

## 5024G

# User's guide

StdLim

5024G LCD weighing terminal

Basic scale with automatic dosing



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# 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 34 for details on error codes and how to recover from various error situations.

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 key the last registered weight is shown in parenthesis. Also above the Clr 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 11 on how to unlock the keyboard.

#### Keys/actions:



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.

>o< 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 A 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 1 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.
- Cir 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 1 and 1 to select the desired setpoint ("Coarse" or "Fine") with the cursor, and then pressing 1 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 1 and 1 to select the "Action" parameter with the cursor, and then pressing 1 to request the indicated action ("START DOSING" or "STOP DOS-ING").



**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 **REGIS-TRATION** 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  $\clubsuit$  and  $\clubsuit$  keys and then pressing the  $\blacklozenge$  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 40, 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.



**Cir** 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 11.

## 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 SET-UP 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 \star 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 
   Once to return to the SETUP screen or twice to return to the NORMAL screen. Please see below in section Enter values, page 12, 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.
- Cir 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 1 and 1 so the **Resolution** parameter is selected and then pressing 1. 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.
- **CI**r 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 ↓.
- 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 1 and  $\biguplus$ . When the correct value is entered press 1 to advance to the next digit. If an error is made, press  $\fbox{Cir}$  to return to the previous digit. When the complete value is entered press  $\Huge{l}$  to accept it. To abort without any changes press  $\fbox{F}$ .

## 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  $\biguplus$  so the "Maximum" weight parameter is selected and then pressing  $\Huge{}$ .

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

	Press once until	"	. 1" is shown in the display.
Т	Press three times until	"	1.000" is shown in the display.
↓	Press once until	"	1.009" is shown in the display.
Т	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 1 and 1 so the "Minimum" weight parameter is selected and then pressing -.

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

- **I**↓ *"*\_ Press once until 9" is shown in the display. . Τ
  - 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 **I** to select the **SET CONTRAST** menu item. ٠
- 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 WEIGH-ING 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).



#### 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.
<b>CALIBRATION</b> :	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 10 select the **WEIGHING** screen to configure the three weighing ranges:

SETUP WEIGHING Mode: NURNHL WISPLAY Unit: KG DP : 3 Resolution: 0.010 Minimum: -0.090 Maximum: 10.090						
MENU	<b>î</b> ≣	Ţ_		<b>€</b> REU		
F	1	t	Ļ	Clr Print	Т	>0<

#### - 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 \star 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 DIS-PLAY** 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 40.

#### 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 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 DISA-BLED). 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.



## - 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 **COR-NER 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  $\uparrow$  and  $\checkmark$  to select the desired load cell/corner with the cursor, and then pressing  $\checkmark$  to request change of the selected corner calibration **FACTOR** parameter. This is useful when a previous calibration must be reestablished. Note that this is only possible, if the calibration factor for this previous calibration tion 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 CALI-BRATION** 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 **COR-NER CALIBRATION PROCEDURE** screen from the **CORNER CAL.** menu.

CORNEI L	R CALI Di Øf C 1:	BRATIO (ReSI (NOT	N PROC sterec regist	EDURE ered)	ł	1.840) 1.840)
LI Menu			regist	ered)		>0<
F	1	Ļ	L L	CIr Print	Т	>0<

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.
- 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**.
- 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.
- 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 **COR-NER CAL. PROC.** menu. **IMPORTANT:** Until this is done the corner calibration is <u>NOT</u> 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 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 CALI-BRATION** 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  =HChOR: 5229288 LOAD: 10.000 0.000						
Unlo Menu	ck Par	ameter	s befo	re cal	.ibrati	ion! >0K
F	1	t	Ļ	CIr Print	т	>0<

#### **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.
- 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.

## - Perform linearization

**Please notice:** Linearization is normally not used, and should only be used in weighing systems where system mechanics shows non ideal behavior.

If decided to do so the relevant parameters can be entered in the LINEARIZATION screen.



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, the corrected "filtered" gross weight and the direction is shown. In the upper right corner the hysteresis limit is shown. A cursor (inverted text) indicates the currently selected parameter.

