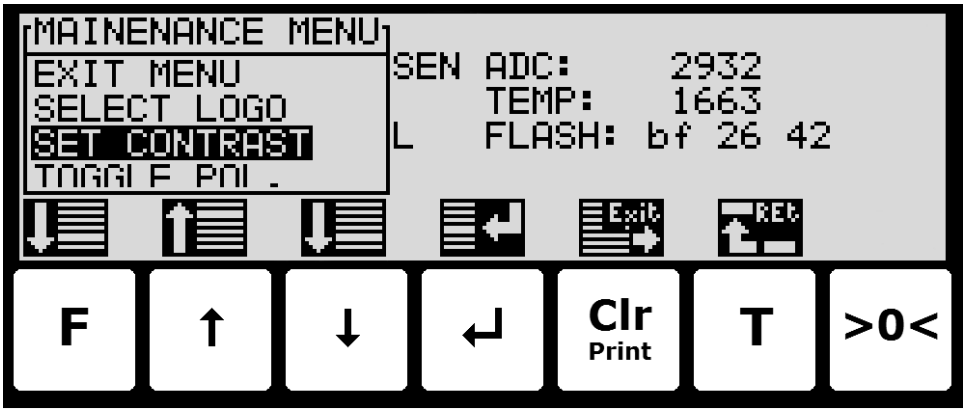
The display contrast can be changed from the **MAINTENANCE** screen, that is shown here:



From the **MAINTENANCE** screen the actual display contrast value can be read.

To change the display contrast value from the **MAINTENANCE** screen perform the following:

- Press F to invoke the **MAINTENANCE** menu.
- Press ↓ to select the **SET CONTRAST** menu item.
- Press ↵ to start entering the new display contrast value.



PLEASE NOTICE:

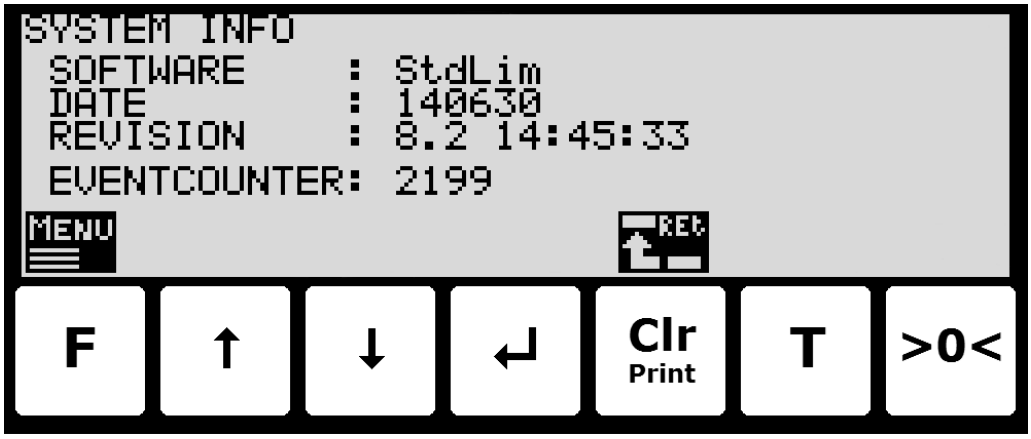
- In most software versions it is not necessary to enter the password before changing the display contrast.
- In order to prevent a too dark/light display and thus unreadable, the contrast value should be changed in small steps (i.e. +/- 10) in the right direction (larger value => darker display).

– Check the software version

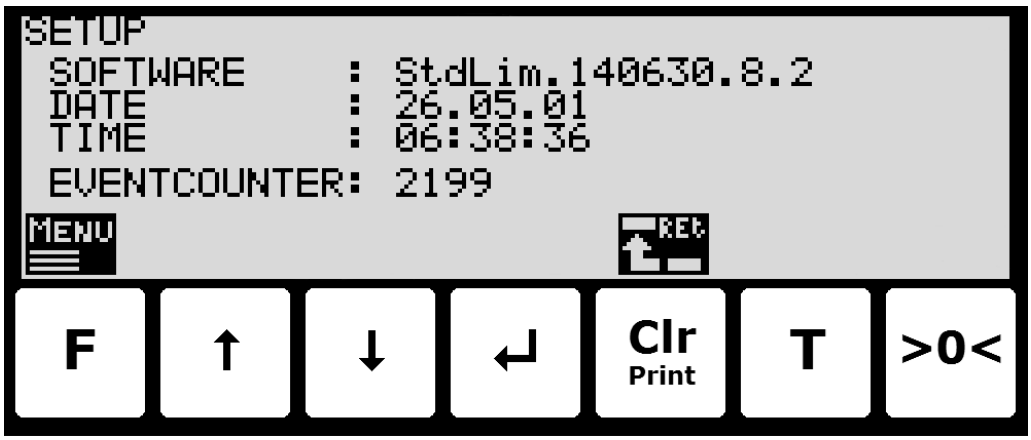
The software version can be checked during the power-on sequence or in the **SYSTEM INFO** or **SETUP** screen. When power is applied to the system, the following will happen:

- The display will show the logo for 5 seconds.
- The display will show the software version (software name, date and revision).
- The weighing terminal is ready and enters the **NORMAL** screen.

Select the **SYSTEM INFO** screen to read the software version (software name, date and revision):



The **SETUP** screen also shows the software version (software name, date and revision):



– Activate Intelligent Setup

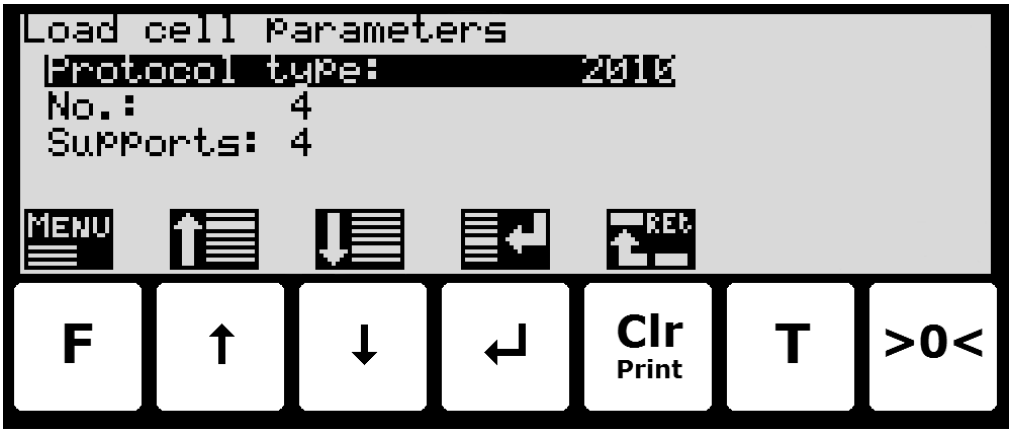
With reference to installation of the weighing system, the weighing terminal has a build-in intelligent setup feature, that automatically comes with suggestions to configuration of the weighing technical parameters. If this feature is to be used, it can be activated/started by performing the following:

- From the **NORMAL** screen press F to activate the menu system, and select **SERVICE MODE** menu item to enter the **SETUP** screen.
- From the **SETUP** screen press F to activate the menu system, and select **SYSTEM** menu item to enter the **SETUP SYSTEM** screen.
- Unlock the parameters for change by entering the password as described earlier.
- Press F to activate the menu system, and select **INTELLIGENT SETUP** menu item to enter the **INTELLIGENT SETUP** screen.
- **NOTE:** Refer to the separate 'Intelligent Setup' manual for further information regarding this feature.

– Set up the load cell configuration

To set up the load cell communication protocol type, number of load cells and supports please follow these steps:

- From the **NORMAL** screen select the **SERVICE MODE** menu item to reach the **SETUP** screen.
- From the **SETUP** screen select the **WEIGHING** menu item to reach the **SETUP WEIGHING** screen.
- From the **SETUP WEIGHING** screen select the **LOAD CELLS** menu item to reach the **Load cell parameters** screen.
- Enter the correct values for load cell communication protocol type, number of load cells and supports, or detect this automatically from the menu.
- **Please notice:** The terminal must be power-cycled and the load cells must be connected before changes take effect!



Load cell communication protocol type

The weighing terminal can be connected to and communicate with different kinds of load cells from Eilersen Electric. Depending on load cells and how they are connected, the weighing terminal can communicate with the load cells using the following load cell protocols:

- **2010:** Load cells connected using MCE2010 (StdBB protocol).
- **401x:** Load cells connected using 4015 connection module.
- **4x40-StdBB:** Load cells connected using 4x40 unit (StdBB protocol).
- **4x40-StdLC:** Load cells connected using 4x40 unit (StdLC protocol).

Please notice: Therefore, selection of protocol type must also take into consideration, the software version in the used load cell modules (MCE2010/4x40).

Number of load cells

The weighing terminal can be connected to a maximum of 16 load cells.

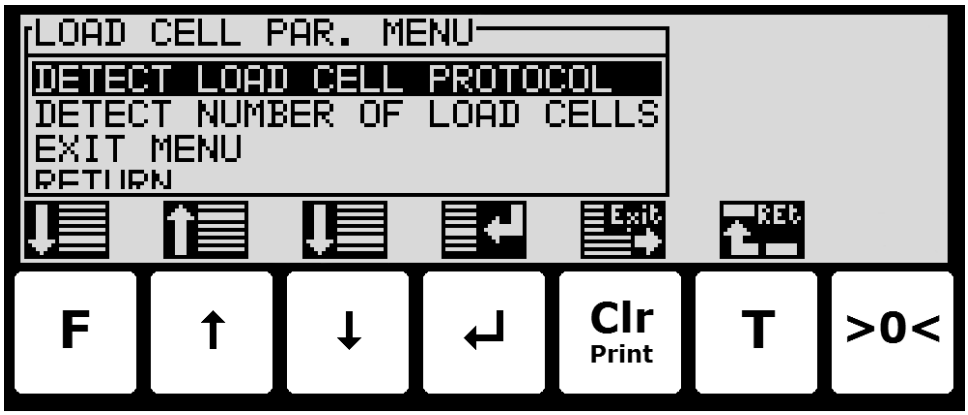
Number of supports

The actual number of supporting points must be in the range 1-16. Note that it is the total number of supporting points including corners supported by load cells. As an example, the **Supports** parameter should be 3 in a system consisting of a three legged tank.

– Detect the load cell configuration

To detect load cell protocol, number of load cells and number of supports the following is performed:

- Use the screens and menu system to select the **LOAD CELLS** screen.
- Press [F] to invoke the **LOAD CELL PAR.** menu.
- Press [↓] to select the **DETECT LOAD CELL PROTOCOL** or **DETECT NUMBER OF LOAD CELLS** menu item.
- Press [↵] to perform the selected action, and follow the instructions in the following screens.



Please notice: The load cells must be connected for the above detection to work correctly.

– Configure the weighing ranges

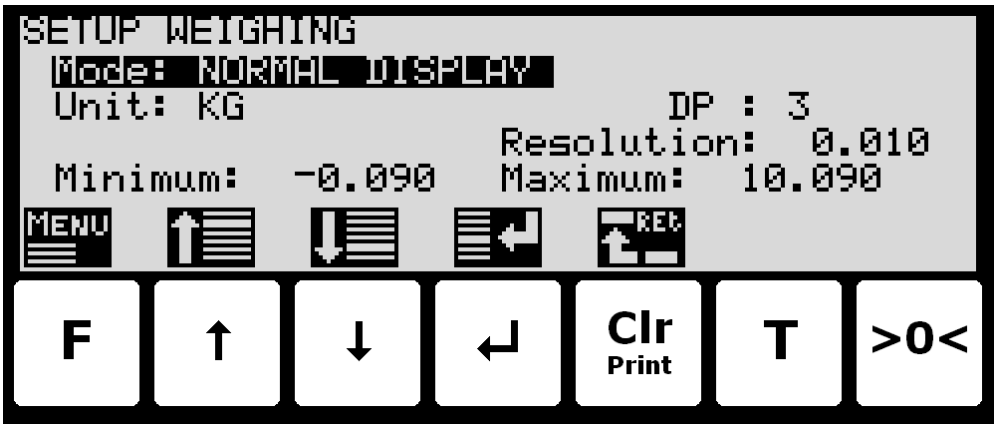
The weighing terminal is equipped with three different weighing range modes that specify the weighing range used for:

NORMAL: Weight readings during normal display reading.

CALIBRATION: Weight readings during calibration and enhanced/high resolution weight display.

PROTOCOL: Weight readings transferred using communication protocols.

