Kokkedal Industripark 4
DK-2980 Kokkedal
Denmark
info@eilersen.com
Tel +45 49 180 100
Fax +45 49 180 200

5429 ASG MODULE

Connecting digital loadcells to system for Analog Strain Gage loadcells

Applies to:

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2) Operation

2.1 Introduction

This document describes the 5429 ASG module from Eilersen Electric. With the software version stated on the front page the 5429 system can be used for interfacing digital loadcells from Eilersen Electric to an analog system normally used for Analog Strain Gage loadcells (hereafter referred to as the ASG system). Up to 4 digital loadcells (system 4000) can be connected. The 5429 system is operated using a 6 digit display and 5 keys for viewing/configuring a series of system parameters.

2.2 Power-up sequence

When power is applied to the 5429 system, the following steps will be performed:

- The green **Power** lamp (LED) will turn ON.
- The **D1**, **D2**, **LC1**, **LC2**, **LC3** and **LC4** lamps (LEDs) will turn ON.
- For 3 seconds all segments in the display will be lit like this:

  This allows for inspection that display and all lamps are working.
- Then the **D1** and **D2** lamps along with any **LCx** lamps not used by the 5429 system will turn OFF and for 2 seconds the display will show:

- For 2 seconds the display will show its program date like this:

  During this period the 5429 system will start communicating with the loadcells and the **TxLC** lamp will turn ON. As soon as the 5429 system establishes connection with any of the connected loadcells it will turn OFF the appropriate **LCx** lamps.
- For 2 seconds the display will show its program revision like this:

- The 5429 system is ready and enters the normal operation mode showing the **LoAd** parameter.

2.3 Operator panel

The operator panel holds a 6 character LED display, a number of lamps, keys and DIP switches. The display will normally show the actual load indication or other parameters used to operate/configure the 5429 system. Below the display the five keys are located.

2.3.1 Lamp functionality

The different lamps located in the front panel of the 5429 system work as follows:

Power	Turns ON when power is applied.
TxLC	Turns ON when 5429 is communicating with the loadcells.
D1	Turns ON when a key is activated or data entry is in progress.
D2	OFF as no feature is implemented. Reserved for future use.
LC1	Turns ON if this loadcell is disconnected or an error is detected.
LC2	Turns ON if this loadcell is disconnected or an error is detected.
LC3	Turns ON if this loadcell is disconnected or an error is detected.
LC4	Turns ON if this loadcell is disconnected or an error is detected.
AN.ERR	Turns ON if an error is detected on the analog output.

2.3.2 Key functionality

The general function of the keys in the front panel is as follows:

F	Step to next parameter in parameter list.
↑	Starts data entry of the selected parameter and increments value.
↓	Starts data entry of the selected parameter and decrements value.
Esc	Aborts data entry without change, or steps to previous parameter.
↵	Accepts adjusted value and terminates data entry.

Further description of the keys is made below in the chapter “Data entry”.

2.4 General display and keyboard behavior

When a parameter is shown the display will alternately show "**XXXXXX**" and "**YYYYYY**". Here "**XXXXXX**" will be a text indicating the actual parameter name, and "**YYYYYY**" will indicate the actual value or request belonging to this parameter.

The next parameter in the parameter list (see below) can be shown by pressing the F key, and the previous key can be shown by pressing the Esc key.

By continuous holding down a key, a keyboard repeat feature will be activated after a while, which gradually increases the speed by which the key is automatically considered reactivated.

By holding down the F key and then pressing the Esc key the **LoAd** parameter is selected.

2.5 Parameter list

The 5429 system has the following parameters, which can be viewed and possibly changed using the user interface:

PARAMETER	DESCRIPTION
LoAd	Display current load on loadcells.
PASS	Display/Change password for unlocking/locking data entry.
ZEro	Request zero of current load indication.
Lc.no.	Display/Change number of loadcells connected.
SuP.no.	Display/Change number of supporting corners.
LC.0 - LC.3	Display individual loadcell signals/status for connected loadcells.
n.unit	Display/Change weighing range unit (Kg, Gram, Lbs).
n.dPno	Display/Change weighing range dpno (digits after decimal point).
n.div	Display/Change weighing range division.
n.UL.	Display/Change weighing range minimum weight (UL indication).
n.OL.	Display/Change weighing range maximum weight (OL indication).
CAL.L.	Display/Change calibration load used.
CAL.	Perform system calibration.
CAL.F.	Display/Change system calibration factor (default is 524288).
Cor.FAc.	Reset all corner calibration factors to 524288.
Cor.rEg.	Clear all registered corner values (restart reg. process).
C.rEg.0 - C.rEg.3	Show corner registered values for the connected loadcells.
Cor.CAL.	Perform corner calibration.
Cor.0 - Cor.3	Display/Change corner calibration factors for the loadcells.
Int.PEr.	Display/Change integration period (measurement time in ms).
F.SA.no.	Display/Change sample filter number (0-15).
F.di.no.	Display/Change display filter number (0-15).
An.SP.	Display/Change analog setpoint for full analog output signal.
An.Err.	Display/Change analog output value during error (0-65535).
An.tESt	Enter analog test mode and output different test values (0-65535).
OutPut	Display current analog output signal (0-65535).

