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5024 WEIGHING TERMINAL

Basic system with automatic dosing

Applies to:

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2) Operation

2.1 Introduction

This document is an overview of the 5024 Weighing Terminal from Eilersen Electric. With the software version stated on the front page the system has automatic dosing (coarse/fine), an Analog output and Ethernet connection as well as possible Profibus-DP, PROFINET, DeviceNet or Ethernet-IP connectivity using external communication modules.

The system is operated by a series of screens, menus and selections lists.

2.2 Power-up sequence

When power is applied to the system, the following steps will be performed:

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

2.2.1 Zeroing during power up

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. If the keyboard lock is activated (see later), you will immediately be asked to unlock the keyboard for the zero to take place.

2.3 Operator panel

The operator panel holds a keyboard and a LCD display. The display will show the actual state of the controller and the user entries possible. Below the display seven keys are located. The function of these keys depends on the actual screen selected. The function of the key will always be shown directly above the key. Normally the keys are used to switch between the different screens or to initiate other user actions. Depending on the actual screen the following keys can be used:

[F]	Selects a menu depending on the actual screen.
[↑]	Increases a value or moves cursor up in a menu.
[↓]	Decreases a value or moves cursor down in a menu.
[↵]	Selects entry or accept of a value, or selects an action from a menu.
[Clr Print]	Return to previous screen. Exits menu without action. Clears entered digit.
[T]	Autotare scale (set net weight to zero).
[>0<]	Zero scale (set gross weight to zero).

The functions stated above are the general function of the keys. Below the specific use of each key will be described depending on the actual screen.

2.4 Keyboard lock

The weighing terminal is equipped with a keyboard lock feature. This feature can be enabled or disabled using the "Keyboard unlock length" parameter in the **SYSTEM** screen. This parameter also indicates how many keys are to be pressed to unlock the normal functions of the keyboard.

If the keyboard lock is disabled, then the keyboard functions will always be active.

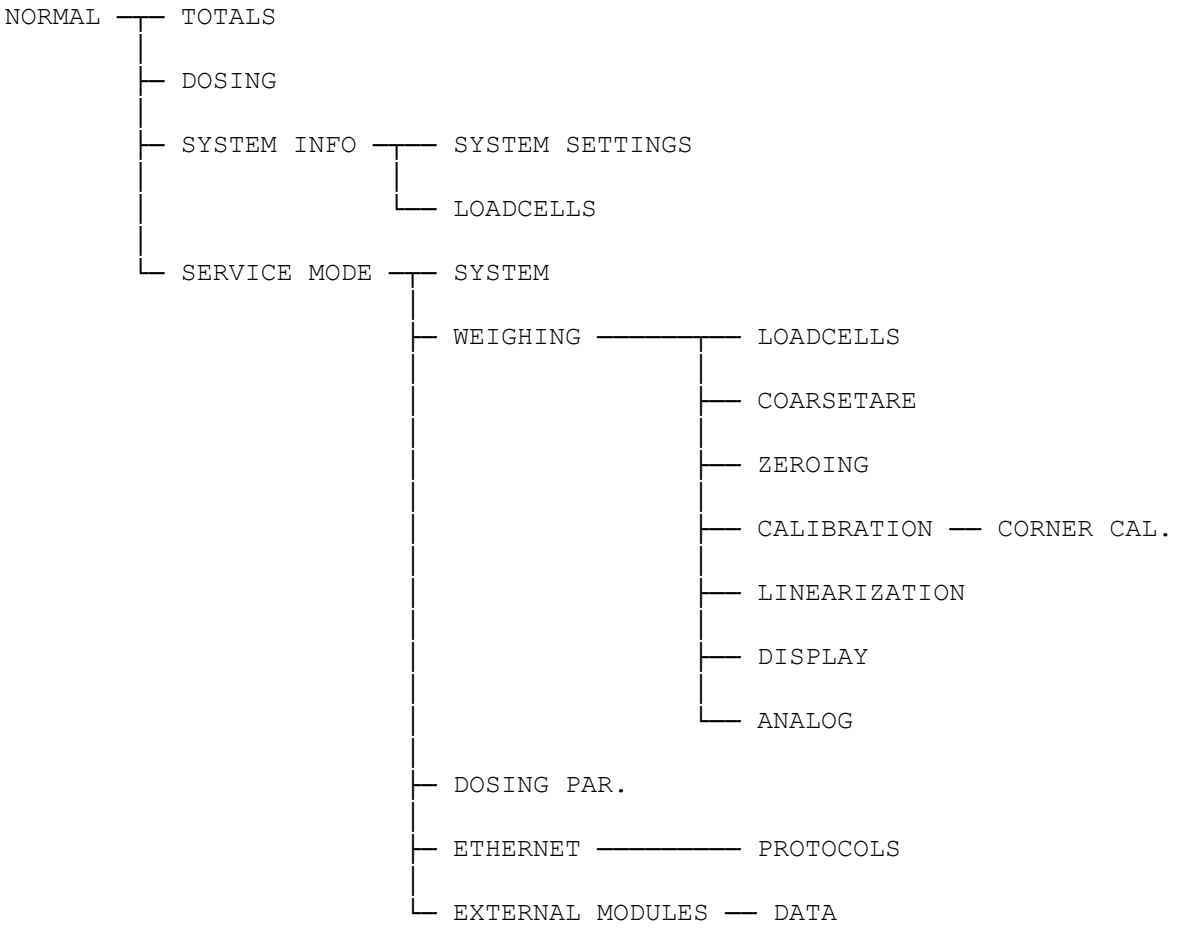
If the keyboard lock is enabled, and the weighing terminal is in the **NORMAL** screen without any key activation for 10 minutes, then the keyboard will automatically lock. When the keyboard is locked, the symbols normaly shown above the keys will blank out, and you can NOT use the normal function on the keys until tje keyboard is unlocked again. **NOTE:** A locked keyboard is unlocked by pressing a key, and then pressing a number of keys one at a time matching the indicated keys until the required sequence is completed without error.

2.5 Menus

Menus are selected by pressing [F]. When a menu is active the current item is changed by [↑] and [↓], and the item action is selected by pressing [↵]. The menu can be exited without any action by pressing [Clr] or by selecting the "Exit menu" menu item. Above each key is an icon illustrating the actual function for the key in the different screens.

2.6 Screens 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 the **DOSING** screen. The other screens are used during installation and calibration.

2.7 Data entry

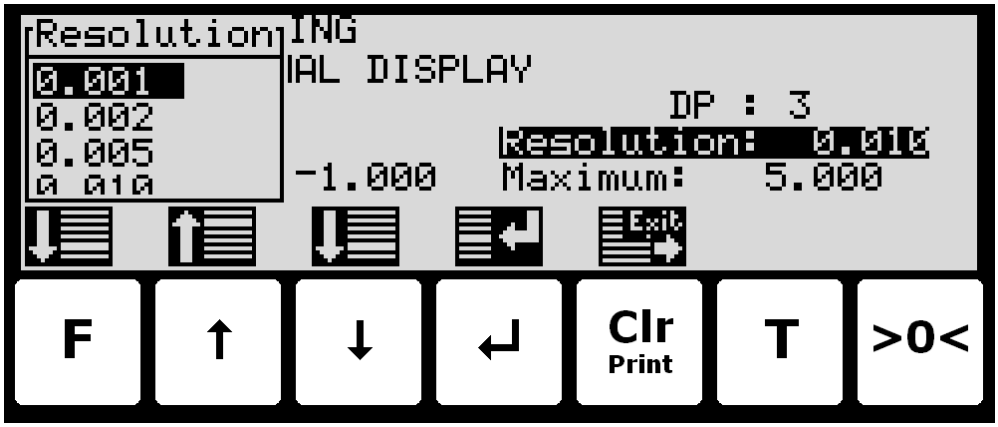
The following chapter describes how data are entered using the keyboard on the weighing terminal. There are two main ways to enter data from the keyboard. Data can be entered by selecting the desired value from a selection list of predetermined values. Data can also be entered by entering the desired value using a data entry screen. The layout of this data entry screen may vary depending on the actual parameter to be entered.

2.7.1 Locking and unlocking parameters

When the power is turned on all parameters changing the event counter are locked. These parameters can be unlocked in the **SYSTEM** screen.

2.7.2 Entry using selection list

Some parameters (such as resolution and decimal point position of the weighing range) 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 predetermined (allowed) values as shown:



The keys can be used as follows:

F	Moves the cursor down in this selection list.
↑	Moves the cursor up in this selection list.
↓	Moves the cursor down in this selection list.
↵	Accepts the selected/marked value as the new desired value.
Clr Print	Aborts the entry without change of parameter. This can also be done by selecting the "CANCEL" entry form the selection list.
T	Not used.
>0<	Not used.

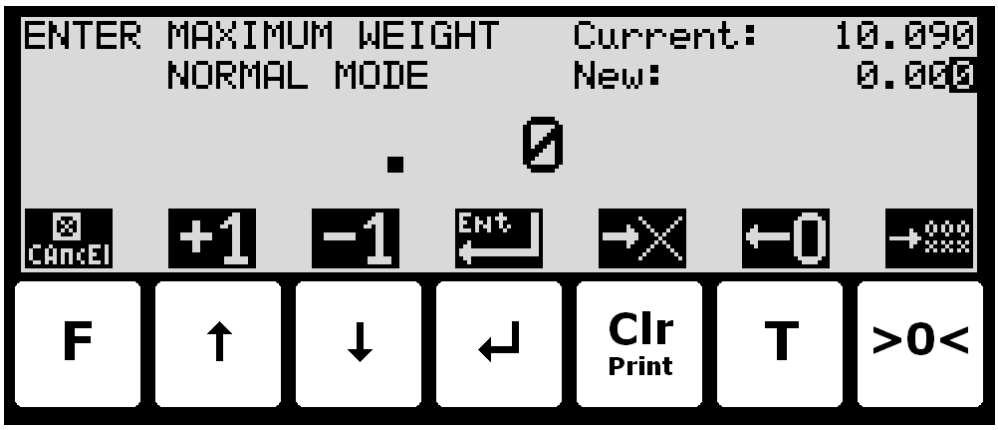
Example - Changing resolution from 0.050 to 0.010:

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:

↑ or ↓	Press repeatedly until "0.010" is selected in the selection list.
↵	Press to accept selection.

2.7.3 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]	Aborts the entry without change of parameter.
[↑]	Increases the value of the digit currently being entered (digit to the right).
[↓]	Decreases the value of the digit currently being entered (digit to the right).
[↵]	Accepts the entered value as the new desired value.
[Clr]	Deletes most right digit and moves all remaining digits one position to the right.
[T]	Moves digits one position to the left and inserts a zero on the most right 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 the following:

↓	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.

Example - Changing date to 11.06.01:

A similar screen to the screen shown above appears once change of date (YY.MM.DD) is requested from the **SETUP MENU** by moving the cursor using ↑ and ↓ so the "SET DATE" entry is selected and then pressing ↵. The layout of the data entry screen is a bit different as date is entered with two decimal points.

In order to change the date (YY.MM.DD) to 11.06.01 perform the following:

T	Press once until	" . .10" is shown in the display.
↑	Press once until	" . .11" is shown in the display.
T	Press two times until	" .11.01" is shown in the display.
↓	Press four times until	" .11.06" is shown in the display.
T	Press two times until	"11.06.01" is shown in the display.
↵	Press to accept	"11.06.01" as the new desired value.

Example - Changing time to 23:45:00:

A similar screen to the screen shown above appears once change of time (HH:MM:SS) is requested from the **SETUP MENU** by moving the cursor using ↑ and ↓ so the "SET TIME" entry is selected and then pressing ↵. The layout of the data entry screen is a bit different as time is entered with two colons.

In order to change the time (HH:MM:SS) to 23:45:00 perform the following:

[↑]	Press two times until	″ : : 2″ is shown in the display.
[T]	Press once until	″ : :20″ is shown in the display.
[↑]	Press three times until	″ : :23″ is shown in the display.
[T]	Press once until	″ : 2:30″ is shown in the display.
[↑]	Press four times until	″ : 2:34″ is shown in the display.
[T]	Press once until	″ :23:40″ is shown in the display.
[↑]	Press five times until	″ :23:45″ is shown in the display.
[↵]	Press to accept	″23:45:00″ as the new desired value.

Example – Entry of IP address 192.168.001.199:

A similar screen to the screen shown above appears once change of IP address is requested from the **SETUP ETHERNET** screen by moving the cursor using [↑] and [↓] so the "IP" parameter is selected and then pressing [↵]. The layout of the data entry screen is a bit different as IP address is entered with three decimal points.

Please note: Subnet is entered in same way as IP address.

Please note: Due to IP address and subnet requirements not all values are allowed.

In order to change the IP address parameter to 192.168.001.199 perform the following:

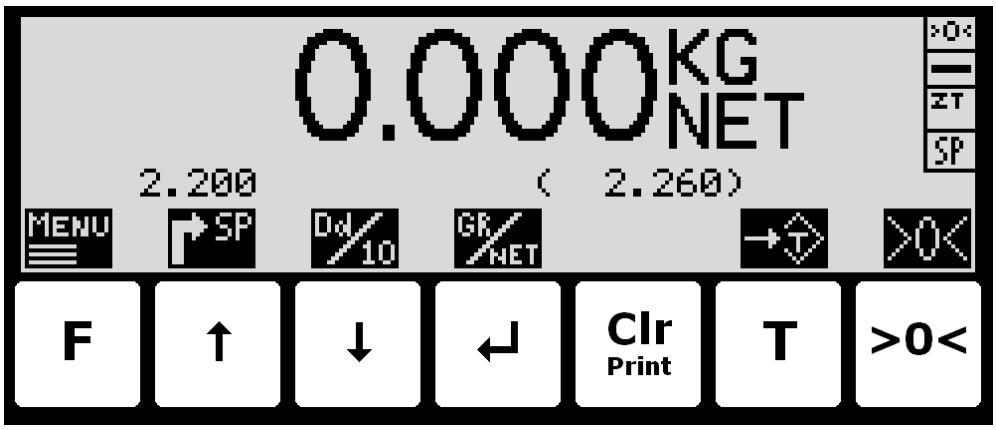
[↑]	Press once until	″ . . . 1″ is shown in the display.
[T]	Press once until	″ . . . 10″ is shown in the display.
[↓]	Press once until	″ . . . 19″ is shown in the display.
[T]	Press once until	″ . . .190″ is shown in the display.
[↑]	Press two times until	″ . . .192″ is shown in the display.
[T]	Press once until	″ . . 1.920″ is shown in the display.
[↑]	Press once until	″ . . 1.921″ is shown in the display.
[T]	Press once until	″ . . 19.210″ is shown in the display.
[↓]	Press four times until	″ . . 19.216″ is shown in the display.
[T]	Press once until	″ . .192.160″ is shown in the display.
[↓]	Press two times until	″ . .192.168″ is shown in the display.
[T]	Press three times until	″ .192.168.000″ is shown in the display.
[↑]	Press once until	″ .192.168.001″ is shown in the display.
[T]	Press once until	″ 1.921.680.010″ is shown in the display.
[↑]	Press once until	″ 1.921.680.011″ is shown in the display.
[T]	Press once until	″ 19.216.800.110″ is shown in the display.
[↓]	Press once until	″ 19.216.800.119″ is shown in the display.
[T]	Press once until	″192.168.001.190″ is shown in the display.
[↓]	Press once until	″192.168.001.199″ is shown in the display.
[↵]	Press to accept	″192.168.001.199″ as the new desired value.

