

WEIGHING SYSTEM

PD 4000 / PD 3230

**Pattern approved
non-automatic
weighing system**

Manual

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1. Pattern approved weighing system.

The pattern approved weighing system is a module constructed system, following the specifications for metrological and technical requirements for non-automatic weighing systems, described in the European Standard EN 45501.

The weighing system consists of several self-contained weighing modules, Weight Transmitters, "PD3230 Weight Transmitter" or "PD1435 Weight Transmitter" mounted in separate boxes and several separate indication units, "PD4000 Weight Display." The Weight Displays may also be mounted in separate boxes. Only PD 3230 Weight Transmitter is mentioned below, but the manual is also valid for the PD 1435 Weight Transmitter.

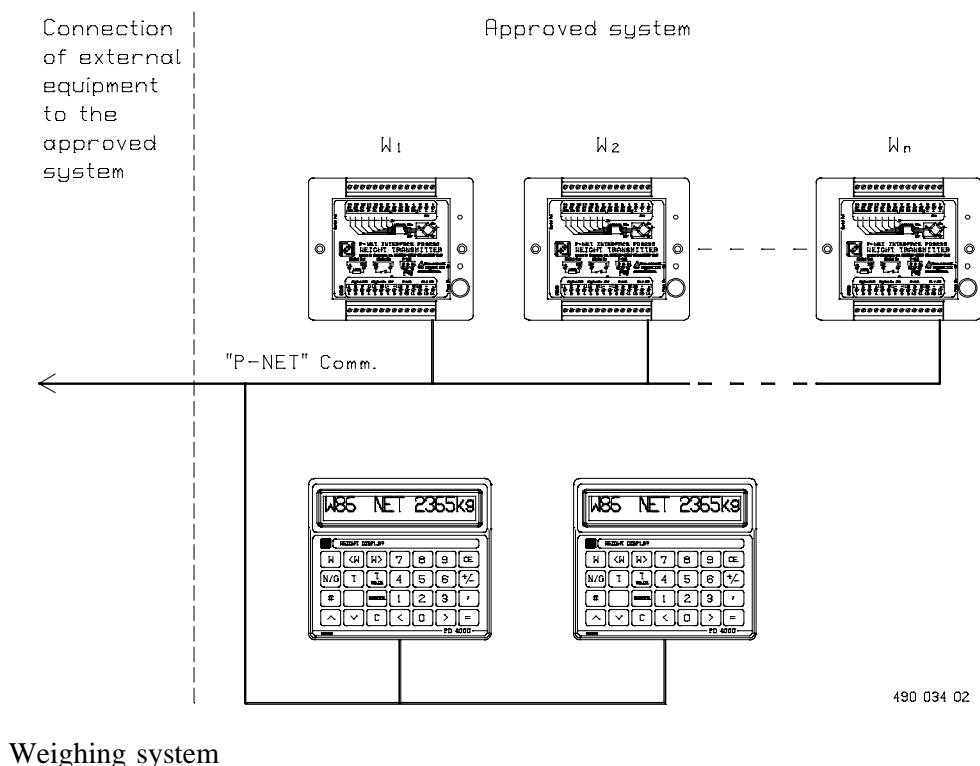
Up to a total of 99 Weight Transmitters and up to 32 Weight Displays may be connected in an approved system. The total number of units must not exceed 125.

Each Weight Display is connected to the Weight Transmitters in a P-NET Fieldbus system.

The communication between the weighing modules and the indication units is performed via the P-NET. Up to 125 master and slave units may be connected to the bus, where a unit may be a PD3230 Weight Transmitter, a PD4000 Weight Display or another P-NET module.

In this system the Weight Transmitter serves as a slave, which converts the input signal from the connected load cells into scaled engineering units (SI units). The display unit serves as a master, which gather and display the data from the connected weighing modules.

A typical weighing system is shown below.



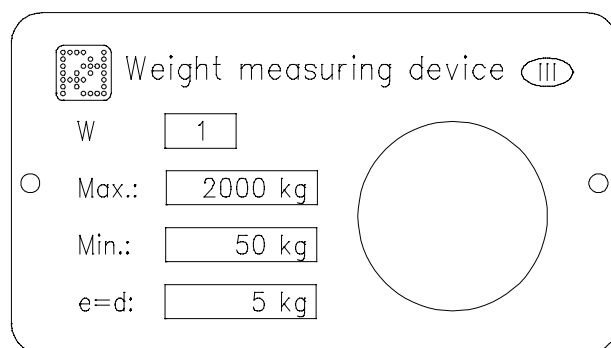
490 034 02

The pattern approval for the system concerns a non-automatic weighing system of class III/III, with up to 3000 scale intervals.

On the sketch on page 1 is shown a possibility of connecting external equipment to the system. The external equipment, which may be connected are not included in the approved system.

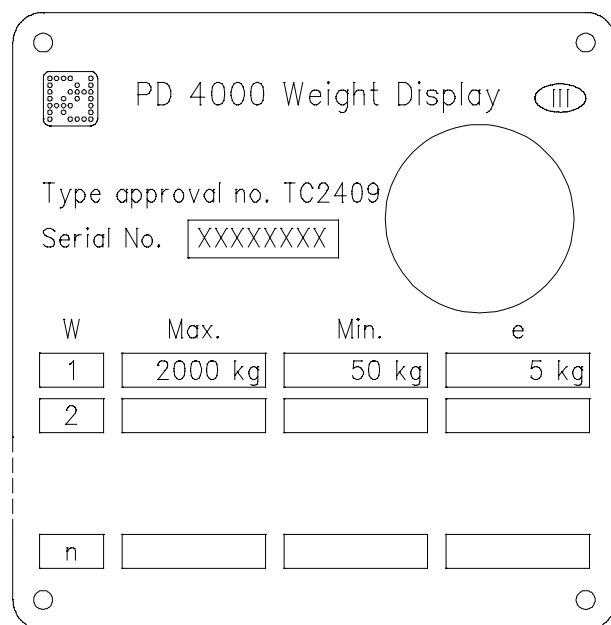
Connecting external equipment to the approved system makes it possible to collect data from the weighing modules. The data are collected via P-NET. The system ensures that the data in the Weight Transmitters and the Weight Displays are not influenced.

All weighing instruments, Weight Transmitters and Weight Displays, are marked with a weight number. The number is used at request from the indication unit.



400 260 03

Example of data plate, measuring device. Scale 1:1.



400 271 02

Example of data plate, Weight Display. Scale 1:1.

2. System description.

The Weight Display unit is based on a PD 4000 P-NET Controller, which is designed as a control computing and display element. The Controller is completely sealed, and is therefore suitable for use in any industrial environment. The compact design and the outstanding environmental specifications for the Controller, makes it exceptional for many applications.

2.1. Display.

The display is a fast graphics LCD, using Supertwist technology, providing wide viewing angle. The display has a resolution of 150 by 20 pixels, enabling a variety of character fonts and graphics to be used, e.g. 3 lines with 25 characters each. The viewing area is 120mm * 19.2mm. A LED backlight is incorporated. The display is covered by non-reflecting glass.

2.2. Keyboard.

The keyboard is a membrane click-switch foil, with metal domes. The keyboard has 28 available keys. The unique design includes a self adhesive keyboard foil with the key functions adapted to the Weight Display application. This ensures an ideal operator/instrumentation interface.

2.3. Real Time Clock.

The Weight Display is equipped with a real time clock with battery back-up. It is configured for 24 hour format and enables the display and recording of real time, in seconds, minutes, hours, days, months and years.

