DIN Rail Blind Transmitter/
DIN Rail Mount Indicator
PS-1040/1045

Installation and Operating Manual

BLH NOBEL
A VPG Brand
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EC Declaration of Conformity, PS-1040
EC Declaration of Conformity, PS-1045
EC Declaration of Conformity, PS-121
Technical Specifications

PERFORMANCE
Resolution 60,000 counts
Conversion Speed 50 updates/second (no filtering)
Sensitivity 0.2 µV/count
Full Scale Range -0.5 mV/V to +3.5 mV/V
Linearity < 0.01% of full scale
Excitation Voltage 5 volts fixed, short circuit proof
Load Current 85 mA (six 350 ohm load cells)
Filter 0.1 Hz to 25 Hz selectable
Temperature Creep < 0.001% of full scale/°C
A/D Converter 24 bits
Increment Size x1, x2, x5, x10, x20, x50
Decimal Point 0.0, 0.00, 0.000
Calibration Methods computer interface or via front panel

ANALOG OUTPUT (ISOLATED)
Type 16 bit D/A conversion
Voltage 0-10 Vdc (10 kohms min load)
Current 4-20 mA (300 ohm max)
Linearity < 0.012% of full scale
Temperature Creep < 0.001% of full scale/°C

INPUTS & OUTPUTS
(2) Logic Inputs opto-isolated, 24 Vdc PNP (requires ext. power supply)
(2) Logic Outputs solid-state relays, (maximum load 24 Vdc/100 mA each)

SERIAL COMMUNICATION
Serial Output RS-232, RS-422 or RS-485
Baud Rate 2400, 9600, 19200, 38400, or 115200 - selectable
Standard Protocols ASCII, Modbus RTU
Maximum Cable Length 15 m RS-232, 1000 m for RS-422 and RS-485

ENVIRONMENTAL
Operating Temperature -10 to +40°C
Storage Temperature -20 to +50°C
Relative Humidity 85% non-condensing

DISPLAY (PS-1045)
Type 6-digit red LED, 7 segment 14 mm high
Status LED’s (4) red LED’s
Keyboard (4) keys (tactile feedback)

ELECTRICAL
Input Voltage 24 Vdc ±15%
Power 7.5 Watts
Isolation class II
Category category II

ENCLOSURE
Overall Dimensions 106 x 90 x 58 mm (L x H x D)
Mounting DIN rail (35 mm x 7.5 mm)
Enclosure ABS Plastic
Protection (front) IP20
Weight 230 g
Wiring Connections terminal blocks (pitch = 5.08 mm)

Nobel Weighing Systems is continually seeking to improve product quality and performance. Specifications may change accordingly.

Front Panel Key Designations

<table>
<thead>
<tr>
<th>Front Panel Key</th>
<th>Flow Chart Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SETPOINT</td>
<td>“SET”</td>
</tr>
<tr>
<td>FUNCTION</td>
<td>“FUN”</td>
</tr>
<tr>
<td>TARE</td>
<td>“TAR”</td>
</tr>
<tr>
<td>PROGRAM</td>
<td>“PRG”</td>
</tr>
</tbody>
</table>
Introduction

This manual provides general information regarding installation, configuration, calibration, and operation of the PS-1040/45 Load Cell Transmitters. There are two models within this series, the Indicator PS-1045 which features a four-button keyboard, 6-digit Red LED display, and four status LED’s, and the Blind Transmitter PS-1040 that can only be configured and calibrated remotely with Pro-View Software. Both models are packaged in ABS Plastic DIN-Rail mounted enclosures.

All units include the following features:
- Drives up to six 350 ohm load cells
- Supports 4 and 6 wire connections
- RS-232, RS-422, or RS-485 outputs
- (2) Logic inputs
- (2) Logic outputs (setpoints)
- Isolated analog output 4/20 mA, 0-5 Vdc or 0-10 Vdc output utilizing a 16 bit DAC

PS-1040 Series Transmitters have three different modes of operation:

**Operating mode**
In this mode the unit displays gross weight, net weight, or peak force readings as required.

**Setup mode**
This mode is used for configuration and calibration of the unit.

**Test mode**
The test mode enables you to test the inputs, outputs, and analog output.

**Front panel key functions (PS-1045)**

**Operating Mode**
The “SET” key enables you to enter values for Setpoints 1 and 2. Press the “SET” key, Set 1 appears on the display. Press the “PRG” key to view the current value. To change the current value, press the “TAR” key to select a digit, then use the “UP” or “DOWN” keys to increment or decrement the value. Repeat this procedure for the remaining digits, then press the “PRG” key to enter the new value. To change the value for Setpoint 2, press the “SET” key again and repeat the above procedure or press the “TAR” key to exit.

The “FUN” key is used to switch the unit from Gross mode to Net mode or Peak Hold mode. To switch to Peak Hold mode, press and hold the “FUN” key until a “P” appears on the display.

The “TAR” key is used to zero the unit in Gross mode, tare the unit in Net mode, and reset the value to zero in Peak Hold mode.

The “PRG” key is used to send the data to the RS-232 serial port for use with a computer.

**Setup Mode**
In setup mode three of the front panel keys are used as directional keys to scroll through the various menus. A label on the lower half of each key identifies the direction provided by the key.

The “SET” and “FUN” keys are used to navigate through the main menu and sub-menus. They are also used to increment or decrement the numerical value of a selected digit.

The ”TAR” key is used to move through certain sub-menu parameters, or to select a specific digit when numerical values are displayed.

It is also used to return to the main menu from any of the sub-menus.

The “PRG” key switches the unit to the “Basic Configuration” mode. It is also used to enter the sub-menus, and store parameter changes.

The “PRG” key, when used in conjunction with the “SET” key, switches the unit to the “Complete Configuration” mode.

**Status LED’s (PS-1045)**
There are four status LED’s on the front of the unit, one for Motion, one for Net mode, and one for each of the solid state relay outputs.

**Enabling/Disabling front panel keys.**
In order to prevent any access to the instrument by non-authorized personnel, a procedure to lock the keyboard has been implemented.

**How to lock the front panel keys:**
Press and hold the “PRG” and “TAR” keys. The "TAR" key must be pressed after the "PRG" key.
Release both keys when the word LOCK is shown on the display.
Press the “PRG” key to confirm.
Now the keys are disabled.

**How to unlock the front panel keys:**
Press and hold the “PRG” and "TAR" keys. The "TAR" key must be pressed after the "PRG" key.
Release both keys when the word UNLOCK is shown on the display.
Press the “PRG” key to confirm.
Now the keys are enabled.

**NOTE:** When the keyboard is locked the message LOCK appears for a while during the power-on sequence.
Installation

Mounting
Install the instrument in a location where it will not be subjected to excessive heat, humidity or vibration. For best results, avoid direct sunlight on the front of the instrument. The unit should be installed at eye level to allow optimal display visibility and easy access to the front panel keys.

Cable Types and sizes
Use 20 AWG (0.5 mm²) shielded cable for all load cell, RS-232, and RS-485 connections.

Power and Wiring Considerations
The instrument is powered from an external 24 Vdc source. The instrument can be operated from a computer, therefore, a “clean” power source is required for reliable operation.

The incoming power should come from a source that is isolated from other process equipment.

Cables carrying primary and switched power should be routed away from load cell and other signal cables to avoid electrical interference.

Relays, motor starters and other inductive devices connected to the equipment must have reliable and effective arc suppression.

Always connect the shield lead where indicated on the drawing, and on one end only.

High voltage devices such as megohmmeters, etc. should never be used to check the wiring connections.

Plastic insulating tape should not be used on load cell connections.

Environmental Considerations
Heavy electrical equipment should not be installed close to the weighing equipment.

Excessive vibration will affect the accuracy of the weigh system and potentially cause damage to electrical and electronic components.

The atmosphere should be dust free and not contain any corrosive gasses or materials which could adversely affect the equipment.

NOTES:
WELDING on or in the vicinity of the equipment is strictly prohibited.

STATIC loads, caused by thunderstorms, must be prevented from developing by using reliable lightning conductors.

ENSURE that equipment ventilation is not obstructed.
Main Power Connections

Use terminal 8 for the (+) input, and terminal 9 for the (-) input. The supply voltage must be 24 Vdc ± 15%. The external power supply must have a minimum rating of 5 watts.

Transducer/s Connections

Attach cable from a transducer or summing junction box to transmitter (terminals 13 through 18). If using a 4-conductor cable (no remote sensing), jumpers *must be* installed between the +Excitation and +Sense leads (terminals 14 to 15) and between the -Excitation and -Sense leads (terminals 13 to 16) as shown below in Figure 1.

Logic Input Connections

Use terminal 4 for Input (1), and terminal 5 for Input (2). Terminal 6 is the common for both inputs. These are powered inputs, which require an input voltage of 24 Vdc to activate them. See Figure 1 for additional information. Input (1) is used to zero the unit in Gross mode, tare the unit in Net mode, and reset the value to zero when operating in Peak Hold mode.