During normal operation the **LoAd** parameter should be selected for display of actual load on the loadcells. A complete description of the different parameters and their usage is given below.

2.6 Data entry and requests

In order to make changes to the different parameters or to perform requests from the keyboard (perform a zero etc.), the parameters have to be unlocked by setting the correct password as described later. Changing parameters (including the password) and performing requests from a parameter is done as follows.

2.6.1 Changing/adjusting parameters

Once a parameter is selected, then its value can be changed/adjusted by using the keys as follows:

[↑] or [↓]	Use the up and down keys until the desired value is reached.
[↵]	Once the desired value is reached, the [↵] key **MUST** be pressed in order to accept the new parameter value.
[Esc] or [F]	Aborts data entry without any changes to the parameter value.

Please note that some parameters can only be set to certain predetermined values. When parameter entry is in progress the yellow **D1** lamp will be ON to indicate this. The D1 lamp will turn OFF once the data entry is completed by pressing the [↵] key or aborted by pressing the [Esc] key or the [F] key.

Example - Changing calibration load from 0.000 to 1.250:

After having ensured the correct password is set use the [F] key (possibly the [Esc] key instead) to step forward (or backwards) to the **CAL.L.** parameter.

- Then use the [↑] key and the [↓] key until the display shows **1.250**.
- The yellow **D1** lamp will be ON during the above process.
- Press the [↵] key to accept the new value and complete the data entry.
- The yellow **D1** lamp will turn OFF once the data entry is completed.

2.6.2 Performing requests

Some parameters are used to perform requests (such as zeroing) instead of changing/adjusting a parameter. Once such a parameter is selected, then the corresponding request can be performed by using the keys as follows:

[↵]	Press and hold down this key.
[↑] or [↓]	While the [↵] key is held down, press either the [↑] key or the [↓] key to perform the desired request. Then release all the keys and inspect that the action has been performed.

Example – Performing a zero when display shows 0.120:

After having ensured the correct password is set use the [F] key (possibly the [Esc] key instead) to step forward (or backwards) to the **ZEro** parameter where the load indication shows **0.120**.

- Then press the [↵] key and keep it held down.
- Now while the [↵] key is held down, press the [↑] key or the [↓] key to perform the zero request.
- Now release all the keys and inspect that the request has been performed and that the load indication shows **0.000**.

2.6.3 Data locking and unlocking

When the power is turned on all parameters are locked. The parameters can be unlocked by setting the correct password in the **PASS** parameter. As long as the password differs from the correct password, **ALL** parameter change and user requests from the keyboard is locked. The password for unlocking and allowing parameter change is:

1357

Note: If the display is left showing the **LoAd** parameter without any keyboard activity for 5 minutes or more, the password will automatically reset to 0.

3) Parameter descriptions

The following is a description of each available parameter for this application.

3.1 LoAd parameter

When the **LoAd** parameter is selected the LED display toggle between showing the parameter name and the current load indication on the loadcells, as follows:

The load indication is shown in the unit specified by the weighing range parameters.

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 a status code will be shown ("**-XXXX-**") instead of the load indication. In this situation the analog output signal will be determined by the **An.Err.** parameter instead of the actual load on the loadcells. A complete list of status codes is shown in the appendix section.

The [F] and [Esc] keys can be used to switch to other parameters.

3.2 PASS parameter

When the **PASS** parameter is selected the LED display toggle between showing the parameter name and the current password, as follows:

The correct password for unlocking data entry and requests is **1357**. For all other password values entered data entry and requests are NOT possible.

The [↑] , [↓] and [↵] keys can be used to change/adjust the password.

If the display is left showing the **LoAd** parameter without any keyboard activity for 5 minutes or more, the password will automatically reset to 0.

IMPORTANT: Always remember to clear the password when done changing parameters.

3.3 ZEro parameter

When the **ZEro** parameter is selected the LED display toggle between showing the parameter name and the current load indication on the loadcells, as follows:

The display shows the same load indication as in the **LoAd** parameter.

The ↑ , ↓ and ↵ keys can be used to perform a zero request of the load indication on the loadcells. The zero should only be done with an empty and clean weighing platform.

NOTE: A zero request is performed (as described earlier) by pressing and holding down the ↵ key followed by activation of either the ↑ or the ↓ key.

NOTE: A zero request can also be performed by activating the digital ZERO input implemented on the **I/O** line (J9 connector). Zeroing using the digital input can be performed regardless of password value and the selected display parameter.

3.4 Lc.no. parameter

When the **Lc.no.** parameter is selected the LED display toggle between showing the parameter name and the number of loadcells for which the 5429 system is configured to, as follows:

During installation the actual number of loadcells (1-4) connected to the 5429 system must be configured using the **Lc.no.** parameter. The 5429 system can be connected to a maximum of 4 system 4000 loadcells. As an example, the **Lc.no.** parameter should be 1 in a system consisting of a three legged tank, where only one corner contains a loadcell.

The ↑ , ↓ and ↵ keys can be used to change/adjust the number of loadcells.

NOTE: If a change is made to this parameter, the power should be turned OFF and ON for the change to take effect.