2.4. Memory.

The program memory is a flash EPROM of 128K bytes, and a 64K bytes boot EPROM. The data memory is CMOS RAM 128K bytes with battery back-up. The program in flash memory in the display unit is protected against undesirable overwriting, by means of a switch. If the switch is in position ON, writing is possible. The system configuration data are stored in battery backed-up memory and may be protected from any modification by means of a systemlock.

2.5. Communication interface.

The Weight Display has a P-NET multi-master interface. P-NET is a RS-485 Serial interface used for communicating with P-NET interface modules with a transmission speed of 76,800 baud. Data exchange between the Weight Display and the connected weighing modules is performed via the P-NET.

2.6. The Weight Transmitter.

The PD 3230 Weight Transmitter is a self-contained weighing module mounted in a separate box. The Weight Transmitter must be connected directly to the load cells. As an option for parallel connection of load cells to a Weight Transmitter, the PD810 Cable Junction Box may be used. For further information on the junction box please refer to the Weight Transmitter PD3230 Manual 502 063.

The weighing process is performed in the Weight Transmitter. The signal voltage from the connected load cells is continuously measured and converted into engineering units.

The calibration of the system, zeropoint adjustment, fullscale adjustment and saving of relevant verification data ("e," "max," "min"...) are stored in the Weight Transmitter. After sealing of the system, none of those data can be changed. The calibration and verification data will remain unchanged after a power failure.

The Weight Transmitter supervises the connection between the transmitter and the load cells, and registers possible errors internal in the Weight Transmitter. The Weight Display supervises the communication on the P-NET.

If an error occurs, an error code will be generated in the Weight Transmitter. Any reading from the Weight Transmitter contains the actual error status. If an error code is present in the Weight Transmitter, then an error message will be written in clear text in the bottom line of the display, i.e., "Overload in W: 01".

Only errors occurring in the Weight Transmitter, which is currently shown in the display, will be written on the display. If an error occurs in a Weight Transmitter, which is not currently displayed, the error text will not be displayed until the Weight Transmitter is selected.

The PD3230 Weight Transmitter interfaces with 2mV/V load cells that follows the specifications in the OIML R 60 recommendation.

The connected load cells are tested for overload. If the signal voltage from the load cells exceeds the maximum value (2 mV/V), a SignalHigh alarm will be generated in the Weight Transmitter.

The Weight Transmitter module has, besides the weight scale channel, a number of digital input/output channels. One of the input channels are reserved for a hardware protection of the calibrated data. The remaining digital channels can not be used in an approved non-automatic weighing system.

3. Installation.

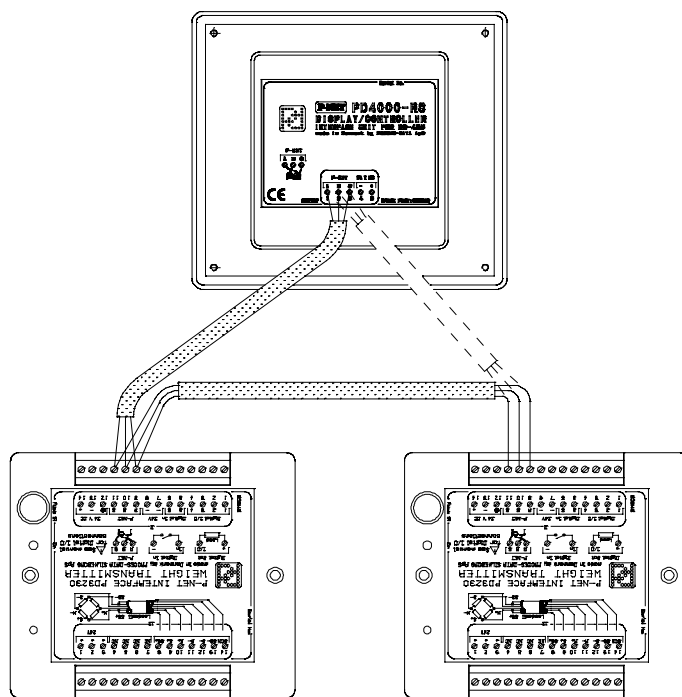
The P-NET is a multi drop bus, which is connected in a physical ring. Up to 125 units can be connected to the bus, where a unit may be a PD 3230 Weight Transmitter, a PD 4000 Controller or another P-NET interface module. The P-NET interface is galvanic isolated. The bus cable is a twisted pair with shield, and the shield is used as a potential equalizer between the driver/receiver circuits in the nodes connected to the bus.

A P-NET unit is connected to the bus by means of 3 terminal-connections, the A terminal, the B terminal and the S terminal.

The connection from one unit to the next unit is performed by connecting A to A, B to B and S to S. If the length of the cable is more than 100 m, the bus cable will have to be connected from field device to field device, forming a physical ring.

All modules, PD3230 Weight Transmitters and PD4000 Weight Displays must be supplied from a 24 V DC power supply. The connection of the power supply is shown clearly on the modules.

Refer to the Weight Transmitter PD3230 Manual 502 063, for connection of the load cells to the Weight Transmitter.



490 060 01

Wiring diagram for PD4000/PD3230

Electrical specification for P-NET:

- Bus structure: A physical ring without termination.
- Medium: Shielded twisted pair cable with minimum .22 mm² area conductors and characteristic impedance of 100-120 ohm. For example TWINAX IBM part No. 7362211 with 105 ±5 ohm, 51 pF/m.
- Bus length: Max 1200 m (EIA RS 485).

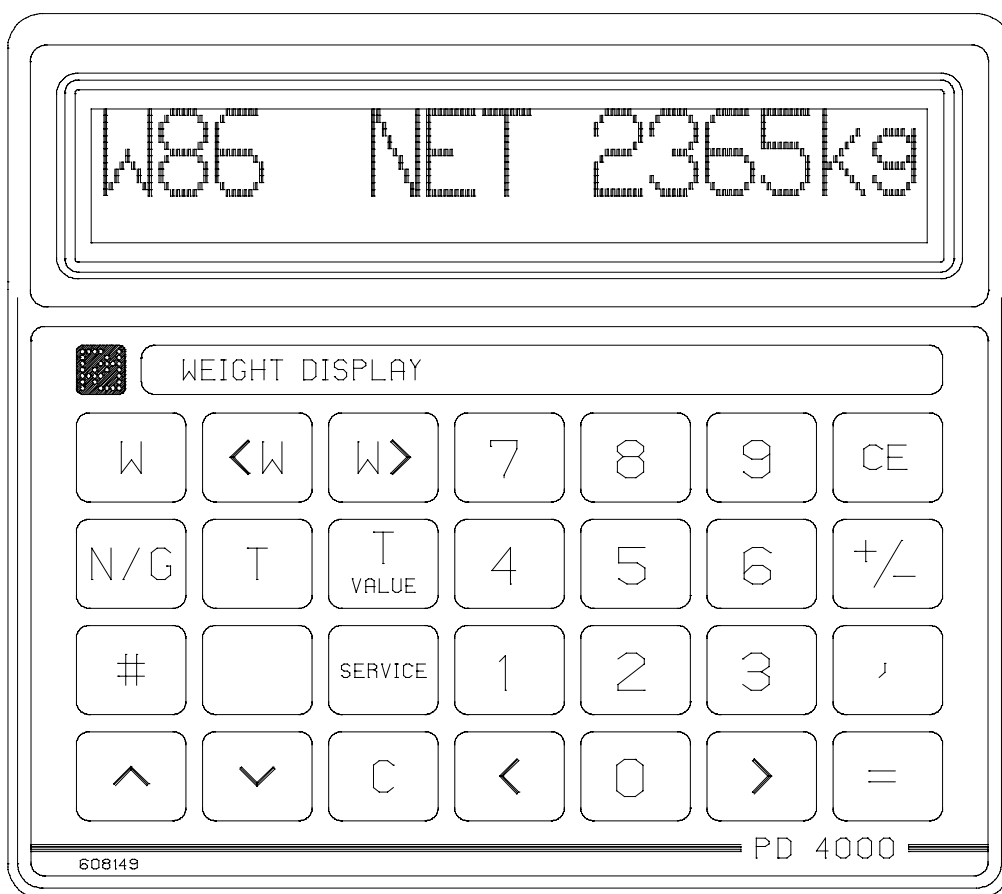
NOTE: You must configure the Weight Display to the right **node number** and **number of masters** after electrical installation and calibration. See further details on page 14.