Logic Input Connections (cont’d)

Input (2) functions as a Print key, closing the input causes the weight data to be sent to the RS-232 serial port.

Logic Output Connections

Use terminal 1 for Output (1) and terminal 2 for Output (2). Terminal 3 is the common for both outputs. The outputs utilize solid-state relays with a maximum load rating of 24 Vdc @ 100 mA.

Analog Output Connections

Use terminal 10 for the 4/20 mA output (300 Ohm load max), or terminal 11 for a 0 to 5 Vdc or 0 to 10 Vdc output (10 kohm load max). Terminal 12 is used as the common for either output.

Serial Output Connections

The transmitter’s serial port supports RS-232, RS-422 or RS-485 communications. Serial parameter selections can be found on page 18. A detailed description of the serial data formats is provided on pages 23 through 25. Wiring connections are shown on page 26.
These instruments can be configured by sending configuration and calibration data to the RS-232 port with Pro-View, a MS Windows based program that can be downloaded from Nobel Weighing Systems website at www.weighingsolutions.com. Click at “Support” and then “Software download” to find the program. Pro-View simplifies the configuration and calibration procedure. The Indicator PS-1045 can also be configured by using the front panel keys to navigate through a series of menus.

Configuration Procedures

There are two procedures available for setup of these instruments, “Basic Configuration” or “Complete Configuration”.

The “Basic Configuration” procedure allows you to change selective parameters, whereas, the “Complete Configuration” procedure allows you to change all parameters.

For example, if the transmitter requires calibration only, the “Basic Configuration” procedure is recommended.

The following pages provide a detailed explanation of both configuration procedures.

Basic Configuration via Front Panel

To perform “Basic Configuration”, press and hold the “PRG” key until the display shows CAPAC. Use the “UP” key to scroll down through the eight basic configuration sub-menus shown below.

<table>
<thead>
<tr>
<th>Display</th>
<th>Sub-menu Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAPAC</td>
<td>Total capacity of transducer/s</td>
</tr>
<tr>
<td>SENSIT</td>
<td>Rated output of the transducer/s</td>
</tr>
<tr>
<td>NET</td>
<td>Net (live) weight value</td>
</tr>
<tr>
<td>DEAD L</td>
<td>Dead load weight value</td>
</tr>
<tr>
<td>DSPDIV</td>
<td>Increment size (resolution)</td>
</tr>
<tr>
<td>SIGNAL</td>
<td>Transducer/s input signal (view)</td>
</tr>
<tr>
<td>CALIBR</td>
<td>Calibration procedure</td>
</tr>
<tr>
<td>ANALOG</td>
<td>Full scale value for analog output</td>
</tr>
</tbody>
</table>

Basic Configuration (cont'd)

To set one of the following parameters, CAPAC, SENSIT, NET, DEAD L, DSPDIV, or ANALOG, press the “PRG” key to view the default or previously selected value for that parameter.

To change the value, press the “TAR” key to select a digit, then use the “UP” or “DOWN” keys to increment or decrement the value of the selected digit. When the desired value appears on the display, press the “PRG” key to store the new value. Press either the “UP” or “DOWN” keys to move to the next parameter.

The SIGNAL parameter enables you to view the actual input signal from the transducer/s. Press the ”TAR” key to get back to the sub-menu SIGNAL.

The CALIBR parameter is used to calibrate the transmitter. The unit can be calibrated using either data sheet or dead load procedures.

Data sheet calibration procedures allow the transmitter to be calibrated without a transducer simulator or test weights. This procedure is based on the capacity and certified, full scale mV/V output (sensitivity) of the transducer/s.

To perform a data sheet calibration, enter the total scale capacity, sensitivity, net weight, tare weight, and display resolution, then press the ”TAR” key. The display will indicate STORE? Press the “PRG” key to save the changes and return to the operating mode.

See page 8 for detailed calibration procedures when using test (dead) weights.

The ANALOG parameter is used to enter the full scale weight value that you want the analog output to represent. The default is net weight value.

To exit from the setup procedure, press the ”TAR” key when any one of the following parameters are displayed CAPAC, SENSIT, … ANALOG.

The display will indicate STORE ? - press the “PRG” key to save the changes and return to the operating mode.

NOTE: While setting the above parameters, if no keys are pressed within a 10 minute period, the transmitter automatically exits from the setup mode. Any parameter changes that have not been saved will be lost.
Basic Configuration Menu

Place the unit in “Basic Configuration” mode by pressing and holding the “PRG” key until the display shows CAPAC. Use either the “UP” or “DOWN” keys to scroll through the eight basic configuration menus shown above. To set one of the following parameters, CAPAC, SENSIT, NET, DEAD L, DSPDIV, or ANALOG, press the “PRG” key to view the default or previously selected value for that parameter. To change the value, press the “TAR” key to select a digit, then use the “UP” or “DOWN” keys to increment or decrement the value of the selected digit. Press the “PRG” key to enter the new value, then press either the “UP” or “DOWN” keys to move to the next parameter. To exit the setup procedure, press the "TAR" key when any one of the sub-menu parameters are displayed. The display will indicate STORE ? - press the “PRG” key to save the changes and return to the operating mode.
Basic Configuration Menu (cont’d)

NOTE: In order to ensure greater stability during the calibration procedure, the digital filter increases to the maximum value automatically (value 9), therefore the weight indication updates very slowly at this stage. Once the calibration procedure has been completed, the digital filter will return to the previous value automatically.

Both methods consist of the following steps.

- Zero calibration
- Apply a known load (test weight)
- Edit weight value
- Span calibration
- Optional linearization (See page 14)

2-point calibration via the front panel keys

To calibrate the PS-1045 transmitter with the front panel keys, proceed as follows:

1. With the unit in “Basic Configuration” mode and the message “CALIBR” displayed, press the “PRG” key (CAL will be blinking on the display).

2. With the system unloaded, press the “TAR” key to perform the ZERO calibration.

3. Apply a known load not less than 10% of the net weight value and press the “UP” key.

4. Enter the actual weight value using the “TAR” key to select each digit, then use the “UP” or “DOWN” keys to increment or decrement the value of the selected digit.

5. Press the “PRG” key to enter the setting (CAL will be blinking on the display).

6. Press the “PRG” key, (the display indicates CALIBR), press either the “UP” or “DOWN” keys to move to the next parameter.

7. If no additional parameter changes are required, press the “TAR” key (the display indicates STORE ?), press the “PRG” key to save the changes and return to the operating mode.

NOTE: To erase calibration entries, enter the CALIBR menu and proceed as follows:

To erase the zero calibration, press and hold the “FUN” key, and then press the “TAR” key. Release both keys, the previous zero calibration entry has been erased. To erase the span calibration, press and hold the “FUN” key, and then press the “SET” key. Release both keys, the previous span calibration entry has been erased.
Complete Configuration via the Front Panel (PS-1045)

In order to perform a complete configuration, the unit must be placed in setup mode. To enter the setup mode, press and hold the “PRG” and “SET” keys on the front of the unit. The “SET” key must be pressed after the “PRG” key. Release both keys when the word CONFIG is shown on the display. The CONFIG menu is the first of six main menus used to completely configure the instrument. Use the “UP” key to scroll down through the six main menus shown below.

<table>
<thead>
<tr>
<th>Display</th>
<th>Main Menu Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONFIG</td>
<td>Parameters for total scale capacity, transducer sensitivity, net and tare weight values, and display divisions.</td>
</tr>
<tr>
<td>CALIBR</td>
<td>Zero and full scale calibration.</td>
</tr>
<tr>
<td>PARAM</td>
<td>Parameters for digital filtering, motion, auto zero and zero tracking</td>
</tr>
<tr>
<td>IN-OUT</td>
<td>Operating mode selection for outputs, and input and output test.</td>
</tr>
<tr>
<td>SERIAL</td>
<td>Serial output configuration.</td>
</tr>
<tr>
<td>ANALOG</td>
<td>Analog output configuration and calibration.</td>
</tr>
</tbody>
</table>

Press the “PRG” key to move down to the sub-menu or parameter desired. Press the “PRG” key to view the default or previously selected value for that parameter.

To change a parameter, press either the “UP” or “DOWN” keys to view the choices for that parameter. When the desired selection appears on the display, press the “PRG” key to enter the selection and move to the next parameter.

To edit numerical values, use the “TAR” key to select the digit, then use either the “UP” or “DOWN” keys to increment or decrement the value of the selected digit.