3) Screens

The following is a description of each available screen and the active keys in each screen.

3.1 Normal display

Below the **NORMAL** screen is shown along with the keys that are enabled.



In this screen the actual weight is shown with large types. To the right the unit is indicated and whether the gross or net weight is shown. If the load is above the weighing range the display will show **OL**. If the load is below the weighing range the display will show **UL**. If an error is present an error code will be shown (**-XXXX-**) instead of the weight reading. Above [↑] the actual setpoint (fine limit) is shown. Above [Clr Print] the last registered weight is shown in parenthesis. Also above [Clr Print] an "**OK**" icon is shown for a short period following every successful registration. In the upper right corner four symbols may be shown below each other indicating:

'>0<' if the weight is zero (within 0 ± ¼ division).

'––' if the weight reading is steady, or '**~**' if the weight reading is not steady.

'ZT' if automatic zeroing (zero tracking) is active (within 0 ± ½ division).

'SP' if automatic dosing is running.

'R' if registration is in progress.

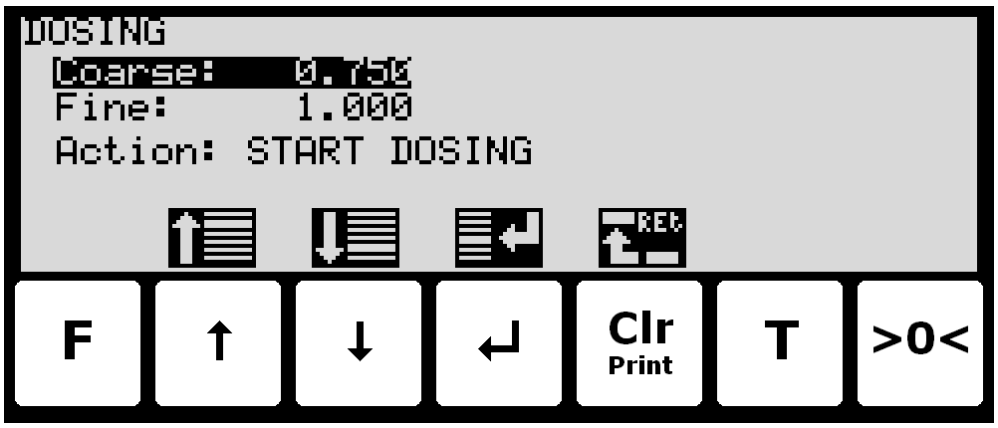
Note: If the keyboard is locked the symbols above the keys will not be shown.

If the keyboard is not locked, the keys are used as follows:

F	Selects the **MAIN** menu.
↑	Selects the **DOSING** screen for entry of setpoints and start/stop of dosing.
↓	Display weight with enhanced resolution for 3 seconds (in the **SYSTEM** screen it can be selected that enhanced resolution is toggle permanently on/off for test purposes). The "Dd/10" symbol above the key will blink when enhanced resolution is selected.
↵	Toggles between gross and net reading.
Print	Not used.
T	Zeroes the net reading and net reading is selected.
>0<	Zeroes the gross reading and gross reading is selected.

3.2 Dosing

Below the **DOSING** screen is shown along with the keys that are enabled.



In this screen setpoints for dosing are shown and can be changed. It is also possible to start/stop a dosing. A cursor (inverted text) indicates the currently selected parameter.

The keys are used as follows:

F	Not used.
↑	Moves the cursor up between the different parameters on the screen.
↓	Moves the cursor down between the different parameters on the screen.
↵	Selects change/entry of the parameter marked/selected by the cursor.
Clr	Return to the **NORMAL** screen.
T	Not used.
>0<	Not used.

Please note that some other dosing parameters (such as registration period and afterflow correction) are configured in the **DOSING PAR.** screen.

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 loadcell error occurs.
10. The weighing terminal is ready for start of a new dosing.

3.2.1 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.

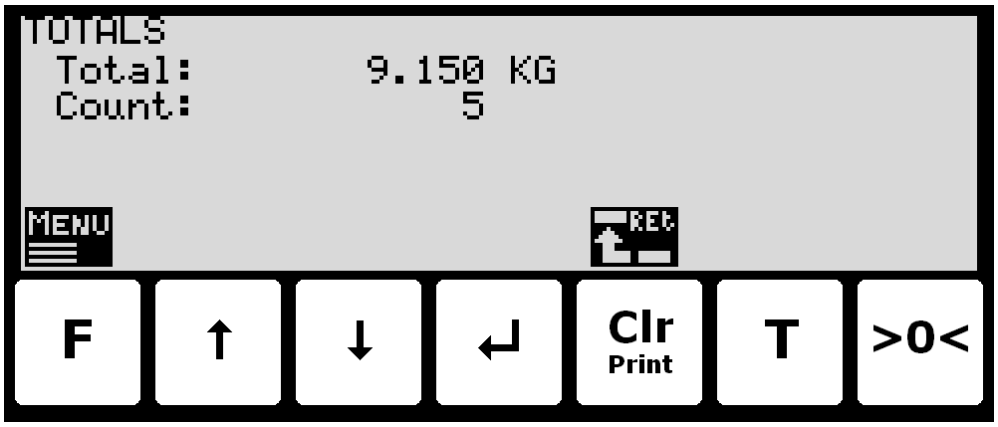
3.2.2 Start/Stop of dosing

In addition to starting a dosing using the digital **START** input, a dosing can be started (or stopped if a dosing is all ready 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").

3.3 Totals

Below the **TOTALS** screen is shown along with the keys that are enabled.



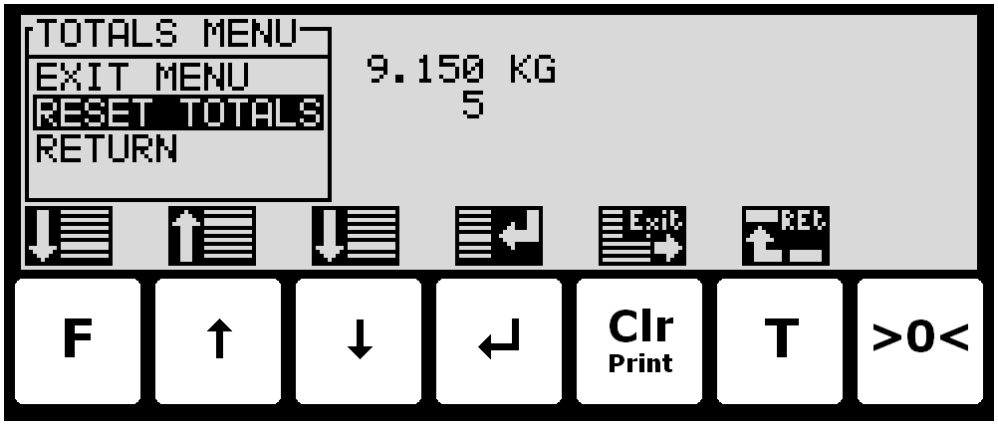
In this screen the totals are shown. Whenever a registration is performed the total weight is updated with the registered amount and the total count is incremented.

The keys are used as follows:

F	Selects the **TOTALS MENU**.
↑	Not used.
↓	Not used.
↵	Not used.
Clr	Return to the **NORMAL** screen.
T	Not used.
>0<	Not used.

3.3.1 Totals menu

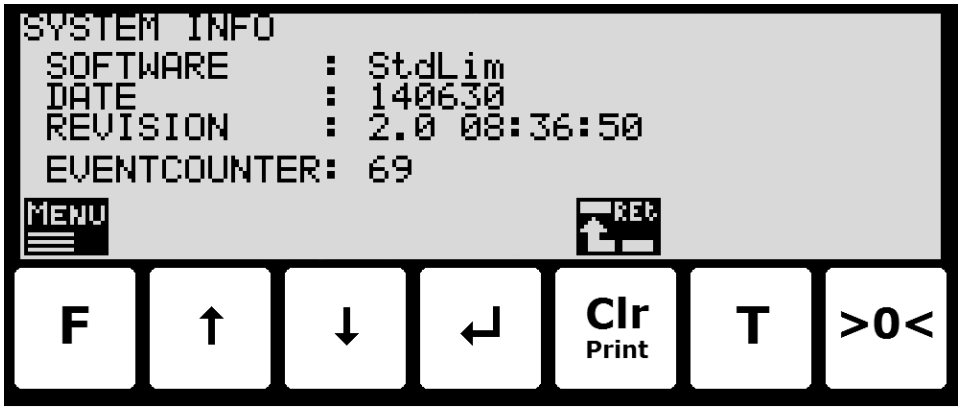
When the **TOTALS MENU** is invoked the screen will look like this:



To reset the totals select the "**RESET TOTALS**" menu item and press ↵.

3.4 System Information

Below the **SYSTEM INFO** screen is shown along with the keys that are enabled.



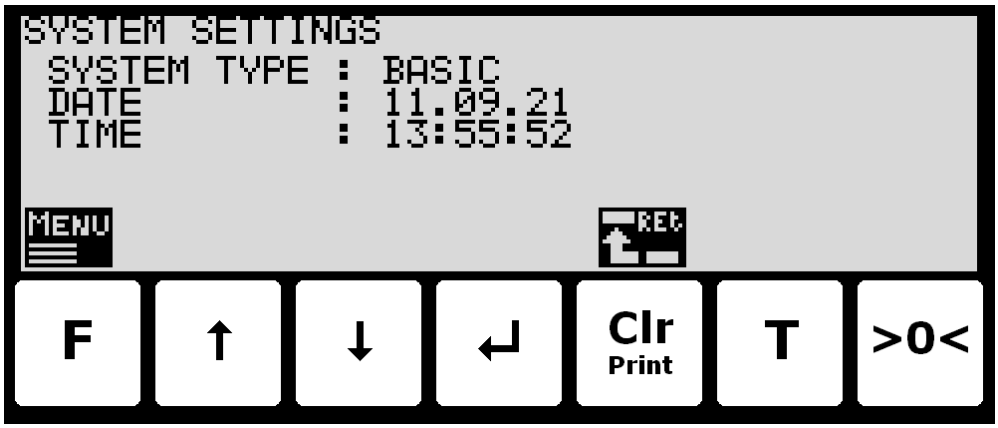
In this screen program identification (consisting of software name, date and revision) and the event counter is shown.

The keys are used as follows:

F	Selects the **INFO** menu.
↑	Not used.
↓	Not used.
↵	Not used.
Clr	Return to the **NORMAL** screen.
T	Not used.
>0<	Not used.

3.5 System settings

Below the **SYSTEM SETTINGS** screen is shown along with the keys that are enabled.



In this screen the system type is shown along with the current date and time.

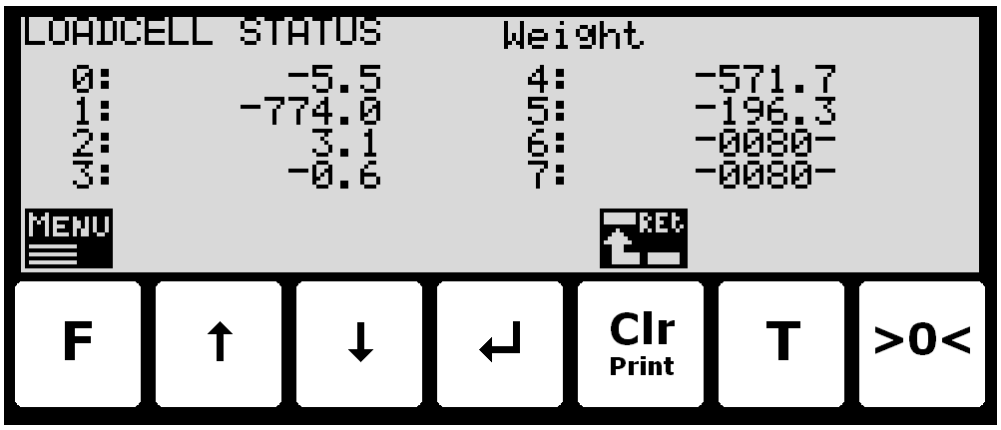
The keys are used as follows:

↑	Not used.

[↓]	Not used.
[↵]	Not used.
[Clr]	Return to the **NORMAL** screen.
[T]	Not used.
[>0<]	Not used.

3.6 Loadcell status

Below the **LOADCELL STATUS** screen is shown along with the keys that are enabled.



In this screen the actual reading from each loadcell is shown.

The keys are used as follows:

[F]	Selects the **LOADCELL STATUS** menu.
[↑]	Not used.
[↓]	Not used.
[↵]	Not used.
[Clr]	Return to the **SYSTEM INFO** screen.
[T]	Not used.
[>0<]	Not used.

Three different readings can be selected with the menu:

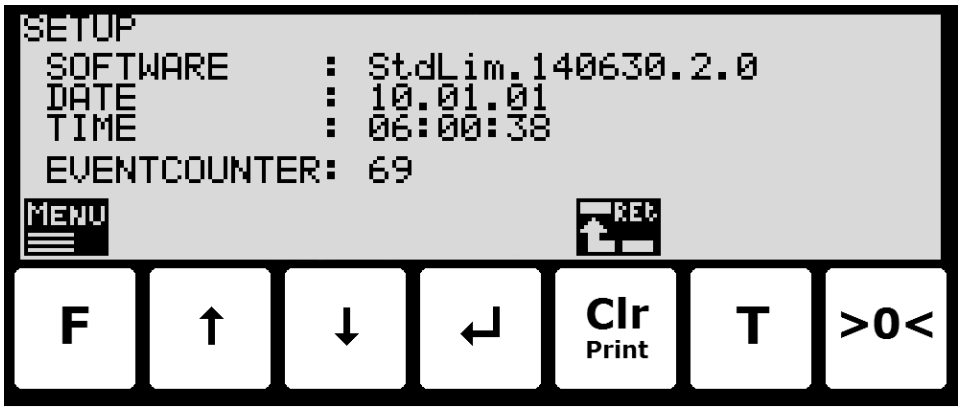
DIRECT: The internal loadcell output value is displayed as it is received. This number is in SI units, but the resolution is loadcell dependent and may be an unusual value like 100mg, 10 gr. etc. Furthermore no zeroing is used and the loadcell value will NOT be 0 when the loadcell is empty, so this value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

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

ZEROED: The loadcell 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.

3.7 Service mode

Below the **SETUP** screen is shown along with the keys that are enabled.



In this screen the software version, actual date, actual time and event counter is shown.

The keys are used as follows:

F	Selects the **SETUP** menu.
↑	Not used.
↓	Not used.
↵	Not used.
Clr	Return to the **NORMAL** screen.
T	Not used.
>0<	Not used.