4. Weight Display.

From the indication unit, the Weight Display, it is possible to display data from all the weighing modules connected to the system.

The keys on the Weight Display consists of some number keys and some function keys. The most important data from a Weight Transmitter may be selected and displayed by a single function key.

The configuration of the system, calibration of the weighing modules and entering verification data is performed via the SERVICE menu.



490 033 02

Weight Display, PD 4000

After switching on the power supply for the Weight Display, a display test is performed. The display is filled with black and the display below will flash. The test takes approx. 15 sec.



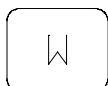
4.1. Main functions.

The main data from a Weight Transmitter data are Gross weight, Net weight and Tare. These data may be selected and displayed by a single function key.

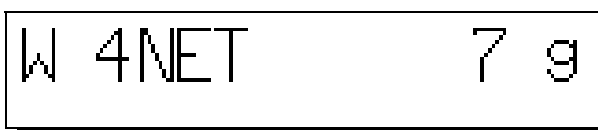
Pressing the "<W" or "W>" keys lead to displaying data from the preceding or the subsequent of the connected weighing modules.

It is possible to alternate between two weight indications: *Gross weight*. and *NET weight*. Gross weight always shows the actual load on the load cell, while NET weight has a possibility of tare.

WEIGHT



Pressing the W key will display the current *NET weight* or *Gross weight*. The N/G key alternates between displaying of Gross weight and NET weight.

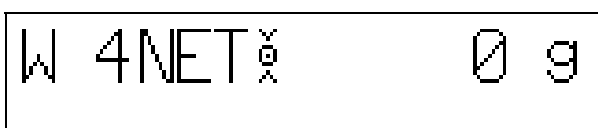


The selected weight number is shown in the upper left corner of the display.

If the displayed weight value is below the MIN value, but different from zero ($(W < -0,5e)$ or $(0,5e < W < \text{Min})$), then the text **Min** flashes on the bottom line of the weighing instrument.



If the displayed weight is zero ($-0,25e < W < 0,25e$), then a zero indication is displayed after the NET/Gross indication as shown below.



If several weighing modules are connected in the weighing system, a specific weighing module may be selected by keying in the weight number and the pressing the W key. The weight number must be in the range from 1 to 99.

If the selected weight number is out of range, the following text will appear in the bottom line: "W xxx invalid", where xxx is the keyed in number.

If the selected weight number is not installed in the weighing system configuration, the following text will appear in the bottom line: "W xxx not found in system", where xxx is the keyed in number.

Preceding WEIGHT



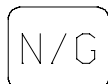
Pressing the "<W" key selects the Weight Transmitter with the nearest, lower weight number to be shown in the display. Only the Weight Transmitters which are included in the approved system can be displayed.

Subsequent WEIGHT

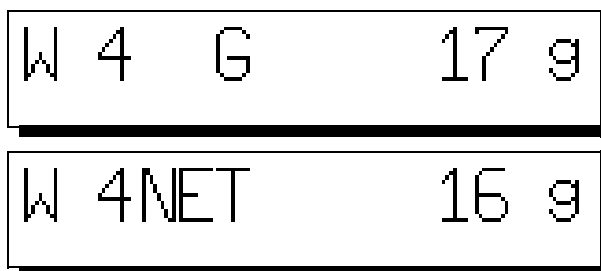


Pressing the "W>" key selects the Weight Transmitter with the nearest, higher weight number to be shown in the display. Only the Weight Transmitters which are included in the approved system can be displayed.

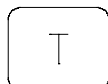
NET / Gross WEIGHT



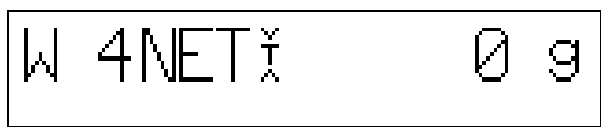
Pressing this key alternates displaying of *Gross weight* or *NET weight*.



TARE



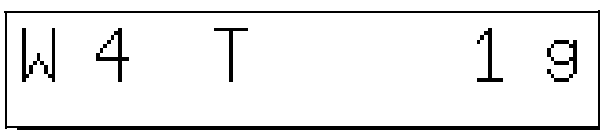
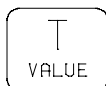
The selected Weight Transmitter may be tared by pressing the T key. It is only possible to perform a tare on the weight reading if NET weight is shown in the display.



Tare of the NET weight is made internally in the display unit. When making a Tare, the old tare value is overwritten. The weight system must be in equilibrium for at least 5 seconds before it is possible to perform a tare.

A **T** is displayed for 0.5 sec. when a tare is performed. The **T** is displayed after the NET indication as shown above.

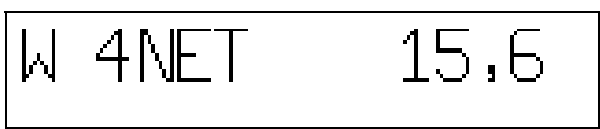
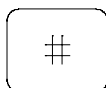
TARE VALUE



When pressing the "T VALUE" key, the current tare value will be displayed for the selected Weight Transmitter.

The tare value may be cleared by holding the "T VALUE" key and following press the "C" key.

#



While pressing the "#" key, the *NET weight* or the *Gross weight* will be shown with an extra digit (a scale interval smaller than **e**). The unit for weight is not shown in this menu.

C



The "C" key is a key with various function, depending on the screen or menu in which it is activated.

The tare value may be cleared by holding the "T VALUE" key and following press the "C" key.

If the "C" key is pressed in the SERVICE menu, the previous menu is selected.

4.2. Key functions for user input

Some of the keys are standard function keys, which are used when entering data in connection with configuration and calibration. The number keys, the sign key and the comma key are all standard keys. The remaining standard keys are explained in the following.

CLEAR ENTER.



The "CE" key is used to clear any user input value entered by means of the number keys. Pressing the "CE" key before the "ENTER" key will clear the input-data and display the previous data.

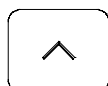
ENTER.



The "ENTER" key is used for entering user input-data to the Weight Display or the selected Weight Transmitter. The "ENTER" key is also used to select a sub-menu by first placing the cursor in the square field after the menu name and then press the ENTER key.

In some sub-menus in the SERVICE section it is possible to scroll between various configuration parameters by means of the "arrow up" and "arrow down" keys. The "ENTER" key is used to select the displayed configuration parameter.

Arrow Up



The "arrow up" key is only used in the SERVICE menus.

The "arrow up" key is a key with various function, depending on the sub-menu in the SERVICE section.

In some sub-menus it is possible to scroll between various configuration parameters. This is written on the display. The "ENTER" key is used to select the displayed configuration parameter.

In other menus the "arrow up" key is used to move the cursor one line upwards. If the cursor is at the top line, the cursor will swap around and continue from the bottom line.

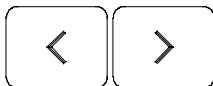
Arrow Down

The "arrow down" key is only used in the SERVICE menus.

The "arrow down" key is a key with various function, depending on the sub-menu in the SERVICE section.