Configuration using Pro-View

To configure PS-1040 Series Transmitters with the Pro-View program, proceed as follows:
1. Download Pro-View from www.vishaynobel.com
2. Install Pro-View on an IBM-compatible computer running Windows 95, 98, Me or XP.
3. Minimum system requirements are 8MB of extended memory and at least 5MB of available hard drive space.
4. Remove power from both units, and connect the PC’s serial port to the RS-232 terminals on the transmitter.
5. Apply power to the PC and the transmitter, then start the Pro-View program.
6. Switch the transmitter into remote mode by removing the upper left cover and moving jumper (J1) to the remote control position as shown below. The PS-1045 can also be switched into remote mode by going into complete configuration and then selecting ‘Remote’ from the serial menu. See page 18.

Pins 1 - 2 = Remote Control
Pins 2 - 3 = Default Setting

When viewing either model from a computer, the current weight value will be displayed under the icon representing the unit being configured.

If ERROR appears under the transmitters icon, re-check all of the wiring connections, verify that the unit is in remote mode, and make sure the icon being displayed matches the address of the transmitter to be configured.

Double-clicking on the transmitters icon will bring you to the Pro-View Main Setup Screen.
Configuration using Pro-View (cont’d)

On this screen you can select the operating mode, set the address, or enter values for the two setpoints.

Click on the SETUP button, seven file folders will appear on the lower half of the screen. The first file folder labeled “Parameters” will be open.

The top section in this folder is for entering the total scale capacity, sensitivity, net weight, and tare weight values. (required parameters for performing a data sheet calibration).

The data sheet calibration procedure allows the transmitter to be calibrated without a transducer simulator or test weights. This procedure is based on the certified full scale capacity (mV/V output sensitivity) of the transducer/s.

To perform a data sheet calibration, enter the designated values, then click the SEND button for that group of parameters.

The next section in this file folder is used to select the display resolution. It consists of a drop down menu and a SEND button.

PS-1040 series units allow count by 1’s up to 60,000 counts, yet, for values greater than 10,000, the units automatically select a lower resolution to ensure greater stability. After selecting the desired resolution, press the SEND button for this parameter. Do not press any of the other SEND buttons in this folder or the unit will revert back to a default setting of x2, x5, etc.

Changes to the display resolution should only be done after the unit has already been calibrated using the data sheet or dead load procedure.

The bottom parameter selection in this file folder is labeled “Operating Mode”. It enables the unit to retain the mode of operation in the event of a power loss. When the power is re-applied, the transmitter automatically returns to the mode that it was operating in prior to the power loss.

The second file folder enables you to calibrate the unit with a transducer simulator or actual weight, (recommended method of calibration).

Inside this second file folder, once the zero calibration has been performed, the program asks the operator if the new zero has to modify the “Data sheet” calibration. If the operator selects “OK”, the “Dead load” value inside the first file folder will change automatically according to the new zero.

If the operator selects “NO”, the “Dead load” value inside the first file folder will remain set to the previous value.

The third file folder contains the parameter selections for digital filtering, zero tracking, etc.

The fourth file folder contains the parameter selections for configuring the inputs and outputs.

The fifth file folder contains the parameter selections for the serial output.

The sixth folder contains the parameter selections for the analog output.

The seventh folder provides a means for testing the solid state and analog relay outputs.

The Main Setup Screen and file folders 1 through 6 all have SEND buttons on them for downloading the various parameter changes.

When configuration and calibration has been completed, the data can be saved on a PC or floppy disk or downloaded (sent) to the transmitter. This method of configuring and calibrating is very beneficial when several transmitters with similar configurations are being set up, or when a transmitter has to be replaced.

To exit Pro-View, click on the Exit Setup icon, a “Save Changes” window will appear, click on OK. Now click on Option in the upper left corner of the screen, from the drop down menu select EXIT, this will return you to the Configuration Utility Screen, click on QUIT.

Figure 2 shows an example of one of the Pro-View configuration screens.

Figure 2
Starting from the 2.0 version, the Pro-View program allows the operator to create new configurations, save new files and open existing files without having any instrument connected to the computer.

Using this feature, the download of a given configuration to the instrument can be performed at any time.

To perform the operation mentioned above, click on the “Edit” menu at the left end upper corner (See figure 2.1), then enable the function “Edit Configuration Offline”. The message “Edit” will appear on the display, showing this particular condition.

Another useful feature allows the print out of all the parameters in a given configuration. This command is performed by clicking on “Print Configuration”.

Besides, the command “Report Notes” allows the operator to include a heading in the report, in order to identify the plant, the customer name or any other useful information.

An example of a printed report is given on the right side of this page:

**Figure 2.1**

![INOVATION MAIN SETUP SCREEN](image)

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An example of a printed report is given on the right side of this page.
Complete Configuration Menu

Place the unit in complete configuration mode by pressing and holding the "PRG" and SET" keys on the front of the unit. The "SET" key must be pressed after the "PRG" key. Release both keys when CONFIG is displayed.

Press the "PRG" key to enter the sub-menu, then use either the "UP" or "DOWN" keys to select one of the sub-menu parameters. Press the "PRG" key to view the default or previously selected value for that parameter.

To change the value, press the "TAR" key to select a digit, then use the "UP" or "DOWN" keys to increment or decrement the value of the selected digit. Press the "PRG" key to enter the new value, then press either the "UP" or "DOWN" keys to move to the next sub-menu parameter or press the "TAR" key to return to the main menu. To exit the configuration procedure, return to the main menu and press the "TAR" key, (the display will indicate STORE ?), press the "PRG" key to save the changes and return to the operating mode.
Complete Configuration Menu (cont’d)

**NOTE:** In order to ensure greater stability during the calibration procedure, the digital filter increases to the maximum value automatically (value 9), therefore the weight indication updates very slowly at this stage. Once the calibration procedure has been completed, the digital filter will return to the previous value automatically.

Prior to calibration, the transmitter must be configured, thus giving it a set of operating parameters.

The unit can be calibrated using the 2-point method or the optional multi-point (linearity compensation) method. See page 14 for a detailed description of the multi-point calibration procedure.

### 2-Point calibration via the front panel keys

To calibrate the transmitter using the front panel keys, proceed as follows:

1. With the unit in “Complete Configuration” mode, press either the “UP” or “DOWN” keys until CALIBR is shown on the display.

2. Press the “PRG” key (CAL will be blinking on the display).

3. With the system unloaded, press the "TAR" key.

4. Apply a known weight, *not less than 10% of the total capacity value* and press the “UP” key.

5. Enter the actual weight value using the "TAR" key to select each digit, then use the “UP” or “DOWN” keys to increment or decrement the value of the digit. Press the “PRG” key to enter the setting (CAL will be blinking on the display).

6. Press the “PRG” key, (the display indicates CALIBR), press either the “UP” or “DOWN” keys to move to the next parameter.

7. If no additional parameter changes are required, press the "TAR" key (the display indicates STORE ?), press the “PRG” key to save the changes and return to the operating mode.

Should it be necessary to erase either of the previous calibration entries, proceed as follows:

To erase the zero calibration, press and hold the “FUN” key, and then press the “TAR” key. Release both keys, the previous zero calibration entry has been erased. To erase the span calibration, press and hold the “FUN” key, and then press the “SET” key. Release both keys, the previous span calibration entry has been erased.

**NOTE:** Input signal from the transducer/s must be stable when entering the zero and span values.
The Model PS-1045 features a 10-point linearization option (available only with the front panel keys). Any number of points up to 10 may be used, however, the last point must always be the full scale value of the weighing system.

Example: A one point linearization correction would require a total of two points, one point within the range, and one point for full scale.

NOTE: Prior to performing the linearization correction, the unit must have already been calibrated using the 2-point method. The unit must be in CALIBR mode, known weight values must equal the points being set.

Multi-point Calibration via Front Panel Keys

1. With the unit in either “Basic or Complete Configuration” mode, press the “PRG” key (CAL will be blinking on the display).

2. Press and hold the “SET” key until Lin P1 is blinking on the display.

3. Apply a known weight for the first linearization point, and press the “PRG” key.

4. Enter the actual weight value using the “TAR” key to select each digit, then use the “UP” and “DOWN” keys to increment or decrement the value of the selected digit.

5. Press the “PRG” key. The unit will increment to the next linearization point (Lin P2).

6. Repeat steps 3 through 5 for additional points.

7. If all 10 points will be linearized, use the 1st. procedure. For linearization correction using less than 10 points, use the 2nd. procedure.

1st Procedure (10-point linearization)

7a. Enter the weight value for linearization point Lin P9, and press the “PRG” key (CAL will be blinking on the display). Press the “PRG” key again, (the display indicates CALIBR).

7b. Press the “TAR” key (the display will indicate STORE ?), press the “PRG” to save the changes and return to the operating mode.

2nd. Procedure (less than 10-point linearization)

7a. The last linearization point must be the full scale value. Press the “TAR” key, (CAL will be blinking on the display).

7b. Press the “PRG” key (the display will show CALIBR). Press the “TAR” key (the display will indicate STORE ?).

7c. Press the “PRG” key to save the changes and return to the operating mode.