### Load points

The load points in which the given corrections are performed must be specified in the **LINE**-**ARIZATION** screen. The load points are changed by using 1 and 1 to select the desired point number in the "Load" column with the cursor, and then pressing 1 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 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 LIN-EARIZATION screen. The up/down corrections are changed by using 1 and 1 to select the desired point number in the "UP-cor" or "DOWN-cor" column with the cursor, and then pressing 1 to request change of the selected up/down correction parameter.

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

## **Hysteresis limit**

The hysteresis limit must be specified in the **LINEARIZATION** screen. The hysteresis limit specifies the weight change in a given direction that must take effect for a direction change to be detected. The hysteresis limit is changed by using 🛉 and ↓ to select the hysteresis limit it parameter with the cursor, and then pressing < to request change of the hysteresis limit parameter.

#### **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 **LINEARIZATION** menu. Select the RESET LINEARIZATION item and press  $\checkmark$ .

## - 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></lf></cr>	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></lf></cr>	(for reading of gross weight)
RN <cr><lf></lf></cr>	(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>
NNN.NNN<CR><LF>
```

(when reading gross weight) (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 <u>D</u>atabits and can be set to '7' or '8'.
<P> indicates the <u>P</u>arity and can be set to 'N' (<u>N</u>one), 'E' (<u>E</u>ven) or 'O' (<u>O</u>dd).
<S> indicates the number of <u>S</u>topbits 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></lf></cr>	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></lf></cr>	(for reading of gross weight)
RN <cr><lf></lf></cr>	(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></lf></cr>	(when reading gross weight)
NNN.NNN <cr><lf></lf></cr>	(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	Weight is below or above the weighing range.		
<b>OL</b> displayed	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 suffi-		
	cient 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 de-		
	scription of error code display and STATUS screen below.		
Weight indication is	Make sure that configuration of load cell communication format is correct		
blank	and that the system has been power-cycled.		
	Check all load cell connections.		
	Refer to load cell documentation for further details.		
Weight never stable	Check installation for mechanical errors, e.g. surroundings touching the		
Weight always stables	weighing arrangement.		
	Check that stability requirements are configured correctly.		
Zero tracking never on	Check installation for mechanical errors, e.g. surroundings touching the		
Zero tracing always on	weighing arrangement.		
	Check that zero tracking is configured correctly.		
Unable to zero	Check installation for mechanical errors, e.g. surroundings touching the		
Unable to autotare	weighing arrangement.		
	Check that stability requirements are configured correctly.		
No keyboard icons	Keyboard is locked. Press a key, and then press indicated key sequence		
shown	until keyboard is unlocked.		
Cannot enter parame-	Unlock parameters.		
ter value			
No RS485 connection	Check the cabling between 5024G and equipment is made correctly.		
between 5024G and	Check the 5024G (in the RS485 COMMUNICATION screen) and the equip-		