In some sub-menus it is possible to scroll between various configuration parameters. This is written on the display. The "ENTER" key is used to select the displayed configuration parameter.

In other menus the "arrow down" key is used to move the cursor one line downwards. If the cursor is at the bottom line, the cursor will swap around and continue from the top line.

CURSOR left, CURSOR right.

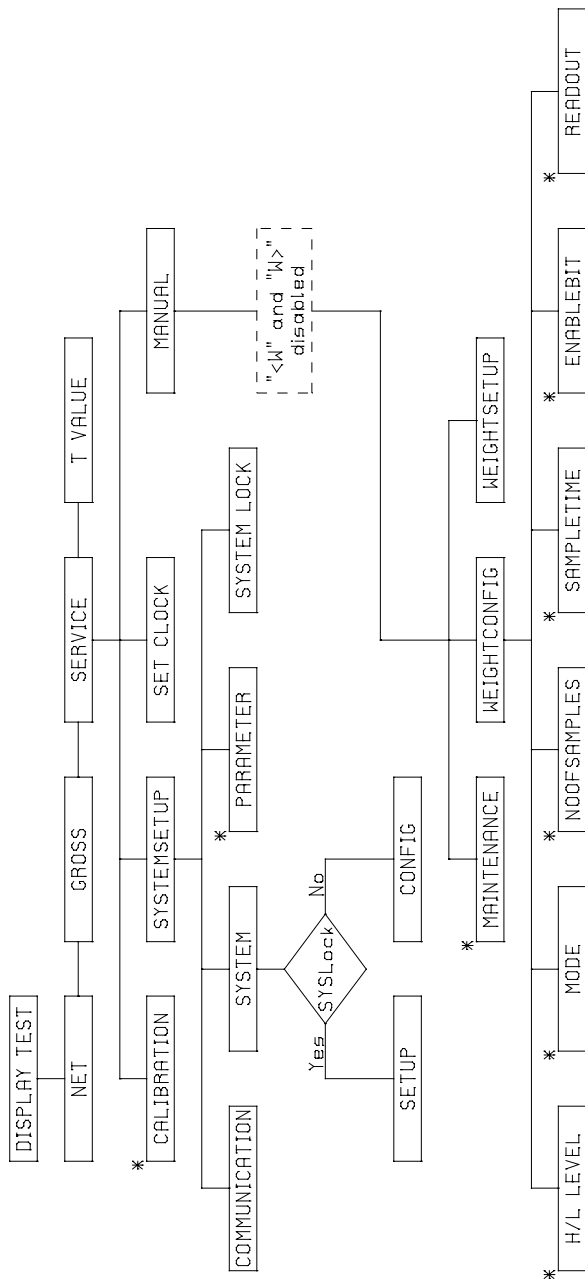
The cursor keys are only used in the SERVICE menus.

The cursor keys are used on the menus to move the cursor in the left direction and in the right direction. When the cursor is moved left and reaches the edge of the screen, the cursor will swap around and continue from the right side one line up. When the cursor is moved right and reaches the edge of the screen, the cursor will swap around and continue from the left side one line down.

The cursor will only be visible when it is possible to select a menu or to enter data.

4.3. Menu overview.

The figure below gives a schematic view of the available menus on the Weight Display.



400 261 02

4.4. Service menu.

Configuration and calibration of a Weight Transmitter and setting the time and date in the Weight Display is made in the 'SERVICE' menu. The 'SERVICE' menu holds a number of sub-menus, which may guide you through the setup.

The different displays are either selected directly by a single function key, or by selecting a main function and then pointing out various sub-menus.

The SERVICE sub-menu holds a number of sub-menus. When selecting a sub-menu, the cursor must be placed in the square field after the menu name and then the ENTER key must be pressed.

To enter new data during calibration, eg. a new 'e' value, the following must be done:

- 1 Place the cursor in the data field,
- 2 Key-in the data,
- 3 Press the ENTER key.

When keying in the new data, these input-data will be placed aligned left in the data field and the remaining part of the data field will be filled out with "*".

Pressing the "CE" key before the "ENTER" key will clear the input-data and display the previous data.

If the input-data are not entered by means of the ENTER key within 15 seconds, then these input-data are cleared and the previous data are displayed again.

To select between different configuration parameters, use the "arrow up" "arrow down" keys to scroll through the possibilities and press the ENTER key to select the displayed value.

At configuration of the weighing system, the coherent weight-, node- and serial number of all the connected weighing modules are stored in the display unit. This precaution protects the system against illegal modifications.

SERVICE



In the SERVICE menu it is possible to configure the connected weighing instruments and the display unit, to adjust the built-in real time clock and to calibrate the Weight Transmitters.

```

W 1  WEIGHT SERVICE MENU
SYSTEMSETUP:◻ SETCLOCK:◻
CALIBRATION:◻ MANUAL  :◻
  
```

4.4.1. Sub-menu SYSTEMSETUP

P-NET communication parameters, the configuration list of connected weighing modules, the verified data parameters and the systemlock are all set through the 'SYSTEM SETUP MENU'. The 'SYSTEM SETUP MENU' is shown below.

```

W 1      SYSTEM SETUP MENU
COMMUNIC. : SYSTEM      :
PARAMETER : SYST.LOCK:

```

COMMUNIC.

In this menu it is possible to set the node number of the display unit and the number of masters which may be connected to the system.

```

WEIGHT DISPLAY SETUP
NodeNo:03  NoOfMaster:05

```

The Weight Display operates as a master in the P-NET communication system. Therefore it is important that the rules for node numbers and number of masters are respected. That is, all units in a P-NET ring must have a unique node number and the value for "number of masters" must be equal in all the masters. If the Weight Display is connected to systems with existing masters then the Weight Display must be assigned an unused node number which was reserved for a master.

Example:

If a system exists with 2 masters with node number 2 and 4, and the value for "number of masters" is 5, then the Weight Display may get one of the node number 1, 3 or 5 and NoOfMaster (value for "number of masters") must be set to 5.

If no master node number is free for the Weight Display, then the other masters must increase their value for "number of masters", otherwise communication errors will occur.

After a master reset (see page 21) of the Weight Display, the node number is set to 127 (factory setting). This value is only used for test purposes and therefore it must be changed to the actual application. NoOfMaster, which is the value for "number of masters" is set to 0 (factory setting), which means that the Weight Display is NOT connected to the system as a master and consequently it is not able to read any values from the weighing modules.

Consequently, NodeNo and NoOfMaster must be changed to match the actual application as described above.

SYSTEM

This menu shows the system configuration, which holds the node numbers and the corresponding serial numbers for the weighing modules which are connected to the system.

The keys <W and W> may be used to scroll through the configuration list. If the systemlock is ON, only the connected Weight Transmitter are listed when scrolling. If the systemlock is OFF, scrolling is performed for the entire configuration list. The connected weighing modules are shown with node no. and serial number.

```
W12    SYSTEM SETUP MENU
NodeNo: 6 SerNo:9321612
```

PARAMETER

The verified data "Max", "Min" and "e" are set from this menu. The values are stored in the weighing transmitter and may be read from all connected display units. If the actual Weight Transmitter is sealed, then calibration will not be possible. A sub-menu is used to select the mass unit, "t", "kg" or "g".

- Max* This is the maximum weighing capacity, not taking into account the additive tare capacity (D_{max}).
- Min* Load values below this value are not approved and may be subject to an excessive relative error.
- e* This is the verification scale interval. The value is expressed in units of mass and is the difference between two consecutive indicated values on the Weight Display.

```
W65    VERIFIED PARAMETERS
Max: 600.0kg Min: 4.0kg
e : 0.2kg W Unit:  
```

UNIT

```
W36    VERIFIED PARAMETERS
^ v For New Settings
"=" To Select W Unit: kg
```

SYST. LOCK

In this menu it is possible to set the systemlock. The systemlock protects the system configuration data.

```
SYSTEMLOCK MENU
SET SYSTEMLOCK:  
```

NOTE: Once the systemlock has been set, it can only be cleared by performing a master reset of the Weight Display (see page 21).