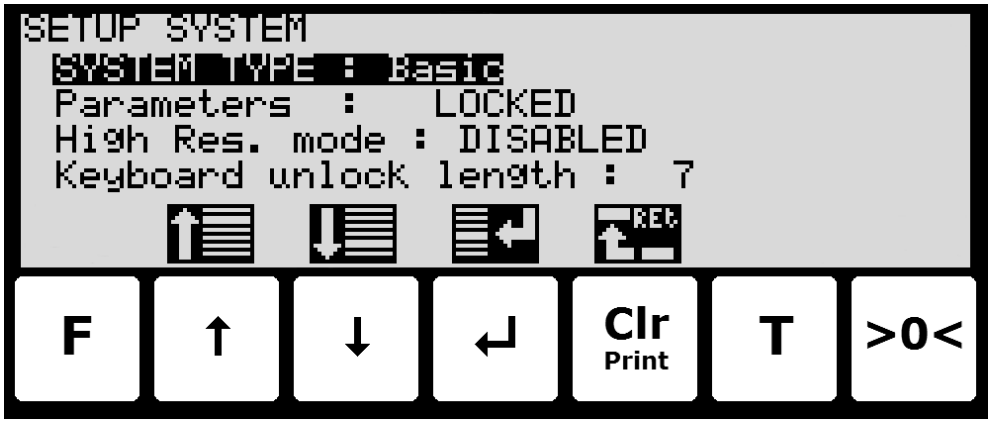
3.7.1 Setting date and time

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).

3.8 System

Below the **SETUP SYSTEM** screen is shown along with the keys that are enabled.



In this screen the system parameters are shown and can be changed. A cursor (inverted text) indicates the currently selected parameter.

The following parameters are accessible:

SYSTEME TYPE: For this software only "Basic" system type can be chosen.

Parameters: When the power is turned on all parameters changing the event counter are locked. Change this setting to "UNLOCKED" to access the parameters. Before unlocking is possible the password 1357 must be entered. The setting automatically returns to "LOCKED" after 5 minutes without keyboard activity in **NORMAL** screen.

High Res. Mode: When this setting is enabled the "Dd/10" key in the **NORMAL** toggles the enhanced resolution on and off permanently. When the setting is disabled the "Dd/10" key in the **NORMAL** toggles the enhanced resolution on for 3 seconds.

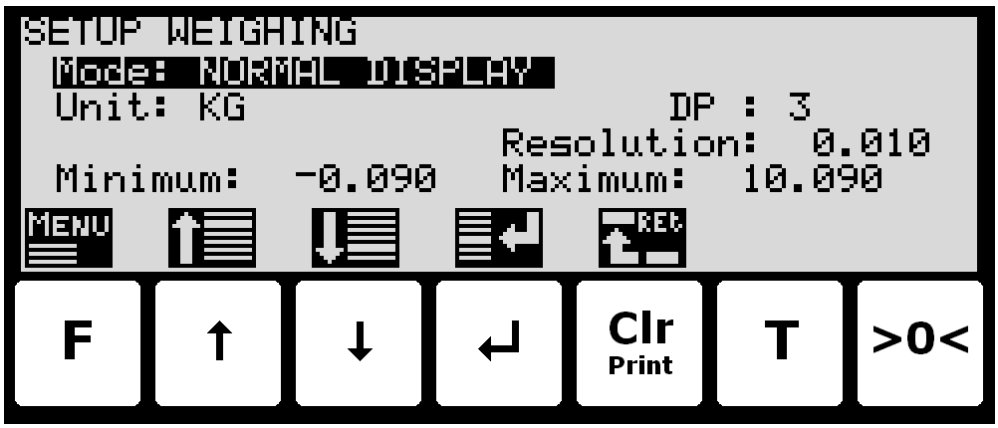
Keyb. unlock leng.: With this setting set to 0, the keyboard lock feature is disabled. With this setting set to other values (1-50; default value is 7), the keyboard lock feature is enabled. The parameter then indicates the length of the key sequence that must be pressed to unlock a locked keyboard.

The keys are used as follows:

F	Not used.
↑	Moves the cursor up between the different parameters on the screen.
↓	Moves the cursor down between the different parameters on the screen.
↵	Selects change/entry of the parameter marked/selected by the cursor.
Clr	Return to the **SETUP** screen.
T	Not used.
>0<	Not used.

3.9 Weighing

Below the **SETUP WEIGHING** screen is shown along with the keys that are enabled.



In this screen weighing parameters are shown and can be changed. A cursor (inverted text) indicates the currently selected parameter.

The keys are used as follows:

F	Selects the **WEIGHING** menu.
↑	Moves the cursor up between the different parameters on the screen.
↓	Moves the cursor down between the different parameters on the screen.
↵	Selects change/entry of the parameter marked/selected by the cursor.
Clr	Return to the **SETUP** screen.
T	Not used.
>0<	Not used.

3.9.1 Weighing range modes

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 resolution weight display.

PROTOCOL: weight readings transferred using serial communication.

The weighing range mode can be selected from the **SETUP WEIGHING** screen. The weighing range mode is changed by using ↑ and ↓ to select the "Mode" parameter with the cursor, and then pressing ↵ to request change of the "Mode" parameter using a selection list as described earlier.

When configuring weighing ranges as described below, values shown as well as changes made only apply to the currently selected weighing range specified by the "Mode" parameter.

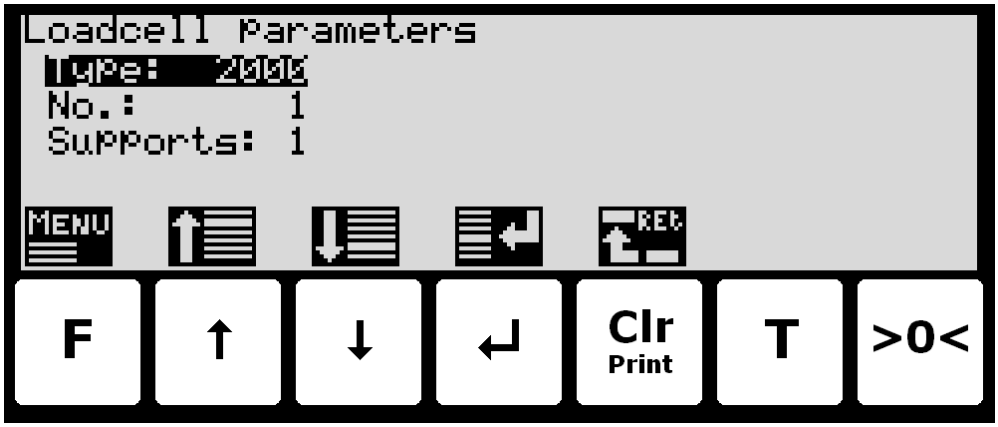
3.9.2 Configuring weighing ranges

An appropriate weighing range can be configured from the **SETUP WEIGHING** screen. A specific weighing range is changed by using ↑ and ↓ to select a weighing range parameter with the cursor, and then pressing ↵ to request change of the given parameter. The following weighing range parameters need to be configured individually for each of the three specific weighing range modes (NORMAL, CALIBRATION and PROTOCOL):

1) "Unit" entered using a selection list as described earlier.
2) "DP" entered using a selection list as described earlier.
3) "Resolution" entered using a selection list as described earlier.
4) "Minimum weight" entered using data entry screen as described earlier.
5) "Maximum weight" entered using data entry screen as described earlier.

3.10 Loadcell parameters

Below the **LOADCELL PARAMETERS** screen is shown along with the keys that are enabled.



In this screen loadcell parameters are shown and can be changed. A cursor (inverted text) indicates the currently selected parameter.

The keys are used as follows:

F	Selects the **WEIGHING** menu.
↑	Moves the cursor up between the different parameters on the screen.
↓	Moves the cursor down between the different parameters on the screen.
↵	Selects change/entry of the parameter marked/selected by the cursor.
Clr	Return to the **SETUP WEIGHING** screen.
T	Not used.
>0<	Not used.

3.10.1 Loadcell type

The weighing terminal can be connected to and communicate with different kinds of loadcells from Eilersen Electric. The weighing terminal can communicate with the following loadcells:

- Eilersen Electric loadcell type 2000
- Eilersen Electric loadcell type 4000

The type of loadcell connected to the weighing terminal must be specified in the **LOADCELL PARAMETERS** screen. The loadcell type indication is changed by using ↑ and ↓ to select the "Type" parameter with the cursor, and then pressing ↵ to request change of the loadcell "Type" parameter using a selection list as described earlier.

3.10.2 Number of loadcells

The weighing terminal can be connected to a maximum of 8 loadcells. The actual number of loadcells connected to the weighing terminal must be specified in the **LOADCELL PARAMETERS** screen. The number of loadcells indication is changed by using ↑ and ↓ to select the "No." parameter with the cursor, and then pressing ↵ to request change of the "No." of loadcells parameter.

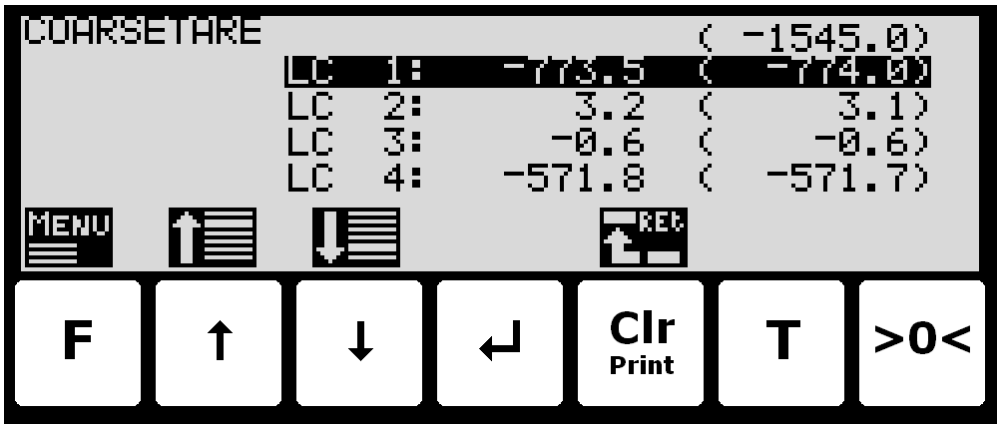
3.10.3 Number of supports

The actual number of supporting points (1-8) in the weighing system must be specified in the **LOADCELL PARAMETRS** screen. The number of supporting points indication is changed by using ↑ and ↓ to select the "Supports" parameter with the cursor, and then pressing ↵ to request change of the number of "Supports" parameter.

Note that it is the total number of supporting points including corners supported by loadcells. As an example, the "Supports" parameter should be 3 in a system consisting of a three legged tank.

3.11 Coarsetare

Below the **COARSETARE** screen is shown along with the keys that are enabled.



In this screen the coarsetare values and actual signals for each loadcell is shown.

The keys are used as follows:

F	Selects the **COARSETARE** menu.
↑	Selects the next coarsetare value
↓	Selects the previous coarsetare value
↵	Not used.
Clr	Return to the **WEIGHING** screen.
T	Not used.
>0<	Not used.

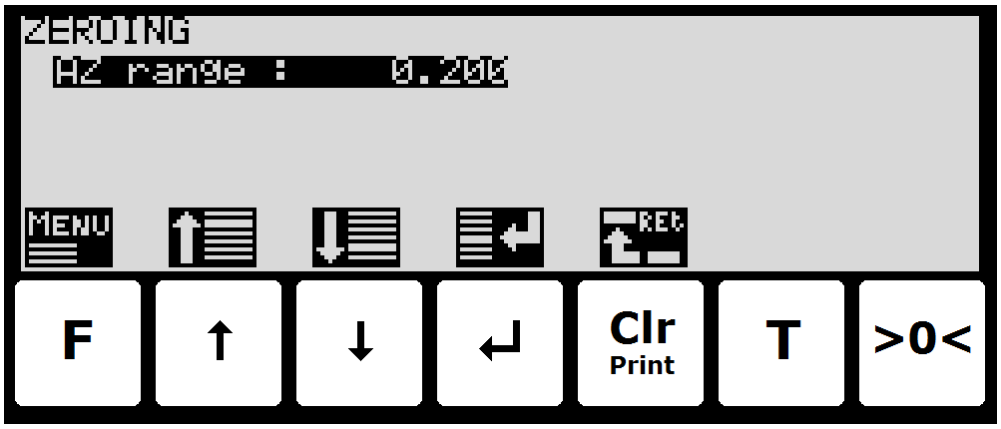
3.11.1 Performing coarsetare

It is possible to coarsetare the system by use of the **COARSETARE** menu. To perform a coarsetare from the **COARSETARE** screen perform the following:

F	Press once to select the **COARSETARE** menu.
↓	Press once to select the "PERFORM COARSETARE" entry from the **COARSETARE** menu.
↵	Press once to perform the coarsetare.

3.12 Zeroing

Below the **ZEROING** screen is shown along with the keys that are enabled.



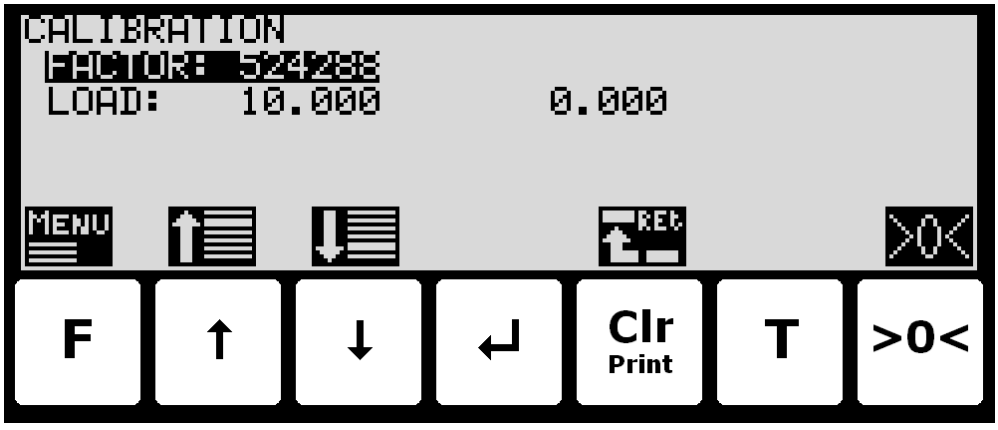
This screen is used to enter the zero tracking (autozero) range.

The keys are used as follows:

F	Selects the **ZEROING** menu.
↑	Moves the cursor up between the different parameters on the screen.
↓	Moves the cursor down between the different parameters on the screen.
↵	Selects change/entry of the parameter marked/selected by the cursor.
Clr	Return to the **WEIGHING** screen.
T	Not used.
>0<	Not used.

3.13 Calibration

Below the **CALIBRATION** screen is shown along with the keys that are enabled.



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 CALIBRATION** screen for corner calibration of the system. A cursor (inverted text) indicates the currently selected parameter.

The keys are used as follows:

[F]	Selects the **CALIBRATE** menu.
[↑]	Moves the cursor up between the different parameters on the screen.
[↓]	Moves the cursor down between the different parameters on the screen.
[↵]	Selects change/entry of the parameter marked/selected by the cursor.
[Clr]	Return to the **SETUP WEIGHING** screen.
[T]	Not used.
[>0<]	Zeroes the gross reading shown to the right in the "Load" line.

3.13.1 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 by using [↑] and [↓] to select the "FACTOR" parameter with the cursor, and then pressing [↵] to request change of the 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 gross weight indication will also change 1% (up or down).