3.5 SuP.no. parameter

When the **SuP.no.** parameter is selected the LED display toggle between showing the parameter name and the number of supporting points in the weighing arrangement, as follows:

During installation the actual number of supporting points (1-8) in the weighing arrangement must be configured using the **SuP.no.** parameter. Note that it is the total number of supporting points including corners supported by loadcells. As an example, the **SuP.no.** parameter should be 3 in a system consisting of a three legged tank.

The [↑] , [↓] and [↵] keys can be used to change/adjust the number of supporting points.

3.6 LC. X parameter

When the **LC. X** parameter is selected the LED display toggle between showing the parameter name and the loadcell signal for the selected loadcell (0-X), as follows:

The loadcell signal (for the selected loadcell) is zeroed and shown in the same unit and resolution as the **LoAd** parameter.

If an error is detected (such as disconnection of the loadcell) an appropriate status code will be shown ("**-XXXX-**") instead of the load indication.

The [F] and [Esc] keys can be used to switch to other parameters.

3.7 n.unit parameter

When the **n.unit** parameter is selected the LED display toggle between showing the parameter name and the weighing range unit with which load indications are shown, as follows:

During installation the desired weighing range unit (Kg, gram or Lbs.) must be configured using the **n.unit.** parameter.

The [↑] , [↓] and [↵] keys can be used to change/adjust the weighing range unit.

NOTE: The unit is set depending on the actual loadcells used.

3.8 n.dPno parameter

When the **n.dPno** parameter is selected the LED display toggle between showing the parameter name and the weighing range decimal point position with which load indications are shown, as follows:

During installation the desired weighing range decimal point position must be configured using the **n.dPno** parameter. The decimal point position is specified as the number of digits following the decimal point.

The ↑ , ↓ and ↵ keys can be used to change/adjust the weighing range decimal point position.

NOTE: The decimal point position is set depending on the actual loadcells used.

3.9 n.div parameter

When the **n.div** parameter is selected the LED display toggle between showing the parameter name and the weighing range division (resolution) with which load indications are shown, as follows:

During installation the desired weighing range division/resolution must be configured using the **n.div** parameter. The division/resolution can be selected from a range of predefined values.

The ↑ , ↓ and ↵ keys can be used to change/adjust the weighing range division.

NOTE: The division/resolution is set depending on the actual loadcells used.

3.10 n.UL. parameter

When the **n.UL.** parameter is selected the LED display toggle between showing the parameter name and the weighing range minimum weight (**U**nder **L**oad) used when load indications are shown, as follows:

During installation the desired weighing range minimum weight must be configured using the **n.UL.** parameter. The minimum weight is used to specify, that below this value the display will show "**- UL -**" (underload) instead of the load indications.

The ↑ , ↓ and ↵ keys can be used to change/adjust the weighing range minimum weight.

NOTE: A good initial value could be minus the total capacity of all the loadcells connected to the 5429 system.

3.11 n.OL. parameter

When the **n.OL.** parameter is selected the LED display toggle between showing the parameter name and the weighing range maximum weight (**O**ver **L**oad) used when load indications are shown, as follows:

During installation the desired weighing range maximum weight must be configured using the **n.OL.** parameter. The maximum weight is used to specify, that above this value the display will show "**- OL -**" (Overload) instead of the load indications.

The ↑ , ↓ and ↵ keys can be used to change/adjust the weighing range maximum weight.

NOTE: A good initial value could be the total capacity of all the loadcells connected to the 5429 system.

3.12 CAL.L. parameter

When the **CAL.L.** parameter is selected the LED display toggle between showing the parameter name and the calibration load used during calibration, as follows:

If calibration is necessary the used calibration load must set using the **CAL.L.** parameter before the calibration is performed. The calibration load is shown in the same unit and resolution as the **LoAd** parameter. The calibration itself is performed in the **CAL.** parameter.

The ↑ , ↓ and ↵ keys can be used to change/adjust the calibration load.

3.13 CAL. parameter

When the **CAL.** parameter is selected the LED display toggle between showing the parameter name and the current load indication on the loadcells, as follows:

The display shows the same load indication as in the **LoAd** parameter.

The ↑ , ↓ and ↵ keys can if necessary be used to perform a needed system calibration request of the load indication on the loadcells.

NOTE: A system calibration request is performed (as described earlier) by pressing and holding down the ↵ key followed by activation of either the ↑ or the ↓ key.

The complete system calibration procedure for calibration is described below.

3.13.1 Performing a system calibration

If necessary, it is possible to perform a system calibration from the **CAL.** parameter by performing the following system calibration procedure (assuming the system has previously been corner calibrated if necessary):

- Ensure the weighing scale is empty and clean.
- Use the **ZEro** parameter to zero the load indication if necessary.
- Use the **CAL.L.** parameter to enter the used calibration load. Please notice that the accuracy of the calibration is deeply dependant on the accuracy and size of the calibration load. Please select a load with a mass not less than the maximum load normally applied to the system.
- Place the calibration load on the weighing arrangement.
- Select the **CAL.** parameter, and to request the system calibration the ↵ key is now pressed and held down followed by activation of either the ↑ or the ↓ key.
- The load indication shown in the **CAL.** parameter and several other parameters will now match the used calibration load and the system calibration factor has been updated correspondingly.