NOTE: Input signal from the transducer/s must be stable when entering the linearization correction point values.
1. With the unit in “Complete Configuration” mode, press either the “UP” or “DOWN” keys until PARAM is shown on the display.

2. Press the “PRG” key to enter the sub-menu, then use either the “UP” or “DOWN” keys to select one of the sub-menu parameters.

3. Press the “PRG” key to view the default or previously selected value for that parameter.

4. To change the value, press the “TAR” key to select a digit, then use the “UP” or “DOWN” keys to increment or decrement the value of the selected digit.

5. Press the “PRG” key to enter the new value, then press either the “UP” or “DOWN” keys to move to the next sub-menu parameter or press the “TAR” key to return to the main menu.

6. To exit the configuration procedure, return to the main menu and press the “TAR” key, (the display indicates STORE ?), press the “PRG” key to save the changes and return to the operating mode.

See Table 2 on page 20 for a detailed explanation of the “PARAM” parameter selections.
Complete Configuration Menu (cont’d)

MODE 1

IN-OUT

SERIAL

ANALOG

CONFIG

CALIBR

PARAM

(MODE 1)(PRG)

NET

GROSS

PEAK H

N.O.

N.C.

POS.

NEG.

NORMAL

STABLE

HYST 1

HYST 2

(See notes on page 22)

Default = 2

(See notes on page 22)

Default = 2

HYST 1

HYST 2

(See notes on page 22)

Default = 2

(See notes on page 22)

Default = 2

TIMER 1

TIMER 2

Enter value 0.00 - 100.0
Default = 0

Enter value 0.00 - 100.0
Default = 0

TIMER 2

DELAY 1

DELAY 2

Enter value 0.00 - 100.0
Default = 0

Enter value 0.00 - 100.0
Default = 0

DELAY 1

DELAY 2

Enter value 0.00 - 100.0
Default = 0

Enter value 0.00 - 100.0
Default = 0

TAR

TAR

TAR

TAR

TAR

TAR

Continued on the following page
Complete Configuration Menu (cont’d)

Cont. from the previous page

See Table 1 on page 22 for a detailed explanation of the “IN - OUT” parameter selections
Complete Configuration Menu (cont’d)

- **SERIAL**
- **ANALOG**
- **CONFIG**
- **CALIBR**
- **PARAM**
- **IN-OUT**

**BAUD R**
- 2400
- 9600
- 19200
- 38400
- 115200

**PROTOCOL**
- CONT IN
- DEMAND
- AUTOM
- SLAVE
- MODBUS
- BCD
- NONE

**ADDRESS**
- Enter value 01 - 32
- Max # 32

**DELAY**
- Enter value 0.00 - 1.00
- Max 1 sec.

**REMOTE**

See Tables 3-5 (pages 20 and 21) for further explanation of the “SERIAL” parameter selections.
1. With the unit in “Complete Configuration” mode, press either the “UP” or “DOWN” keys until ANALOG is shown on the display.

2. Press the “PRG” key to enter the sub-menu, then use either the “UP” or “DOWN” keys to select one of the sub-menu parameters.

3. Press the “PRG” key to view the default or previously selected value for that parameter.

4. To change a parameter, press either the “UP” or “DOWN” keys to view the choices for that parameter. When the desired selection appears on the display, press the “PRG” key to enter the selection and move to the next parameter.

5. To edit numerical values, use the “TAR” key to select the digit, then use either the “UP” or “DOWN” keys to increment or decrement the value of the selected digit.

6. Press the “PRG” key to enter the new value, then press either the “UP” or “DOWN” keys to move to the next sub-menu parameter or press the “TAR” key to return to the main menu.

The “ANZERO” parameter is a negative weight value to which the zero offset of the analog output can be referred.

Example: If the selected range is 4/20 mA and the “ANZERO” value is “10”, the analog output value will be 4 mA when the weight is “−10”.

The Complete Configuration Menu (cont’d)
### Table 2

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>SELECTIONS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FILTER</td>
<td>0 to 9</td>
<td>Digital filtering value</td>
</tr>
<tr>
<td></td>
<td>(Default = 5)</td>
<td>0 = no filtering</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9 = maximum filtering</td>
</tr>
<tr>
<td>MOTION</td>
<td>0 to 4</td>
<td>Weight stabilization</td>
</tr>
<tr>
<td></td>
<td>(Default = 2)</td>
<td>0 = Weight always stable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 = slow stabilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 = fast stabilization</td>
</tr>
<tr>
<td>AUTO 0</td>
<td>0.0 to 10.0%</td>
<td>Auto zero range @ power up.</td>
</tr>
<tr>
<td></td>
<td>(of net weight value)</td>
<td>0 = function disabled</td>
</tr>
<tr>
<td>0 TRAC</td>
<td>0 to 4</td>
<td>Zero tracking range</td>
</tr>
<tr>
<td></td>
<td>(Default = 2)</td>
<td>0 = function disabled</td>
</tr>
<tr>
<td>0 BAND</td>
<td>1 to 200</td>
<td>Operating range of the “0” key (given as number of divisions)</td>
</tr>
<tr>
<td></td>
<td>(Default = 100)</td>
<td>0 = key disabled</td>
</tr>
</tbody>
</table>

Digital filtering affects the update rate and speed of the unit.

Filter setting = 0  Update rate = 25 Hz  Filter setting = 5  Update rate = 1 Hz
Filter setting = 1  Update rate = 10 Hz  Filter setting = 6  Update rate = 0.7 Hz
Filter setting = 2  Update rate = 5 Hz   Filter setting = 7  Update rate = 0.4 Hz
Filter setting = 3  Update rate = 2.5 Hz  Filter setting = 8  Update rate = 0.2 Hz
Filter setting = 4  Update rate = 1.5 Hz  Filter setting = 9  Update rate = 0.1 Hz

### Table 3

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>SELECTIONS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAUD R</td>
<td>2400, 9600, 19200, 38400, 115200</td>
<td>Baud rate selection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Standard baud rate: 9600</td>
</tr>
<tr>
<td>PROTOC</td>
<td>NONE</td>
<td>Serial port transmission mode selection</td>
</tr>
<tr>
<td></td>
<td>CONTIN</td>
<td>Standard transmission mode: Continuous</td>
</tr>
<tr>
<td></td>
<td>DEMAND</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AUTOM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SLAVE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MODBUS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BCD</td>
<td></td>
</tr>
<tr>
<td>ADDRESS</td>
<td>01 to 32</td>
<td>Identification address, selectable from 1 to 32</td>
</tr>
<tr>
<td>DELAY</td>
<td>0.00 to 1.00</td>
<td>Delay in responding to a data request from the host in “Demand” or “MODBUS” modes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time unit: 1/100 second (maximum 1 second)</td>
</tr>
<tr>
<td>REM-CO</td>
<td>REMOTE</td>
<td>Enables communication with Pro-View without re-positioning jumper (J1) as described on page 9.</td>
</tr>
</tbody>
</table>
Sub-menu parameter selections (cont’d)

Continuous transmission:
The transmission speed depends on the digital filter setting and the baud rate value selected. See Table 4 below for additional information.

Table 4

<table>
<thead>
<tr>
<th>DIGITAL FILTER</th>
<th>2400</th>
<th>9600</th>
<th>19,200</th>
<th>38,400</th>
<th>115,200</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>6 Hz</td>
<td>25 Hz</td>
<td>50 Hz</td>
<td>50 Hz</td>
<td>50 Hz</td>
</tr>
<tr>
<td>1</td>
<td>6 Hz</td>
<td>25 Hz</td>
<td>50 Hz</td>
<td>50 Hz</td>
<td>50 Hz</td>
</tr>
<tr>
<td>2</td>
<td>6 Hz</td>
<td>25 Hz</td>
<td>50 Hz</td>
<td>50 Hz</td>
<td>50 Hz</td>
</tr>
<tr>
<td>3</td>
<td>6 Hz</td>
<td>25 Hz</td>
<td>25 Hz</td>
<td>25 Hz</td>
<td>25 Hz</td>
</tr>
<tr>
<td>4</td>
<td>6 Hz</td>
<td>25 Hz</td>
<td>25 Hz</td>
<td>25 Hz</td>
<td>25 Hz</td>
</tr>
<tr>
<td>5</td>
<td>6 Hz</td>
<td>12 Hz</td>
<td>12 Hz</td>
<td>12 Hz</td>
<td>12 Hz</td>
</tr>
<tr>
<td>6</td>
<td>6 Hz</td>
<td>12 Hz</td>
<td>12 Hz</td>
<td>12 Hz</td>
<td>12 Hz</td>
</tr>
<tr>
<td>7</td>
<td>6 Hz</td>
<td>12 Hz</td>
<td>12 Hz</td>
<td>12 Hz</td>
<td>12 Hz</td>
</tr>
<tr>
<td>8</td>
<td>6 Hz</td>
<td>6 Hz</td>
<td>6 Hz</td>
<td>6 Hz</td>
<td>6 Hz</td>
</tr>
<tr>
<td>9</td>
<td>6 Hz</td>
<td>6 Hz</td>
<td>6 Hz</td>
<td>6 Hz</td>
<td>6 Hz</td>
</tr>
</tbody>
</table>

Driver for the optional BCD Board:
The transmission speed depends on the digital filter setting and the baud rate value selected. See Table 5 below for additional information.