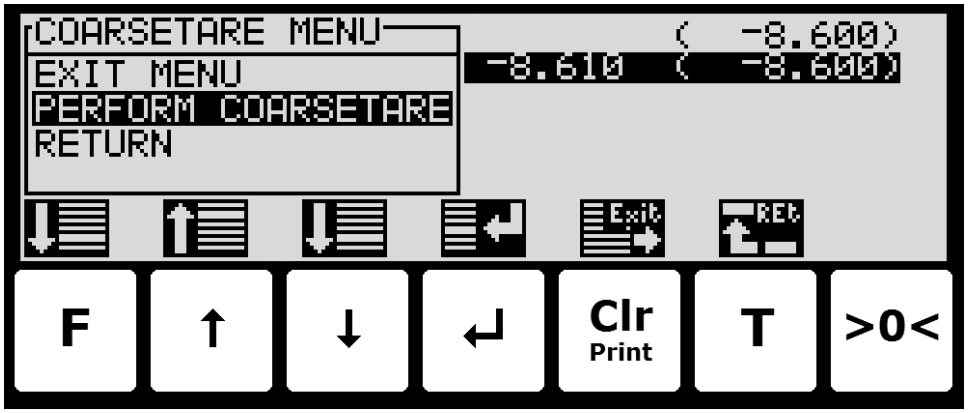
Using the screens and menu system as described above in section Operate the menu system, page 11 select the **WEIGHING** screen to configure the three weighing ranges:



– Perform coarse taring

To coarse tare the system follow these steps:

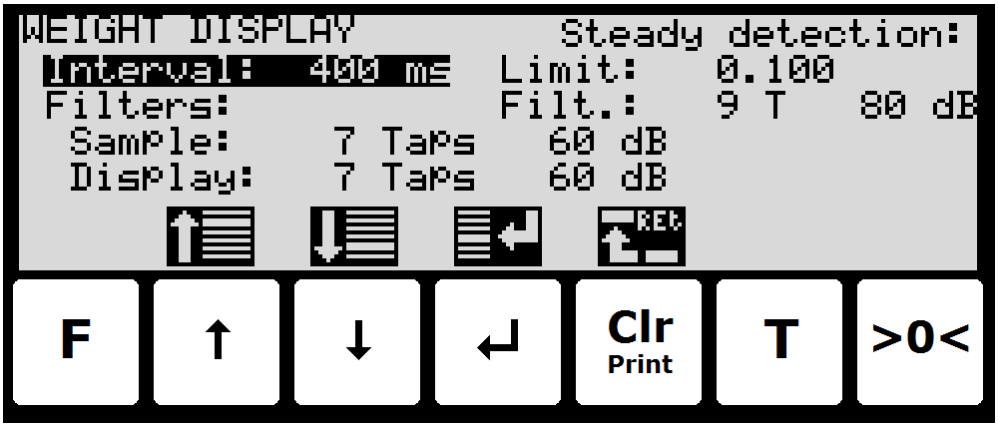
- Use the screens and menu system to select the **COARSETARE** screen.
- Press F to invoke the **COARSETARE** menu.
- Press ↓ to select the **PERFORM COARSETARE** menu item.
- Press ↵ to perform a coarse tare.



Please notice: Coarse taring should only be done when the system is empty!

– Configure display, filtering and stability requirement

To configure display update rate, filtering and stability requirement, select the **WEIGHT DISPLAY** screen:



Interval

The interval between each update of the weight indication is entered in milliseconds (ms). A small value results in fast update of the display reading, while a larger value results in a more steady display reading. A good starting/default value is 400 ms.

Filters

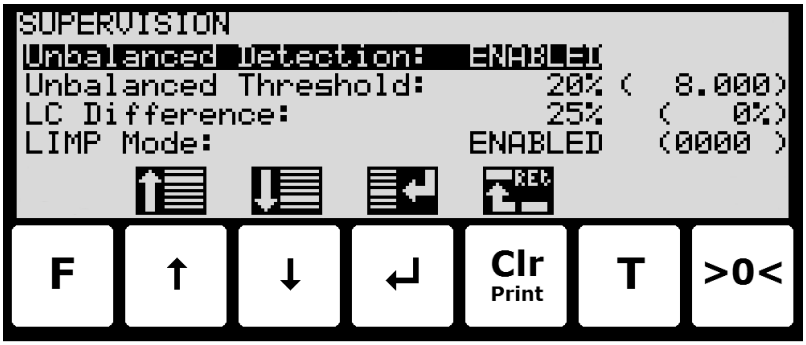
Two types of filters can be applied: A filter on each sampling from the load cell and/or a filter on each display weight reading update. The sampling frequency depends on the load cell communication formats and number of load cells and the weight display reading update rate, as described below in section Appendix D – Filters, page 48.

Steady/stability detection

The weight is considered stable when the readings are within the limit entered here. The weight ready used for steady detection is filtered with the filter entered here. The steady detection filter works like the display filter.

– Configure Unbalanced Detection and LIMP Mode features

To enable/disable and configure the **Unbalanced Detection** feature and the **LIMP Mode** features, select the **SUPERVISION** screen:



Unbalanced Detection

The **Unbalanced Detection** feature is used to indicate if the system is unbalanced (the load cell signals differ too much from each other). If unbalanced a warning ("**UNBALANCED**") is shown flashing in the **NORMAL** screen. This is also indicated in some of the external communication. The feature is enabled/disabled using the **Unbalanced Detection** parameter. The **LC Difference** parameter (%) is used to specify at what difference (the maximum load cell signal compared to the minimum load cell signal) unbalance is indicated. If **Unbalanced Detection** is enabled the actual difference measured is shown in parenthesis following the **LC Difference** parameter.

Note: Unbalance is **NOT** indicated, if the sum of the raw load cell signals (not coarse-tared/zeroed) is less than the fraction of the total load cell capacity of the connected load cells entered in the **Unbalanced Threshold** parameter (%). If **Unbalanced Detection** is enabled the actual threshold in weight reading (kg, gram etc.) is shown in parenthesis following the **Unbalanced Threshold** parameter.

Note: Unbalance is **NOT** detected in systems with only one load cell.

Example – Unbalanced Detection: With the unbalanced values shown in the **SUPERVISION** screen shown just above:

```
Unbalanced Detection:  ENABLED
Unbalanced Threshold:      20% (  8.000)
LC Difference:             25%   (   0%)
```

it results in the following behavior with the **Unbalanced Detection** enabled in a system consisting of four 10 kg load cells for a total load cell capacity of 40 kg:

- the shown calculated **Unbalanced Threshold** of 8.000 kg (the percentage of the total load cell capacity) requires that the sum of the raw load cell signals (i.e. not coarse-tared/zeroed) must exceed 8.000 kg before any unbalanced warning will be indicated.
- the actual measured load cell difference shown in parenthesis (shown as 0% above) will be updated once the sum of the raw load cell signals (i.e. not coarsetared/zeroed) exceeds the **Unbalanced Threshold**.

LIMP Mode

The **LIMP Mode** feature is used to generate an approximate weight value if one or more load cells (but not all) are "missing/lost" based on the remaining working load cell(s) signal. This is done by calculating an average of the still working load cell signals and using this to compensate for the "missing/lost" load cell(s). The feature is enabled/disabled using the **LIMP Mode** parameter.

If **LIMP Mode** is enabled:

- then a warning ("**LIMP MODE**") is shown flashing in the **NORMAL** screen. This is also indicated in some of the external communication.

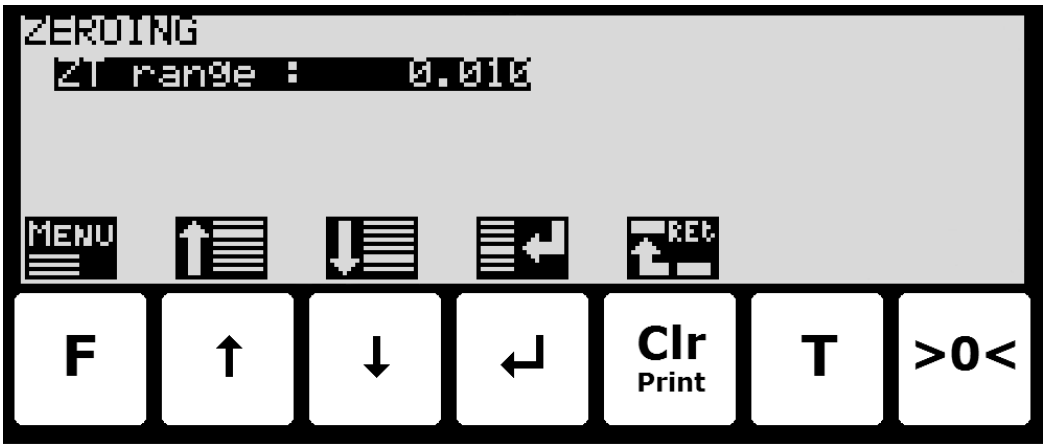
- a 16 bit register is shown in parenthesis (as a 4 digit hexadecimal number) indicating load cells “missing”. If some but not all load cells are missing, then shown just below is the calculated average of the still working load cells, which is used as signal for the missing load cells.
- some features/commands in some screens are disabled. This includes features like coarsetare, corner calibration, linearization, intelligent setup and automatic detection of loadcell protocol and number of loadcells.

IMPORTANT:

- For **LIMP Mode** to work properly the load cells in the system must be identical (same capacity and exponent), the load must be placed symmetrically on the load cells and the empty weighing system must previously have been coarsetared and zeroed.
- As **LIMP Mode** strongly depends on the weighing system being symmetrical for it to work properly, Eilersen Electric cannot be made accountable in any way for incorrect weight readings when **LIMP Mode** is enabled.
- It is the users responsibility to make the decision to use and manually enable **LIMP Mode**. Once **LIMP Mode** is enabled it should be confirmed, that the weight reading is correct, before continuing using the system with **LIMP Mode** enabled.
- It is the users responsibility to manually disable **LIMP Mode** again.
- After any repair and **LIMP Mode** has been disabled again, it is up to the user to ensure coarsetare, calibration etc. is performed, and then make a final load check to ensure correct weight reading has been established.

– Configure zero tracking

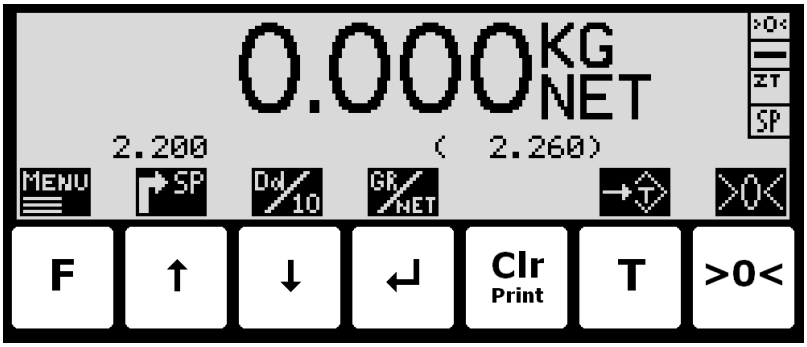
To configure the zero tracking range, select the **ZEROING** screen:



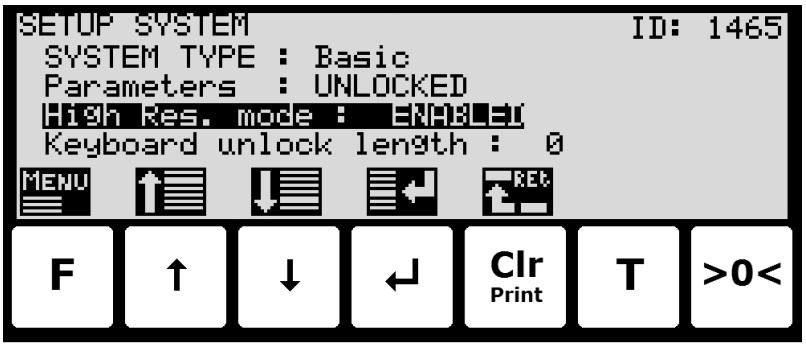
– Change reading to high resolution mode

High resolution mode changes the display reading to the enhanced resolution entered as the **CALI** weighing range. This can be done in two ways:

- Press ↓ in the **NORMAL** screen. This will select high resolution mode for 3 seconds (assuming the **High res. mode** parameter in the **SETUP SYSTEM** screen is set to DISABLED). The symbol above ↓ will flash while high resolution is active.



- In the **SETUP SYSTEM** screen, change the **High res. mode** parameter to ENABLED (this can only be done when parameters are unlocked). Now when pressing ↓ in the **NORMAL** screen high resolution mode will be selected until ↓ is pressed again. The symbol above ↓ will flash while high resolution is active.