3.14 CAL.F. parameter

When the **CAL.F.** parameter is selected the LED display toggle between showing the parameter name and the system calibration factor used for system calibration of the load indication, as follows:

If manual inspection/change of the system calibration is necessary the system calibration factor can be viewed/changed using the **CAL.F.** parameter. The system calibration factor is changed whenever a new system calibration is performed using the **CAL.** parameter and should be noted so that it is possible to re-establish the system calibration.

The ↑ , ↓ and ↵ keys can be used to change/adjust the system calibration factor.

The calibration factor lays in the interval 104858 to 943718 with 524288 as the standard calibration factor (corresponding to no calibration). If the calibration factor is changed 1% (up or down), the load indication will also change 1% (up or down). By changing the calibration factor within the stated interval

it is possible to change the load indication with ±80%. The procedure for calibration is described above.

3.15 Cor.FAc. (rESEt) parameter

When the **Cor.FAc.** parameter is selected the LED display toggle between showing the parameter name and the reset text, as follows:

The **Cor.FAc.** parameter can be used to reset the corner calibration to their default values (set all the corner calibration factors to 524288).

The ↑ , ↓ and ↵ keys can if necessary be used to request a reset of the corner calibration factors to their standard values.

NOTE: A request of reset of corner calibration factors is performed (as described earlier) by pressing and holding down the ↵ key followed by activation of either the ↑ or the ↓ key.

3.16 Cor.rEg. (cLEAr) parameter

When the **Cor.rEg.** parameter is selected the LED display toggle between showing the parameter name and the clear text, as follows:

The **Cor.rEg.** parameter can be used to clear all registered corner loads and thereby restarting a corner calibration procedure.

The ↑ , ↓ and ↵ keys can if necessary be used to request a clear of the registered corner loads.

NOTE: A request of clear of registered corner loads is performed (as described earlier) by pressing and holding down the ↵ key followed by activation of either the ↑ or the ↓ key.

3.17 C.rEg. X parameter

When the **C.rEg. X** parameters are selected the LED display toggle between showing the parameter name and the registered corner load for the selected corner, as follows:

The **Cor.rEg. 0** to the **Cor.rEg. 3** parameter can be used to show the registered corner load for a given load placed above a given corner. The parameters are also used to register these values. If a load has NOT yet been registered for a given corner, then "**------**" will be shown instead of a value as indicated above.

The ↵ key can be used to register a load placed above a given corner.

NOTE: When a corner value is registered by pressing the ↵ key, the 5429 system will automatically detect above which corner the load was placed, and update the proper **C.rEg. X** parameter accordingly.

NOTE: When registering corner loads, the same load should be moved from corner to corner, and registered one corner at a time.

3.18 Cor.CAL. (StArt) parameter

When the **Cor.CAL.** parameter is selected the LED display toggle between showing the parameter name and the start text, as follows:

Once a load value has been registered for ALL corners using the **C.rEg. X** parameters, then the **Cor.CAL.** parameter can be used to request the actual corner calibration.

The ↑ , ↓ and ↵ keys can if necessary be used to perform a needed corner calibration request.

NOTE: A corner calibration request is performed (as described earlier) by pressing and holding down the ↵ key followed by activation of either the ↑ or the ↓ key.

The complete corner calibration procedure for corner calibration is described below.

3.18.1 Performing a corner calibration

If necessary, it is possible to perform a corner calibration from the **Cor.CAL.** parameter by performing the following corner calibration procedure:

- Ensure the weighing scale is empty and clean.
- Use the **ZEro** parameter to zero the load indication if necessary.
- If necessary use the **Cor.rEg.** parameter to clear the registered corner values (restart the corner calibration).
- Place the used calibration load directly above one of the loadcells/corners.
- Select one of the **C.rEg. X** parameters.
- Perform the sampling/registration of the loadcell/corner in question by pressing the ↵ key. The 5429 system will automatically detect above which loadcell/corner the load is actually placed and register the corresponding signal. The 5429 system automatically switches to showing the

registered value by switching to the proper **C.rEg. X** parameter where the registered value is now shown instead of "**------**".

- Ensure the corner for which the value is registered corresponds to the corner/loadcell where the load was placed.
- Remove the calibration load. Zero the load indication if necessary by using the **ZEro** parameter before the load is placed above a new loadcell/corner.
- Repeat the registration process for each loadcell/corner in the 5429 system as the calibration load is moved to a new loadcell/corner each time. It is important that the registration process is performed for every loadcell/corner in the system. When all loadcells/corners are registered all **C.rEg. X** parameters should indicate a value instead of "**------**".
- The corner calibration procedure can be restarted at any given time by using the **Cor.rEg.** parameter to clear the registered corner loads.
- Once all loadcells/corners have been sampled/registered the corner calibration itself can be performed. This is done by selecting the **Cor.CAL.** parameter, and to request the corner calibration the ↵ key is now pressed and held down followed by activation of either the ↑ or the ↓ key. **IMPORTANT:** Until this is done the corner calibration is **NOT** performed and the corner calibration factors will remain unchanged.
- Following the corner calibration it should be verified that the corner calibration factors are reasonable values. It should also be checked that identical load indications are achieved when the calibration load is placed above each of the loadcells/corners.