3.13.2 Calibration load

The actual mass of the load used for calibration must be specified in the **CALIBRATION** screen before calibration is performed. The calibration load indication is changed by using [↑] and [↓] to select the "LOAD" parameter with the cursor, and then pressing [↵] to request change of the calibration "LOAD" parameter.

3.13.3 Perform calibration

It is possible to calibrate the system by performing the following calibration procedure (assuming the system has previously been coarsetared and possibly corner calibrated):

	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. Please notice that the accuracy of the calibration is deeply 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.

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.

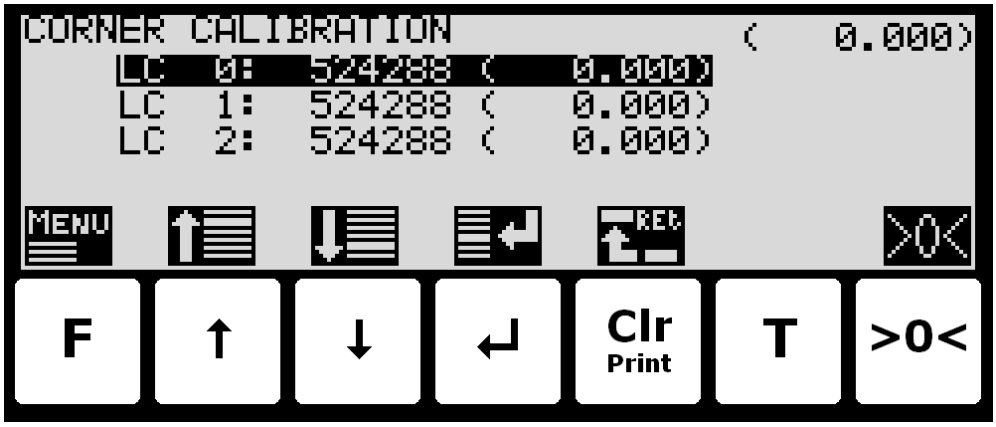
↓ — Press once to select the "PERFORM CALIBRATION" entry from the **CALIBRATE** menu.

↵ — 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.

3.13.4 Corner calibration

Below the **CORNER CALIBRATION** screen is shown along with the keys that are enabled.



In this screen corner calibration parameters such as corner calibration factor, and actual load on corresponding loadcell is shown on one line for each loadcell. The actual gross weight is shown in the upper right corner. This makes it possible to manually enter the corner calibration factor for each loadcell. 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.

The keys are used as follows:

F — Selects the **CALIBRATE** menu.

↑ — Moves the cursor up between the different parameters on the screen.

↓ — Moves the cursor down between the different parameters on the screen.

↵ — Selects change/entry of the parameter marked/selected by the cursor.

Clr	Return to the **CALIBRATION** screen.
T	Not used.
>0<	Zeroes the gross reading shown in the upper right corner.

3.13.5 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 loadcell/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 loadcell/corner will also change 1% (up or down).

3.13.6 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 perform the following:

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.

3.13.7 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. Below the **CORNER CALIBRATION PROCEDURE** screen is shown along with the keys that are enabled.

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

The keys are used as follows:

F	Selects the **CORNER CAL. PROC.** menu.
↑	Moves the cursor up between the different parameters on the screen.
↓	Moves the cursor down between the different parameters on the screen.
↵	Selects change/entry of the parameter marked/selected by the cursor.
Clr	Return to the **CORNER CALIBRATION** screen.
T	Not used.
>0<	Zeroes the gross reading shown in the upper right corner.

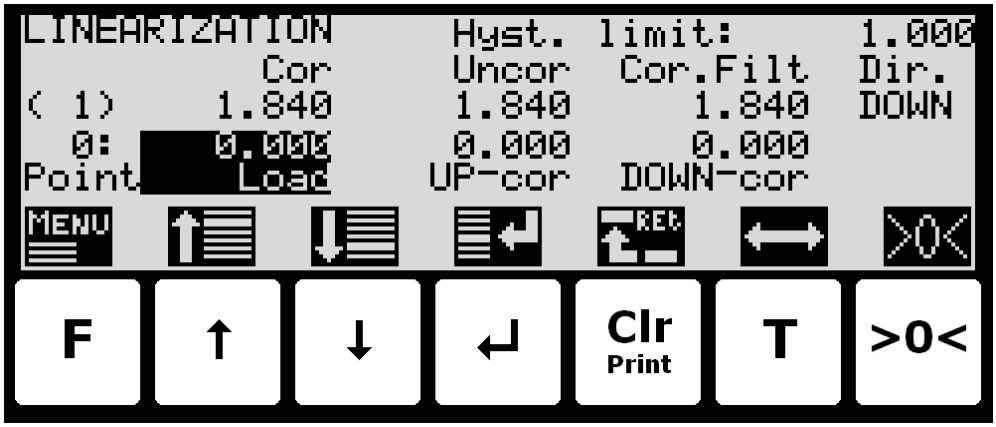
To corner calibrate the system from the CORNER CALIBRATION PROCEDURE screen the following procedure (assuming the system has previously been coarsetared) is followed:

1) Zero the gross reading in the upper right corner by pressing >0<.
2) Place the used calibration load directly above one of the loadcells/corners.
3) Perform the sampling/registration of the loadcell/corner in question by pressing the ↵ key. The weighing terminal will automatically detect above which loadcell/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".
4) Remove the calibration load. Zero the weight reading if necessary by pressing >0< before the load is placed above a new loadcell/corner.
5) Repeat 2-4 for each loadcell/corner in the system as the calibration load is moved to a new loadcell/corner each time. It is important that 2-4 is performed for every loadcell/corner in the system. When all loadcells/corners are registered all status indications should indicate "Registered".
6) 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.
7) Once all loadcells/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.
8) The corner calibration will now be performed based on the sampled values, and the weighing terminal returns to the **CORNER CALIBRATION** screen.

9) 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 loadcells/corners. **NOTE:** 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 loadcell/corner values.

3.14 Linearization

Below the **LINEARIZATION** screen is shown along with the keys that are enabled.



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.

NOTE: This screen is normally **NOT** used, and should only be used in weighing systems where system mechanics shows non ideal behavior.

The keys are used as follows:

F	Selects the **LINEARIZATION** menu.
↑	Moves the cursor up between the different parameters on the screen.
↓	Moves the cursor down between the different parameters on the screen.
↵	Selects change/entry of the parameter marked/selected by the cursor.
Clr	Return to the **SETUP WEIGHING** screen.
T	Moves the cursor right to the next parameter column on the screen.
>0<	Zeroes the gross reading.

3.14.1 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 load points including the up/down corrections are valid.

3.14.2 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.

Note that UP corrections are added while DOWN corrections are subtracted.

3.14.3 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 parameter with the cursor, and then pressing [↵] to request change of the hysteresis limit parameter.

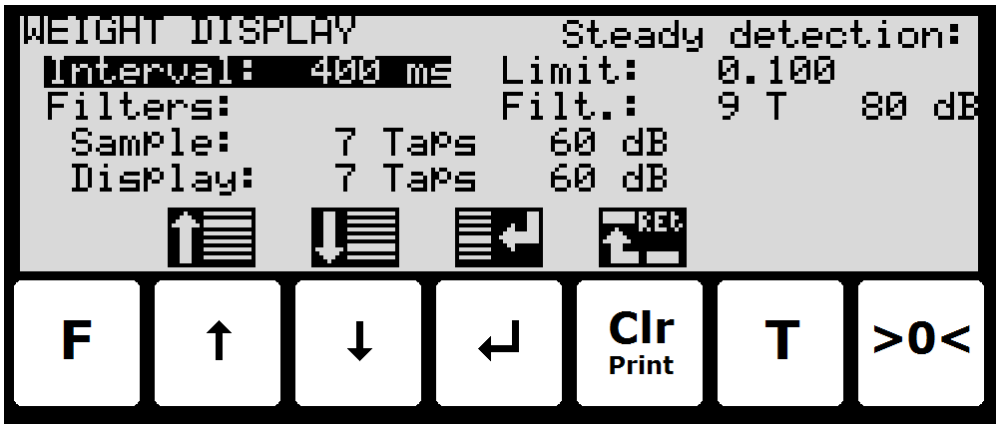
3.14.4 Reset linearization

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. To perform a reset of linearization from the **LINEARIZATION** screen perform the following:

[F]	Press once to select the **LINEARIZATION** menu.
[↓]	Press once to select the "RESET LINEARIZATION" entry from the **LINEARIZATION** menu.
[↵]	Press once to perform the reset of the linearization parameters.

3.15 Weight display

Below the **WEIGHT DISPLAY** screen is shown along with the keys that are enabled.



In this screen weight display parameters are shown and can be changed. A cursor (inverted text) indicates the currently selected parameter.

The keys are used as follows:

F	Not used.
↑	Moves the cursor up between the different parameters on the screen.
↓	Moves the cursor down between the different parameters on the screen.
↵	Selects change/entry of the parameter marked/selected by the cursor.
Clr	Return to the **SETUP WEIGHING** screen.
T	Not used.
>0<	Not used.

3.15.1 Interval

The interval between each update of the weight indication must be specified in the **WEIGHT DISPLAY** screen. The interval indication is changed by using ↑ and ↓ to select the "Interval" parameter with the cursor, and then pressing ↵ to request change of the display "Interval" parameter.

The interval (measuring time) 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.

3.15.2 Filters

Two types of filters can be applied: A filter on each sampling from the loadcell and/or a filter on each display weight reading update. The sampling frequency depends on the types and number of loadcells and the weight display reading update rate, as described below (Section 7.1 Appendix A: Filters). The weight display reading update rate is selected in the **WEIGHT DISPLAY** screen as described above. The filter selections are changed by using [↑] and [↓] to select the "Filters - Sample" and "Filters - Display" parameter with the cursor, and then pressing [↵] to invoke a filter selection list. The filter selections list will indicate the possible filter taps and damping; the filter frequency depends on the sampling/update rate.

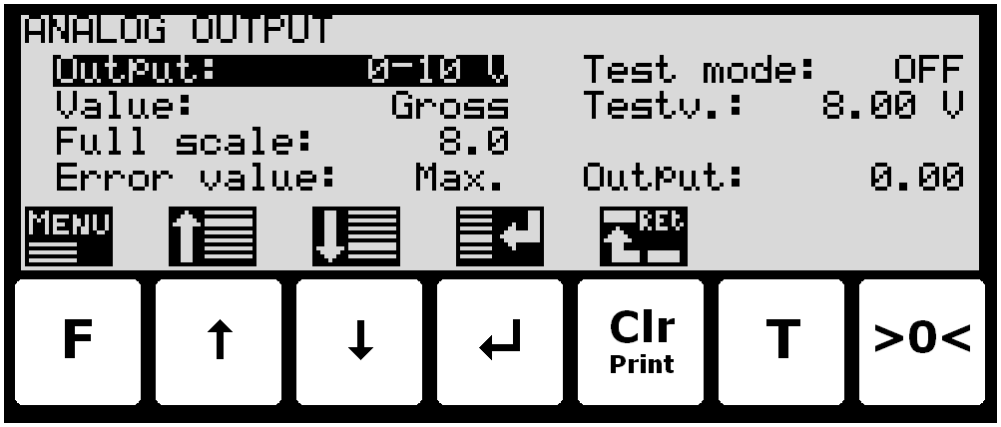
Please see below (Section 7.1 Appendix A: Filters) for details on filter specifications.

3.15.3 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.

3.16 Analog output

Below the **ANALOG OUTPUT** screen is shown along with the keys that are enabled.



In this screen analog output parameters are shown and can be changed. A cursor (inverted text) indicates the currently selected parameter.

The keys are used as follows:

[F]	Selects the **ANALOG OUTPUT** menu.
[↑]	Moves the cursor up between the different parameters on the screen.
[↓]	Moves the cursor down between the different parameters on the screen.
[↵]	Selects change/entry of the parameter marked/selected by the cursor.
[Clr]	Return to the **SETUP WEIGHING** screen.
[T]	Not used.
[>0<]	Not used.

3.16.1 Output type

The analog output type can as current: 4-20mA or voltage: 0-10V. Please notice that voltage and current outputs are assigned to two different pins. The pin for the type not used will take a random voltage value from –15V to +15V. The maximum load resistor for current output is 500 ohm.

3.16.2 Output value

The value used to generate the analog output can be either the current gross weight or the current net weight.

3.16.3 Full-scale value

When the selected weight is zero, the analog output is at its minimum value (4mA or 0V).

The maximum output value (20mA or 10V) is reached when the weight is at the entered full-scale value.

3.16.4 Error output value

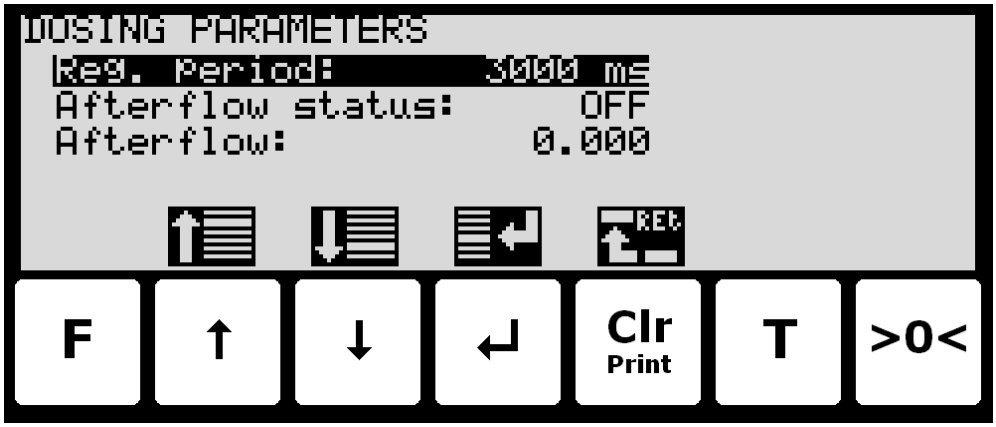
When the selected weight cannot be calculated e.g. due to loadcell not connected or loadcell error the analog output can be selected to be at the minimum value (4mA or 0V) or the maximum output value (20mA or 10V).

3.16.5 Test output

When the Test Mode is set to *ON* the analog is not controlled by the current weight but by the test value entered.

3.17 Dosing parameters

Below the **DOSING PAR.** screen is shown along with the keys that are enabled.



In this screen dosing parameters such as registration period and afterflow correction are shown and can be changed. A cursor (inverted text) indicates the currently selected parameter.

The keys are used as follows:

[F]	Not used.
[↑]	Moves the cursor up between the different parameters on the screen.
[↓]	Moves the cursor down between the different parameters on the screen.
[↵]	Selects change/entry of the parameter marked/selected by the cursor.
[Clr]	Return to the **SETUP** screen.
[T]	Not used.
[>0<]	Not used.

3.17.1 Registration period

The registration period, the time from a dosing has finished to the actual amount dosed is registered automatically, must be specified in the **DOSING PAR.** screen. The registration period is changed by using [↑] and [↓] to select the "Reg. period" parameter with the cursor, and then pressing [↵] to request change of the "Reg. period" parameter.

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).