external equipment	ment 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  $\uparrow$  and  $\checkmark$  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 I 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 connec- tions	-	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.140630.6.6.		
3. Unlock parameters	ServiceMode -> System	Parameters: <locked unlocked=""></locked>		
4. Intelligent Setup?	ServiceMode -> System	<b>Intelligent Setup:</b> Possible activation of Intelligent Setup feature for automatic proposal of weighing technical parameters below.		
(Optional)		See separate 'Intelligent Setup' manual for further information.		
5. Configure load cells	ServiceMode -> Weighing ->	Protocol type: <protocol 2010="" 401x="" 4x40-stdbb="" 4x40-stdlc="" type:=""></protocol>		
used	Load Cells	No.: <number cells="" connected="" load="" of=""></number>		
		Supports: <number of="" points="" supporting=""></number>		
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 weigh-	ServiceMode -> Weighing	Mode: NORMAL / CALIBRATION / PROTOCOL each consisting of:		
ing ranges		- Unit: <desired unit=""></desired>		
		- DP: <number after="" decimal="" digits="" of="" point=""></number>		
		- Resolution: <desired resolution=""></desired>		
		- Minimum: <desired minimum="" weight=""></desired>		
		- Maximum: <desired maximum="" weight=""></desired>		
8. Configure display and	ServiceMode -> Weighing ->	Interval: <measuring 400ms="" default:="" period.=""></measuring>		
filtering	Display	Filters: <sample, and="" default:="" display="" filters.="" none="" steady=""></sample,>		
		Steady detection limit: <value 1="" default:="" detection.="" division="" for="" steady=""></value>		
9. Perform coarsetare	ServiceMode -> Weighing ->	Perform coarsetare with no load on weighing arrangement.		
	Coarsetare			
10. Configure zero track- ing range	ServiceMode -> Weighing -> Zeroing	<b>ZT range:</b> <range automatic="" default:="" division="" for="" tracking.="" zero="" ½=""></range>		
11. Perform load check	Normal	Verify weight reading with known load.		
12. Perform corner cali-	ServiceMode -> Weighing ->	Perform corner calibration if needed.		
bration Calibration -> Corner.Cal.				
(Optional)				
13. Perform system/span calibration	ServiceMode -> Weighing -> Calibration	Perform calibration of system/span. Note calibration factor.		
14. Perform linearization (Optional)	ServiceMode -> Weighing -> Linearization	Perform linearization (Up/Down correction) if needed.		
15. Perform final load check	Normal	Verify weight reading with known load if necessary.		
16. Configure analog	ServiceMode -> Analog	Output: <analog 0-10v="" 4-20ma="" or="" output="" type:=""></analog>		
output		Value: <analog follows:="" gross="" net="" or="" output="" weight=""></analog>		
(Possible option)		Full scale: <value analog="" in="" maximum="" resulting="" signal=""></value>		
		Error value: <output error:="" maximum="" minimum="" on="" or="" value=""></output>		
		Test mode/value: <used an="" for="" force="" output="" signal="" test="" to=""></used>		
17. Confiaure Ethernet	ServiceMode -> Ethernet	Configure Ethernet connection (IP, subnet and protocol) on Ethernet con-		
connection	(-> Protocols)	nector of the 5024 if needed.		
(Optional)				
18. Configure external equipment, module or	ServiceMode -> Ext.Module or	Configure the connection of any external equipment, module or remote display on the RS485 channel if needed:		
remote display	ServiceMode -> Remote Display	- MCEXX35: Profibus-DP module		
(Possible option)	or	- MCE9637: DeviceNet module		
	ServiceMode -> RS485 COMM.	- 2X50: Ethernet module		
		- 2070: PROFINET module		
10 Configure avetom	SomicoMode -> Desing par	- 5024: Remote Display		