NOTE: The calibration load from the **CAL.L.** parameter is NOT used during corner calibration. Instead the corner calibration procedure will result in a load indication of approximately the average value of the registered loadcell/corner values.
NOTE: Corner calibration should be performed prior to system calibration described previously. Following a corner calibration a system calibration should therefore be performed.

3.19 Cor. X parameter

When the **Cor. X** parameter is selected the LED display toggle between showing the parameter name and the corner calibration factor for the selected loadcell/corner, as follows:

If manual inspection/change of the corner calibration is necessary the corner calibration factors for each loadcell (0-x) can be viewed/changed using the **Cor. X** parameters. The corner calibration factors are changed whenever a new corner calibration is performed using the **Cor.CAL.** parameter and they should be noted so that it is possible to re-establish the corner calibration.

The ↑ , ↓ and ↵ keys can be used to change/adjust the corner calibration factors.

The corner calibration factors work in the same way as the system calibration factor, but on the individual signals form the individual loadcells/corners.

The calibration factor lays in the interval 104858 to 943718 with 524288 as the standard calibration factor (corresponding to no calibration). If the calibration factor is changed 1% (up or down), the load signal will also change 1% (up or down). By changing the calibration factor within the stated interval it is possible to change the load signal with ±80%. The procedure for corner calibration is described above.

3.20 Int.PEr. parameter

When the **Int.PEr.** parameter is selected the LED display toggle between showing the parameter name and the integration period, as follows:

The integration period (measurement time) is the interval between each update of the load indication and must be specified in the **Int.PEr.** parameter during installation.

The ↑ , ↓ and ↵ keys can be used to change/adjust the integration period.

The integration period 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.

NOTE: A good initial starting value is 100 ms

3.21 Sample and Display filters

Two types of filters can be applied. A sample filter on each sampling from the loadcells and/or a display filter on each display load update. The sample filter is selected using the **F.SA.no.** parameter, and the display filter is selected using the **F.di.no.** parameter.

When the **F.SA.no.** parameter is selected the LED display toggle between showing the parameter name and the sample filter number (0-15), as follows:

When the **F.di.no.** parameter is selected the LED display toggle between showing the parameter name and the display filter number (0-15), as follows:

The ↑ , ↓ and ↵ keys can be used to change/adjust both the sample filter number and the display filter number.

The sampling frequency depends on the types and number of loadcells and the display update rate for the load indication, as described below in the appendix section. The update rate for the load indication (integration period) is selected in the **Int.PEr.** parameter as described above.

The filter selections list will indicate the possible filter taps and damping; the filter frequency depends on the sampling/update rate. Please see below in the appendix section for details on filter specifications using the filter number as reference.

NOTE: A filter number of 0 indicates that the corresponding filter is NOT enabled.

3.22 An.SP. parameter

When the **An.SP.** parameter is selected the LED display toggle between showing the parameter name and the analog setpoint used for scaling the analog output signal, as follows:

The analog setpoint used to indicate the load resulting in full scale signal must be set using the **An.SP.** parameter during installation. The analog setpoint is shown in the same unit and resolution as the **LoAd** parameter.

The ↑ , ↓ and ↵ keys can be used to change/adjust the analog setpoint.

NOTE: A good initial value for the analog setpoint could be the total capacity of all the loadcells connected to the 5429 system.

3.23 An.Err. parameter

When the **An.Err.** parameter is selected the LED display toggle between showing the parameter name and the analog error value used during error situations, as follows:

The analog error value used to control the analog output during error situations must be set using the **An.Err.** parameter during installation.

The ↑ , ↓ and ↵ keys can be used to change/adjust the analog error value.

NOTE: A good initial value for the analog error value is 65535.

3.24 An.tESt parameter

When the **An.tESt** parameter is selected the LED display toggle between showing the parameter name and the status of the analog test parameter, as follows:

The analog test parameter can be used to enable an analog test mode for testing the analog output signal. If test mode is enabled the value controlling the analog output normally determined by the load on the loadcells can be overwritten by a manually selected value.

The [↑] , [↓] and [↵] keys can be used to enable the analog test mode and change the value controlling the analog output.

Once the **An.tESt** parameter is selected the display will show "**OFF**" indicating that the analog test mode is disabled. To enable the analog test mode the [↵] key must be pressed. When the analog test mode is enabled, the display will instead show an analog test value that is sent out on the analog output. **NOTE** that this value overrides the normal analog output signal (based on the actual load indication) for as long as the analog test mode is enabled.

When the analog test mode is enabled, it is possible to change the analog test value by using the [↑] or [↓] key. Thus it is possible to set 21 different predetermined values from 0 to 65535.

The analog test mode is disabled by pressing the [Esc] key when still in **An.tESt** parameter. The analog test mode is also automatically disabled once the **An.tESt** parameter is left by pressing the [F] key. Once the analog test mode is disabled, the analog output signal will again be controlled by the actual load indication.

3.25 OutPut parameter

When the **OutPut** parameter is selected the LED display toggle between showing the parameter name and the current analog output value controlled by the load indication, as follows:

The analog output value shown in the **OutPut** parameter is an internal value used by the 5429 to control the analog output.

The [F] and [Esc] keys can be used to switch to other parameters.