Table 5

<table>
<thead>
<tr>
<th>DIGITAL FILTER</th>
<th>2400</th>
<th>9600</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>12 Hz</td>
<td>50 Hz</td>
</tr>
<tr>
<td>1</td>
<td>12 Hz</td>
<td>50 Hz</td>
</tr>
<tr>
<td>2</td>
<td>12 Hz</td>
<td>50 Hz</td>
</tr>
<tr>
<td>3</td>
<td>12 Hz</td>
<td>25 Hz</td>
</tr>
<tr>
<td>4</td>
<td>12 Hz</td>
<td>25 Hz</td>
</tr>
<tr>
<td>5</td>
<td>12 Hz</td>
<td>12 Hz</td>
</tr>
<tr>
<td>6</td>
<td>12 Hz</td>
<td>12 Hz</td>
</tr>
<tr>
<td>7</td>
<td>12 Hz</td>
<td>12 Hz</td>
</tr>
<tr>
<td>8</td>
<td>6 Hz</td>
<td>6 Hz</td>
</tr>
<tr>
<td>9</td>
<td>6 Hz</td>
<td>6 Hz</td>
</tr>
</tbody>
</table>
### Table 6

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>SELECTIONS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE 1</td>
<td>GROSS NET PEAK H</td>
<td>Operating mode selection for output number 1.</td>
</tr>
<tr>
<td></td>
<td>N.O N.C</td>
<td>Contact status below the setpoint value.</td>
</tr>
<tr>
<td></td>
<td>POS. NEG.</td>
<td>Comparison with positive or negative weight values.</td>
</tr>
<tr>
<td></td>
<td>NORMAL STABLE</td>
<td>Output enabled only after the weight reading has stabilized.</td>
</tr>
<tr>
<td>HYST - 1</td>
<td>(Default = 2)</td>
<td>Hysteresis setting, used to eliminate chattering of the relay @ coincidence point.</td>
</tr>
<tr>
<td>TIMER 1</td>
<td>0.0 to 10.0 (0 = disabled)</td>
<td>The output is disabled after the time period has expired. (1/10 second increments).</td>
</tr>
<tr>
<td>DELAY 1</td>
<td>0.0 to 10.0 (0 = disabled)</td>
<td>Time delay before the output is enabled. (1/10 second increments).</td>
</tr>
</tbody>
</table>

Same parameter selections as above for output 2.

| TEST IN     | See page 17       | Test procedure for inputs.                                                  |
| TEST OUT    |                   | Test procedure for outputs.                                                 |

**NOTES:**

1. The hysteresis setting must be less than its respective setpoint value. Entering a hysteresis setting greater than the setpoint value will automatically be replaced with a default setting of (2) counts.

2. Hysteresis settings of within 10 counts of their respective setpoint values are possible, however, much smaller values are normally sufficient.

3. A large hysteresis setting (4,990 counts) could be used as follows:

   Setpoint 1 is used to fill a vessel with 5,000 lbs. of product, and setpoint 2 will be used as a high weight alarm. When the weight in the vessel reaches 5,000 lbs., relay # 1 de-energizes stopping the flow, feed, etc. The product is drawn from the vessel as required, when the weight in the vessel reaches 10 lbs., setpoint # 1’s relay re-energizes and automatically refills the vessel to 5,000 lbs.
SECTION 3
SERIAL COMMUNICATION

Serial Data
Baud Rates
2400, 9600, 19200, 38400, and 115200.

Data Formats
All serial characters are in ASCII format, and consist of the following.

1 Start Bit, 8 Data Bits, 1 Stop Bit, No Parity

Transmission of the serial data can be initiated in several ways as described below.

Transmission modes

Automatic mode
The “Automatic” mode is used to interface with printers or other data acquisition devices. The serial data is transmitted automatically, upon stabilization whenever the weight value has increased or decreased more than 20 divisions. This function is not performed when the “MOTION” parameter is set to 0 (weight stability check disabled).

Continuous mode
The “Continuous” mode is used to interface with computers, remote displays, or other types of devices that require constant data updating.

Demand mode
The “Demand” mode is used to interface with printers and requires a manual print command from the front panel keys (Model 1045) or a remote contact closure to initiate the output.

In the above modes, the transmitter sends serial data using the format shown below:

<table>
<thead>
<tr>
<th>STX</th>
<th>&lt;status&gt;</th>
<th>&lt;net weight&gt;</th>
<th>&lt;gross weight&gt;</th>
<th>&lt;peak value&gt;</th>
<th>ETX</th>
<th>&lt;chksum&gt;</th>
<th>EOT</th>
</tr>
</thead>
</table>

STX (start of text) = 02h    ETX (end of text) = 03h    EOT (end of transmission) = 04h

- **<status>** = 1 ASCII character consisting of the following:
  - “S” = Stable
  - “M” = Motion
  - “O” = Overload
  - “E” = Error

- **<net weight>** = 6 ASCII characters
- **<gross weight>** = 6 ASCII characters
- **<peak value>** = 6 ASCII characters
- **<checksum>** = 2 ASCII characters (STX & ETX are not included in the checksum)

NOTE: The brackets “< “>” are not sent, they are only shown for clarification.

The checksum control value is obtained by performing the XOR operation.

It is expressed with 2 Hexadecimal digits. Example: 25 = 1D

The result of the above calculation equals 1 character, which can be a numerical value of 0 to 9 or A to F (Hexadecimal)
Serial Communication (cont’d)

Slave mode
The slave mode is used for interfacing with distributed control systems (DCS) or programmable logic controllers (PLC). This mode requires a data request from the master to initiate the output. In this mode the host sends serial data to the transmitter using the formats shown below:

```
<addr>  “N”  EOT
```

After receiving the request, the transmitter responds with the following data string.

```
<addr>  “N”  <status>  <net weight>  <gross weight>  <peak value>  ETX  <chksum>  EOT
```

In case of an error, the transmitter will respond with the following data string.

```
<addr>  NAK  EOT
```

In case of an error, the transmitter will respond with the following data string.

```
<addr>  serial address + 80h  Example: address 1 would be 1 + 80h = 81h
ETX (end of text) = 03h  EOT (end of transmission) = 04h
```

Character strings

- `<status>` = 1 ASCII character consisting of the following:
  - “S” = Stable
  - “M” = Motion
  - “O” = Overload
  - “E” = Error

- `<net weight>` = 6 ASCII characters
- `<gross weight>` = 6 ASCII characters
- `<peak value>` = 6 ASCII characters
- `<checksum>` = 2 ASCII characters (N & ETX are not included in the checksum)

NOTE: The brackets “< “>” are not sent, they are only shown for clarification.

The checksum control value is obtained by performing the XOR operation. It is expressed with 2 Hexadecimal digits. Example: 25 = 1D

The result of the above calculation equals 1 character, which can be a numerical value of 0 to 9 or A to F (Hexadecimal)
Set-points

Programming the set-points

Command from the host:

\[
\begin{array}{c|c|c|c|c|c}
\hline
<\text{addr}> & "S" & <s1> & <s2> & \text{ETX} & <\text{chksum}> & \text{EOT} \\
\hline
\end{array}
\]

\(<s1>\) = 6 ASCII characters for set-point 1
\(<s2>\) = 6 ASCII characters for set-point 2

The transmitter responds with the following data string:

\[
<\text{addr}> \text{ ACK } \text{ EOT}
\]

In case of an error, the transmitter will respond with the following data string:

\[
<\text{addr}> \text{ NAK } \text{ EOT}
\]

**NOTE:** Programmed values are stored in RAM, and are not retained if the power is removed. There is no limit, however, to the number of times that these commands can be performed.

Store set-point values in Eeprom

Command from the host:

\[
<\text{addr}> \ "M" \text{ EOT}
\]

The transmitter responds with the following data string:

\[
<\text{addr}> \ "M" \text{ EOT}
\]

In case of an error, the transmitter will respond with the following data string:

\[
<\text{addr}> \text{ NAK } \text{ EOT}
\]

This command is used to store the programmed set-point values in Eeprom. This command can be performed up to 100,000 times.

Request set-point values

Command from the host:

\[
<\text{addr}> \ "R" \text{ EOT}
\]

The transmitter responds with the following data string:

\[
<\text{addr}> \ "R" <s1> <s2> \text{ETX}<\text{chksum}>\text{EOT}
\]

In case of an error, the transmitter will respond with the following data string:

\[
<\text{addr}> \text{ NAK } \text{ EOT}
\]

Modbus mode

The Modbus mode is used to communicate with Modicon Programmable Controllers using a unique message structure that the controllers can understand regardless of the type of networks being used.