3.17.2 Afterflow status

The afterflow status, indicating whether afterflow correction is disabled (OFF), enabled using a fixed correction (ON) or enabled using an automatically ad-

justed correction (AUTO), must be configured in the **DOSING PAR.** screen. The afterflow status can be toggled between OFF, ON and AUTO by using ↑ and ↓ to select the "Afterflow status" parameter with the cursor, and then pressing ↵ until the "Afterflow status" parameter is set to the desired value.

3.17.3 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 and can be set in the **DOSING PAR.** screen.

The afterflow correction is changed by using ↑ and ↓ to select the "Afterflow" parameter with the cursor, and then pressing ↵ to request change of the "Afterflow" parameter.

Please note that the "Afterflow" parameter is not used if afterflow correction is disabled by setting the "Afterflow status" parameter to OFF.

Also note that the "Afterflow" parameter can be changed automatically after each dosing if afterflow correction is performed automatically by setting the "Afterflow status" parameter to AUTO.

3.18 Ethernet

The **SETUP ETHERNET** screen is described separately in the "ETHERNET COMMUNICATION" chapter.

3.19 External module

An external module can be connected to the RS485 channel. This external module can be used for Profibus-DP, PROFINET, DeviceNet or Ethernet-IP connectivity.

The **EXTERNAL MODULE** and **EXTERNAL MODULE DATA** screens are described separately in the "EXTERNAL MODULES" chapter.

4) Ethernet communication

This chapter describes the Ethernet communication on the RJ45/Cat5 Ethernet connector (J7) of the 5024 terminal.

For possible Ethernet-IP communication using an external 2x50 Ethernet communication module, refer to later chapter describing external modules.

4.1 Ethernet specification

Protocol:	TCP/IP to PC. Weight terminal is TCP server
Communication settings	10MB/s, Half duplex
IP-Address:	Fixed (default: 192.168.1.199)
TCP Port:	Selectable
Ethernet connection:	RJ45/Cat5

4.1.1 Registration

Whenever a registration is made. The result is transmitted as an ASCII string on the TCP connection. This is only done if a client is connected to the weight terminal TCP server. Only 1 TCP connection can be opened. The transmission format is

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

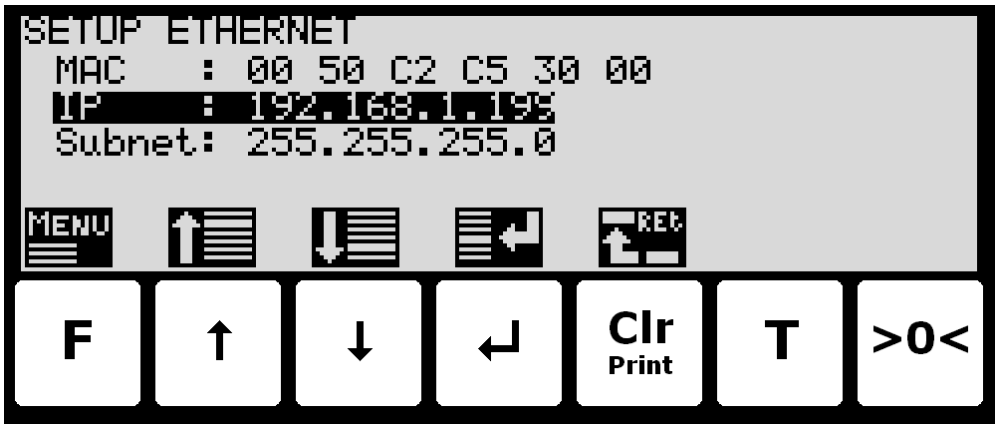
`NNN.NNN`	Net weight with decimal point position and resolution as in display reading.
`GGG.GGG`	`Gross` weight with decimal point position and resolution as in display reading.
`<CR><LF>`	Carriage return and linefeed characters.

4.1.2 PC Test software

The Ethernet communication can be tested with the EEOnline software. Just copy the .EXE and .INI file to a suitable location and run EEOnline.exe. Enter the IP address and the port. When then PC and the 5024 is on the same network segment a connection can be established by clicking “Connect”.

4.2 Ethernet

Below the **SETUP ETHERNET** screen is shown along with the keys that are enabled.



In this screen the different Ethernet parameters are shown and can be changed. A cursor (inverted text) indicates the currently selected parameter.

The keys are used as follows:

F	Selects the **ETHERNET** menu.
↑	Moves the cursor up between the different parameters on the screen.
↓	Moves the cursor down between the different parameters on the screen.
↵	Selects change/entry of the parameter marked/selected by the cursor.
Clr	Return to the **SETUP** screen.
T	Not used.
>0<	Not used.

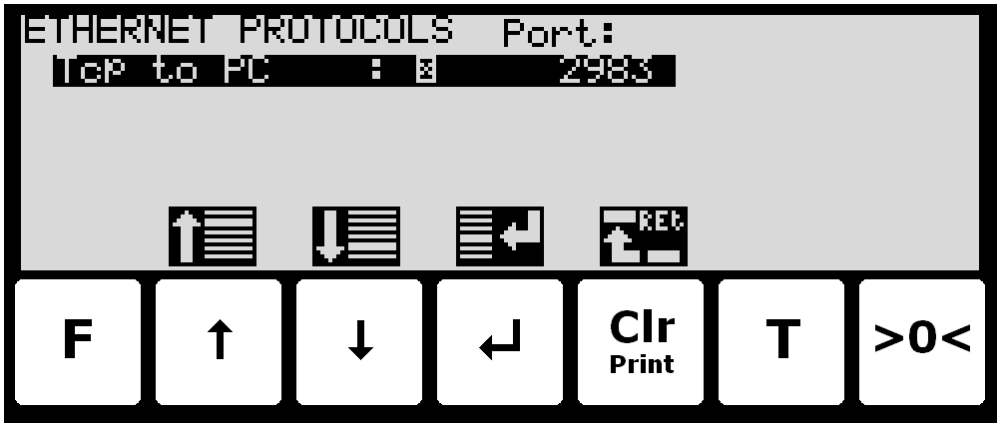
4.2.1 Ethernet settings

Appropriate Ethernet settings can be selected from the **SETUP ETHERNET** screen. Ethernet settings are changed by using ↑ and ↓ to select an Ethernet parameter with the cursor, and then pressing ↵ " to request change of the given parameter. The following Ethernet parameters can be configured:

1) "IP" address entered using a data entry screen as described earlier.
2) "Subnet" mask entered using a data entry screen as described earlier.

4.3 Ethernet Protocols

Below the **ETHERNET PROTOCOLS** screen is shown along with the keys that are enabled.



In this screen the different Ethernet protocols are shown and can be changed. A cursor (inverted text) indicates the currently selected protocol.

The keys are used as follows:

F	Not used.
↑	Moves the cursor up between the different parameters on the screen.
↓	Moves the cursor down between the different parameters on the screen.
↵	Selects change of the protocol settings for the protocol selected.
Clr	Return to the **ETHERNET** screen.
T	Not used.
>0<	Not used.

4.3.1 Ethernet protocol settings

Each Ethernet protocol can be enabled or disabled. When the protocol is enabled the port-number can be entered.

5) External modules

5.1 Introduction

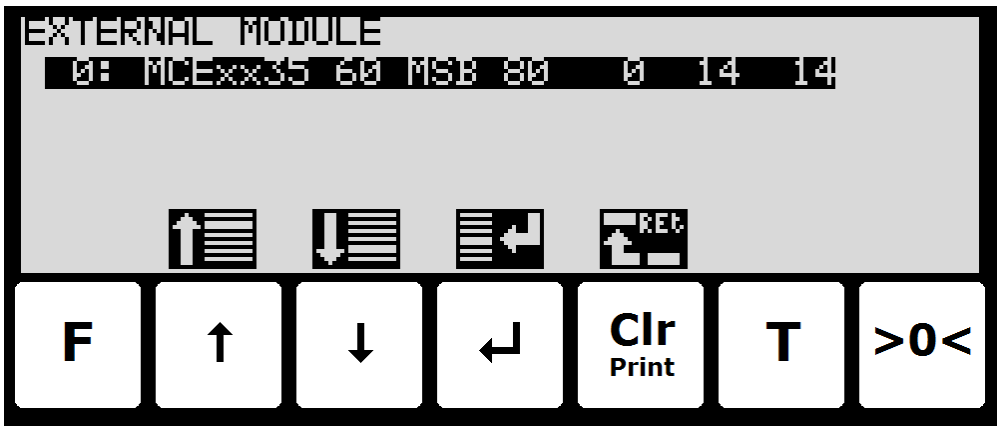
The 5024G can be connected to one external communication module on its RS485 channel. The communication module can be either a Profibus-DP, PROFINET, DeviceNet or Ethernet module (with Ethernet-IP protocol).

With the software versions stated below installed in the external module the external communication module can function as a slave on the AUX-bus (RS485), where it transfers 14 input bytes from the RS485 master (5024G) to the Profibus-DP/PROFINET/DeviceNet/Ethernet master and 14 output bytes from the Profibus-DP/PROFINET/DeviceNet/Ethernet master to the RS485 master (5024G).

Exchange of data between master and slave is made according to the profile/protocol described below.

5.2 External module

Below the **EXTERNAL MODULE** screen is shown along with the keys that are enabled.



In this screen the external module is shown and can be changed. A cursor (inverted text) indicates the currently selected module. With this version of the software only one module can be installed.

The line with module data shows the following information:

Device Index: Always 0 with this software version.

Device Type: ------- if no external module is connected. *MCExx35* if a Profibus-DP module is connected. *MCE9637* if MCE9637 DeviceNet module is connected. *2x50* if a 2x50 Ethernet module is connected. 2070 if a 2070 PROFINET module is connected.

Device Address: The address is the entered address plus the base address for the module type selected

Endian: Endian of the individual data values transferred: *MSB* most significant byte first: Big endian. *LSB* least significant byte first: Little endian. MSB is normally used with Profibus-DP and PROFINET while LSB is normally used with all other types of modules.

Status: *00*: Communication up and running. *80*: No connection to the module.

Error Counter: Number off errors in communication

Bytes Out: Number of bytes to be sent from the 5024G to the external module and from there to the Profibus-DP/PROFINET/DeviceNet/Ethernet master. This is the number of input bytes in the Profibus-DP/PROFINET/DeviceNet/Ethernet master.

Bytes In: Number of bytes to be received in the 5024G from the external module and transmitted from the Profibus-DP/PROFINET/DeviceNet/Ethernet master. This is the number of output bytes in the Profibus-DP/PROFINET/DeviceNet/Ethernet master.

The keys are used as follows:

[F] Not used.

[↑] Moves the cursor up between the different modules on the screen.

[↓] Moves the cursor down between the different modules on the screen.

[↵] Selects change of the settings for the selected module.

[Clr] Return to the **SETUP** screen.

[T] Not used.

[>0<] Not used.

The following parameters can be changed for the external module:

Device Type: The following types can be selected. *None* if no external module is connected. *MCExx35* if a Profibus-DP module is connected. *MCE9637* if MCE9637 DeviceNet module is connected. *2x50* if a 2x50 Ethernet module is connected. 2070 if a 2070 PROFINET module is connected.

Device Address: The address is automatically added to the base address for the module type selected. Enter a number in the interval 0-15. With this software version where only one external module can be connected 0 is the normal address value.

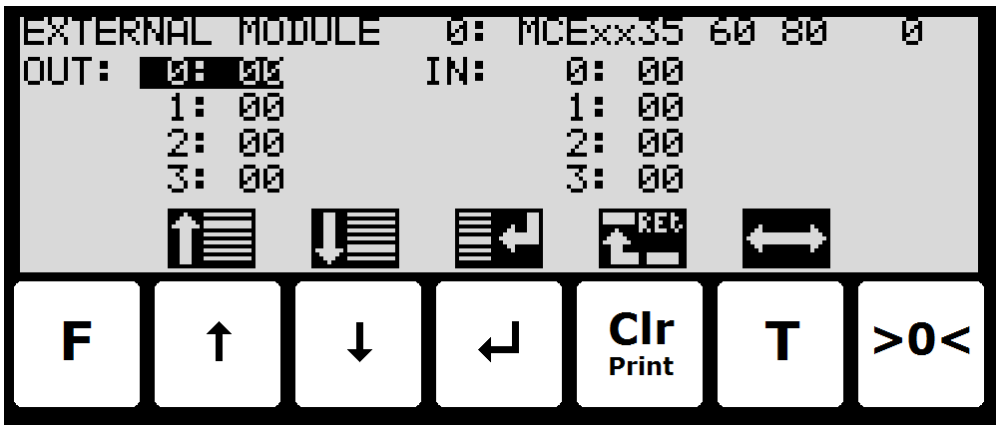
Endian: Endian of the individual data values transferred: *MSB* most significant byte first: Big endian. *LSB* least significant byte first: Little endian. MSB is normally used with Profibus-DP and PROFINET while LSB is normally used with all other types of modules.

Bytes Out: Number of bytes to be sent from the 5024G to the external module and from there to the Profibus-DP/PROFINET/DeviceNet/Ethernet master. This is the number of input bytes in the Profibus-DP/PROFINET/DeviceNet/Ethernet master. The value must be the same as the value in the external module. Normally 14.

Bytes In: Number of bytes to be received in the 5024G from the external module and transmitted from the Profibus-DP/PROFINET/DeviceNet/Ethernet master. This is the number of output bytes in the Profibus-DP/PROFINET/DeviceNet/Ethernet master. The value must be the same as the value in the external module. Normally 14.

5.3 External module data

Below the **EXTERNAL MODULE DATA** screen is shown along with the keys that are enabled.



This screen will show the data sent to the external module (*OUT*) and the data received from the external module (*IN*).

The keys are used as follows:

F	Not used.
↑	Moves the cursor up between the data bytes.
↓	Moves the cursor down between the data bytes.
↵	Selects entry of the selected input data byte for test purposes. If an external module is communication the value will immediately be overwritten by the value receive form the external module..
Clr	Return to the **EXTERNAL MODULE** screen.
T	Toggles the cursor between the output and the input bytes.
>0<	Not used.

5.4 External communication using PPO

The communication with the external module is made using a *'parameter-process data object'* (PPO) consisting of 14 bytes data. This telegram (object) is used during both reception and transmission of data. The structure of this telegram is as follows:

MOD	**PCV**							**PCD**					
MDS	PCA	PNU		PVA				CTW STW		MRV MAV			
1	2	3	4	5	6	7	8	9	10	11	12	13	14

Byte 1 **Byte 14**

The telegram is made up of 3 blocks; a MOD part (1 byte), a PCV part (the next 7 bytes) and a PCD part (the last 6 bytes). The three blocks are as follows:

MOD (Mode)
MDS (Byte 1): Mode selector

PCV (Parameter-Characteristic-Value)
PCA (Byte 2): Parameter Characteristics
PNU (Bytes 3-4): Parameter number
PVA (Bytes 5-8): Parameter value

PCD (Process Data)
CTW (Bytes 9-10) (Master to Slave): Control Word
STW (Bytes 9-10) (Slave to Master): Status Word
MRV (Bytes 11-14) (Master to Slave): Main Reference Value
MAV (Bytes 11-14) (Slave to Master): Main Actual Value

In the following the meaning of the individual blocks of the telegram is explained further.