4.4.2. Sub-menu SET CLOCK

The Real Time Clock and the date stored in the Weight Display may be displayed and set in this menu.

```

Move cursor to Time/Date
Time : 13:24:27
Date : 16:11:93
  
```

4.4.3. Sub-menu CALIBRATION

```

W36 WEIGHT CALIBRATION
NetWeight: 51.35kg
Scale:2000.0 Zero:27.409
  
```

In this menu a complete calibration of the weighing instruments can be made. If the actual Weight Transmitter is sealed, calibration will be impossible.

Please refer to page 19 for further details on the calibration procedure.

4.4.4. Sub-menu MANUAL

From the MANUAL menu it is possible to make a complete configuration of a connected Weight Transmitter. The data in these menus can not be modified when the Weight Transmitter is sealed.

```

MANUAL WEIGTH SETUP MENU
CONFIG :  SETUP: 
MAINTENANCE: 
  
```

The Weight Configuration Menu holds a number of sub-menus for setting additional functions in the Weight Transmitter. Please refer to the Weight Transmitter manual, 502 063.

```

WEIGHT CONFIGURATION MENU
Level: Mode : NoSamp:
EnBit: STime: ReadOu:
  
```

The Weight Setup Menu shows a list of the parameters, which may be configured via the Weight Display.

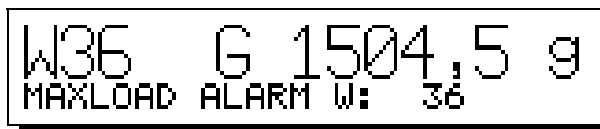
```

^ ZeroPoint : 27.409
74 Max : 1000.0
v Min : 6.0
  
```

5. Error detection.

The system includes a comprehensive error detector and alarm function.

The Weight Transmitter supervises the connection between the transmitter and the load cells and registers possible errors internally in the Weight Transmitter. If an error occurs, then an error code is generated in the Weight Transmitter. Any reading from the Weight Transmitter contains the actual error status. If an error code is present in the Weight Transmitter, it will result in an error message written in clear text in the bottom line of the display.



The displayed errors which can occur in the Weighing System are (xx is the weight number):

Errors generated in the weighing module:

'ModuleError in W: xx'

General error in the weight module (eg. EEPROM error).

'SignalHigh in W: xx'

If the signal from the loadcells exceeds the maximum signal value.

'SignalLow in W: xx'

If the signal from the loadcells falls below the minimum signal value.

'HighAlarm in W: xx'

If the GROSS-value exceeds the keyed-in value for HighLevel and the error generation is enabled.

'LowAlarm in W: xx'

If GROSS-value is less than the keyed-in value for LowLevel and the error generation is enabled.

'InternError in W: xx'

Error inside the module (repair necessary).

'ExternError in W: xx'

Fault in load-cells or the connections between weighing module and load cells detected (check connections).

'Overload in W: xx'

Fault in load-cells or the connections between weighing module and load cells detected (check connections).

'Unexpected ModuleErr.: xx'

This error is generated when an unexpected error is seen. This error should not occur in this application.

Errors referring to the displayed weight value generated in the Weight Display:

'MINLOAD ALARM W: xx'

If the GROSS-value is 9*e below zero.

'MAXLOAD ALARM W: xx'

If the GROSS-value exceeds Max with more than 9*e.

'OVERLOAD ALARM W: xx'

IF the GROSS-value plus Zeropoint exceeds FullScale with more than 9*e.

The Weight Display supervises the P-NET connection between the Weight Display and the Weight Transmitter.

'Transmission Error: zzzz'

Registration of possible transmission errors result in this error text followed by a four digit code describing the type of error.

If more errors occur at the same time for one Weight Transmitter, only the error with the highest error code will be displayed. Communication errors have the highest priority.

For further explanation of the listed errors, please refer to the Weight Transmitter PD 3230 manual (502 063).

6. Calibration and protection.

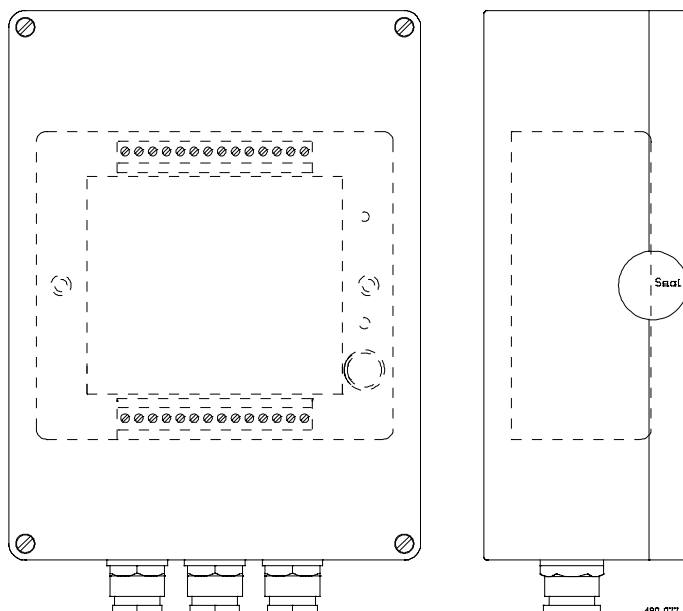
The approved system must be protected against dismantling and calibration by the user.

6.1. Protection.

On the Weight Transmitter, a wire must always be connected between pin 8 on connector J1 and pin 1 on connector J2.

To be able to calibrate and configure the Weight Transmitter, an external 24V DC voltage must be connected to the transmitter, see page 22. After the calibration, the external voltage must be disconnected, and the Weight Transmitter will be protected.

To be able to secure the Weight transmitter against recalibration and dismantling, it must be mounted in a box which can be sealed. To recalibrate the Weight transmitter, the sealing must be broken.



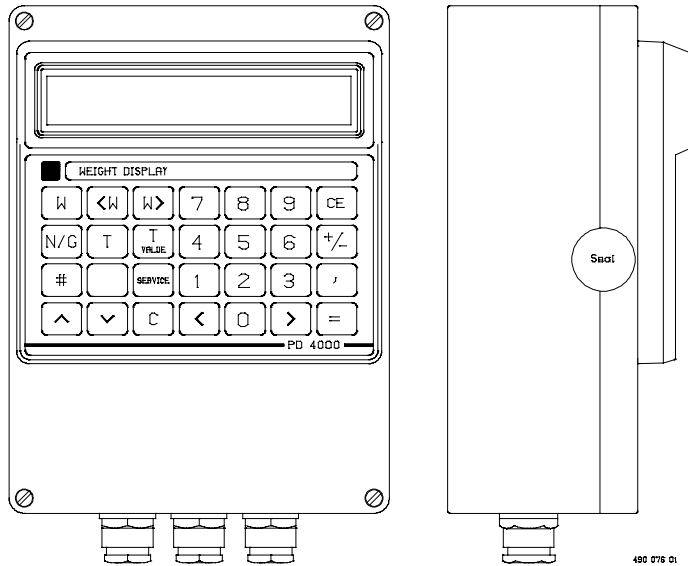
The display unit is composed of two parts, one part containing the display and keyboard and one part containing a power interface. The ON/OFF switch is placed on the inside of the power interface. To be able to set the switch ON, the two parts must be separated which will perform a master reset of the display unit.