4) Hardware description

The following describes the main external and internal hardware features of the 5429 ASG module. This includes connection of power, connection of loadcells, various connectors, lamps (LEDs) and switches.

4.1 Front view

4.2 Connection of power

The 5429 system is powered by +24VDC which is connected to the **Power** connector (J6). This powers the entire digital system including the connected loadcell(s), but this does **NOT** power the entire analog section.

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

IMPORTANT: A part of the analog section is supplied by an external 6V power supply as specified in the description of the ASG connector (J2).

4.3 Loadcell connection

Loadcells (system 4000) are connected to the 5429 system directly through the loadcell connectors (J1, J11, J3 and J12) marked **LC1** to **LC4** as follows:

- the center wire of the coax cables is connected to the left terminal of the connectors (J1.1 , J11.1 , J3.1 and J12.1).
- the shield of the coax cables is connected to the right terminal of the connectors marked with a GND symbol (J1.2 , J11.2 , J3.2 and J12.2).

4.4 Digital I/O connector

The **I/O** connector (J9) can be used for connecting a digital input or output signal to the 5429 system. This connector has the following pin out and labels:

J9 pin	FUNCTION
1	**I/O** INPUT: **ZERO** (Zero the load reading)
2	**+24V OUT** +24VDC
3	**GND** Gnd

4.5 ASG connector

The ASG connector (J2) is used for interfacing the 5429 system with an analog system normally used for Analog Strain Gage loadcells. This connector has the following pin out and labels:

J2 pin	FUNCTION
1	**AGND** Analog ground.
2	**SEN+** Sense (+) output signal to the ASG system.
3	**SEN-** Sense (-) output signal to the ASG system.
4	**SIG+** Analog output signal (+) to the ASG system. Represents actual load on LCs.
5	**SIG-** Analog output signal (-) to the ASG system. Represents actual load on LCs.
6	**EXC+** Excite supply voltage (+) from the ASG system. See requirements below.
7	**EXC-** Excite supply voltage (-) from the ASG system. See requirements below.

IMPORTANT: The 5429 ASG module is configured, so the external supply voltage applied between the **EXC+** and **EXC-** terminals of the ASG connector (J2) MUST be 6,00V +- 10%.

4.6 Ethernet connector

The **Ethernet** connector (J4) is a standard RJ45/Cat5 Ethernet connector that can be used to connect the 5429 system to Ethernet. With the software version covered in this manual no Ethernet functionality has been implemented.

4.7 Light Emitting Diodes (LEDs)

The 5429 system is equipped with a number of lamps (LEDs). These lamps have the following functionality:

LED	FUNCTION
D7 (Green)	**Power** Power is applied.
D1 (Green)	**TxLC** 5429 is communicating with the loadcells.
D4 (Yellow)	**D1** A key is activated or data entry is in progress.
D28 *(Green)*	***D2*** *Reserved for future use.*
D9 (Red)	**LC1** Loadcell is disconnected or error detected for a configured loadcell.
D14 (Red)	**LC2** Loadcell is disconnected or error detected for a configured loadcell.
D18 (Red)	**LC3** Loadcell is disconnected or error detected for a configured loadcell.
D27 (Red)	**LC4** Loadcell is disconnected or error detected for a configured loadcell.
D20 (Red)	**AN.ERR** An error has been detected on the analog output.
D17 (Green)	TX line (LC) (Internal LED) Status of the transmit line to the loadcells.
D19 (Yellow)	RX line (LC) (Internal LED) Status of the receive line from the loadcells.

4.8 DIP-switch settings

The 5429 system is equipped with a 4 pole DIP-switch block (**SW3**). The switches are only read during power-on, and have the following functionality:

SWITCH	FUNCTION
Sw3.1-Sw3.4	*Reserved for future use.*

4.9 Jumper settings

The 5429 system is equipped with a number of internal jumpers. These jumpers have the following functionality:

JUMPER	FUNCTION
JP11	**Reset** The jumper allows reset of the on-board microcontroller. OFF: Normal operation (normal setting from factory) ON: Reset of the 5429 on-board microcontroller
JP12	**BOOT Load** The jumper is used when downloading new software to the 5429 system using the J8 serial connector. OFF: Normal power-up/operation (normal setting from factory) ON: Download operation possible (see download description)

4.10 JTAG connector

The 8 pin JTAG connector (J5) allows connection of a PC to the 5429 system by use of proper hardware/software tools. This allows for download of program and debugging during development. This connector is reserved for use by Eilersen Electric only. The connector has the following pin out:

J5 pin	FUNCTION
1	**GND**
2	**3V3**
3	**JNRST**
4	**JTDI**
5	**JTMS**
6	**JTCK**
7	**JTDO**
8	**/RESET**

4.11 Serial BOOT load connector

The 5 pin serial connector (J8) can be used for download of new program to the 5429 system by use of a special serial cable supplied by Eilersen Electric A/S. The serial connector can also be used for test purposes by Eilersen Electric. This connector has the following pin-out:

J8 pin	FUNCTION
1	**GND**
2	**3V3**
3	**UART1-Rx**
4	**UART1-Tx**
5	**BOOT_EXT**

5) Appendices

5.1 Appendix A: 5429 Installation checklist

ACTION	PARAMETERS
1. Check electrical connections	Power, loadcells, digital I/O, analog interface and DIP switch settings.
2. Apply power and check software ID	Check software indication during power up sequence matches program name on front page. Check that the green **Power** lamp is ON.
3. Unlock parameters	Enter the correct password in the **PASS** parameter.
4. Configure loadcells used	Enter the correct number of connected loadcells in the **Lc.no.** parameter. Enter the correct number of supporting points in the **SuP.no.** parameter.
5. Power off/on and check loadcells	Check that the green **TxLC** lamp is ON. Verify that all **LC1** to **LC4** lamps end up turning OFF. Verify all loadcells found are without error indications in the **LC. 0** to **LC. X** parameters.
6. Unlock parameters once again	Enter the correct password in the **PASS** parameter.
7. Configure the weighing range	Depending on the used loadcells configure the weighing range unit in the **n.unit.** parameter. Depending on the used loadcells configure the weighing range dpno in the **n.dpno** parameter. Depending on the used loadcells configure the weighing range division in the **n.div** parameter. Depending on the used loadcells configure the weighing range minimum weight in the **n.UL.** parameter. Depending on the used loadcells configure the weighing range maximum weight in the **n.OL.** parameter.
8. Check system calibration factor	Check the system calibration factor is initially set to 524288 in the **CAL.F.** parameter.
9. Check corner calibration factors	Check the corner calibration factors are initially set to 524288 in the **Cor. 0** to **Cor. 3** parameters.
10. Configure display and filtering	Enter the desired integration period (measurement time in ms) in the **int.PEr.** parameter. Enter the desired sample filter number in the **F.SA.no.** parameter. (default: 0 = No filter) Enter the desired display filter number in the **F.di.no.** parameter. (default: 0 = No filter)
11. Configure the analog output	Use the **An.SP.** parameter to indicate the load for full-scale signal (normally the total loadcell capacity). Use the **An.Err.** parameter to indicate the value set on the analog output during errors (normally 65535). Optionally use the **An.tESt** parameter to check the analog connection to the ASG system. Check that the red **AN.ERR** lamp is OFF.
12. Perform zero	Perform a zero with no load on weighing arrangement using the **ZEro** parameter or the ZERO input.
13. Perform load check (5429)	Verify the load indication with a known load using the **LoAd** parameter.
14. Perform load check (ASG system)	Verify the load indication on the J2 connector is transferred correctly to the ASG system.
15. Corner calibration? (Optional)	Perform a corner calibration on the 5429 if desired/needed. Note corner calibration factors.
16. Perform system calibration? (Optional)	Perform a system (span) calibration if desired/needed. Note system calibration factor.
17. Perform final load check (Optional)	If necessary verify the load indication in the **LoAd** parameter is ok using a known load. If necessary verify the load indication is transferred correctly to the ASG system using a known load.
18. Lock parameters	Lock parameter change by setting the password in the **PASS** parameter to 0.

5.2 Appendix B: 5429 Parameter list

This application (5429.Std.150220.1v0) contains the following parameters:

PARAMETER	DESCRIPTION
LoAd	Display current load on loadcells.
PASS	Display/Change password for unlocking/locking data entry.
ZEro	Request zero of current load indication.
Lc.no.	Display/Change number of loadcells connected.
SuP.no.	Display/Change number of supporting corners.
LC.0 - LC.3	Display individual loadcell signals/status for connected loadcells.
n.unit	Display/Change weighing range unit (Kg, Gram, Lbs).
n.dPno	Display/Change weighing range dpno (digits after decimal point).
n.div	Display/Change weighing range division.
n.UL.	Display/Change weighing range minimum weight (UL indication).
n.OL.	Display/Change weighing range maximum weight (OL indication).
CAL.L.	Display/Change calibration load used.
CAL.	Perform system calibration.
CAL.F.	Display/Change system calibration factor (default is 524288).
Cor.FAc.	Reset all corner calibration factors to 524288.
Cor.rEg.	Clear all reigstered corner values (restart reg. process).
C.rEg.0 - C.rEg.3	Show corner registered values for the connected loadcells.
Cor.CAL.	Perform corner calibration.
Cor.0 - Cor.3	Display/Change corner calibration factors for the loadcells.
Int.PEr.	Display/Change integration period (measurement time in ms).
F.SA.no.	Display/Change sample filter number (0-15).
F.di.no.	Display/Change display filter number (0-15).
An.SP.	Display/Change analog setpoint for full analog output signal.
An.Err.	Display/Change analog output value during error (0-65535).
An.tESt	Enter analog test mode and output different test values (0-65535).
OutPut	Display current analog output signal (0-65535).

5.3 Appendix C: 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 **int.PEr.** , **F.SA.no.** and **F.di.no.** parameters as described above.

All filters are FIR filters with 7-100 taps.