– Specific gravity

The weighing terminal holds a specific gravity factor that influences the system's calibration. This **GRAVITY** parameter is shown and changed in the **CALIBRATION** screen described in the following. Thus the system has a feature, which makes it possible to calibrate, test and approve the system before sending it to a location with another gravitational constant *g*, than the place of approval. The specific **GRAVITY** parameter normally defaults to 9.8155 m/s^2 (the value of *g* in Denmark). The procedure are as follows:

- The specific gravity for the current location has to be entered.
- Now the system can be calibrated, tested and approved on this location.
- Before final approval, the specific gravity parameter is possibly changed to reflect the specific gravity on the destination location.
- The system can be used without re-approval on the destination location.

Please notice:

- Changing the **GRAVITY** parameter affects the calibration factor and the event counter.
- The **GRAVITY** parameter is **NOT** affected by the 'Intelligent Setup' feature or change of calibration factors.

– Perform load check

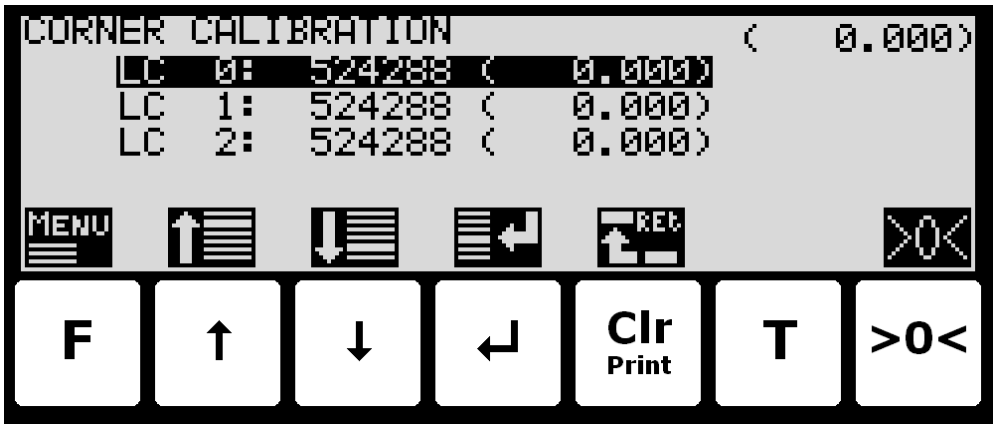
When checking the weight reading please observe these points:

- Use different loads; small and near the maximum load.
- Do not place the full load on the corners.
- Use approx. 1/3 of full load to check the corners.
- Use High resolution mode for a more accurate reading.

– Perform corner calibration

Please notice: Corner calibration is only necessary in system with more than one load cell. Corner calibration is not possible when there are more supports than load cells and should only be used in weighing systems where system mechanics shows non ideal behavior regarding load in the corners.

Use the **CORNER CALIBRATION** screen to perform a corner calibration if necessary.



In this screen corner calibration parameters such as corner calibration factor, and actual load on corresponding load cell is shown on one line for each load cell. The actual gross weight is shown in the upper right corner. This makes it possible to manually enter the corner calibration factor for each load cell. From the **CORNER CAL.** menu it is possible to select the **CORNER CAL. PROC.** screen for corner calibration of the system. It is also possible to reset the corner calibration factors to default values from the menu. A cursor (inverted text) indicates the currently selected parameter.

Corner calibration factor

The corner calibration factors can be changed/specified in the **CORNER CALIBRATION** screen by performing a calibration of the corners by switching to the **CORNER CAL. PROC.** screen as described below or by manually entering a new factor.

The corner calibration factors can be manually changed by using ↑ and ↓ to select the desired load cell/corner with the cursor, and then pressing ↵ to request change of the selected corner calibration **FACTOR** parameter. This is useful when a previous calibration must be re-established. Note that this is only possible, if the calibration factor for this previous calibration is known. The standard calibration factor is 524288. If this value is changed 1% (up or down), the signal from that load cell/corner will also change 1% (up or down).

Reset corner calibration factors

It is possible to reset the corner calibration factors to default values (524288) by using the **CORNER CAL.** menu. To perform a reset of corner calibration factors from the **CORNER CALIBRATION** screen use these steps:

- F Press once to select the **CORNER CAL.** menu.
- ↓ Press once to select the "RESET CORNER CAL. FACTORS" entry from the **CORNER CAL.** menu.
- ↵ Press once to perform the reset of the corner calibration factors.

Corner calibration procedure

It is possible to perform an automatic corner calibration of the system by selecting the **CORNER CALIBRATION PROCEDURE** screen from the **CORNER CAL.** menu.

In this screen a line for each load cell will be shown indicating “NOT registered“. Once the signal resulting from a given load placed above a load cell is registered this indication will change to “Registered” followed by the registered load for this load cell/corner. The actual gross weight is shown in the upper right corner.

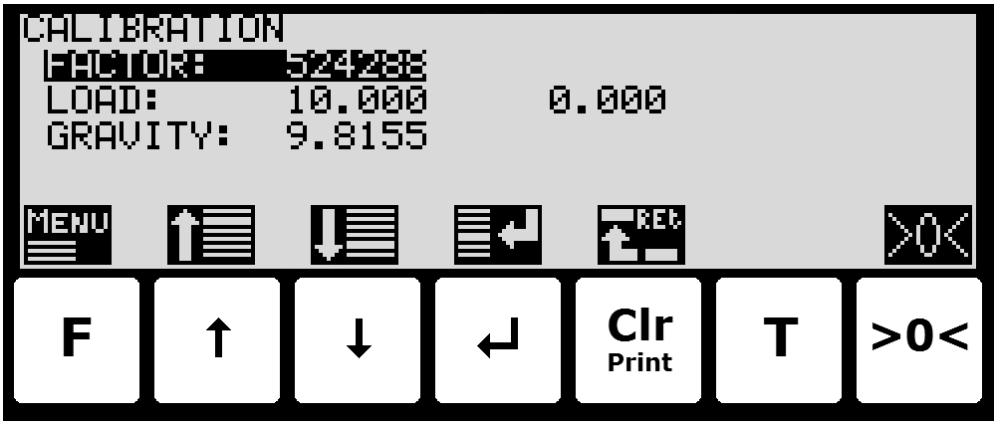
To corner calibrate the system use the following steps:

1. The system must be previously coarse tared.
2. Zero the gross reading in the upper right corner by pressing [>0<].
3. Place the used calibration load directly above one of the load cells/corners.
4. Perform the sampling/registration of the load cell/corner in question by pressing the [↵] key. The weighing terminal will automatically detect above which load cell/corner the load is actually placed and register the corresponding signal. The registered value is indicated on the screen and the status is changed from ”NOT registered” to ”Registered”.
5. Remove the calibration load. Zero the weight reading if necessary by pressing [>0<] before the load is placed above a new load cell/corner.
6. Repeat 2-4 for each load cell/corner in the system as the calibration load is moved to a new load cell/corner each time. It is important that 2-4 is performed for every load cell/corner in the system. When all load cells/corners are registered all status indications should indicate **Registered**.
7. The corner calibration can be restarted at any given time by selecting ”RESTART CORNER CAL. PROC.” from the **CORNER CAL. PROC.** menu or by leaving the **CORNER CALIBRATION PROCEDURE** screen.
8. Once all load cells/corners have been sampled/registered the corner calibration itself can be performed. This is done by selecting **PERFORM CORNER CAL.** from the **CORNER CAL. PROC.** menu. **IMPORTANT:** Until this is done the corner calibration is **NOT** performed and the corner calibration factors will remain unchanged.
9. The corner calibration will now be performed based on the sampled values, and the weighing terminal returns to the **CORNER CALIBRATION** screen.
10. Following the corner calibration it should be verified that the corner calibration factors are reasonable values. It should also be checked that identical weight readings are achieved when the calibration load is placed above each of the load cells/corners.

Please notice: The calibration load parameter from the **CALIBRATION** screen is not used during corner calibration; instead the corner calibration procedure will result in a gross reading of approximately the average value of the registered load cell/corner values.

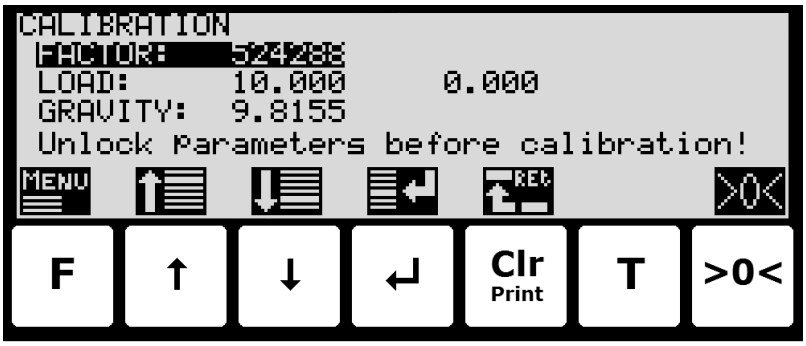
– Perform system calibration

A common system calibration can be done from the **CALIBRATION** screen:



In this screen calibration parameters such as specific gravity (described above), calibration factor, calibration load (to the left) and actual gross weight (to the right) are shown and can be changed. This makes it possible to calibrate the system. From the **CALIBRATE** menu it is possible to select the **CORNER CALIBRATION** screen for corner calibration of the system. A cursor (inverted text) indicates the currently selected parameter.

If parameter change is locked, then remember to unlock parameter change prior to calibration attempt, as shown in the display:



Calibration factor

The actual system calibration factor can be changed/specified in the **CALIBRATION** screen by performing a calibration of the system as described below or by manually entering a new factor.

The calibration factor indication can be manually changed. This is useful when a previous calibration must be re-established. Note that this is only possible, if the calibration factor for this previous calibration is known. The standard calibration factor is 524288. If this value is changed 1% (up or down), the gross weight indication will also change 1% (up or down).

Calibration load

The actual mass of the load used for calibration must be specified in the **CALIBRATION** screen before calibration is performed.

Perform calibration

It is possible to calibrate the system by performing the following calibration procedure:

- Ensure the weighing scale is has been coarse tared.
- Ensure the weighing scale is empty and clean.

>0< Press once to zero the gross reading of the empty weighing scale.

↓ Press repeatedly until “LOAD” parameter is selected with the cursor.

↵ Press once to start entry of the actual calibration load if necessary.

- Place the load on the weighing arrangement. The gross weight of the load displayed to the far right in the **LOAD** line will now be inside +/- 10% of the correct reading. If this isn’t the case the mechanical and electrical installation must be checked. Furthermore all weighing range parameters must be checked again.

F Press once to select the **CALIBRATE** menu.

↓ Press once to select the “PERFORM CALIBRATION” entry from the **CALIBRATE** menu.

↵ Press once to perform the calibration.

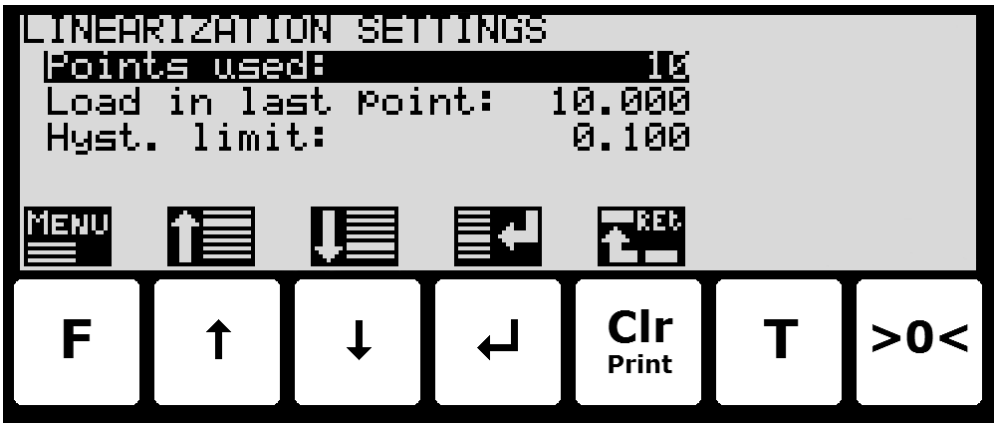
- The gross weight shown in the display will now match the used calibration load and the calibration factor will have been updated correspondingly.

Please notice: The accuracy of the calibration is highly dependent on the accuracy and size of the calibration load. Please select a load with a mass not less than the maximum weight normally applied to the system.

– Linearization

Please notice: Linearization is normally not used, and should only be used in systems where it is absolutely necessary to achieve correct readings.

If decided to use linearization and before the actual linearization is performed in the **LINEARIZATION** screen, then the following basic parameters must be entered in the **LINEARIZATION SETTINGS** screen. This screen is achieved by selecting the **LIN. SETTINGS** item in the **LINEARIZATION** menu and then press ↵.



In this screen the **Points used** , **Load in last point** and **Hyst. limit** parameters (used for a possible linearization) are shown and changed. A cursor (inverted text) indicates the currently selected parameter.