Please refer to the tables on pages 27 through 36 for information regarding the "MODBUS" RTU Protocol Specifications.

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Serial Output Wiring Connections

RS-232 serial connections to a computer, printer, remote serial display or other data acquisition device. See Figure 3 below.

RS-485 multi-drop serial configuration allows connection of up to 32 units to a distributed control system (DCS) or programmable logic controller (PLC). See Figure 4 below.
Modbus RTU Protocol Specifications

Precautions

The Modbus protocol writes directly into the memory of the instrument.

Use caution when sending data to the instrument:
The data being sent must be within the specified ranges given in the tables on the following pages.

Some of the data is written into the E2prom’s memory (refer to the column in the tables “Stored in E2prom”) for additional information. This memory can only be written to 100,000 times, therefore, you should avoid writing continuously into this memory.

**NOTE:** To confirm the storage of a new value in the E2prom, perform the MAKE - BACKUP function. If this function is not performed, all of the newly stored data will be lost when power is removed from the instrument.

The “Set point” setting does not require the MAKE - BACKUP function to be performed.

**The set point values are expressed as number of divisions**
This means that any set point value (temporary or permanent) has to be multiplied by the “Display division” data, in order to obtain the actual value of the set point.

E.G. Assuming that the “display division” value is 0.2; if the PLC asks for a set point value and get the data “3949” from the instrument, this means that the actual value of the set point is 789.8 (3949 x 0.2 = 789.8).

Even the other weight values are given as number of divisions, except for the “Net weight” and “Gross weight”.

“**Net weight**” and “**Gross weight**” (Modbus addresses 40006 and 40007) are given as absolute values

**Note:**
The numeric values on the following pages for addresses, codes, and data are represented as decimal values.

The addresses given in the following tables refer to the standards provided in the Modicon Modbus Protocol Reference Guide PI-MBUS-300 Rev J.

Data Format

- 1 Start Bit
- 8 Data Bits, The least significant bit (LSB) is sent first.
- No parity
- 2 Stop Bits

**List of Functions Supported**

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 (01)</td>
<td>READ COIL STATUS</td>
</tr>
<tr>
<td>03 (03)</td>
<td>READ HOLDING REGISTERS</td>
</tr>
<tr>
<td>04 (04)</td>
<td>READ INPUT REGISTERS</td>
</tr>
<tr>
<td>05 (05)</td>
<td>FORCE SINGLE COIL</td>
</tr>
<tr>
<td>06 (06)</td>
<td>PRESET SINGLE REGISTER</td>
</tr>
<tr>
<td>15 (0F)</td>
<td>FORCE MULTIPLE COILS</td>
</tr>
<tr>
<td>16 (10)</td>
<td>PRESET MULTIPLE REGISTERS</td>
</tr>
</tbody>
</table>

Hexadecimal values between brackets
Each single function is explained in detail on pages 30, 31 and 32 of the operator’s manual.

Each function is composed by a **Query** (request master → instrument) and a **Response** (answer instrument → master). Queries and responses are composed by a sequence of data that are briefly explained here below (*****), please note that the code “0x” before any value indicates that the value is represented as hexadecimal value.

**NOTE:** Besides, **all the Modbus addresses** (the ones mentioned in the left end column on pages 33 and 34) have to be represented as hexadecimal values, but, **only for these addresses, there is an important rule to be taken into consideration:**

Before converting the address into an hexadecimal value, the 1st digit on the left has not to be considered and the remaining 4 digits have to be decremented by “1”.

**1st Example:**

To represent the address 40150 (“display division” on page 33) as hexadecimal value, exclude the digit “4” (remains “0150”), then decrement by 1 the number “0150”. The result is “0149”, now perform the conversion into hexadecimal. The result is “00 95”. This is the value to be used in the query.

**2nd Example:**

To represent the address 40102 (“load cells sensitivity” on page 33) as hexadecimal value, exclude the digit “4” (remains “0102”), then decrement by 1 the number “0102”. The result is “0101”, now perform the conversion into hexadecimal. The result is “00 65”. This is the value to be used in the query.

(*****)

**Address:** is the number of the instrument’s address, represented as hexadecimal value (in this case do not decrement the number by 1).

**Function:** is the number of the function to be performed (see the table above).

**1st Output address:** is the address number where the reading of the outputs status has to start.

**Number of outputs:** is the number of the outputs to be read.

**1st Input address:** is the address number where the reading of the inputs has to start.

**Number of inputs:** is the number of the inputs to be read.

**Number of bytes:** represents the number of bytes which compose a data.

**2 byte CRC:** “Cyclical Redundancy Check”. It’s an algorithm used as checksum.

**Total byte:** Total number of bytes transmitted. **This data is not included in the strings.**

**Instrument Response Time**

The response time for most data requests is within 20 milliseconds.

**Exceptions:**

- E2prom Backup command (Maximum time = 350 milliseconds).
- Writing of the following registers: Load cell/s total capacity, load cell/s sensitivity, Net weight, Tare weight, and Filter (Maximum time = 550 milliseconds).

**RESPONSE TIME WHEN CONNECTING SEVERAL SLAVES**

**Single twisted pair**

<table>
<thead>
<tr>
<th>Query Master to slave 01</th>
<th>Response time slave 01</th>
<th>Response slave 01</th>
<th>20 msec delay</th>
<th>Query Master to slave 02</th>
</tr>
</thead>
</table>

**Double twisted pair**

<table>
<thead>
<tr>
<th>Query Master to slave 01</th>
<th>Response time slave 01</th>
<th>Response slave 01</th>
<th>delay</th>
<th>Query Master to slave 02</th>
</tr>
</thead>
</table>

With a baud rate of 19200 Time = 15 to 20 milliseconds

28
Scheme of the communication time in a Master-Slave RS-485 system, using a double twisted pair.

RTU Baud 9600

RTU Baud 19200
Transmission Strings

<table>
<thead>
<tr>
<th>Symbols used in the strings</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = 1 byte for slave address (Example: Slave Nº 17: A = 0x 11)</td>
</tr>
</tbody>
</table>

**FUNCTION 1: READ COIL STATUS**

**QUERY**

<table>
<thead>
<tr>
<th>Address</th>
<th>Function</th>
<th>1st. Output address</th>
<th>Number of outputs</th>
<th>2 byte</th>
<th>Total byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0x 01</td>
<td>0x 0000</td>
<td>0x 0008</td>
<td>CRC</td>
<td>8</td>
</tr>
</tbody>
</table>

**RESPONSE**

<table>
<thead>
<tr>
<th>Address</th>
<th>Function</th>
<th>Number of bytes</th>
<th>Status of outputs</th>
<th>2 byte</th>
<th>Total byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0x 01</td>
<td>0x 01</td>
<td>0x 00</td>
<td>CRC</td>
<td>6</td>
</tr>
</tbody>
</table>

Status of outputs: In this byte each output is identified by 1 bit.
The address of the 1st. output is the least significant bit (LSB) in this byte. (1 = On, 0 = Off).

**FUNCTION 2: READ INPUT STATUS**

**NOT USED**

**FUNCTION 3: READ HOLDING REGISTERS**

**QUERY**

<table>
<thead>
<tr>
<th>Address</th>
<th>Function</th>
<th>1st. Register address</th>
<th>Number of register</th>
<th>2 byte</th>
<th>Total byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0x 03</td>
<td>0x 0000</td>
<td>0x 0002</td>
<td>CRC</td>
<td>8</td>
</tr>
</tbody>
</table>

**RESPONSE**

<table>
<thead>
<tr>
<th>Address</th>
<th>Function</th>
<th>Number of bytes</th>
<th>1st. Register</th>
<th>2nd. Register</th>
<th>2 byte</th>
<th>Total byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0x 03</td>
<td>0x 04</td>
<td>0x 0064</td>
<td>0x 00C8</td>
<td>CRC</td>
<td>3 + 2 x Nº of registers + 2</td>
</tr>
</tbody>
</table>

**FUNCTION 4: READ INPUT REGISTERS (“read only”)**

**QUERY**

<table>
<thead>
<tr>
<th>Address</th>
<th>Function</th>
<th>1st. Register address</th>
<th>Number of register</th>
<th>2 byte</th>
<th>Total byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0x 04</td>
<td>0x 0000</td>
<td>0x 0001</td>
<td>CRC</td>
<td>8</td>
</tr>
</tbody>
</table>

**RESPONSE**

<table>
<thead>
<tr>
<th>Address</th>
<th>Function</th>
<th>Number of bytes</th>
<th>1st. register</th>
<th>2 byte</th>
<th>Total byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0x 04</td>
<td>0x 02</td>
<td>0x 0064</td>
<td>CRC</td>
<td>3 + 2 x Nº of registers + 2</td>
</tr>
</tbody>
</table>
**FUNCTION 5: FORCE SINGLE COIL**