5.3.1 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 communication 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)				
No.	Taps	Damping					
0	-	-	No filter enabled				
1	7	-60dB	120 Hz 14 ms	48 Hz 35 ms	24 Hz 70 ms	16 Hz 105 ms	12 Hz 140 ms
2	9	-60dB	100 Hz 18 ms	40 Hz 45 ms	20 Hz 90 ms	13 Hz 135 ms	10 Hz 180 ms
3	9	-80dB	120 Hz 18ms	48 Hz 45ms	24 Hz 90ms	16 Hz 135ms	12 Hz 180ms
4	12	-60dB	80 Hz 24 ms	32 Hz 60 ms	16 Hz 120 ms	11 Hz 180 ms	8 Hz 240 ms
5	12	-80dB	100 Hz 24 ms	40 Hz 60 ms	20 Hz 120 ms	13 Hz 180 ms	10 Hz 240 ms
6	15	-80dB	80 Hz 30 ms	32 Hz 75 ms	16 Hz 150 ms	11 Hz 225 ms	8 Hz 300 ms
7	17	-60dB	60 Hz 34 ms	24 Hz 85 ms	12 Hz 170 ms	8 Hz 255 ms	6 Hz 340 ms
8	21	-80dB	60 Hz 42 ms	24 Hz 105 ms	12 Hz 210 ms	8 Hz 315 ms	6 Hz 420 ms
9	25	-60dB	40 Hz 50 ms	16 Hz 125 ms	8 Hz 250 ms	5 Hz 375 ms	4 Hz 500 ms
10	32	-80dB	40 Hz 64 ms	16 Hz 160 ms	8 Hz 320 ms	5 Hz 480 ms	4 Hz 640 ms
11	50	-60dB	20 Hz 100 ms	8 Hz 250 ms	4 Hz 500 ms	2,7 Hz 750 ms	2 Hz 1000 ms
12	64	-80dB	20 Hz 128 ms	8 Hz 320 ms	4 Hz 640 ms	2,7 Hz 960 ms	2 Hz 1280 ms
13	67	-60dB	15 Hz 134 ms	6 Hz 335 ms	3 Hz 670 ms	2 Hz 1005 ms	1,5 Hz 1340 ms
14	85	-80dB	15 Hz 170 ms	6 Hz 425 ms	3 Hz 850 ms	2 Hz 1275 ms	1,5 Hz 1700 ms
15	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.

5.3.2 Display filter

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			
No.	Taps	Damping				
0	-	-	No filter enabled			
1	7	-60dB	12 Hz 140 ms	2,4 Hz 700 ms	1,2 Hz 1,4 s	0,6 Hz 2,8s
2	9	-60dB	10 Hz 180 ms	2,0 Hz 900 ms	1,0 Hz 1,8 s	0,5 Hz 3,6 s
3	9	-80dB	12 Hz 180 ms	2,4 Hz 900 ms	1,2 Hz 1,8 s	0,6 Hz 3,6 s
4	12	-60dB	8 Hz 240 ms	1,6 Hz 1,2 s	0,8 Hz 2,4 s	0,4 Hz 4,8 s
5	12	-80dB	10 Hz 240 ms	2,0 Hz 1,2 s	1,0 Hz 2,4 s	0,5 Hz 4,8 s
6	15	-80dB	8 Hz 300 ms	1,6 Hz 1,5 s	0,8 Hz 3 s	0,4 Hz 6 s
7	17	-60dB	6 Hz 340 ms	1,2 Hz 1,7 s	0,6 Hz 3,4 s	0,3 Hz 6,8 s
8	21	-80dB	6 Hz 420 ms	1,2 Hz 2,1 s	0,6 Hz 4,2 s	0,3 Hz 8,4 s
9	25	-60dB	4 Hz 500 ms	0,8 Hz 2,5 s	0,4 Hz 5 s	0,2 Hz 10 s
10	32	-80dB	4 Hz 640 ms	0,8 Hz 3,2 s	0,4 Hz 6,4 s	0,2 Hz 12,8 s
11	50	-60dB	2 Hz 1,0s	0,4 Hz 5 s	0,2 Hz 10 s	0,1 Hz 20 s
12	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
13	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
14	85	-80dB	1,5 Hz 1,70 s	0,3 Hz 8,5 s	0,15 Hz 17 s	0,075 Hz 34 s
15	100	-60dB	1 Hz 2,0 s	0,2 Hz 10 s	0,1 Hz 20 s	0,05 Hz 40 s

5.4 Appendix D: Status codes

Status codes can be shown as a 4 digit hex number ("**-XXXX-**") instead of the actual load indication in the **LoAd** , **ZEro** , **LC. X** and **CAL.** parameters. If more than one of the status conditions listed below is present, the status codes are OR'ed together.

CODE (Hex)	CAUSE
0001	*Reserved for future use*
0002	*Reserved for future use*
0004	*Reserved for future use*
0008	*Reserved for future use*
0010	**Power failure** Supply voltage to loadcells is too low.
0020	*Reserved for future use*
0040	*Reserved for future use*
0080	**No answer from loadcell** No data is received from the loadcell. This can be caused by the removal of a loadcell or that the connection between loadcell and 5429 is broken.
0100	*Reserved for future use*
0200	*Reserved for future use*
0400	*Reserved for future use*
0800	**No answer from loadcells** No loadcells connected or bad connection between 5429 and all loadcells.
1000	*Reserved for future use*
2000	*Reserved for future use*
4000	*Reserved for future use*
8000	**Wrong number of loadcells** The expected number of loadcells found during power-on does not match the number indicated by the **Lc.no.** parameter. If the **Lc.no.** parameter setting is correct, all the loadcell connections must be examined.