Number of load points used

The number of shown load points (up to 10) in the **LINEARIZATION** screen that are actually used must be specified in the **LINEARIZATION SETTINGS** screen. This can be set using the ***Points used*** parameter. The parameter can be set from 2 to 10, and it must be set as the first thing, if the linearization function is to be used.

Note: When parameter entry is completed, the entered value must be accepted. If the value is accepted a **Reset linearization** is performed as described below. If the value is rejected the terminal continues as if the entry was never initiated.

Load in last point

The load in the last used load point (maximum value for the linearization) must be specified in the **LINEARIZATION SETTINGS** screen. This can be set using the ***Load in last point*** parameter.

Note: The value entered for the load in the last point must always be a bit smaller than the maximum weight for the 3 weighing ranges, so that the weight does NOT exceed the weighing range (shows **OL**), when linearization in the top point is made.

Note: When parameter entry is completed, the entered value must be accepted. If the value is accepted a **Reset linearization** is performed as described below. If the value is rejected the terminal continues as if the entry was never initiated.

Hysteresis limit

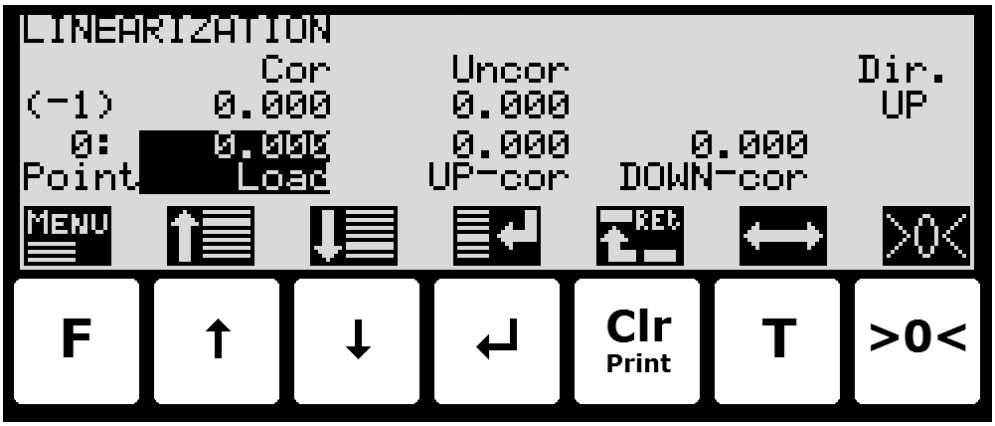
The hysteresis limit must be specified in the **LINEARIZATION SETTINGS** screen. This can be set using the ***Hyst. limit*** parameter. The hysteresis limit specifies the weight change in a given direction that must take effect for a direction change to be detected.

Reset linearization

The entered linearization (load points and up/down corrections) can be reset (setting load points to default values and up/down corrections to 0) by using the **LIN. SETTINGS** menu. Select the **RESET LINEARIZATION** item and press ↵.

– Perform linearization

Please notice: If decided to use linearization the relevant points and found corrections can be entered manually in the **LINEARIZATION** screen, or the "automatic" linearization procedure can be started from this screens menu by selecting **START LIN. PROCEDURE** (see Appendix I – Linearization procedure).



In this screen linearization parameters are shown and can be changed in order to compensate for hysteresis etc. in the weighing system. In the lower half of the screen just above the key icons the selected linearization point number, the entered load for this point and the up/down corrections (added/subtracted) for this point are shown. Just above this in the upper half of the screen the actual used interval, the corrected gross weight, the uncorrected gross weight and the direction is shown. A cursor (inverted text) indicates the currently selected parameter.

Note: For load point no. 0 it is only possible to enter 0 for both "Load" and "UP-cor", but for the "DOWN-cor" values different from 0 can also be entered.

Load points

The load points in which the given corrections are performed must be specified in the **LINEARIZATION** screen. The load points are changed by using ↑ and ↓ to select the desired point number in the "Load" column with the cursor, and then pressing ↵ to request change of the selected load parameter.

The load parameters must be entered in rising order; i.e. starting with 0kg for point no. 0 and always rising upwards for rising point numbers. It must be ensured all used load points including the up/down corrections are valid.

Up/Down corrections

The up/down corrections performed in the different load points must be specified in the **LINEARIZATION** screen. The up/down corrections are changed by using ↑ and ↓ to select the desired point number in the "UP-cor" or "DOWN-cor" column with the cursor, and then pressing ↵ to request change of the selected up/down correction parameter.

Please notice: The UP corrections are added while the DOWN corrections are subtracted.

Reset UP/DOWN corrections

The entered UP/DOWN corrections can be reset without changing the load points or the hysteresis limit. This is done by using the **LINEARIZATION** menu. Select the **ZERO CORRECTIONS** item and press ↵.

Start linearization procedure

An "automatic" linearization procedure that guides the user through the process for determining the necessary compensations can be started from the **LINEARIZATION** menu by selecting the **START LIN. PROCEDURE** item and pressing ↵.

Note: See Appendix I – Linearization procedure for further details.

– Zero with extended range (power-up zeroing)

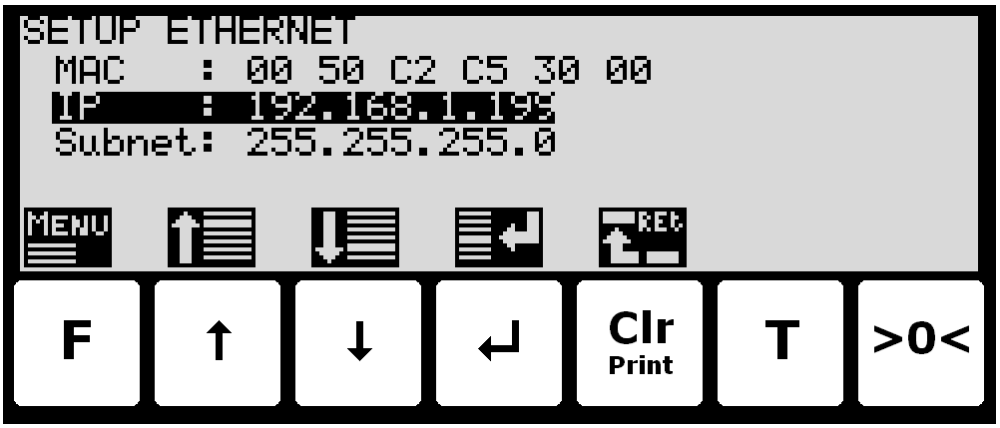
If a zeroing is to be performed during power up (with extended zeroing range), >0< must be pressed while the program identification (software name, date and revision) is shown. Pressing >0< before this is ignored.

– Configure Ethernet settings

Address settings

Ip addresses, subnet masks etc. are normally set from a PC with the EEConnect software. Please refer to the EEConnect documentation for further details.

If the terminal is unreachable e.g. due to network topology, the Ethernet settings can be entered in the **SETUP ETHERNET** screen:

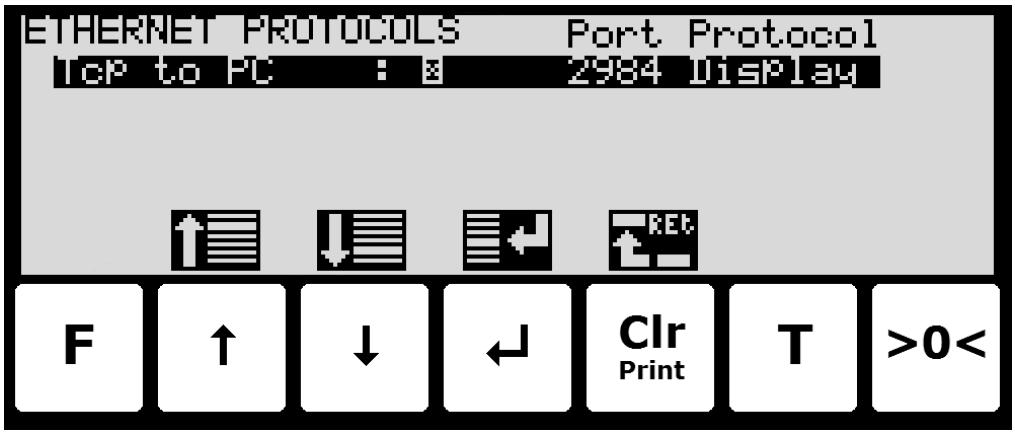


– Configure Ethernet TCP communication

The terminal can perform Ethernet communication on its RJ45/Cat5 Ethernet connector (J7) using a TCP protocol and using the Ethernet settings previously configured. The weighing terminal acts as a TCP server. For this to work the following must be performed:

Enable TCP protocol

The TCP protocol must be enabled. This can be done in the **ETHERNET PROTOCOLS** screen shown below:



Select TCP port

Once the TCP protocol has been enabled, the used TCP port number must be set. This can also be done in the **ETHERNET PROTOCOLS** screen shown above.

Select data output

Once the TCP protocol has been enabled, it can be selected when data are to be transmitted. This can also be done in the **ETHERNET PROTOCOLS** screen shown above. It is possible to select ***None***, ***Registration, Display*** or ***Poll***.

Please notice: In this application either ***None***, ***Registration, Display*** or ***Poll*** should be selected.

With ***Registration*** or ***Display*** selected the data shown below is transmitted as an ASCII string on the TCP connection every time a registration is made or the display reading is updated. This is only done if a client is connected to the weight terminal TCP server. Only 1 TCP connection can be opened.

GGG.GGG,NNN.NNN<CR><LF>

GGG.GGG	Gross weight with decimal point position and resolution as in display reading.
NNN.NNN	Net weight with decimal point position and resolution as in display reading.
<CR><LF>	Carriage return and linefeed characters.

The length of the gross and net fields may vary due to sign, decimal point, error codes etc.

With ***Poll*** selected a connected client can read gross or net weight by sending one of the following 4 byte long ASCII "poll" telegrams on the TCP connection:

RG<CR><LF>	(*for reading of gross weight*)
RN<CR><LF>	(*for reading of net weight*)

When one of the valid "**poll**" telegrams is received on the 5024G terminal, one of the following ASCII telegrams below, is send back on the TCP connection (depending on what was received from the client):

GGG.GGG<CR><LF>	(when reading gross weight)
NNN.NNN<CR><LF>	(when reading *net weight*)

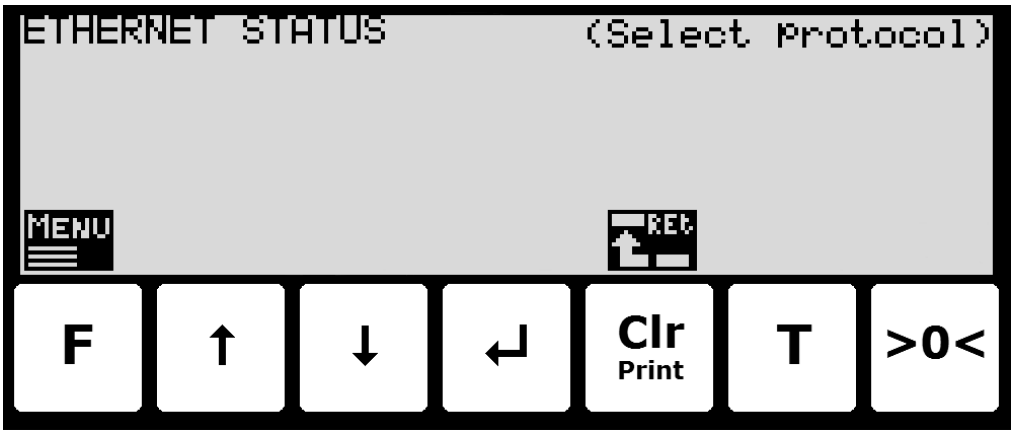
Here the indications of the telegram contents is defined in the same way as described earlier above under the ***Registration*** and ***Display*** description.