To protect the program in the Weight Display against undesirable writing and modification, the display unit is supplied with a ON/OFF switch. If the switch is in position OFF writing is impossible.

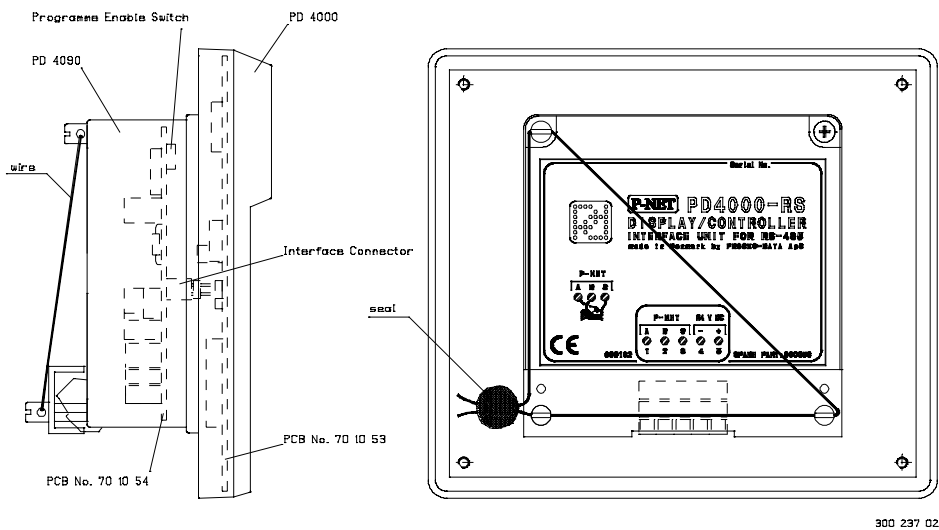
The system configuration is protected by means of a systemlock. The systemlock can be set in the SERVICE menu, and can only be reset by performing a master reset for the Weight Display.

The Weight Display must be protected against dismantling, the program and the system configuration must be secured from being modified by the user.

For this protection, the Weight Display may be mounted in a box which can be sealed.



The Weight Display may alternatively be sealed directly with a wire, a metal band covering the screw terminals and the plug, and a lead seal, see the drawing below. To disconnect the cables or the plug, the sealing must be broken. In this case, the box in which the Weight Display is mounted is not sealed.

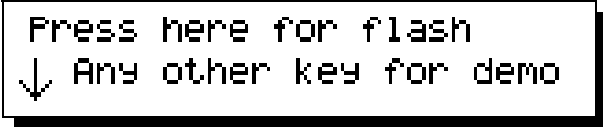


6.1.1. Master reset

A master reset for the Weight Display is performed by separating the power supply unit from the display/keyboard unit. The power supply unit is the little squared box on the back of the controller. The 4 screws must be removed before the units can be separated. The power supply unit must be dismantled for at least 15 seconds before mounting again.

NOTE: the power supply must be switched OFF before the units are separated.

When the power supply is switched on after a master reset, the following text will appear on the display.



```
Press here for flash
↓ Any other key for demo
```

The Weight Display program is stored in flash memory and the **W** key must be pressed to select this program. Any other key will select a demo-program. If, by accident, the demo-program is selected, then another master reset must be performed.

After selecting the Weight Display program by pressing the the **W** key, the following text will be displayed.



```
Now reset the controller
```

Reset the Weight Display by switching off the power supply. When power is switched on again, the test display will appear and the Weight Display is ready for configuration and calibration.

6.2. Configuration and calibration.

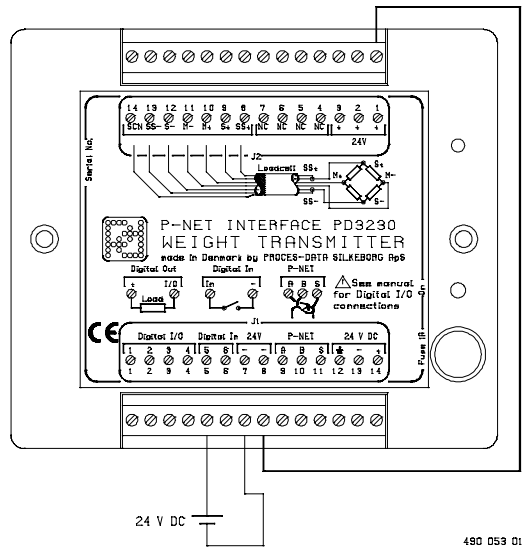
The configuration and calibration of a weighing module is done in the following steps:

Open the hardware lock by connecting a 24 V DC power supply between pin 5 and pin 7 on connector J1. The plus pole must be connected to pin 5, see the figure on page 22.

Perform the configuration and the calibration of the Weight Transmitter, see page 22.

Disconnect the 24 V DC power supply.

The Weight Transmitter is now calibrated and protected against any writing in the EEPROM registers and may be sealed.



Connection of the 24 V DC power supply

6.2.1. Adding a weighing module to the system.

The procedure described below should be followed when adding a new weighing module:

NOTE: If the systemlock is on, a master reset must be performed before adding a new Weight Transmitter (see page 21, Master reset). Remember to set the NodeNo and NoOfMaster.

The system configuration includes a definition of the weighing modules which are verified and following may be viewed on the indication unit, when the system is calibrated, sealed and verified.

- 1 First select 'WEIGHT SERVICE MENU' by pressing "SERVICE"-key.

```

W36  WEIGHT SERVICE MENU
SYSTEMSETUP:▣ SETCLOCK:▣
CALIBRATION:▣ MANUAL  :▣
    
```

- 2 Then select 'SYSTEMSETUP', followed by selecting 'SYSTEM'.

```

W36  SYSTEM SETUP MENU
COMMUNIC. :▣ SYSTEM  :▣
PARAMETER :▣ SYST.LOCK:▣
    
```

```

W 1  SYSTEM CONFIG MENU
NodeNo:■ 0 SerNo:
Weight not selected
    
```

Now 'SYSTEM CONFIG MENU' is displayed.

- 3 Select the desired weight number, using "W>"- and "W<"-keys. Now key in the 'NodeNo:'. The 'NodeNo' must be a unique number for each Weight Transmitter in the range from 'NoOfMaster' for the Weight Display to 125.

The serialnumber for the new Weight Transmitter must now be keyed in.

If any Weight Transmitter has this 'NodeNo' already, then the serial-number ('SerNo:') for this Weight Transmitter will be displayed and a new weight number should be selected for the Weight Transmitter to insert in the configuration.

```
W 1      SYSTEM CONFIG MENU
NodeNo: 6 SerNo:00000000
Key in Serialnumber
```

When a serial number has been keyed in, the bottom line will no longer display 'Key in Serialnumber'. Now the weighing module is installed in the system configuration.

This procedure must be followed for all weighing modules in the system.