IMPORTANT: During transfer/reception of data (i.e. the MAV) it is up to the master (the PLC) to ensure consistent data, when a parameter consisting of several bytes is read/updated and when AS/MAV or RS/MRV is read/set.

5.5 MOD

The MOD part of the telegram indicates which value is to be transferred as **Main Reference Value** (MRV) and as **Main Actual Value** (MAV). Please see below for further information.

5.5.1 MDS

MDS contains an RS part for selection of **Main Reference Value** (MRV) and an AS part for selection of **Main Actual Value** (MAV), as shown in the figure below.

Bit 7							Bit 0
7	6	5	4	3	2	1	0
RS				AS			

RS: Reference value selector (Values: 0..15)
AS: Actual value selector (Values: 0..15)

5.6 PCV Description

The PCV part of the telegram is made up of a PCA part, a PNU part and a PVA part. The function of these different parts of the PCV part is described here.

5.6.1 PCA

The PCA part contains an RC part for 'request' and 'response' indication.

Bit 7							Bit 0
7	6	5	4	3	2	1	0
RC							

RC: Request/Response Characteristics (Values: 0..255)

RC is used by the master to tell the slave which ’request’ is desired. Similarly the slave uses RC to inform the master the status of the received 'request' (’response’). The contents of RC has the following function during ’request:

REQUEST	FUNCTION
0	No request
1	Request parameter value
2	Change parameter value (2 bytes)
3	Change parameter value (4 bytes)
Others	*Reserved for future use*

The contents of RC has the following function during response:

RESPONSE	FUNCTION
0	No response
1	Transfer parameter value (2 bytes)
2	Transfer parameter value (4 bytes)
3	Request rejected (incl. Error#, see later)
4	Cannot be serviced by PCV interface
Others	*Reserved for future use*

5.6.2 PNU

The PNU part indicates the parameter number of the parameter to be read/changed. The parameters and their function is described below.

5.6.3 PVA

The PVA part contains 4 bytes for reception and transmission of parameter values. The PVA part transfers '2 byte' parameters in bytes 5 and 6, while '4 byte' parameters are transferred in bytes 5 and 8.

If the slave rejects a request from the master the RC part assumes the value 3 (see above) and the error number itself is transferred in the PVA part (bytes 5 and 6). The following error indications are possible:

ERROR #	CAUSE
0	Illegal command for this PNU or PNU not used.
1	*Reserved for future use*
2	Upper or lower limit exceeded

5.7 PCD Description

The PCD part of the telegram is made up of a CTW/STW part and a MRV/MAV part. The function of these two parts of the PCD part is described here. Note that the PCD part (the last 6 bytes) always transfers these data disregarding the contents of the PCV part.

5.7.1 CTW/STW

During communication from the master to the slave, the first two bytes of the PCD part are used as a Control Word (CTW). Using the Control Word (CTW) it is possible to tell the slave how to react as different commands can be transferred to the slave.

During communication from the slave to the master, the first two bytes of the PCD part are used as a Status Word (STW). Using the Status Word (STW) it is possible for the master to gain information on the status of the slave.

5.7.2 MRV/MAV

During communication from the master to the slave the last four bytes of the PCD part are used as a **Main Reference Value** (MRV); a setpoint. Using the RS defines exactly which value is transferred as MRV.

During communication from the slave to the master the last four bytes of the PCD part are used as a **Main Actual Value** (MAV); the actual value. Using the AS defines exactly which value is transferred as MAV.

5.8 Communication overview

Please note the following:

1. All weights are transferred as shown in the display without a decimal point (i.e. 300.0 kg is transferred as 3000 and 67.2 kg is transferred as 672).
2. All negative numbers are transferred as 2-complement numbers.
3. Actual unit and decimal point position can be read from the appropriate parameter.

5.9 RS –Reference Value Selector, MRV – Main Reference value

RS **Reference value selector**	**MRV** **Main Reference value**
0	*Not used*
Others	*Not used*

5.10 AS –Actual Value Selector, MAV – Main Actual value

AS **Actual value selector**	**MAV** **Main Actual value**
0	*Not used*
1	Actual gross weight
2	Actual net weight
Others	*Not used*

Actual gross weight is the actual gross weight on the 5024G terminal.
Actual net weight is the actual net weight on the 5024G terminal.

5.11 CTW –Control Word

Bit	Function
0	Zero
1	Autotare (zero of net weight)
2	Start dosing
3	Stop dosing
4	Registration
Others	*Not used*

Zero must be activated if a zero of the gross weight is desired.

Autotare must be activated if a zero of the net weight is desired.

Start dosing must be activated if a start of dosing is desired.
Stop dosing must be activated if a dosing is to be stopped before the fine limit is reached. If the terminal is set to perform automatic registration on time this will take place afterwards.
Registration must be activated if a registration of the actual net weight is desired. Any dosing in progress will be aborted before registration.

5.12 STW –Status Word

Bit	Function
0	Weight reading not possible
1	Zero OK
2	Zero not possible
3	Autotare OK
4	Autotare not possible
5	Start dosing OK
6	Start dosing not possible
7	Stop dosing OK
8	Stop dosing not possible
9	Registration OK
10	Registration not possible
11	Fine dosing
12	Coarse dosing
13	*Not used*
14	Registration ready
15	OK – always ON

Weight reading not possible is active when the 5024G terminal is unable to determine the weight.

Zero OK is active when zero was possible.*)

Zero not possible is active when zero was NOT possible.*)

Autotare OK is active when autotare was possible.*)

Autotare not possible is active when autotare was NOT possible.*)

Start dosing OK is active when start of dosing was possible.*)
Start dosing not possible is active when start of dosing was NOT possible.*)
Stop dosing OK is active when stop of dosing was possible.*)

Stop dosing not possible is active when stop of dosing was NOT possible.*)
Registration OK is active when registration of net weight was possible.*)
Registration not possible is active when registration of net weight was NOT possible.*)

Fine dosing is active during dosing until the fine limit (pos. adjusted for after-flow) is reached.
Coarse dosing is active during dosing when the net weight is below the coarse limit.
Registration ready is active when a registration is ready. The bit is cleared when a new dosing is started.
OK – always ON is always activated. Can be used as a control of the communication.

Bits marked with *) are cleared again when the corresponding request bit is cleared.

5.13 Parameters

NO	TYPE	PARAMETER
1	4, R	Actual gross weight
2	4, R	Actual net weight
3	4, RW	Fine limit
4	4, RW	Coarse limit
5	-	*Not used*
6	4, R	Last registered amount
7	4, R	Total dosed amount
8	4, R	Total number of weighings
10	2, R	Unit *0: kg* *1: lbs* *2: gram*
11	2, R	Decimal point position
20 - 27	2, R	Loadcell-Status[x]
40 - 47	4, R	Loadcell-Gross[x]
Others		*Not used*

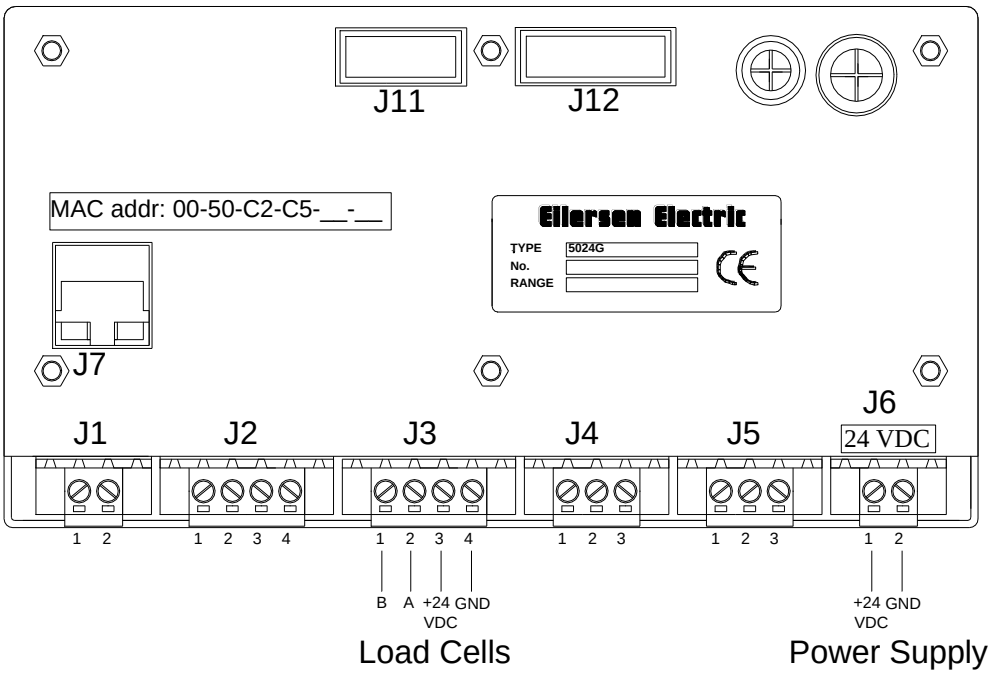
Actual gross weight is the actual gross weight on the 5024G terminal.
Actual net weight is the actual net weight on the 5024G terminal.
Fine limit contains the fine limit used during dosing.
Coarse limit contains the coarse limit used during dosing.
Last registered amount contains the result (registration) of the last dosing.
Total dosed amount contains the total dosed amount.
Total number of weighings contains the total number of weighings.
Unit indicates the unit used in the display reading. It should be used to scale weight indications received/transmitted using the Profibus-DP/PROFINET/DeviceNet/Ethernet-IP communication.
Decimal point position indicates the number of digits after the decimal point in the display reading. It should be used to scale weight indications re-

ceived/transmitted using the Profibus-DP/PROFINET/DeviceNet/Ethernet-IP communication.
Loadcell-Status[x] contains the actual status for loadcell x.
Loadcell-Gross[x] contains the actual gross signal (not zeroed) on loadcell x.

6) Hardware description

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

6.1 Rear view



6.2 Connection of power

The 5024 system is powered by +24VDC which is connected to either J1 or J6. This powers the entire system including the connected loadcell.

J1 pin	FUNCTION
1	**+24V**
2	**GND**

J6 pin	FUNCTION
1	**+24V**
2	**GND**

6.3 Loadcell connection

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

- J11 connector using a ribbon cable to System 2000 loadcell modules (without use of MCE9601).

- J3 connector using a shielded cable to System 2000 loadcell modules, by using a MCE9601 connector module

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

- J12 connector using a ribbon cable to a 4015 loadcell connection module, for System 4000 loadcells.

6.4 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.

6.5 RS485 communication connector (external modules)

The 3 pin RS485 serial communication connector (J4) can be used for RS485 communication with externally connected equipment: 2035 Profibus-DP module, 2070 PROFINET module, MCE9637 DeviceNet module or 2x50 Ethernet module.

This connector has the following pin-out:

J4 pin	FUNCTION	Connection
1	**RS485-B** (negative line)	**External module MCE9601: B** or **RS485-B** on communication connector on the external module.
2	**RS485-A** (positive line)	**External module MCE9601: A** or **RS485-A** on communication connector on the external module.
3	**RS485-GND**	**External module MCE9601: GND** or **RS485-GND** on communication connector on the external module.

IMPORTANT: Remember to supply power to any external communication module used. This can be done by connecting +24V and GND (possibly taken from the J1 or J6 connector on the 5024 terminal) to the used MCE9601 connection module or directly to any power connector on the external module.

6.6 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	**Analog GND**
2	**Analog current output** Maximum load resistor: 500 ohm
3	**Analog voltage output**

6.7 Ethernet connector

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

6.8 Jumper settings

The 5024 system is equipped with a number of jumpers. These jumpers have the following functionality:

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)*

6.9 Light Emitting Diodes (LEDs)

The 5024 system is equipped with a number of internal lamps (light emitting diodes). These have the following functionality:

LED	FUNCTION
D7 (Green)	**Loadcell Tx (RS485)** Data is transmitted to the loadcell.
D8 (Red)	**Loadcell Enable (RS485)** Transmission to the loadcell is enabled.
D9 (Yellow)	**Loadcell Rx (RS485)** Data is received from the loadcell.
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.

6.10 MCE2035 Profibus-DP module

If a 2035 Profibus-DP module is connected it must have the following software version:

MCE2535.AUXSLAVE.050909.0 (O14_I14)

It is possible to connect the 2035 communication module on a PROFIBUS-DP network, where it will act as a slave. It will then be possible from the PROFIBUS-DP master to transfer data to/from the 5024G terminal (RS485 master).

6.10.1 MCE2035 Profibus-DP specification

The 2035 communication module confirms to the following PROFIBUS-DP specifications:

Protocol:	Profibus-DP
Communications form:	RS485
Module type:	Slave
Baud rates [kbit/sec]:	9.6, 19.2, 93.75, 187.5, 500, 1500, 3000, 6000, 12000
Profibus-DP address:	0-127 (Sw2.2-Sw2.8)
Profibus-DP connection:	9-pin sub-D (female) connector

6.10.2 MCE2035 Checklist during installation

During installation of the system the following should be checked/performed:

1) The Profibus-DP master is configured to communicate with the Profibus-DP module (2035) using the supplied GSD file.
2) The Profibus-DP module (2035) is connected to the Profibus-DP network, and a possible termination at the Profibus-DP slave is made.
3) The Profibus-DP module (2035) address is set using Sw2.1- Sw2.7. Power is applied and the Profibus-DP communication is started.
4) Check that yellow LEDs (DES and RTS) of the Profibus-DP module (2035) are lit/flashing, and that the green LED (D1) flashes. Check that the TXBB LED on the Profibus-DP module flashes and that the red LED (PBE) is not lit.

6.10.3 MCE2035 Connection

The 10 pole connector (J2) on the 2035 module is connected to the 10 pole connector on the MCE9601 connection module using the supplied ribbon cable with mounted connectors. Through this bus cable connection of power supply is achieved as well as connection to the 5024G terminal (RS485 master).

The MCE9601 module is connected to the 5024G terminal as follows:

MCE9601 CONNECTOR	CONNECTION
GND	-
B (DATA-)	5024G J4.1: RS485-B
A (DATA+)	5024G J4.2: RS485-A
GND	-
+24V	5024G J6.1: +24VDC (Vin)
GND	5024G J6.2: 0 VDC (GNDin)
I/O	-

Please notice that the internal Jumper JU 1 must be ON (inserted).

6.10.4 MCE2035 DIP-switch settings

The 2035 PROFIBUS-DP module is equipped with DIP-switch blocks that have the following function:

SWITCH	FUNCTION
Sw1.1-Sw1.4	**Selection of AUX communication address** The address is selected as the DIP-switches are binary coded, so that Sw1.1 is MSB and Sw1.4 is LSB. Note that these switches are only read during power on. The address should not be set so that the module has an address that matches another Profibus-DP module on the same AUX bus. The modules should be numbered from 0 and upwards without skipping any numbers. If only one module of a given type is connected to the AUX bus all switches should be OFF.

SWITCH	FUNCTION
Sw2.1	*Reserved for future use*
Sw2.2-Sw2.8	**Selection of PROFIBUS-DP communication address** The address is selected as the DIP-switches are binary coded, so that Sw2.2 is MSB and Sw2.8 is LSB. Note that these switches are only read during power on.