NOTE: If an error is detected on the 5024G terminal all of the above described telegrams will be replaced by the following error telegram (ASCII):

ERROR<CR><LF>

– Check Ethernet communication status

In the **ETHERNET STATUS** screen, the status of a selected Ethernet communication protocol can be read:



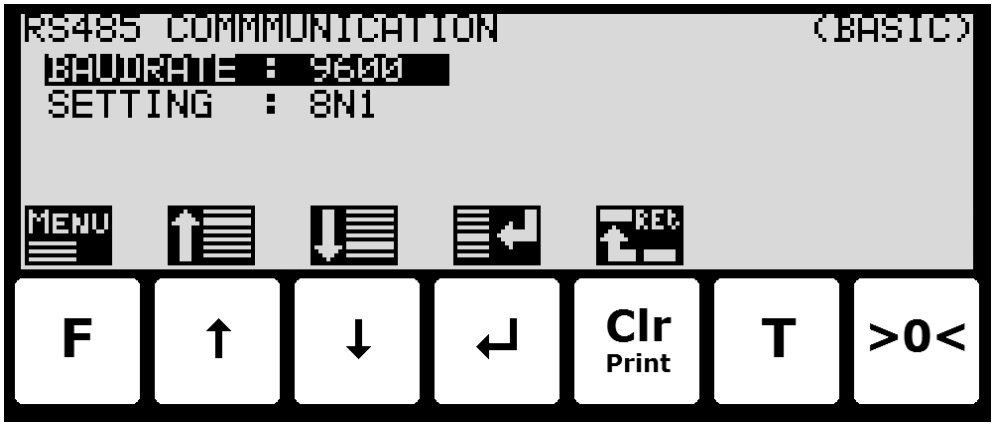
By use of the screen menu (the F key) the active Ethernet protocol, whose status is to be read, is selected. For an Ethernet protocol to be selected, it must be active. This means, that

the protocol itself must be enabled in the **ETHERNET PROTOCOLS** screen (which again also may require, that the corresponding communication option must be enabled).

– Configure BASIC RS485 communication settings

NOTE: Unless the two-wire RS485 connection (J4) is reserved for other usage, the system can communicate with external equipment as described below. For different optional use please refer to separate document that replaces the RS485 communication descriptions below.

The RS485 serial communication settings such as Baudrate, Databits, Stopbits and Parity are shown and can be set in the **RS485 COMMUNICATION** screen:



RS485 Baudrate

The RS485 **BAUDRATE** is used to specify the actually used baudrate on the RS485 communication when communicating with externally connected equipment. The baudrate can be set to a wide variety of commonly used baud rates in the interval 1200 bps to 115200 bps.

RS485 Serial Setting

The RS485 **SETTING** is used to specify the actual serial settings used on the RS485 communication when communicating with externally connected equipment. The settings can be set to a wide range of combinations all defined and indicated by 3 characters with the following format:

<D> <P> <S>

where:

<D> indicates the number of Databits and can be set to '**7**' or '**8**'.

<P> indicates the Parity and can be set to '**N**' (None), '**E**' (Even) or '**O**' (Odd).

<S> indicates the number of Stopbits and can be set to '**1**' or '**2**'.

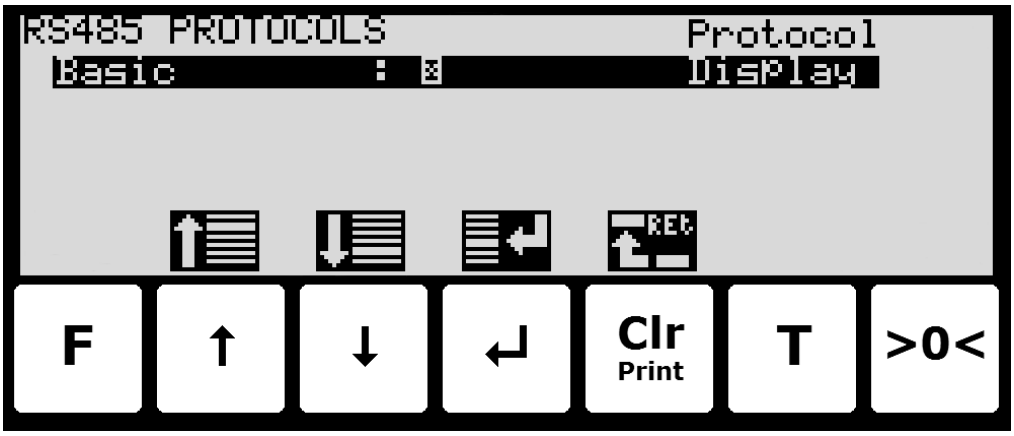
Hence '**8N1**' would indicate 8 Databits, No Parity and 1 Stopbit.

– Configure RS485 communication protocol

The terminal can perform RS485 communication on its RS485 serial communication connector (J4) using a selected RS485 protocol and using the RS485 settings previously configured. For this to work the following must be performed:

Enable RS485 protocol

One and **ONLY** one of the shown RS485 protocols must be enabled. This can be done in the **RS485 PROTOCOLS** screen shown below:



Select data output for BASIC RS485 protocol

Once the **BASIC** RS485 protocol has been enabled, it must be selected when data are to be transmitted on the RS485 connection. This can also be done in the **RS485 PROTOCOLS** screen shown above. It is possible to select ***None***, ***Registration, Display*** or ***Poll***.

Please notice: In this application either ***None***, ***Registration, Display*** or ***Poll*** should be selected.

With ***Registration*** or ***Display*** selected the data shown below is transmitted as an ASCII string on the RS485 connection every time a registration is made or the display reading is updated.

GGG.GGG,NNN.NNN<CR><LF>

GGG.GGG	Gross weight with decimal point position and resolution as in display reading.
NNN.NNN	Net weight with decimal point position and resolution as in display reading.
<CR><LF>	Carriage return and linefeed characters.

The length of the gross and net fields may vary due to sign, decimal point, error codes etc.

With ***Poll*** selected a connected controller/PLC can read gross or net weight by sending one of the following 4 byte long ASCII ”poll” telegrams to the 5024G terminal:

RG<CR><LF>	(*for reading of gross weight*)
RN<CR><LF>	(*for reading of net weight*)

When one of the valid ”**poll**” telegrams is received on the 5024G terminal, one of the following ASCII telegrams below, is send back on the RS485 connection (depending on what was received from the controller/PLC):

GGG.GGG<CR><LF>	(when reading gross weight)
NNN.NNN<CR><LF>	(when reading *net weight*)

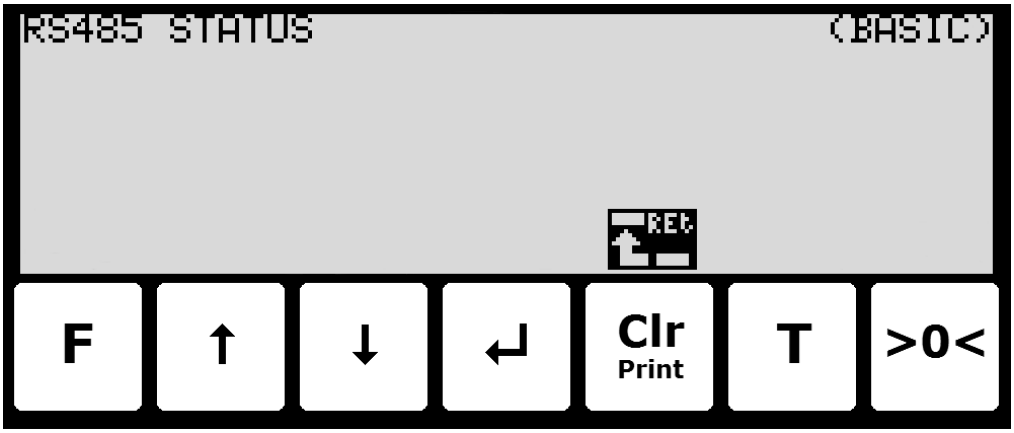
Here the indications of the telegram contents is defined in the same way as described earlier above under the ***Registration*** and ***Display*** description.

NOTE: If an error is detected on the 5024G terminal all of the above described telegrams send from the 5024G terminal, will be replaced by the following error telegram (ASCII):

ERROR<CR><LF>

– Check BASIC RS485 communication status

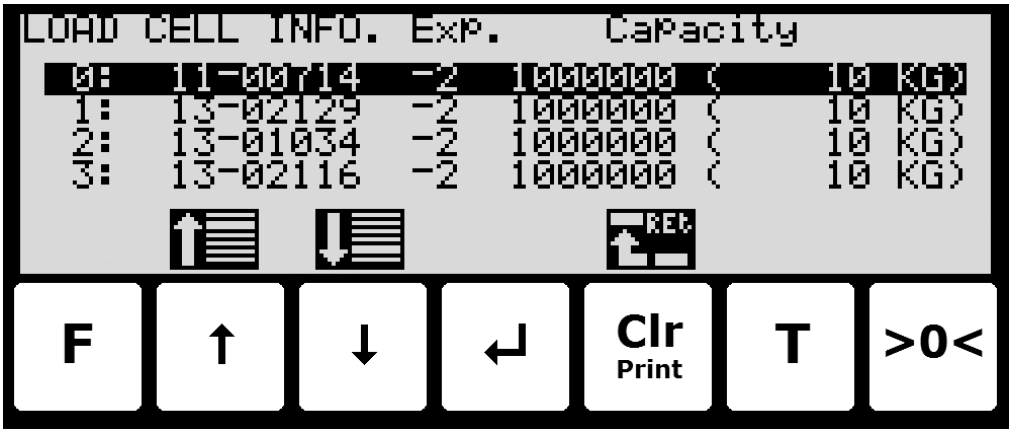
In the **RS485 STATUS** screen, the status of a selected RS485 communication protocol can be read:



For the **BASIC** RS485 protocol the **RS485 STATUS** screen will be blank (no data is shown).

– Check load cell serial no., exponent and capacity

In the **LOAD CELL INFO.** screen, the load cell serial number, exponent and capacity can be read for the individual load cells:

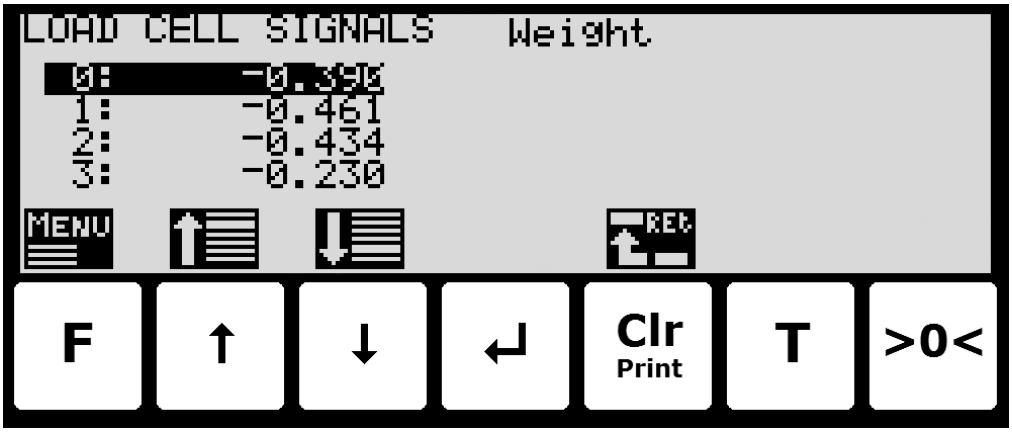


On each line for each load cell the serial number, exponent and capacity as well as in parenthesis the capacity converted to an appropriate unit depending on the exponent is shown.

Please notice: If a line is flashing this indicates, that an error code is present for the corresponding load cell. This can be examined further using the **STATUS** and **LOAD CELL INFO.** screens.

– Check individual load cell signals

In the **LOAD CELL SIGNALS** screen, the individual load cell readings can be checked:



Three different readings can be selected from the **LOAD CELL SIGNALS** menu:

DIRECT

The internal load cell output value is displayed as it is received. This number is in SI units, but the resolution is load cell dependent and may be an unusual value like 100mg, 10 gr. etc. Furthermore no zeroing is used and the load cell value will NOT be 0 when the load cell is empty, so this value is NOT the absolute load on this load cell.

WEIGHT

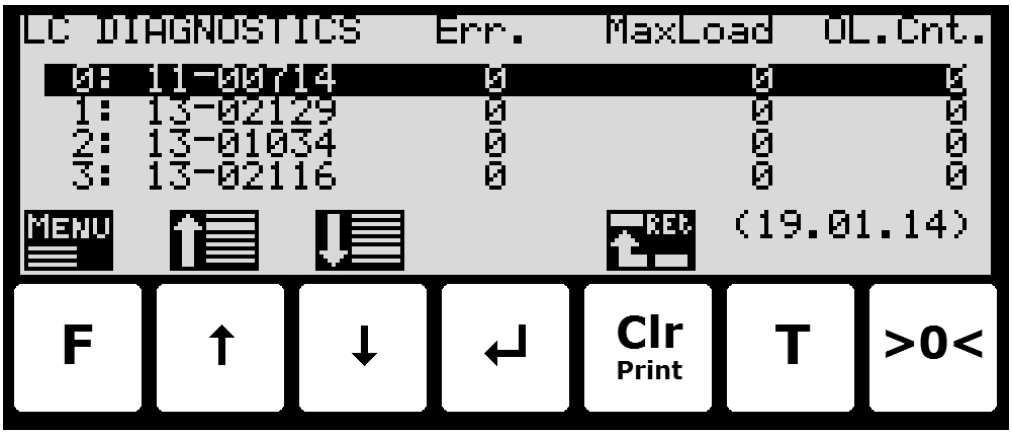
The load cell output value in the resolution etc., selected for the display. No zeroing is used and the load cell value will NOT be 0 when the load cell is empty, so this value is NOT the absolute load on this load cell.