- 4 All weighing modules with a 'NodeNo' may now be displayed. If you are quite sure that all weighing modules now are in the system-configuration, the system configuration may be protected by a systemlock, 'SYST.LOCK'. The systemlock can be selected from 'SYSTEM SETUP MENU' and the 'SYSTEMLOCK' may be set.

```
SYSTEMLOCK MENU
SET SYSTEMLOCK:    
```

```
SYSTEMLOCK MENU
SYSTEMLOCK IS SET
Do master reset to unlock
```

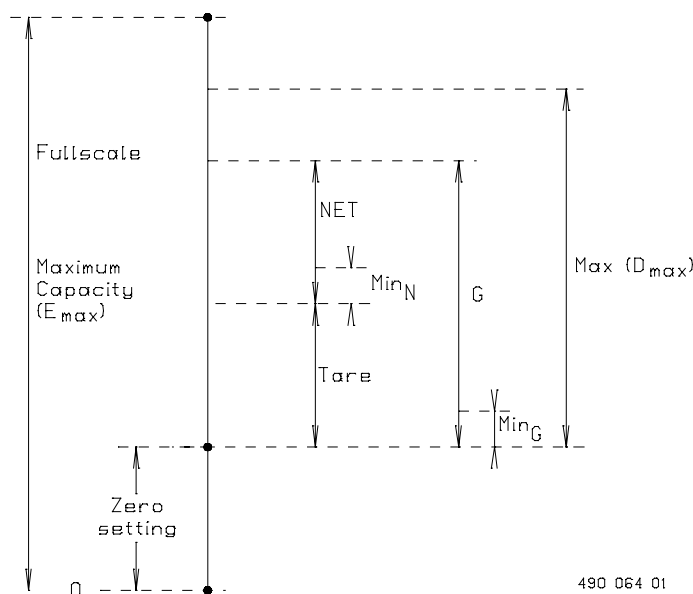
Be aware that after this 'SYSTEMLOCK' is set, it is not possible to make changes in the system configuration. The 'SYSTEMLOCK' may only be released by a master reset. A master reset will clear the system configuration.

- 5 Now each weighing module has to be configured and calibrated.

First set up fullscale and zeropoint. Select 'CALIBRATION' from 'WEIGHT SERVICE MENU'.

```
W36      WEIGHT CALIBRATION
NetWeight: 51.35kg 
Scale:2000.0 Zero:27.409
```

The relation between the calibration parameters is shown below.



Calibration parameters.

- 6a Now 'Scale:' and 'Zero:' can be keyed in separately, if the fullscale and zeropoint for the selected weighing module is known.

FullScale can be calculated from the following information about the weighing system:

- A: Number of load cells []
- B: Maximum load per load cell [kg]
- C: Weight Transmitter sensitivity: 2 [mV/V]
- D: Load cell sensitivity [mV/V]

Calculation of FullScale:

$$\text{FullScale} = A * B * (C / D)$$

Example: FullScale = 6 cells * 100kg/cell * 2mV/V / 2mV/V = 600kg

- 6b The Weight Transmitter utilizes automatic calculation of fullscale and zeropoint during calibration. The FullScale value will be calculated automatically if the known weight of a calibrated load at the load cell is written in NetWeight. To ensure accuracy, the calibration load must be a reasonable fraction of the maximum load.

First make sure that 'Scale:' is larger than or equal to 1.0.

Key in 0 in 'NetWeight:' with only the dead-load on the load cell.

Then place a load on the weight scale, and key in the mass of the load in 'NetWeight:'.

Repeat the procedure for more accurate calculation of both 'Scale:' and 'Zero:'. Since the automatic calculation of FullScale and ZeroPoint is based on the averaged weight input, the functions should not be repeated with short time intervals. The averaging function needs at least SampleTime * NoOfSamples [s] (see description of ChConfig in the PD 3230 Weight Transmitter manual, 502 063) to stabilize with a new FullScale or ZeroPoint value.

This setup of fullscale and zeropoint must be performed for all Weight Transmitters.

- 7 If you want other features in addition to the standard settings, you may now select 'MANUAL' from 'WEIGHT SERVICE MENU', followed by 'CONFIG:'.

```
MANUAL WEIGH SETUP MENU
CONFIG :  SETUP: 
MAINTENANCE: 
```

```
WEIGHT CONFIGURATION MENU
Level: Mode : NoSamp:
EnBit: STime: ReadOu:
```

From this menu other menus may be selected, and different data in the weighing modules may be set up. Please refer to the PD3230 manual (502 063) for further information.

- 8 Finally select 'SYSTEMSETUP' followed by 'PARAMETER'.

```
W36 VERIFIED PARAMETERS
Max:1000.0kg Min: 6.0kg
e : 0.5kg W Unit:
```

Now 'Max:', 'Min:', 'e:' and weight unit may be entered. Select 'W Unit:' for selecting the mass unit 't', 'kg' or g .

```
W36 VERIFIED PARAMETERS
^ v For New Setting
"=" To Select W Unit: kg
```

When these data are entered, the main weight indication on the Weight Display must be selected by means of the "W" key.

Now the weighing module is ready to be sealed.

REMARK: Before sealing the weighing module or disconnecting the power, press the "W" key and **wait** for 20 seconds. The Weight Transmitter is calculating internal memory-data after calibration. These data are used to detect memory-failures during operation and measuring.

7. Construction, Mechanical.

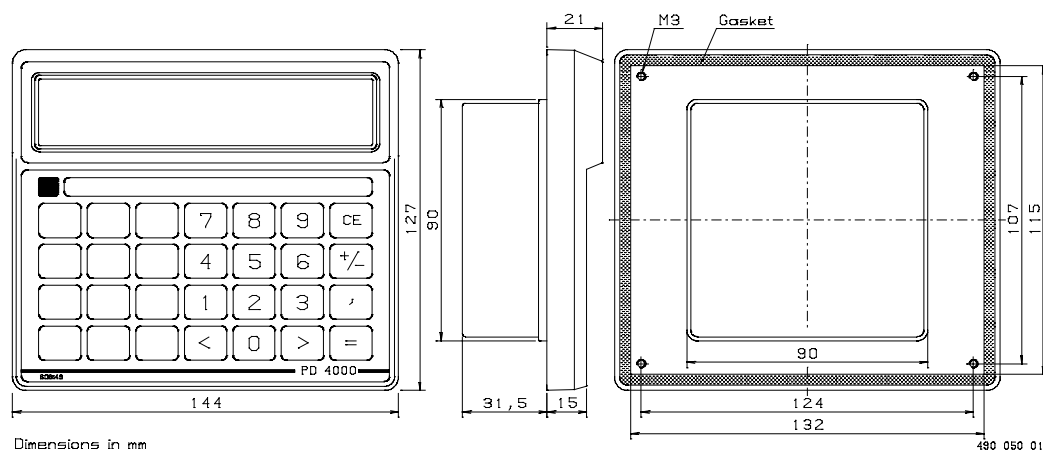
The PD4000 Controller is manufactured in a black injection moulded plastic enclosure. The entire Controller is completely filled with silicone. This construction makes it extremely resistant to water, dust and vibrations.

The case measures W x H x D = 144.0 x 127.0 x 52.5 mm (tolerance to DIN 16901).

The module is designed for panel mounting. The module incorporates one snap connector, which provide the terminals for power and communications.

The module may be removed for service, without interfering with operational activities on the rest of the network.

Scale drawing (in mm):



Materials

Case	: Black NORYL GFN (injection moulded)
Front foil	: Polycarbonate.

8. Appendix 1

The specifications for a weight indicator, which consists of a PD 4000 Weight Display and a PD 3230 Weight Transmitter are listed below. The data are valid for a weight indicator in a pattern approved weighing system.

8.1. Specifications of the indicator

Applicant	:	PROCES-DATA SILKEBORG APS, Navervej 10, DK-8600 Silkeborg.
Manufacturer	:	Same.
Type	:	Weighing System PD 4000 / PD 3230
Class	:	III.
The fraction Pi	:	0.5.
Maximum number of scale intervals	:	3.000.
Excitation voltage (AC and/or DC)	:	5 V Alternating DC.
Maximum measuring range	:	11 mV.
Minimum dead load voltage	:	- mV.
Maximum dead load voltage	:	- mV.
Minimum signal voltage per verification scale interval	:	0.5 μ V
Max. influence of the temperature on the no load indication	:	+/- 1 ppm/K
Max. influence of the temperature on the sensitivity	:	+/- 7 ppm/K
Sensitivity	:	2 mV/V
Minimal load cell impedance	:	60 Ω
Maximal load cell impedance	:	1.000 Ω
Min. and max. temperature	:	Min. -10°C. Max. +40°C
Power voltage	:	24 V DC +/- 4 V.
Minimum battery voltage	:	-
Frequency	:	DC
The fraction Pi (power)	:	-
Remote sensing in the indicator	:	Yes.
Is it possible to install a high resolution (description)	:	-
Specifications of the load cell connection cable		
type	:	3 x twisted pair.
length	:	Max. 50 m.
cable shield	:	Yes.
impedance	:	50 - 150 Ω .