6.10.5 MCE2035 Jumpers

The 2035 PROFIBUS-DP module is equipped with 4 jumpers. These jumpers have the following function:

JUMPER	FUNCTION
JU1	**Baudrate on the AUX bus.** OFF: Communication at 9600 bps. ON: Communication at 115200 bps. (MUST be in this position for communication with 5024G) (Normally the jumper will be mounted on delivery.)
JU2-JU4	**Alternative termination of the Profibus-DP.** If R17, R21 and R22 are mounted these jumpers can be used to connect the termination resistors, so this is done directly on the module and not the normal way in the Profibus-DP connectors

6.10.6 MCE2035 Light Emitting Diodes

The 2035 PROFIBUS-DP module is equipped with 6 light emitting diodes (LED). These LED's have the following function:

LED	FUNCTION
TXBB (Green)	**Communication with AUX-master** 2035 is communicating with AUX-master.
D1 (Green)	**Communication with AUX-master** Toggles when the 2035 module receives a valid telegram on the AUX-bus.
D2 (Green)	*Reserved for future use*
PBE (Red)	**Profibus Error (when initialising the SPC3)** The SPC3 Profibus-DP controller was not initialised correctly.
DES (Yellow)	**Data Exchange State** Exchange of data between slave and master.
RTS (Yellow)	**RtS signal (SPC3)** The Profibus-DP module sends to the master.

6.10.7 MCE2035 PROFIBUS-DP connector

The 2035 PROFIBUS-DP module is equipped with a nine pole female sub-D connector (J1) for connection to the PROFIBUS-DP network. The connector is a standard PROFIBUS-DP connector. Termination of the PROFIBUS-DP should take place in the sub-D connector (male) of the cable. The specific terminals in the connector have the following function:

J1 Terminals	Function
J1.1	Not used
J1.2	Not used
J1.3	RS485-A (**positive** line) (Siemens designation: B line)
J1.4	Request to Send (RTS)
J1.5	0 VDC (Gnd)
J1.6	+5VDC (Vout)
J1.7	Not used
J1.8	RS485-B (**negative** line) (Siemens designation: A line)
J1.9	Not used

Note that some companies use different designations for the RS485-A and the RS485-B lines. Therefore the polarity of the lines has been listed.

6.11 2070 PROFINET module

If a 2070 PROFINET module is connected it must have the following software version:

2070.AUXSLAVE.160708.1v0

It is possible to connect the 2070 communication module to an PROFINET network, where it will act as a slave. It will then be possible from the PROFINET master to transfer data to/from the 5024G terminal (RS485 master).

6.11.1 2070 Checklist during installation

During installation of the system the following should be checked/performed:

1. All hardware connections are made as described below.
2. If necessary, the PROFINET master should be configured to communicate with the 2070 PROFINET module using the supplied GSDML file.
3. Set the RS485 communication address by use of **SW1**.1 – **SW1**.4 as described later.
4. The 2070 PROFINET module is connected to the PROFINET network using the PORT1 PROFINET connector (and possibly also PORT2) in the front of the 2070 module.
5. The 2070 PROFINET module is connected to the RS485 master using the 3 pole RS485 connector (J1).
6. Power (24VDC) is applied at the two pole power connector (J2) or through the ten pole connector (J7) connected to the MCE9601 connection module using the supplied ribbon cable.
7. The PROFINET communication is started.
8. Verify that the BF, SF, MT and ST lamps of the 2070 module end up OFF.
9. Verify that the RDY lamp ends up green.
10. Verify that the TxBB lamp (green) and D1 lamp (green) on the 2070 PROFINET module starts toggling rapidly shortly after power up.
11. Verify that expected data can be transferred across the PROFINET.

6.11.2 2070 Connection without MCE9601

If the 2070 PROFINET module is connected to the 5024G terminal **without** an external MCE9601 connection module, the connection is made as described in the following.

The grey ten pole ribbon connector (J7) of the 2070 module is **NOT** used.

The green two pole power connector (J2) of the 2070 module is connected as follows:

2070 J2 CONNECTOR	CONNECTION
J2.1	5024G J6.1: +24VDC (Vin)
J2.2	5024G J6.2: 0 VDC (GNDin)

The green three pole RS485 connector (J1) of the 2070 module is connected as follows:

2070 J1 CONNECTOR	FUNCTION	CONNECTION
J1.1	RS485-B (DATA-)	5024G J4.1: RS485-B
J1.2	RS485-A (DATA+)	5024G J4.2: RS485-A
J1.3	0 VDC (GNDin)	5024G J4.3: RS485-GND

6.11.3 2070 Connection with MCE9601

If the 2070 PROFINET module is connected to the 5024G terminal **with** an external MCE9601 connection module, the connection is made as described in the following.

The green two pole power connector (J2) of the 2070 module is **NOT** used. The green three pole RS485 connector (J1) of the 2070 module is **NOT** used. Instead the grey ten pole ribbon connector (J7) of the 2070 module is used.

The ten pole connector (J7) on the 2070 module is connected to the 10 pole connector on the MCE9601 connection module using the supplied ribbon cable with mounted connectors. Through this bus cable connection of power supply is achieved as well as connection to the 5024G terminal (RS485 master).

The MCE9601 module is connected to the 5024G terminal as follows:

MCE9601 CONNECTOR	CONNECTION
GND	-
B (DATA-)	5024G J4.1: RS485-B
A (DATA+)	5024G J4.2: RS485-A
GND	5024G J4.3: RS485-GND
+24V	5024G J6.1: +24VDC (Vin)
GND	5024G J6.2: 0 VDC (GNDin)
I/O	-

6.11.4 2070 DIP-switch settings

The 2070 PROFINET module is equipped with a 4 pole DIP switch block located in the front of the module. This DIP switch block is named **SW1** and has the following function:

SWITCH	FUNCTION
SW1.1 – **SW1**.4	**Selection of RS485 communication address** The address is selected as the DIP-switches are binary coded, so that **SW1**.1 is MSB and **SW1**.4 is LSB. Note that these switches are only read during power on. The address should not be set so that the module has an address that matches another PROFINET module.

The 2070 PROFINET module is also equipped with an 8 pole DIP switch block also located in the front of the module. This DIP switch block is named **SW2** and has the following function:

SWITCH	FUNCTION
***SW2**.1 – **SW2**.8*	*Reserved for future use*

6.11.5 2070 Jumper settings

The 2070 PROFINET module is internally equipped with 6 jumpers. These jumpers have the following function:

JUMPER	FUNCTION
JP11	**STM32 RESET** The jumper allows reset of the onboard STM32 microcontroller. OFF: Normal operation (normal setting from factory) ON: Reset of the 2070 on-board microcontroller
JP12	**STM32 BOOT0** The jumper is used when downloading new software to the 2070 module using the J8 serial connector. OFF: Normal power-up/operation (normal setting from factory) ON: Download operation possible
P2	***STM32 configuration jumper*** *(Reserved for future use)*
P3	***STM32 configuration jumper*** *(Reserved for future use)*
JP1	**TPS-1 RESET** Not used. Must be in OFF position.
JP2	**TPS-1 BOOT1** Not used. Must be in OFF position.

6.11.6 2070 Light Emitting Diodes

The front of the 2070 PROFINET module is equipped with a number of status lamps (light emitting diodes). These have the following functionality:

LED	FUNCTION
PORT1 connector (Green) (RJ45)	**Link (PORT1)** PROFINET is connected.
PORT1 connector (Yellow) (RJ45)	**Activity (PORT1)** PROFINET data is received or transmitted.
PORT2 connector (Green) (RJ45)	**Link (PORT2)** PROFINET is connected.
PORT2 connector (Yellow) (RJ45)	**Activity (PORT2)** PROFINET data is received or transmitted.
TxBB (Green)	**2070 communication with AUX-master** PROFINET module is communicating with AUX-master.
BF (Red)	**Bus Fail LED** The 2070 Bus Fail LED can be lit/flashing depending on the status of the network. The function of the BF LED is given below.
SF (Red)	**System Fail LED** The 2070 System Fail LED can be lit/flashing depending on the status of the system. The function of the SF LED is given below.
MT (Yellow)	**MainTenance required LED** The 2070 MainTenance required LED can be lit/flashing depending on the status of the system. The function of the MT LED is given below.
RDY (Green)	**ReaDY LED** The 2070 device ReaDY LED can be lit/flashing depending on the status of the device. The function of the RDY LED is given below.
ST (Red)	*Reserved for future use*
D1 (Green)	**Communication with RS485 master** Toggles when the PROFINET module receives a valid telegram on the RS485 bus.

The TXBB, BF, SF, MT, RDY, ST and D1 LED's display the status of the PROFINET device, and can in conjunction with the table below be used for error finding.

LED	Color	Status	Description
BF	Red		**Bus Fail:**
		ON	No link status available.
		Flashing	Link status ok. No communication link to a PROFINET IO controller.
		OFF	The PROFINET IO controller has an active communication link to this PROFINET IO device.
SF	Red		**System Fail:**
		ON	PROFINET diagnostic exists.
		Flashing	Reserved.
		OFF	No PROFINET diagnostic.
MT	Yellow		**Maintenance Required:**
		ON	Manufacturer specific - depends on the capabilities of the device.
		Flashing	
		OFF	
RDY	Green		**Device Ready:**
		ON	TPS-1 has started correctly.
		Flashing	TPS-1 is waiting for synchronization of the host CPU (firmware start is complete).
		OFF	TPS-1 has not started correctly.

The 2070 PROFINET module is also equipped with a number of status lamps (LEDs) located inside the module and are only visible if the cover is removed. These have the following functionality:

LED	FUNCTION
D4 (Yellow)	**RS485 RX** RS485 data is received.
D9 (Green)	**RS485 TX** RS485 data is transmitted.
D10 (Green)	**Power** 3.3 VDC internal power supply is on.

6.11.7 2070 PROFINET connector

The front of the 2070 PROFINET module is equipped with two standard Ethernet RJ45 connectors (**PORT1** and **PORT2**) for PROFINET connection using Cat5 cables.

6.12 MCE9637 DeviceNet module

If a MCE9637 DeviceNet module is connected it must have the following software version:

9637C_DN.AUXSLAVE.O14_I14.000529.1

It is possible to connect the MCE9637 communication module on a DeviceNet, where it will act as a slave. It will then be possible from the DeviceNet master to transfer data to/from the 5024G terminal (RS485 master).

6.12.1 MCE9637 DeviceNet specification

The following DeviceNet specifications apply to the MCE9637 communication module:

Protocol:	DeviceNet
Communication media:	CAN
Module type:	Group 2 slave (Polled I/O)
Baud rates [kbit/sec]:	125, 250, 500 (SW2.1-SW2.2)
DeviceNet MAC ID:	0-63 (SW2.3-SW2.8)
DeviceNet connection:	5-pin Open Connector (male)

6.12.2 MCE9637 Checklist during installation

During installation of the system the following should be checked/performed:

1) If necessary configure the DeviceNet master to communicate with the DeviceNet module (MCE9637) using the supplied EDS file.
2) The DeviceNet module (MCE9637) is connected to the DeviceNet, and a possible termination at the DeviceNet slave is made.
3) The DeviceNet module (MCE9637) baudrate is set using Sw2.1-Sw2.2 and its address is set using Sw2.3- Sw2.8. Power is applied and the DeviceNet communication is started.
4) Check that yellow LED (D1) of the DeviceNet module (MCE9637) is lit, and that the red LED (D2) is off. Check that the TXBB LED on the DeviceNet module flashes. Check that both the MS and the NS LED on the DeviceNet module (MCE9637) end up being lit solid green.

6.12.3 MCE9637 Connection

The 10 pole connector on the MCE9637 module is connected to the 10 pole connector on the MCE9601 connection module using the supplied ribbon cable with mounted connectors. Through this bus cable connection of power supply is achieved as well as connection to the 5024G terminal (RS485 master).

The MCE9601 module is connected to the 5024G terminal as follows:

MCE9601 Terminal	Connection
GND	Not used
B	5024G J4.1: RS485-B
A	5024G J4.2: RS485-A
GND	Not used
+24V	5024G J6.1: +24VDC (Vin)
GND	5024G J6.2: 0 VDC (GNDin)
I/O	Not used

6.12.4 MCE9637 DIP-switch settings

The MCE9637 module is equipped with two DIP-switch blocks. DIP-switch block 1 has the following function:

SWITCH	FUNCTION
Sw1.1-Sw1.4	**Selection of AUX communication address** The address is selected as the DIP-switches are binary coded, so that Sw1.4 is LSB and Sw1.1 is MSB. Note that these switches are only read during power on. The address should not be set so that the module has an address that matches another DeviceNet module on the same AUX bus. The modules should be numbered from 0 and upwards without skipping any numbers. If only one module of a given type is connected to the AUX bus all switches should be OFF.

DIP-switch block 2 has the following function:

SWITCH	FUNCTION
Sw2.1-Sw2.2	**Setting of DeviceNet DataRate (DR)** The desired baudrate is set according to the table shown below. Note that these switches are only read during power-on.
Sw2.3-Sw2.8	**Setting of DeviceNet Node Address (NA)** The address (0-63) is set as the DIP-switches are binary coded, so that Sw2.8 is LSB and Sw2.3 is MSB. Note that these switches are only read during power-on.

The baudrate of the MCE9637 module is set according to this table:

Sw2.2	Sw2.1	Baudrate
OFF	OFF	125 kbps
ON	OFF	250 kbps
OFF	ON	500 kbps
ON	ON	Not allowed

6.12.5 MCE9637 Jumpers

The MCE9637 module is equipped with 5 internal jumpers that function as follows:

JUMPER	FUNCTION
JU2	**Test mode** JU2 OFF: Normal mode (Default at delivery. Shouldn't be changed). JU2 ON: Test mode. The jumper must be OFF during normal operation.
JU3	**Baudrate on the AUX bus.** OFF: Communication at 115200 bps. ON: Communication at 9600 bps. (Normally the jumper will NOT be mounted on delivery.)
JU4	*Reserved for future use*
JU5	*Reserved for future use*
JU6	**Test mode** JU6 OFF: Normal mode (Default at delivery. Shouldn't be changed). JU6 ON: Test mode. The jumper must be OFF during normal operation.

6.12.6 MCE9637 Light Emitting Diodes

The MCE9637 module is equipped with 6 LED's that function as follows:

LED	FUNCTION
TxBB (Green LED)	**Communication with AUX-master** The MCE9637 is communicating with AUX-master.
D1 (Yellow LED)	**DeviceNet Voltage Detected** The MCE9637 module has detected DeviceNet voltage on the DeviceNet connector.
D2 (Red LED)	**Communication with AUX-master** Toggles when the MCE9637 module receives a valid telegram on the AUX-bus.
TxCAN (Green LED)	**CAN bus TxD (Transmit Data)** The MCE9637 module transmits data across the CAN bus.
MS (Green/Red LED)	**Module Status LED** The MCE9637 Module Status LED, that can be lit/flashing in different colours depending on the status of the module. The function of the MS LED is given in the table below.
NS (Green/Red LED)	**Network Status LED** The MCE9637 Network Status LED, that can be lit/flashing in different colours depending on the status of the network. The function of the NS LED is given in the table below.