ZEROED

The load cell output value in the resolution etc., selected for the display. The value is zeroed along with the normal display reading. So this value is the change since the last zeroing.

– Check load cell diagnostics

In the **LOAD CELL DIAGNOSTICS** screen, the load cell diagnostics can be read for the individual load cells:



On each line for each load cell the serial number, number of detected errors (**Err.**), the maximum load measured on the load cell (**MaxLoad**) and the number of times the load cell has been overloaded (**OL.Cnt.**). All these numbers apply since the last reset of diagnostics data, which took place on the date shown in parenthesis in the lower right corner (YY.MM.DD).

Please notice: Diagnostics data can be reset from the **LOAD CELL DIAGNOSTICS** menu if the correct password has been entered.

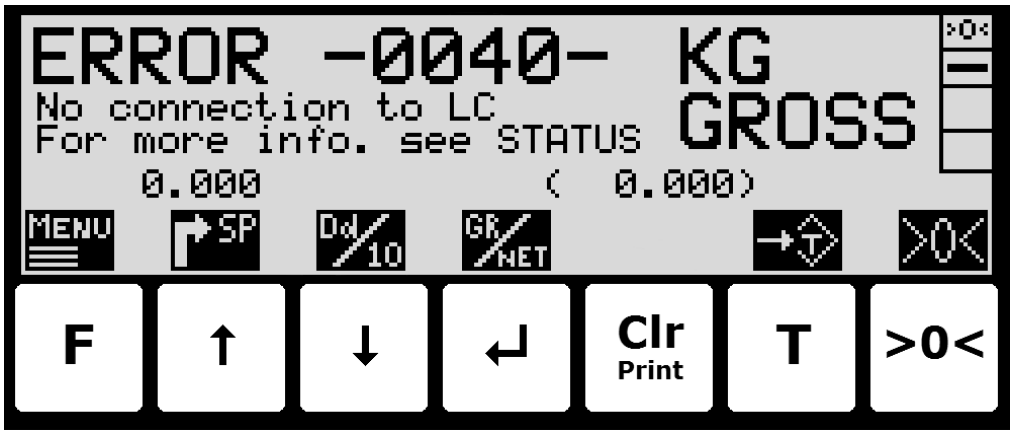
Trouble shooting

– Error situations

Problem	**Explanation and possible solutions**
UL *displayed* ***OL*** *displayed*	Weight is below or above the weighing range. Check installation for mechanical errors, e.g. surroundings touching the weighing arrangement. It the load too heavy for the scale capacity? Make sure that load cell and weighing range configuration is correct. Empty the system. Zero the system, first during operation if this is not sufficient then during power-up. As a final possibility perform a coarse taring operation when the system is empty.
-XXXX- *displayed*	Load cell error. Make sure that load cell configuration is correct and that the system has been power-cycled. Check all load cell connections. Refer to load cell documentation for further details, as well as to the description of error code display and **STATUS** screen below.
Weight indication is blank	Make sure that configuration of load cell communication format is correct and that the system has been power-cycled. Check all load cell connections. Refer to load cell documentation for further details.
Weight never stable *Weight always stables*	Check installation for mechanical errors, e.g. surroundings touching the weighing arrangement. Check that stability requirements are configured correctly.
Zero tracking never on *Zero tracing always on*	Check installation for mechanical errors, e.g. surroundings touching the weighing arrangement. Check that zero tracking is configured correctly.
Unable to zero *Unable to autotare*	Check installation for mechanical errors, e.g. surroundings touching the weighing arrangement. Check that stability requirements are configured correctly.
No keyboard icons shown	Keyboard is locked. Press a key, and then press indicated key sequence until keyboard is unlocked.
Cannot enter parameter value	Unlock parameters.
No RS485 connection between 5024G and external equipment	Check the cabling between 5024G and equipment is made correctly. Check the 5024G (in the **RS485 COMMUNICATION** screen) and the equipment are configured correctly to the same serial settings. Check the correct protocol has been enabled on the 5024G terminal (in the **RS485 PROTOCOLS** screen).

– Error code display (in NORMAL screen)

When the system detects a load cell error (***-XXXX-***) this will be shown in the **NORMAL** screen as follows:

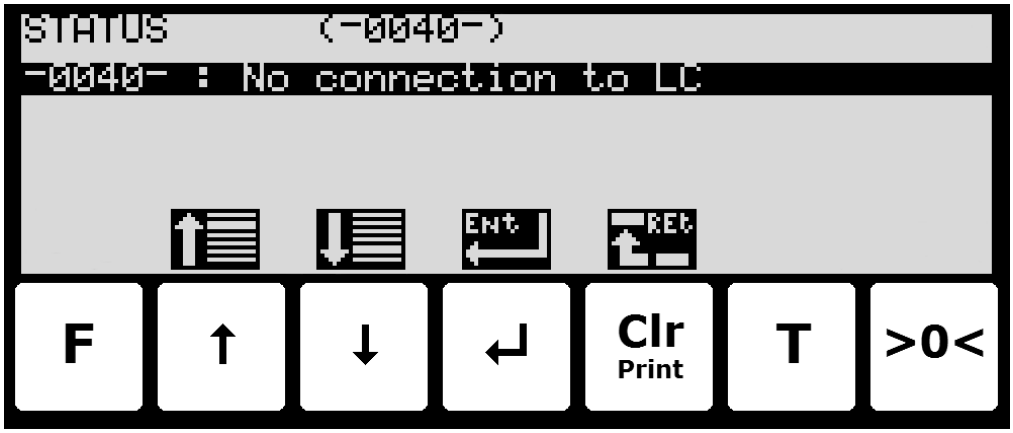


The weight indication normally shown in large types is replaced by an error code with a corresponding description and reference to the **STATUS** screen, where the error code is elaborated and possible tips to how the individual error codes can be solved are given.

Please notice: If an error is indicated the **STATUS** screen can be accessed from the **NORMAL** menu.

– Error solving (in STATUS screen)

In the **STATUS** screen, a list of error codes currently present on the system is shown as follows:



Please notice: Depending on the load cell protocol, a given error may result in multiple error codes at the same time. These error codes will be logical OR'ed together, and the resulting error code shown in the **NORMAL** screen is also shown in the top line of this screen.

Please notice: If more error codes are present at once, a given error code can be selected by moving the cursor up or down in the list with the ↑ and ↓ keys. More error codes than can be shown, can be present. In such case these can also be shown using the arrow keys.

Please notice: If ↵ is pressed, a list of possible tips to solve the currently selected (using the cursor) error code will appear.

Appendices

Appendix A – Installation checklist

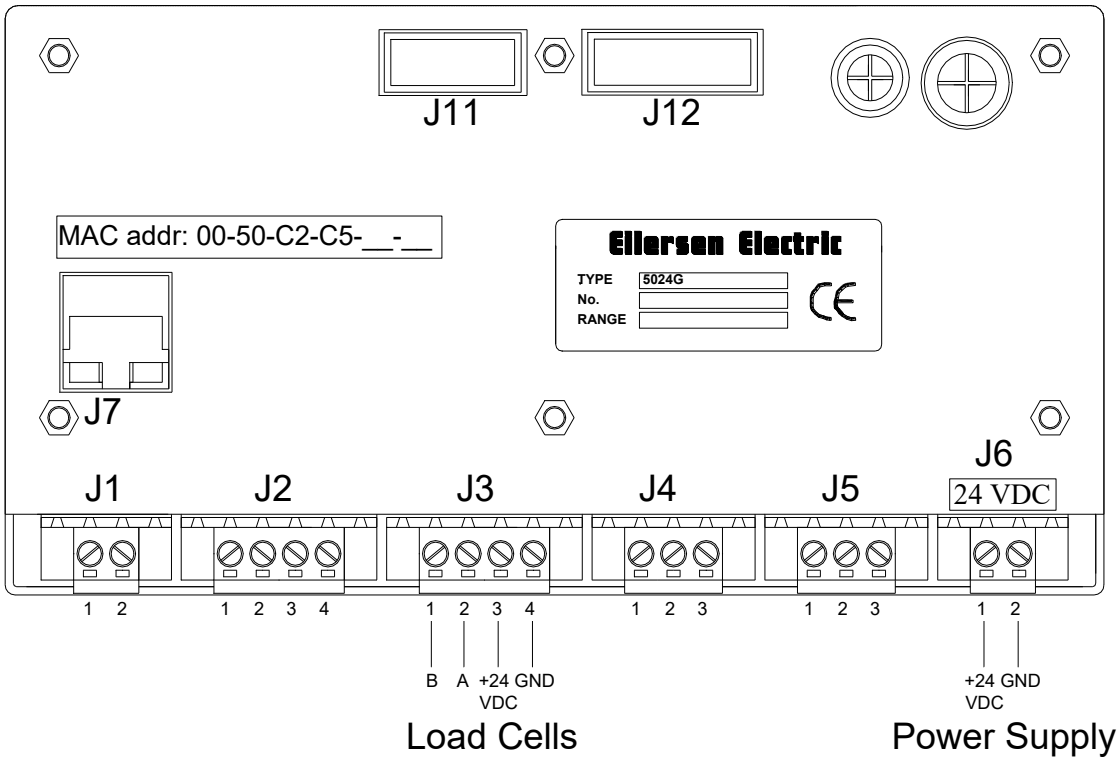
ACTION	5024 SCREEN	PARAMETERS
1. Check electrical connections	-	Power, Load cells, Digital I/O, RS485 (external modules/equipment), analog output (4-20mA or 0-10V) and Ethernet.
2. Apply power and check software ID	**ServiceMode**	**Software: StdLim.140630.8.2**.
3. Unlock parameters	**ServiceMode** -> **System**	**Parameters:** <Locked / Unlocked>
4. Intelligent Setup? (Optional)	**ServiceMode** -> **System**	**Intelligent Setup:** Possible activation of Intelligent Setup feature for automatic proposal of weighing technical parameters below. See separate 'Intelligent Setup' manual for further information.
5. Configure load cells used	**ServiceMode** -> **Weighing** -> **Load Cells**	**Protocol type:** <Protocol type: 2010/401x/4x40-StdBB/4x40-StdLC> **No.:** <Number of connected load cells> **Supports:** <Number of supporting points>
6. Power off/on and check load cells	**SystemInfo** -> **Load Cell Signals**	**Load Cell Signals:** Verify all load cells found without error indications?
7. Configure the 3 weighing ranges	**ServiceMode** -> **Weighing**	**Mode:** NORMAL / CALIBRATION / PROTOCOL each consisting of: - **Unit:** <Desired unit> - **DP:** <Number of digits after decimal point> - **Resolution:** <Desired resolution> - **Minimum:** <Desired minimum weight> - **Maximum:** <Desired maximum weight>
8. Configure display and filtering	**ServiceMode** -> **Weighing** -> **Display**	**Interval:** <Measuring period. Default: *400ms*> **Filters:** <Sample, Display and Steady filters. Default: *None*> **Steady detection limit:** <Value for steady detection. Default: 1 *division*>
9. Perform coarsetare	**ServiceMode** -> **Weighing** -> **Coarsetare**	Perform coarsetare with no load on weighing arrangement.
10. Configure zero tracking range	**ServiceMode** -> **Weighing** -> **Zeroing**	**ZT range:** <Range for automatic zero tracking. Default: ½ *division*>
11. Gravitational constant	**ServiceMode** -> **Weighing** -> **Calibration**	Check gravitational constant matches the one where system is approved. Changed after calibration and approval if system is sent to another country.
12. Perform load check	**Normal**	Verify weight reading with known load.
13. Perform corner calibration (Optional)	**ServiceMode** -> **Weighing** -> **Calibration** -> **Corner.Cal.**	Perform corner calibration if needed.
14. Perform system/span calibration	**ServiceMode** -> **Weighing** -> **Calibration**	Perform calibration of system/span. Note calibration factor.
15. Perform linearization (Optional)	**ServiceMode** -> **Weighing** -> **Linearization**	Perform linearization (Up/Down correction) if needed.
16. Perform final load check	**Normal**	Verify weight reading with known load if necessary.
17. Configure analog output (Possible option)	**ServiceMode** -> **Analog**	**Output:** <Analog output type: 4-20mA or 0-10V> **Value:** <Analog output follows: Gross or Net weight> **Full scale:** <Value resulting in maximum analog signal> **Error value:** <Output value on error: Maximum or Minimum> **Test mode/value:** <Used for test to force an output signal>
18. Configure Ethernet connection (Optional)	**ServiceMode** -> **Ethernet** (-> **Protocols**)	Configure Ethernet connection (IP, subnet and protocol) on Ethernet connector of the 5024 if needed.
19. Configure external equipment, module or remote display (Possible option)	**ServiceMode** -> **Ext.Module** or **ServiceMode** -> **Remote Display** or **ServiceMode** -> **RS485 COMM.**	Configure the connection of any external equipment, module or remote display on the RS485 channel if needed: - **MCEXX35:** Profibus-DP module - **MCE9637:** DeviceNet module - **2X50:** Ethernet module - **2070:** PROFINET module - **5024:** Remote Display
20. Configure system specifics	**ServiceMode** -> **Dosing par.** (possibly other screens as well)	Configure system specific parameters (dosing, afterflow, etc.).