9. Appendix 2.

9.1. Standard specifications.

The standard specifications for a PD 4000 Weight Display and a PD 3230 Weight Transmitter are listed below.

All electrical characteristics are valid at an ambient temperature from -25 °C to +70 °C.

All specifications are respected in the approved EMI conditions.

EMC test specifications for PD 4000 are available in a separate document, PD no. **506 022**.

EMC test specifications for PD 3230 are available in a separate document, PD no. **506 020**.

9.2. Ambient Temperature.

Operating temperature : -25 °C .. +70 °C
(with reduced scale interval)

Storage temperature : -40 °C .. +85 °C

9.3. Humidity.

Relative humidity : max. 95 %

9.4. Approvals.

Compliance with EMC-directive no.: 89/336/ECC

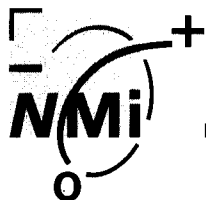
Generic standards for emission:
Residential, commercial and light industry EN 50081-1
Industry PrEN 50081-2

Generic standards for immunity:
Residential, commercial and light industry EN 50082-1
Industry PrEN 50082-2

Vibration (sinusoidal): IEC 68-2-6 Test Fc

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Nederlands Meetinstituut

Test certificate

Number **TC2409** Revision 0
Project number 10019606
Page 1 of 4

Issued by NMI IJkwezen B.V.
Hugo de Grootplein 1
3314 EG Dordrecht
The Netherlands

Notified body number 122

In accordance with Paragraph 8.1 of the European Standard on Metrological aspects of non-automatic weighing instruments EN 45501:1992. The applied error fraction p_i , meant in paragraph 3.5.4. of this standard is 0.4.

Applicant Proces-Data Silkeborg ApS
Navervej 10
DK-8600 Silkeborg
Denmark

In respect of The model of an **indicator**, tested as part of a weighing instrument (for non-automatic weighing instrument class **III** and **III**).

Manufacturer : Proces-Data
Type : PD 4000/PD 3230
: PD 4000/PD 1435

Characteristics Electronic, self-indicating device, with single interval indication. The maximum number of verification scale intervals will be:
 $n \leq 3000$ for class **III** instruments or
 $n \leq 1000$ for class **III** instruments.

In the description TC2409 further essential characteristics are described.

Description and documentation The indicator is described in the description number TC2409 and documented in the documentation folder number TC2409-1, appertaining to this test certificate.

Remarks Summary of the tests involved: see Appendix number TC2409.

Dordrecht, 3 June 1994
NMI IJkwezen B.V.

M. Charité
Director

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 Project number 10019606
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1 General information about the indicator

All properties of the indicator, whether mentioned or not may not be in conflict with the standard mentioned in the test certificate.

1.1 Essential parts

Description	Drawing number	Rev.	Remarks
PCB No. 701052-4 Weight transm, PD3230 + parts list (6 sheets)	405026K1		PD 3230 and PD 1435
PCB No. 701053-03 Controller, PD4000 + parts list (4 sheets)	305007K6 and 305007K1		
PCB No. 701054-2 Power supply, PD4090 + parts list (3 sheets)	405029K1		

1.2 Essential characteristics

Devices:

- span adjustment device. Calibration / set-up mode enabled when a 24 V DC power supply is connected to pin 5 and 7 (see drawing 490 053 01, "Hardware lock of weight transmitter");
- device for changing from Net to Gross;
- extended indicating device;
- device to determine stability of equilibrium;
- zero indicating device;
- semi-automatic subtractive tare weighing device;
- selection device for load receptors and measuring devices;
- device that acts upon significant faults;
- device to check the display;

Connections:

- the indicator may be connected to a 24 V DC \pm 4 V power supply;
- the minimum value allowed for the signal voltage per verification scale interval is 1 μ V;
- the excitation power supply for the load cells is 5 V AC square wave;
- the minimum input impedance of the load cells is 60 Ω .
- "Remote-sensing" is used, however the influence of the cable between the load cell junction box and the indicator is not totally compensated. By using 0.3 as a value for the fraction p_i for the connection cable the total length of this cable is limited to 85 m per mm² cross section area of the sense wires in this cable.

**1.3 Essential shapes**

Description	Drawing number	Rev.	Remarks
Weight display PD 4000	300 237 02		PD 4000
Weight transmitter PD 3230	300 236 01		PD 3230 and PD 1435

- The weight transmitter PD 3230/PD 1435 is mounted in a box (see drawing 490 077 01);
- The display PD 4000 can be mounted in a box (see drawing 490 076 01);
- To secure components that may not be dismantled or adjusted by the user, the indicator has to be secured in a suitable manner on the locations indicated in the drawings:

Description	Drawing number	Rev.	Remarks
Weight display PD 4000	300 237 02		PD 4000
Sealing of display box	490 076 01		PD 4000
Sealing of weight transmitter box	490 077 01		PD 3230 and PD 1435

The securing component has to bear either:

- a mark of the manufacturer laid down in a notified body approved quality system (Annex II of the Directive 90/384/EEC), or
 - an official mark of a Member State of the EEC, or an other party to the EEA agreement.
- The data plate is secured against removal by sealing or will be destroyed when removed and consists of the following information:
 - this testcertificate number TC2409;
 - manufacturers name or mark.

1.4 Conditional parts

- Indication:
 - the primary display is a matrix LCD display;

Tests carried out for this test certificate on the indicator Proces-Data, type PD 4000/PD 3230:

Test	Type or version	Institute
Temperature effect on the sensitivity with maximum weighing range (20, 40, -10, 5 and 20 °C)	PD 4000/PD 3230	NMi Certin B.V.
Temperature effect on the no load indication with maximum weighing range (20, 40, -10, 5 and 20 °C)	PD 4000/PD 3230	NMi Certin B.V.
Temperature effect on the sensitivity with minimum weighing range and minimum input impedance (60 Ω) (20, 40 -10, 5 and 20 °C)	PD 4000/PD 3230	NMi Certin B.V.
Temperature effect on the no load indication with minimum weighing range and minimum input impedance (60 Ω) (20, 40, -10, 5 and 20 °C)	PD 4000/PD 3230	NMi Certin B.V.
Damp heat, steady state	PD 4000/PD 3230	NMi Certin B.V.
Span stability test	PD 4000/PD 3230	NMi Certin B.V.
Checklist	PD 4000/PD 3230	NMi Certin B.V.
Cable length (impedance) between the indicator and load cell	PD 4000/PD 3230	NMi Certin B.V.
Stability of equilibrium	PD 4000/PD 3230	NMi Certin B.V.
Voltage variations	PD 4000/PD 3230	NMi Certin B.V.
Short time power reductions	PD 4000/PD 3230	NMi Certin B.V.
Electrical bursts	PD 4000/PD 3230	NMi Certin B.V.
Electrostatic discharges	PD 4000/PD 3230	NMi Certin B.V.
Immunity to radiated electromagnetic fields	PD 4000/PD 3230	NMi Certin B.V.