Please note that the LED's will flash shortly during power-up during the selftest of the module. The MS and NS LED's will shortly flash Green/Red. The MS and NS LED's can in conjunction with the table below be used for error finding.

Light emitting diode	Colour	Status	Description
MS	Green	ON	**Normal Operation.** Communication performed normally.
		Flashing	**Standby State.** The unit needs supervision.
	Red	ON	**Unrecoverable fault.** A timer error, memory error or other system error. The unit may need replacing.
		Flashing	**Recoverable fault.** Configuration error, DIP-switch not set correct or similar error. Correct error and restart unit.
	---	OFF	**No power.** The power is disconnected or the unit is being restarted.
NS	Green	ON	**On-Line, Connection OK.** The unit is On-Line and a connection with the master has been established.
		Flashing	**On-Line, No Connection.** The unit is On-Line but no connection to the master has been established.
	Red	ON	**Critical Communication Error.** The unit has detected an error that makes it impossible to communicate on the network (duplicate MAC Id or Bus-Off error).
		Flashing	**Communication Time-Out.** One or more I/O connections are in the Time-Out state.
	---	OFF	**No power/Off-line.** The device may not be powered.

6.12.7 MCE9637 DeviceNet connector

The MCE9637 module is equipped with a 5 pole connector for connection to DeviceNet. The connection is according to the DeviceNet specification and is made as follows:

J2 Connector	Function	Colour
J2.1	V-	(Black)(0VDC input)
J2.2	CAN_L	(Blue)
J2.3	SHIELD	(Grey)
J2.4	CAN_H	(White)
J2.5	V+	(Red)(24VDC input)

6.13 2x50 Ethernet-IP module

If a 2x50 Ethernet module (with Ethernet-IP protocol) is connected it must have the following software version:

2x50.AUXSLAVE.140422.1v0

It is possible to connect the 2x50 communication module to an Ethernet-IP network, where it will act as a slave. It will then be possible from the Ethernet-IP master to transfer data to/from the 5024G terminal (RS485 master).

6.13.1 2x50 Ethernet-IP specification

The 2x50 Ethernet module confirms with the following Ethernet-IP specifications:

Protocol:	Ethernet-IP
Media:	Ethernet
Module type:	Slave(/Target)
Communication settings	10MB/s, Half duplex
IP-Address:	Fixed (default: 192.168.1.199)
Ethernet connection:	RJ45/Cat5
System setup:	RS232 terminal interface

6.13.2 2x50 Checklist during installation

During installation of the system the following should be checked/performed:

1. All hardware connections are made as described below.
2. If necessary connect the 2x50 Ethernet module to a PC with a RS232 connection and setup IP Address etc. as described below.
3. If necessary the Ethernet-IP master should be configured to communicate with the 2x50 Ethernet module using the supplied EDS file.
4. The 2x50 Ethernet module is connected to the Ethernet-IP network using the RJ45 Ethernet connector in the front panel.
5. Power (24VDC) is applied through the two pole connector (J2) or through the ten pole connector (J7) connected to the MCE9601 connection module using the supplied ribbon cable.
6. The Ethernet-IP communication is started.
7. Verify that the **MS** lamp and the **NS** lamp both end up green.
8. Verify that none of the **D1** or **D2** lamps are lit.

6.13.3 2x50 Connection without MCE9601

If the 2x50 Ethernet module is connected to the 5024G terminal **without** an external MCE9601 connection module, the connection is made as described in the following.

The grey ten pole ribbon connector (J7) of the 2x50 module is **NOT** used.

The green two pole power connector (J2) of the 2x50 module is connected as follows:

2x50 J2 CONNECTOR	CONNECTION
J2.1	5024G J6.1: +24VDC (Vin)
J2.2	5024G J6.2: 0 VDC (GNDin)

The green three pole RS485 connector (J1) of the 2x50 module is connected as follows:

2x50 J1 CONNECTOR	FUNCTION	CONNECTION
J1.1	RS485-B (DATA-)	5024G J4.1: RS485-B
J1.2	RS485-A (DATA+)	5024G J4.2: RS485-A
J1.3	0 VDC (GNDin)	5024G J4.3: RS485-GND

6.13.4 2x50 Connection with MCE9601

If the 2x50 Ethernet module is connected to the 5024G terminal **with** an external MCE9601 connection module, the connection is made as described in the following.

The green two pole power connector (J2) of the 2x50 module is **NOT** used. The green three pole RS485 connector (J1) of the 2x50 module is **NOT** used. Instead the grey ten pole ribbon connector (J7) of the 2x50 module is used.

The ten pole connector (J7) on the 2x50 module is connected to the 10 pole connector on the MCE9601 connection module using the supplied ribbon cable with mounted connectors. Through this bus cable connection of power supply is achieved as well as connection to the 5024G terminal (RS485 master).

The MCE9601 module is connected to the 5024G terminal as follows:

MCE9601 CONNECTOR	CONNECTION
GND	-
B (DATA-)	5024G J4.1: RS485-B
A (DATA+)	5024G J4.2: RS485-A
GND	5024G J4.3: RS485-GND
+24V	5024G J6.1: +24VDC (Vin)
GND	5024G J6.2: 0 VDC (GNDin)
I/O	-

6.13.5 2x50 DIP-switch settings

The 2x50 Ethernet module is equipped with an external DIP switch block (S1) as well as an internal DIP switch block (S2). These DIP switch blocks are NOT used and all switches should be left OFF.

SWITCH	FUNCTION
Sw1.1-Sw1.8	*Reserved for future use*

SWITCH	FUNCTION
Sw2.1-Sw2.8	*Reserved for future use*

6.13.6 2x50 Light Emitting Diodes

The 2x50 Ethernet module is equipped with a number of status lamps (LEDs) located in the front panel. These have the following functionality:

LED	FUNCTION
TxBB (Green)	**2x50 communication with AUX-master** 2x50 is communicating with AUX-master.
Ethernet connector (RJ45) Yellow	**Link** Ethernet is connected.
Ethernet connector (RJ45) Green	**Activity** Ethernet data is received or transmitted.
MS (Green/Red)	**Module Status LED** The 2x50 Module Status LED, that can be lit/flashing in different colors depending on the status of the module. The function of the MS LED is given in the table below.
NS (Green/Red)	**Network Status LED** The 2x50 Network Status LED, that can be lit/flashing in different colors depending on the status of the network. The function of the NS LED is given in the table below.
D1 (Red)	*Reserved for future use*
D2 (Red)	*Reserved for future use*

The MS and NS LED's can in conjunction with the table below be used for error finding.

Light emitting diode	Color	Status	Description
MS	Green	ON	**Normal Operation.** Communication performed normally.
		Flashing	**Standby State.** The module needs supervision.
	Red	ON	**Unrecoverable fault.** A timer error, memory error or other system error. The module may need replacing.
		Flashing	**Recoverable fault.** Configuration error, DIP-switch not set correct, IP-Address error or similar error. Correct error and restart module.
	---	OFF	**No power.** The power is disconnected or the module is being restarted.
NS	Green	ON	**On-Line, Connection OK.** The module is On-Line and a connection with the master has been established.
		Flashing	**On-Line, No Connection.** The module is On-Line but no connection to the master has been established.
	Red	ON	**Critical Communication Error.** The module has detected an error that makes it impossible to communicate on the network
		Flashing	**Communication Time-Out.** One or more I/O connections are in the Time-Out state.
	---	OFF	**No power/Off-line.** The device may not be powered.

The 2x50 Ethernet module is also equipped with a number of status lamps (LEDs) located inside the module and are only visible if the cover is removed. These have the following functionality:

LED	FUNCTION
D4 (Yellow)	**RS485 RX** RS485 data is received.
D9 (Green)	**RS485 TX** RS485 data is transmitted.
D14 (Yellow)	**RS232 RX** RS232 data is received.
D5 (Green)	**RS232 TX** RS232 data is transmitted.
D10 (Red)	**Power** 3.3 VDC internal power supply is on.

6.13.7 2x50 RS232 connector (J4)

The small 4 pole connector (J4) at the bottom of the 2x50 Ethernet module contains an RS232 communication channel. This RS232 channel is used for setup/configuration of the 2x50 Ethernet module from a PC as described below. Connection to this connector is made using a special serial cable supplied by Eilersen Electric A/S.

The 4 pole connector (J4) on the 2x50 module has the following connections:

J4 CONNECTOR	FUNCTION
J4.1	RS232-GND (connected to PC-GND)
J4.2	RS232-RXD (connected to PC-TXD)
J4.3	RS232-TXD (connected to PC-RXD)
J4.4	RS232-GND (connected to PC-GND)

6.13.8 2x50 Ethernet connector (J8)

The front panel of the 2x50 Ethernet module is equipped with a standard Ethernet RJ45 connector for Cat5 cables.

7) Appendices

7.1 Appendix A: Filters

Two types of filters can be applied: A filter on each sampling from the loadcell and/or a filter on each display weight reading update. The sampling frequency depends on the types and number of loadcells and the weight display reading update rate, as described below. The weight display reading update rate and the filter selection is done in the **WEIGHT DISPLAY** screen as described above (Section 3.15.2 Filters).

All filters are FIR filters with 7-100 taps.

7.1.1 Sampling filter

The sampling frequency and the filter frequency depend on the type and number of loadcells.

Please notice that 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 loadcell 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.

Loadcell type		4000	2000	2000	2000	2000
Number of loadcells		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

Please notice that 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 loadcell communication. A combination of a short sampling filter and a display filter or a higher display update rate is a better choice and will prevent these problems.

7.1.2 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

7.2 Appendix B – 2x50 Setup with Terminal Interface

The MAC address of the 2x50 Ethernet module is preset to a unique value within the Eilersen Electric A/S range. The default settings for IP address etc. are:

DHCP:	Disabled
IP Address:	192.168.1.199
Subnet mask:	255.255.255.0
Gateway:	192.168.1.254

These defaults can be altered by connecting the RS232 connector (J4) to a COM port on a PC and starting a terminal emulation program (like Hyper-Terminal or RealTerm) with these settings:

Baudrate:	9600
Databits:	7
Parity:	Even
Stopbits:	1
Flow control:	None

When the 2x50 is powered the following will be displayed

```
Eilersen Electric A/S
2x50 module.
Software version: EthernetIP.111025.1.1

------------------------------------------------
--- MAIN MENU
(1) show Info
(2) change Settings
(3) reset and switch to Download mode
------------------------------------------------
```

7.2.1 IP Address setting

To get the main menu press "Enter" one or more times until the main menu is displayed:

```
------------------------------------------------
--- MAIN MENU
(1) show Info
(2) change Settings
(3) reset and switch to Download mode
------------------------------------------------
```

Then press "2" to the *Change Settings Menu* displayed:

```
------------------------------------------------
--- CHANGE SETTINGS MENU
(1) change Mac address
(2) select enable of Dhcp
(3) change Ip address
(4) change Subnet mask
(5) change Gateway address
(6) Return to Main Menu
------------------------------------------------
```

Then press "3" to change to entry of a new IP address. The display will be like this:

```
************************************************
*** ENTER NEW IP ADDRESS:
Enter IP address in decimal (ddd.ddd.ddd.ddd) and press 'Enter':
```

Now enter a new IP address (e.g. 192.168.1.109) and press enter. Change the Subnet Mask and the Gateway Address the same way if necessary. **DO NOT** change the factory set MAC address. Do not enable DHCP if a DHCP server is not present.

To check all settings re-power the device and in the *Main Menu* press "1" to select the *System Info* display looking like this

```
************************************************
*** SYSTEM INFO:
MAC Address: 00 50 c2 c5 30 10
Use DHCP: No (use statically assigned addresses - see below)
IP Address: 192.168.1.109
Subnet Mask: 255.255.255.0
Gateway IP: 192.168.1.254
```

Check that all settings are as expected. The device is now ready to connect to the Ethernet-IP network

7.3 Appendix C – 2x50 Ethernet-IP connection to Allen Bradley

To connect the 2x50 Ethernet module with Ethernet-IP protocol to an Allen Bradley (Rockwell Automation) PLC using the Logix 5000 software the following must be observed:

1. Use the "ETHERNET MODULE Generic Ethernet Module
2. Do **NOT** use unicast, always use multicast.
3. Set connection format to "SINT"
4. Set "Input" "Assembly instance to 103, "Size" 14 (8-bit)
5. Set "Output" "Assembly instance to 102, "Size" 14 (8-bit)
6. Set "Configuration" "Assembly instance to 101, "Size" 1 (8-bit)

7.3.1 Ethernet-IP communication – Master input

Ethernet-IP communication from the 2x50 Ethernet module uses a single Assembly consisting of 14 bytes data as specified in the EDS file:

Assembly:	Assem3	Input
Assembly instance:	103	(0x67)
Connection:	Connection1	Exclusive Owner
Transfer class	Class 1	

The data bytes transferred to the master (PLC) using this assembly, are structured and used as previously described.

7.3.2 Ethernet-IP communication – Master output

Ethernet-IP communication to the 2x50 Ethernet module uses a single Assembly consisting of 14 bytes data as specified in the EDS file:

Assembly:	Assem2	Output
Assembly instance:	102	(0x66)
Connection:	Connection1	Exclusive Owner
Transfer class	Class 1	

The data bytes transferred from the master (PLC) using this assembly, are structured and used as previously described.

7.4 Appendix D – PROFINET Configuration tips

7.4.1 MAC addresses

The MAC addresses of the 2070 PROFINET module are noted on a label on the side of the 2070 module. The MAC addresses of the 2070 module are preset to unique values within the Eilersen Electric A/S range.

7.4.2 GSDML file

The supplied GSDML can be used to configure the PROFINET master to communicate with the 2070 PROFINET module.

Please note that on a Siemens SIMATIC STEP 7 software platform, once the GSDML file has been imported, the imported 2070 PROFINET module will normally be placed in the following location of the "Hardware catalog":

Other field devices \ PROFINET IO \ I/O \ Eilersen Electric \ 2x70 AUXSLAVE

7.4.3 Factory settings

Upon delivery the 2070 PROFINET module contains the following default factory settings:

Device Name:	d2x70
IP Address:	192.168.1.199
Subnet Mask:	255.255.255.0
Default Gateway:	192.168.1.254
Vendor ID:	840 (0x348)
Device Type:	D2x70

7.4.4 Setting DeviceName, IP Address etc.

The default factory settings of the 2070 PROFINET module, such as device name (d2x70) and IP address (192.168.1.199) etc., must be changed according to the actual PROFINET configuration.

Please note that on a Siemens SIMATIC STEP 7 software platform (TiA Portal), this is normally done under "Online Access" where the different node parameters (MAC address, IP address, DeviceName etc.) can be viewed and changed.

7.4.5 Data sizes

The amount of data exchanged between the PROFINET master and the 2070 PROFINET module is specified in the GSDML file. This application with the software specified on the front page of the manual uses 14 input bytes and 14 output bytes.

NOTE: Please beware that the terms "input" and "output" may be confusing and are used differently from vendor to vendor. Throughout this manual, these terms are always from the PROFINET masters (PLC's) point of view. Therefore, the data from the 2070 module to the PLC are referred to as "input" data, while the data from the PLC to the 2070 module are referred to as "output" data.