**QUERY**

<table>
<thead>
<tr>
<th>Address</th>
<th>Function</th>
<th>Output address</th>
<th>Status of output</th>
<th>2 byte</th>
<th>Total byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0x 05</td>
<td>0x 0000</td>
<td>0x FF00</td>
<td>CRC</td>
<td>8</td>
</tr>
</tbody>
</table>

**RESPONSE**

<table>
<thead>
<tr>
<th>Address</th>
<th>Function</th>
<th>Output address</th>
<th>Status of output</th>
<th>2 byte</th>
<th>Total byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0x 05</td>
<td>0x 0000</td>
<td>0x FF00</td>
<td>CRC</td>
<td>8</td>
</tr>
</tbody>
</table>

Status of output: (FF00 = On, 0000 = Off)
The response includes the echo of the query

**FUNCTION 6: PRESET SINGLE REGISTER**

**QUERY**

<table>
<thead>
<tr>
<th>Address</th>
<th>Function</th>
<th>Register address</th>
<th>Register value</th>
<th>2 byte</th>
<th>Total byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0x 06</td>
<td>0x 0000</td>
<td>0x 1234</td>
<td>CRC</td>
<td>8</td>
</tr>
</tbody>
</table>

**RESPONSE**

<table>
<thead>
<tr>
<th>Address</th>
<th>Function</th>
<th>Register address</th>
<th>Register value</th>
<th>2 byte</th>
<th>Total byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0x 06</td>
<td>0x 0000</td>
<td>0x 1234</td>
<td>CRC</td>
<td>8</td>
</tr>
</tbody>
</table>

The response includes the echo of the query

**FUNCTION 7: READ EXCEPTION STATUS**

NOT USED

**FUNCTION 8: DIAGNOSTIC**

NOT USED

**FUNCTION 11: FETCH COMM EVENT CTR**

NOT USED

**FUNCTION 12: FETCH COMM EVENT LOG**

NOT USED

**FUNCTION 15: FORCE MULTIPLE COILS**

**QUERY**

<table>
<thead>
<tr>
<th>Address</th>
<th>Function</th>
<th>1st. Output address</th>
<th>Nº of outputs</th>
<th>Nº of bytes</th>
<th>Status of outputs</th>
<th>2 byte</th>
<th>Total byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0x 0F</td>
<td>0x 0000</td>
<td>0x 0002</td>
<td>0x 01</td>
<td>0x 00</td>
<td>CRC</td>
<td>10</td>
</tr>
</tbody>
</table>

**RESPONSE**

<table>
<thead>
<tr>
<th>Address</th>
<th>Function</th>
<th>1st. Output address</th>
<th>Nº of outputs</th>
<th>Nº of bytes</th>
<th>2 byte</th>
<th>Total byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0x 0F</td>
<td>0x 0000</td>
<td>0x 0002</td>
<td>CRC</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

Number of outputs: Number of the output to be written, starting from the address.
Number of bytes: Number of bytes transmitted as status of outputs (8 outputs each byte)
Status of outputs: 1 output each bit (1 = On, 0 = Off); the 1st. Output coincides with the least significant bit (LSB) of the 1st. Byte. Non-significant bits are set to zero.
The response includes the identification of the modified outputs.
FUNCTION 16: PRESET MULTIPLE REGISTERS

QUERY

<table>
<thead>
<tr>
<th>Address</th>
<th>Function</th>
<th>1st. Register output</th>
<th>Number of register</th>
<th>Number of bytes</th>
<th>1st. Register value</th>
<th>2nd. Register value</th>
<th>Total byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0x 10</td>
<td>0x 0000</td>
<td>0x 0002</td>
<td>0x 04</td>
<td>0x 0000</td>
<td>0x 0000</td>
<td>CRC</td>
</tr>
</tbody>
</table>

RESPONSE

<table>
<thead>
<tr>
<th>Address</th>
<th>Function</th>
<th>1st. Register address</th>
<th>Nº of registers</th>
<th>2 byte</th>
<th>Total byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0x 10</td>
<td>0x 0000</td>
<td>0x 0002</td>
<td>CRC</td>
<td>8</td>
</tr>
</tbody>
</table>

Number of registers: Number of the registers to be written, starting from the address.
Number of bytes: Number of bytes transmitted as registers value (2 bytes each register)
Registers value: Content of the registers, starting from the 1st.
The response includes the identification of the modified registers.

Broadcast Mode

This function is not implemented in the instrument.

Communication Errors

The communication strings are controlled by the CRC (Cyclical Redundancy Check). If a communication error occurs, the slave unit doesn’t answer. The master unit controls a timeout when waiting for the response from the slave. If the slave doesn’t answer during this timeout, it means that a communication error has occurred.

Errors in the Received Data

If the string is received correctly but is not executable, the slave answers the master with an EXCEPTION RESPONSE. The field “function” is transmitted having the most significant digit (MSD) set to 1.

EXCEPTION RESPONSE

<table>
<thead>
<tr>
<th>Address</th>
<th>Function</th>
<th>Exception code</th>
<th>2 byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Function + 80h</td>
<td>0x 01</td>
<td>CRC</td>
</tr>
</tbody>
</table>

Description of the Exception codes.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ILLEGAL FUNCTION (The function is not valid or not supported)</td>
</tr>
<tr>
<td>2</td>
<td>ILLEGAL DATA ADDRESS (The specified data address is not available)</td>
</tr>
<tr>
<td>3</td>
<td>ILLEGAL DATA VALUE (The data value received is not valid)</td>
</tr>
</tbody>
</table>
# Registers and Functions

## List of the Holding Registers (4x)

<table>
<thead>
<tr>
<th>Modbus Address</th>
<th>Description</th>
<th>Range Value</th>
<th>Stored in E2prom</th>
</tr>
</thead>
<tbody>
<tr>
<td>40001</td>
<td>Set point 1 temporary</td>
<td>0 to full scale</td>
<td>NO</td>
</tr>
<tr>
<td>40002</td>
<td>Set point 2 temporary</td>
<td>0 to full scale</td>
<td>NO</td>
</tr>
<tr>
<td>40003</td>
<td>Command register</td>
<td>01-05, 10, 12-13, 20 (Hex)</td>
<td>See relative table (page 36)</td>
</tr>
<tr>
<td>40004</td>
<td>Set point 1 permanent</td>
<td>SET 1</td>
<td></td>
</tr>
<tr>
<td>40005</td>
<td>Set point 2 permanent</td>
<td>SET 2</td>
<td></td>
</tr>
<tr>
<td>40006</td>
<td>Net weight value (H)</td>
<td>0 to full scale</td>
<td></td>
</tr>
<tr>
<td>40007</td>
<td>Net weight value (L)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40008</td>
<td>Input status byte</td>
<td></td>
<td>See relative table (page 35)</td>
</tr>
<tr>
<td>40009</td>
<td>Gross weight value (H)</td>
<td>0 to full scale</td>
<td></td>
</tr>
<tr>
<td>40010</td>
<td>Gross weight value (L)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40020</td>
<td>Peak gross weight</td>
<td>0 to full scale</td>
<td>NO</td>
</tr>
<tr>
<td>40081</td>
<td>Command data register</td>
<td>11 (Hex)</td>
<td>See relative table (page 36)</td>
</tr>
<tr>
<td>40082</td>
<td>Status register</td>
<td>00, 03-05 (Hex)</td>
<td>See relative table (page 36)</td>
</tr>
<tr>
<td>40083</td>
<td>Status data register</td>
<td>06 (Hex)</td>
<td>See relative table (page 36)</td>
</tr>
<tr>
<td>40100</td>
<td>Load cell/s total capacity (kg) H</td>
<td>CAPAC</td>
<td>0-500000 (1)</td>
</tr>
<tr>
<td>40101</td>
<td>Load cell/s total capacity (kg) L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40102</td>
<td>Sensitivity of load cell/s</td>
<td>SENSIT</td>
<td>1.0000 - 4.0000 (5)</td>
</tr>
<tr>
<td>40103</td>
<td>Net weight of the weighing system (H)</td>
<td>NET</td>
<td>0 to full scale (1)</td>
</tr>
<tr>
<td>40104</td>
<td>Net weight of the weighing system (L)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40105</td>
<td>Dead load of the weighing system (H)</td>
<td>DEAD L</td>
<td>0 to full scale (1)</td>
</tr>
<tr>
<td>40106</td>
<td>Dead load of the weighing system (L)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40110</td>
<td>Operating mode</td>
<td>OPMODE</td>
<td>0-2 (3)</td>
</tr>
<tr>
<td>40150</td>
<td>Display divisions</td>
<td>DSPDIV</td>
<td>0 - 14 (2)</td>
</tr>
<tr>
<td>40180</td>
<td>Digital filter value</td>
<td>FILTER</td>
<td>0-9 (3)</td>
</tr>
<tr>
<td>40181</td>
<td>Motion band value</td>
<td>MOTION</td>
<td>0-4 (3)</td>
</tr>
<tr>
<td>40182</td>
<td>Auto zero value</td>
<td>AUTO 0</td>
<td>0.1-10.00 (3) (5)</td>
</tr>
<tr>
<td>40183</td>
<td>Zero tracking value</td>
<td>0 TRAC</td>
<td>0-4 (3)</td>
</tr>
<tr>
<td>40200</td>
<td>Operating mode Set point 1</td>
<td>MODE 1</td>
<td></td>
</tr>
<tr>
<td>40201</td>
<td>Hysteresis Set point 1</td>
<td>HYST 1</td>
<td>0 to full scale</td>
</tr>
<tr>
<td>40202</td>
<td>Timer Set point 1</td>
<td>TIMER1</td>
<td>0.1-100.0 (5)</td>
</tr>
<tr>
<td>40203</td>
<td>Delay Set point 1</td>
<td>DELAY1</td>
<td>0.1-100.0 (5)</td>
</tr>
<tr>
<td>40204</td>
<td>Operating mode Set point 2</td>
<td>MODE 2</td>
<td></td>
</tr>
<tr>
<td>40205</td>
<td>Hysteresis Set point 2</td>
<td>HYST 2</td>
<td>0 to full scale</td>
</tr>
<tr>
<td>40206</td>
<td>Timer Set point 2</td>
<td>TIMER2</td>
<td>0.1-100.0 (5)</td>
</tr>
<tr>
<td>40207</td>
<td>Delay Set point 2</td>
<td>DELAY2</td>
<td>0.1-100.0 (5)</td>
</tr>
</tbody>
</table>