(Optional)		

Appendix B – Electrical connections

The following describes the main hardware features such connection of power, connection of load cells, various connectors and jumpers as well as internal indicators (LEDs).

Rear view



Power Connection

The 5024 system is powered by +24VDC which is connected to either J1 or J6 (J1 and J6 are internally short-circuited). This powers the entire system including the connected load cells.

J1 pin	Function
1	+24V
2	GND

J6 pin	Function
1	+24V
2	GND

Load cell connection

Load cells can be connected to the system in one of the following three ways:

- J11 connector using a ribbon cable to 2010 load cell modules (without use of MCE9601).
- J3 connector using a shielded cable to either 2010 load cell modules (by using a MCE9601 connector module), or to a 4x40 unit.

J3 pin	Function
1	RS485-B (negative line)
2	RS485-A (positive line)
3	+24V (output – may be used to supply the load cells)
4	GND

- J12 connector using a ribbon cable to a 4015 load cell connection module, for System 4000 compatible load cells.

Digital I/O connector

The 4 pin digital I/O connector (J2) can be used for connecting digital inputs and outputs to the 5024 system. This connector has the following pin-out:

J2 pin	Function
1	**IO_1 (START)** INPUT: Tare weight reading (zero net reading) and start automatic dosing.
2	**IO_2 (REGISTRATION)** INPUT: Register weight.
3	**IO_3 (FINE)** OUTPUT: Fine dosing. ON during automatic dosing until the net weight reaches the FINE setpoint, and the dosing is completed.
4	**IO_4 (COARSE)** OUTPUT: Coarse dosing. ON during automatic dosing as long as the net weight is below the COARSE setpoint.

IMPORTANT: Connection of the digital I/O signals to external equipment must be made using solid-state-relays (SSR).

RS485 communication

The 3 pin RS485 serial communication connector (J4) can be used for RS485 communication with externally connected equipment. This connector has the following pin-out:

J4 pin	Function	Connection
1	RS485-B (negative line)	**External equipment:** RS485-B *For possible other usage - please refer to Appendix H.*
2	RS485-A (positive line)	**External equipment:** RS485-A *For possible other usage - please refer to Appendix H.*
3	RS485-GND	**External equipment:** RS485-GND *For possible other usage - please refer to Appendix H.*

Please notice: A and B line definition may be switched on eternal equipment. Especially on Siemens equipment and a few other German manufacturers A and B lines definitions are different.

Analog output connector

The 3 pin analog output connector (J5) can be used for output of analog control signals from the 5024 system. This connector has the following pin-out:

J5 pin	Function
1	*Reserved for future use – please refer to Appendix H.*
2	*Reserved for future use – please refer to Appendix H.*
3	*Reserved for future use – please refer to Appendix H.*

Ethernet connector

The RJ45/Cat5 Ethernet connector (J7) is a standard Ethernet connector that can be used to connect the 5024 system to Ethernet.

Jumper settings

The 5024G has three internal jumpers:

Jumper	Function
JP1	Reset The jumper allows reset of the on-board microcontroller. OFF: Normal operation (normal setting from factory) ON: Reset of the 5024 on-board microcontroller
JP2	BOOT Load The jumper is used when downloading new software to the 5024 system using the J8 serial connector. OFF: Normal power-up/operation (normal setting from factory) ON: Download operation possible (see download description)
JP3	Configuration jumper *(Reserved for future use)*

Light Emitting Diodes (LED's)

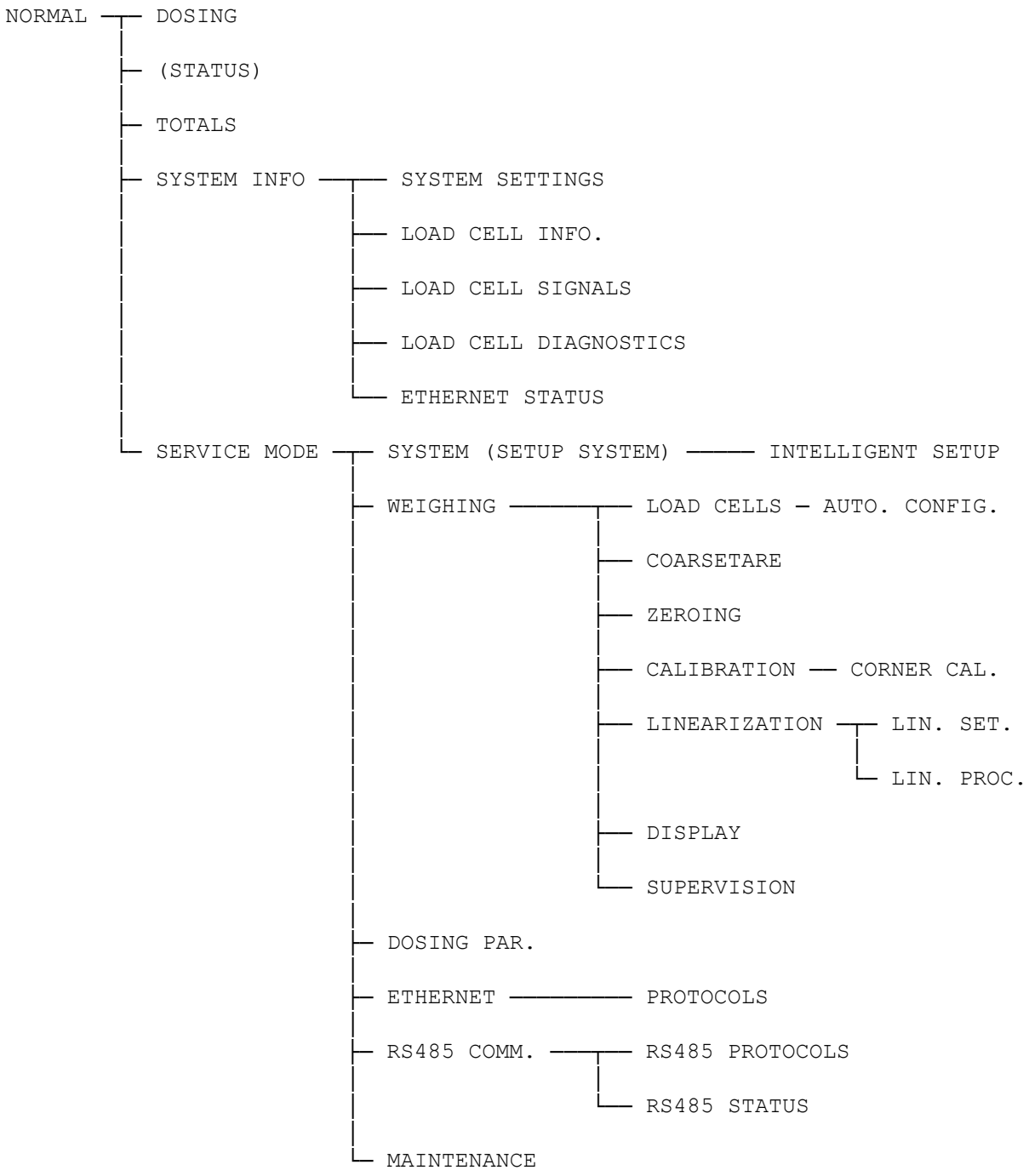
The 5024 system is equipped with a number of internal LED:

LED	Function
D7 (Green)	Load cell Tx (RS485) Data is transmitted to the load cell.
D8 (Red)	Load cell Enable (RS485) Transmission to the load cell is enabled.
D9 (Yellow)	Load cell Rx (RS485) Data is received from the load cell.
D16 (Yellow)	External Rx (RS485) Data is received from external equipment.
D17 (Red)	External Enable (RS485) Transmission to external equipment is enabled.

D18 (Green)	External Tx (RS485) Data is transmitted to external equipment.

Appendix C – Screen overview

The system has the following screens, which are selected using the menu system:



During normal use it is only necessary to use the **NORMAL** and **DOSING** screen. The other screens are used during installation and calibration.

Appendix D – Filters

Two types of filters can be applied: A filter on each sampling from the load cell and/or a filter on each display weight reading update. The sampling frequency depends on the types and number of load cells and the weight display reading update rate, as described below.

All filters are FIR filters with 7-100 taps.

Sampling filter

The sampling frequency and the filter frequency depend on the load cell communication format and number of load cells.

Please notice: Filtering is a time consuming operation – so selecting a long filter (with many taps) on small sample rates (2-5 ms) may slow operation considerably down or even stop Ethernet or load cell communication. A combination of a short sampling filter and a display filter or a higher display update time is a better choice and will prevent these problems.

Load cell protocol type		401x 4x40-StdLC	2010 4x40-StdBB	2010 4x40-StdBB	2010 4x40-StdBB	2010 4x40-StdBB
Number of load cells		1-4	1	2	3	4
Sampling time		2	5	10	15	20
Filter		Filter frequency (Hz) and total settling time (ms)				
Taps	Damping					
7	-60dB	120 Hz 14 ms	48 Hz 35 ms	24 Hz 70 ms	16 Hz 105 ms	12 Hz 140 ms
9	-60dB	100 Hz 18 ms	40 Hz 45 ms	20 Hz 90 ms	13 Hz 135 ms	10 Hz 180 ms
9	-80dB	120 Hz 18ms	48 Hz 45ms	24 Hz 90ms	16 Hz 135ms	12 Hz 180ms
12	-60dB	80 Hz 24 ms	32 Hz 60 ms	16 Hz 120 ms	11 Hz 180 ms	8 Hz 240 ms
12	-80dB	100 Hz 24 ms	40 Hz 60 ms	20 Hz 120 ms	13 Hz 180 ms	10 Hz 240 ms
15	-80dB	80 Hz 30 ms	32 Hz 75 ms	16 Hz 150 ms	11 Hz 225 ms	8 Hz 300 ms
17	-60dB	60 Hz 34 ms	24 Hz 85 ms	12 Hz 170 ms	8 Hz 255 ms	6 Hz 340 ms
21	-80dB	60 Hz 42 ms	24 Hz 105 ms	12 Hz 210 ms	8 Hz 315 ms	6 Hz 420 ms
25	-60dB	40 Hz 50 ms	16 Hz 125 ms	8 Hz 250 ms	5 Hz 375 ms	4 Hz 500 ms
32	-80dB	40 Hz 64 ms	16 Hz 160 ms	8 Hz 320 ms	5 Hz 480 ms	4 Hz 640 ms
50	-60dB	20 Hz 100 ms	8 Hz 250 ms	4 Hz 500 ms	2,7 Hz 750 ms	2 Hz 1000 ms
64	-80dB	20 Hz 128 ms	8 Hz 320 ms	4 Hz 640 ms	2,7 Hz 960 ms	2 Hz 1280 ms
67	-60dB	15 Hz 134 ms	6 Hz 335 ms	3 Hz 670 ms	2 Hz 1005 ms	1,5 Hz 1340 ms
85	-80dB	15 Hz 170 ms	6 Hz 425 ms	3 Hz 850 ms	2 Hz 1275 ms	1,5 Hz 1700 ms
100	-60dB	10 Hz 200 ms	4 Hz 500 ms	2 Hz 1000 ms	1,3 Hz 1500 ms	1 Hz 2000 ms

Display and steady filters

The filter frequency depends on the weight display reading update rate. Examples are given in the table below:

Update period (ms)		20	100	200	400
Filter		Filter frequency (Hz) and total settling time (ms/s)			
Taps	Damping				
7	-60dB	12 Hz 140 ms	2,4 Hz 700 ms	1,2 Hz 1,4 s	0,6 Hz 2,8s
9	-60dB	10 Hz 180 ms	2,0 Hz 900 ms	1,0 Hz 1,8 s	0,5 Hz 3,6 s
9	-80dB	12 Hz 180 ms	2,4 Hz 900 ms	1,2 Hz 1,8 s	0,6 Hz 3,6 s
12	-60dB	8 Hz 240 ms	1,6 Hz 1,2 s	0,8 Hz 2,4 s	0,4 Hz 4,8 s
12	-80dB	10 Hz 240 ms	2,0 Hz 1,2 s	1,0 Hz 2,4 s	0,5 Hz 4,8 s
15	-80dB	8 Hz 300 ms	1,6 Hz 1,5 s	0,8 Hz 3 s	0,4 Hz 6 s
17	-60dB	6 Hz 340 ms	1,2 Hz 1,7 s	0,6 Hz 3,4 s	0,3 Hz 6,8 s
21	-80dB	6 Hz 420 ms	1,2 Hz 2,1 s	0,6 Hz 4,2 s	0,3 Hz 8,4 s
25	-60dB	4 Hz 500 ms	0,8 Hz 2,5 s	0,4 Hz 5 s	0,2 Hz 10 s
32	-80dB	4 Hz 640 ms	0,8 Hz 3,2 s	0,4 Hz 6,4 s	0,2 Hz 12,8 s
50	-60dB	2 Hz 1,0s	0,4 Hz 5 s	0,2 Hz 10 s	0,1 Hz 20 s
64	-80dB	2 Hz 1,28 s	0,4 Hz 6,4 s	0,2 Hz 12,8 s	0,1 Hz 25,6 s
67	-60dB	1,5 Hz 1,34 s	0,3 Hz 6,7 s	0,15 Hz 13,4 s	0,075 Hz 26,8 s
85	-80dB	1,5 Hz 1,70 s	0,3 Hz 8,5 s	0,15 Hz 17 s	0,075 Hz 34 s
100	-60dB	1 Hz 2,0 s	0,2 Hz 10 s	0,1 Hz 20 s	0,05 Hz 40 s

Appendix E – Setting of MAC Address

The MAC Address is pre-set to a unique value from the pool assigned by the IEEE to Eilersen Electric.