specifics	(nossibly other screens as well)	Configure system specific parameters (dosing, afternow, etc.).		
(Optional)	(F)			

## 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 dos-				
	ing.				
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.				

#### **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	External equipment: RS485-B		
	(negative line)	For possible other usage - please refer to Appendix H.		
2	RS485-A	External equipment: RS485-A		
	(positive line)	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	Load cell Tx (RS485)
(Green)	Data is transmitted to the load cell.
D8	Load cell Enable (RS485)
(Red)	Transmission to the load cell is enabled.
D9	Load cell Rx (RS485)
(Yellow)	Data is received from the load cell.
D16	External Rx (RS485)
(Yellow)	Data is received from external equipment.
D17	External Enable (RS485)
(Red)	Transmission to external equipment is enabled.
D18	External Tx (RS485)
(Green)	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	2010	2010	2010	2010
		4x40-StdLC	4x40-StdBB	4x40-StdBB	4x40-StdBB	4x40-StdBB
Number of load cells		1-4	1	2	3	4
Sampling time		2	5	10	15	20
Filter		Filter frequent	cy (Hz) and total	settling time (n	ns)	L
Taps	Damping	-				
7	-60dB	120 Hz	48 Hz	24 Hz	16 Hz	12 Hz
		14 ms	35 ms	70 ms	105 ms	140 ms
9	-60dB	100 Hz	40 Hz	20 Hz	13 Hz	10 Hz
		18 ms	45 ms	90 ms	135 ms	180 ms
9	-80dB	120 Hz	48 Hz	24 Hz	16 Hz	12 Hz
		18ms	45ms	90ms	135ms	180ms
12	-60dB	80 Hz	32 Hz	16 Hz	11 Hz	8 Hz
		24 ms	60 ms	120 ms	180 ms	240 ms
12	-80dB	100 Hz	40 Hz	20 Hz	13 Hz	10 Hz
		24 ms	60 ms	120 ms	180 ms	240 ms
15	-80dB	80 Hz	32 Hz	16 Hz	11 Hz	8 Hz
		30 ms	75 ms	150 ms	225 ms	300 ms
17	-60dB	60 Hz	24 Hz	12 Hz	8 Hz	6 Hz
		34 ms	85 ms	170 ms	255 ms	340 ms
21	-80dB	60 Hz	24 Hz	12 Hz	8 Hz	6 Hz
		42 ms	105 ms	210 ms	315 ms	420 ms
25	-60dB	40 Hz	16 Hz	8 Hz	5 Hz	4 Hz
		50 ms	125 ms	250 ms	375 ms	500 ms
32	-80dB	40 Hz	16 Hz	8 Hz	5 Hz	4 Hz
		64 ms	160 ms	320 ms	480 ms	640 ms
50	-60dB	20 Hz	8 Hz	4 Hz	2,7 Hz	2 Hz
		100 ms	250 ms	500 ms	750 ms	1000 ms
64	-80dB	20 Hz	8 Hz	4 Hz	2,7 Hz	2 Hz
		128 ms	320 ms	640 ms	960 ms	1280 ms
67	-60dB	15 Hz	6 Hz	3 Hz	2 Hz	1,5 Hz
		134 ms	335 ms	670 ms	1005 ms	1340 ms
85	-80dB	15 Hz	6 Hz	3 Hz	2 Hz	1,5 Hz
		170 ms	425 ms	850 ms	1275 ms	1700 ms
100	-60dB	10 Hz	4 Hz	2 Hz	1,3 Hz	1 Hz
		200 ms	500 ms	1000 ms	1500 ms	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	2,4 Hz	1,2 Hz	0,6 Hz
		140 ms	700 ms	1,4 s	2,8s
9	-60dB	10 Hz	2,0 Hz	1,0 Hz	0,5 Hz
		180 ms	900 ms	1,8 s	3,6 s
9	-80dB	12 Hz	2,4 Hz	1,2 Hz	0,6 Hz
		180 ms	900 ms	1,8 s	3,6 s
12	-60dB	8 Hz	1,6 Hz	0,8 Hz	0,4 Hz
		240 ms	1,2 s	2,4 s	4,8 s
12	-80dB	10 Hz	2,0 Hz	1,0 Hz	0,5 Hz
		240 ms	1,2 s	2,4 s	4,8 s
15	-80dB	8 Hz	1,6 Hz	0,8 Hz	0,4 Hz
		300 ms	1,5 s	3 s	6 s
17	-60dB	6 Hz	1,2 Hz	0,6 Hz	0,3 Hz
		340 ms	1,7 s	3,4 s	6,8 s
21	-80dB	6 Hz	1,2 Hz	0,6 Hz	0,3 Hz
		420 ms	2,1 s	4,2 s	8,4 s
25	-60dB	4 Hz	0,8 Hz	0,4 Hz	0,2 Hz
		500 ms	2,5 s	5 s	10 s
32	-80dB	4 Hz	0,8 Hz	0,4 Hz	0,2 Hz
		640 ms	3,2 s	6,4 s	12,8 s
50	-60dB	2 Hz	0,4 Hz	0,2 Hz	0,1 Hz
		1,0s	5 s	10 s	20 s
64	-80dB	2 Hz	0,4 Hz	0,2 Hz	0,1 Hz
		1,28 s	6,4 s	12,8 s	25,6 s
67	-60dB	1,5 Hz	0,3 Hz	0,15 Hz	0,075 Hz
		1,34 s	6,7 s	13,4 s	26,8 s
85	-80dB	1,5 Hz	0,3 Hz	0,15 Hz	0,075 Hz
		1,70 s	8,5 s	17 s	34 s
100	-60dB	1 Hz	0,2 Hz	0,1 Hz	0,05 Hz
		2,0 s	10 s	20 s	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





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	

# **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. Ex-
			tended 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.

# Contact

With further questions or improvement suggestions please contact us:



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