Eilersen Electric MAC Address ranges:

00-50-C2-C5-30-00 to 00-50-C2-C5-3f-ff

20-85-93-60-00-00 to 20-85-93-6f-ff-ff

The MAC Address is set to a default value within this range and **CAN NOT** be set to a random value.

If the user has obtained another pool of MAC Addresses from IEEE and wishes to use one of these, please contact Eilersen Electric for details.

Always apply to the IEEE standards especially regarding the uniqueness of MAC Addresses.

Appendix F – Software download

New firmware may be downloaded on the Ethernet connection. This is done from a Windows PC with the EEConnect software. Please refer to the EEConnect user's manual for further details.

Appendix G – Advanced features

Some devices may have advanced features – like EtherNetIP testing or general debugging – that can be operated from the EEConnect software. Please refer to the reference manual for the device for further details.

Appendix H – Options

Depending on how the 5024 weighing terminal is configured, it can be equipped with different options. For further information regarding the individual options, please refer to the following separate documents:

OPTION	DOCUMENT
Analog output (4-20mA / 0-10V)	*Options Guide – Analog Output*
Ethernet Printer	*Options Guide – Ethernet Printer*
Ethernet Communication – EthernetIP	*Options Guide – Ethernet-IP*
Ethernet Communication – ModbusTCP	*Options Guide – Modbus TCP*
RS485 Communication – Serial Modbus	*Options Guide – Serial Modbus*
RS485 Communication – Using external module	*Options Guide – External Module*
RS485 Communication – 5024 Remote display	*Options Guide – Remote Display*

Appendix I – Linearization procedure

The linearization procedure is started by selecting the **START LIN. PROCEDURE** item from the **LINEARIZATION** menu, and assumes the following is fulfilled/performed in the listed chronological order:

- Load cells have been mounted and the weighing arrangement is empty.
- All parameter configuration on the 5024G terminal has been made to acceptable values.
- The specific gravity for the current location (9.8155 m/s^2 in Denmark) has to be entered prior to calibration and linearization. After completing calibration and linearization the specific gravity parameter should possibly be changed to reflect the specific gravity on the destination location.
- All 3 weighing ranges **MUST** have been configured to values matching the actual application!

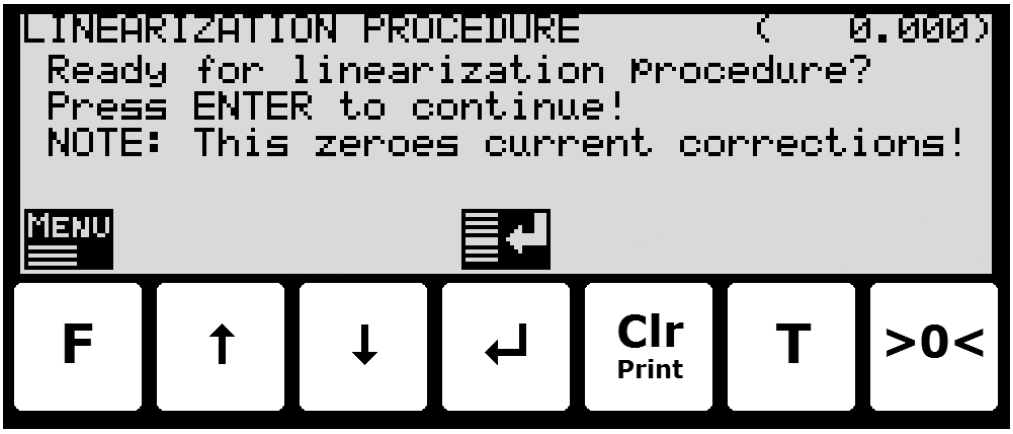
  The 3 **Maximum** values (weighing range) should all be a bit larger than the **Load in last point** parameter.

  The weighing ranges should **NOT** be changed following this!
- The system is coarse tared, corner calibration factors are set to default values (524288), and if zero tracking is to be active, the **ZT range** is set to 0 during the procedure, and set to the desired value again after linearization procedure is finished.
- The **Points used** and **Load in last point** parameters should be set to values depending on the number of points made during linearization procedure and the maximum load applied in the last point.
- A **RESET LINEARIZATION** is possibly performed to update all **Load** points with default values, as well as set all the **UP-cor** and **DOWN-cor** parameters to 0.

  All these parameters should be manually checked and approved.

  Alternately a **ZERO CORRECTIONS** can be performed instead, if all **Load** points and **Hyst. limit** parameter are ok, but all the **UP-cor** and **DOWN-cor** parameters still need to be set to 0 (as some are not 0).
- A corner calibration is performed if needed (with all corrections set to 0).
- A standard calibration at full load corresponding to last point is performed (with all corrections set to 0).

Following this the linearization procedure can be started from the **LINEARIZATION** menu causing the different **LINEARIZATION PROCEDURE** screens to appear. These will guide the user through the different steps of the procedure. The linearization procedure can always be aborted from the **LINEARIZATION PROCEDURE** menu using the [F] key.



The different steps of the linearization procedure to be followed are described and listed in chronological order in the table below. Unless stated otherwise below the value shown in the upper right corner is the actual gross weight, corresponding to the gross weight shown in the **NORMAL** screen (with enhanced resolution selected).

STEP	LINEARIZATION PROCEDURE DISPLAY TEXT	COMMENTS
1	**Ready for Linearization procedure?** **Press ENTER to continue!** **NOTE: This zeroes current corrections!**	Acknowledge all previously mentioned requirements are fulfilled (see above)? This zeroes all current UP and DOWN corrections and increments event counter! This CANNOT be undone! Press [↵] to continue or press [F] to abort from menu shown.
2	**Zero system with no load applied!** **Then press ENTER to continue!**	Zero the system by pressing [>0<]. Ensure shown gross weight is actually 0. Then press [↵] to continue.
3	**Increase load to: x.xxx KG** **Then press ENTER to register!** **NOT STABLE!** **DEVIATION TO LARGE!**	Increase load to the indicated x.xxx kg (going UP). Then press [↵] to register the applied load. Weight indication must be error free. Weight indication must be stable (not show **NOT STABLE!**). Weight indication must not deviate to much (not show **DEVIATION TO LARGE!**). Repeated a number of times until last point on the way UP is registered.
4	**Decrease load to: x.xxx KG** **Then press ENTER to register!** **NOT STABLE!** **DEVIATION TO LARGE!**	Decrease load to the indicated x.xxx kg (going DOWN). Then press [↵] to register the applied load. Weight indication must be error free. Weight indication must be stable (not show **NOT STABLE!**). Weight indication must not deviate to much (not show **DEVIATION TO LARGE!**). Repeated a number of times until last point on the way DOWN is registered.
5	**Approve collected weight data!** **ENTER to approve. CANCEL to discard.** **0: 0.000 0.000 0.000 0.000** **Point UP-Gr UP-cor DOWN-Gr DOWN-cor**	Use the [↑] / [↓] arrows to view and approve the collected weight data. Then press [↵] to approve or [>0<] to discard the collected weight data. Value in upper right corner is NOT gross, but **Load** parameter for selected point. Shown for each point: Gross value and found correction for both UP and DOWN.
6	**Exit and perform final load check!** **Press ENTER to exit.**	Linearization procedure done. Press [↵] to exit. Turn the power supply off and back on. Perform load check (all the way up and down) to approve the found linearization. Make a note of **all** parameters in the 5024G terminal including the event counter.

Revision History

Date	Author	Rev.	*Update*
2018-11-28	HJA	4v0	*Initial document created and adapted.* *(based on StdLim-140630-3v0-UG-eng)*
2019-01-10	HJA	5v0	*Based on StdLim-140630-4v0-UG-eng, but:* *Added LOAD CELL INFO. and LOAD CELL DIAGNOSTICS screens. Extended display of error codes with STATUS screen and tips.*
2019-02-19	HJA	5v1	*Updated references to software ID.*
2019-04-24	jk	5v2	*Updated references to software ID.*
2019-05-20	jk	5v3	*Updated references to software ID.*
2019-09-03	HJA	5v4	*Added Intelligent Setup with possible entry of parameter values.* *New MAC address range added.*
2020-02-18	HJA	5v6	*Added improvements to Intelligent Setup feature.* *Changed "Automatic Zeroing (AZ)" to "Zero Tracking (ZT)".* *Added ETHERNET STATUS screen.* *Added message in CALIBRATION screen.*
2020-09-08	HJA	5v7	*Updated references to software ID.*
2021-02-11	HJA	5v8	*Added POLL mode in Ethernet TCP protocol for reading of gross and net weight.*
2021-05-07	HJA	6v0	*Updated references to software ID.*
2021-11-12	HJA	6v0a	*Added "How to – Change display contrast" description.*
2022-01-19	HJA	6v1	*Updated references to software ID.*
2022-03-29	HJA	6v2	*Updated references to software ID.*
2022-05-19	HJA	6v2a	*Added references to options manuals (Appendix H).*
2022-11-28	HJA	6v3	*Added possible remote display option.*
2023-02-23	HJA	6v4	*Updated references to software ID.*
2023-05-30	HJA	6v5	*Updated references to software ID.*
2023-08-29	HJA	6v6	*Added possible RS485 communication (Basic) with new RS485 COMMUNICATION , PROTOCOLS and STATUS screens.* *Added possible RS485 serial Modbus communications option.*
2023-01-09	HJA	6v6a	*Added use of SSR when connecting digital I/O.*
2024-09-02	HJA	6v7	*Added new linearization procedure taken from EilerCal system.*
2025-02-26	HJA	6v8	*Updated references to software ID.*
2025-09-29	HJA	6v9	*Updated references to software ID.*
2025-10-22	HJA	7v0	*Added new SUPERVISION screen.* *Added **Unbalanced Detection** feature.* *Added **LIMP Mode** to compensate for missing load cells.*
2026-01-20	HJA	7v1	*Added Unbalanced Threshold parameter in SUPERVISION screen and changed so unbalanced only indicated if gross exceeds this fraction of the total load cell capacity.*
2026-03-02	HJA	7v2	*Added **LC OL** indication if one or more load cells are overloaded.* Added gravitational constant. *Modified criteria for unbalance indication so it is the sum of the raw load cell signals that is used.*
2026-03-24	HJA	8v0	*Program can now run on both 5024G and 5026G terminal.*
2026-04-15	HJA	8v1	*Unbalance is only indicated in systems with more than 1 load cell.*
2026-04-29	HJA	8v2	*Updated references to software ID.*

2026-09-08	JK	8v2a	*Coordinated Vulnerability Disclosure Policy added*

Contact

Security

Coordinated Vulnerability Disclosure Policy

Eilersen Electric A/S takes the security of our products seriously. We welcome reports from users who identify potential vulnerabilities in our products with digital elements, and we are committed to working with the reporting party to understand and resolve issues quickly.

Reporting a Vulnerability

If you believe you have found a security vulnerability in an Eilersen product, please report it to:

security@eilersen.com

Further information

https://eilersen.com/about-us/security

Information

With further questions or improvement suggestions please contact us:

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