Holding Register Table continued on the following page.
**List of the Holding Registers (4x) cont’d**

<table>
<thead>
<tr>
<th>Serial Configuration</th>
<th>Relevant menu</th>
<th>Value range</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>40300 Baud rate</td>
<td>BAUD R</td>
<td>0-4 (3)</td>
<td>YES</td>
</tr>
<tr>
<td>40301 Serial address</td>
<td>ADDRES</td>
<td>1-32</td>
<td>YES</td>
</tr>
<tr>
<td>40302 Response delay</td>
<td>DELAY</td>
<td>0-100</td>
<td>YES</td>
</tr>
</tbody>
</table>

**Analog Output**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>40400 Analog output full scale</td>
<td>F-SCAL</td>
<td>0 to full scale</td>
<td>YES</td>
</tr>
<tr>
<td>40401 Analog output operating mode</td>
<td>MODE</td>
<td>0-3 (3)</td>
<td>YES</td>
</tr>
<tr>
<td>40402 Analog output range</td>
<td>RANGE</td>
<td>0-3 (3)</td>
<td>YES</td>
</tr>
<tr>
<td>40403 Zero offset</td>
<td>OFFSET</td>
<td></td>
<td>(4)</td>
</tr>
<tr>
<td>40404 Full scale offset</td>
<td>OFFSET</td>
<td></td>
<td>(4)</td>
</tr>
<tr>
<td>40405 An-Zero (negative weight value for zero analog output)</td>
<td>ANZERO</td>
<td></td>
<td>YES</td>
</tr>
</tbody>
</table>

1. The combined theoretical net and tare weight values must not exceed the total capacity value.
2. Refer to the 15 values from 0.001 to 50.
3. For the list of values please refer to the user manual.
4. They are stored in the E2prom if writing the function 0000 in the status register.
5. When setting these values the decimal point must not be included.

**Serial parameter specifications:**

- Once the “serial address” and “response delay” have been modified, they take effect immediately.
- The serial port mode can’t be modified via Modbus.
- When setting a new baud rate value, the power to the instrument must be removed and re-applied in order for the changes to take effect.

**TABLE “A”**

**IDENTIFICATION CODES**

<table>
<thead>
<tr>
<th>Code</th>
<th>Display divisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (00)</td>
<td>0.001</td>
</tr>
<tr>
<td>1 (01)</td>
<td>0.002</td>
</tr>
<tr>
<td>2 (02)</td>
<td>0.005</td>
</tr>
<tr>
<td>3 (03)</td>
<td>0.01</td>
</tr>
<tr>
<td>4 (04)</td>
<td>0.02</td>
</tr>
<tr>
<td>5 (05)</td>
<td>0.05</td>
</tr>
<tr>
<td>6 (06)</td>
<td>0.1</td>
</tr>
<tr>
<td>7 (07)</td>
<td>0.2</td>
</tr>
<tr>
<td>8 (08)</td>
<td>0.5</td>
</tr>
<tr>
<td>9 (09)</td>
<td>1</td>
</tr>
<tr>
<td>10 (0A)</td>
<td>2</td>
</tr>
<tr>
<td>11 (0B)</td>
<td>5</td>
</tr>
<tr>
<td>12 (0C)</td>
<td>10</td>
</tr>
<tr>
<td>13 (0D)</td>
<td>20</td>
</tr>
<tr>
<td>14 (0E)</td>
<td>50</td>
</tr>
</tbody>
</table>

Hexadecimal values between brackets
### Table of the Input Status bytes

<table>
<thead>
<tr>
<th>Description</th>
<th>Bit’s meaning</th>
<th>0</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net weight polarity</td>
<td></td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Gross weight polarity</td>
<td></td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Stable weight</td>
<td>no</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Millivolt polarity</td>
<td></td>
<td>+</td>
<td>yes</td>
</tr>
<tr>
<td>Underload condition</td>
<td>no</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Overload condition</td>
<td>no</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Off range condition</td>
<td>no</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Preset tare condition</td>
<td>no</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Input 1</td>
<td>De-activated</td>
<td></td>
<td>Activated</td>
</tr>
<tr>
<td>Input 2</td>
<td>De-activated</td>
<td></td>
<td>Activated</td>
</tr>
</tbody>
</table>

The Modbus address 40008 is composed of 2 bytes. The conversion of these 2 bytes from hex into binary gives the meaning of each single bit described in this table.

E.g. If the bytes in the address 40008 are 00 85, the conversion into binary gives the sequence of bits 10000101. The digit at the right hand side matches with the 1st bit (Net weight polarity), therefore the values given in the above mentioned example are equivalent to:

- Net weight polarity = negative
- Gross weight polarity = positive
- Weight stability = yes
- Millivolt polarity = positive
- Underload, Overload, Off range condition = no
- Preset tare condition = no
- Input 1 = De-activated
- Input 2 = De-activated

### List of the Input Registers (3x)

<table>
<thead>
<tr>
<th>Modbus Address</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>30003</td>
<td>A/D converter internal counts H</td>
</tr>
<tr>
<td>30004</td>
<td>A/D converter internal counts L</td>
</tr>
<tr>
<td>30005</td>
<td>Millivolt value</td>
</tr>
<tr>
<td>30006</td>
<td>Instrument software release</td>
</tr>
</tbody>
</table>

### List of the coils (0x)

<table>
<thead>
<tr>
<th>Modbus Address</th>
<th>Description</th>
<th>Bit’s meaning</th>
<th>Range value</th>
<th>Stored in E2prom</th>
</tr>
</thead>
<tbody>
<tr>
<td>00001</td>
<td>Logic output 1</td>
<td>De-activated</td>
<td>Activated</td>
<td>1 bit, NO</td>
</tr>
<tr>
<td>00002</td>
<td>Logic output 2</td>
<td>De-activated</td>
<td>Activated</td>
<td>1 bit, NO</td>
</tr>
</tbody>
</table>
### List of the functions “Command register”

<table>
<thead>
<tr>
<th>Function Codes</th>
<th>Description</th>
<th>Function Command Data Register</th>
<th>Stored in E2prom</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001 (01 Hex)</td>
<td>Semi-automatic zero</td>
<td>-</td>
<td>NO</td>
</tr>
<tr>
<td>0002 (02 Hex)</td>
<td>Auto tare</td>
<td>-</td>
<td>NO</td>
</tr>
<tr>
<td>0003 (03 Hex)</td>
<td>Peak reset</td>
<td>-</td>
<td>NO</td>
</tr>
<tr>
<td>0004 (04 Hex)</td>
<td>Force net weight visualization</td>
<td>-</td>
<td>NO</td>
</tr>
<tr>
<td>0005 (05 Hex)</td>
<td>Force gross weight visualization</td>
<td>-</td>
<td>NO</td>
</tr>
<tr>
<td>0016 (10 Hex)</td>
<td>Zero calibration</td>
<td>-</td>
<td>YES</td>
</tr>
<tr>
<td>0017 (11 Hex)</td>
<td>Full scale calibration</td>
<td>Sample weight</td>
<td>YES</td>
</tr>
<tr>
<td>0018 (12 Hex)</td>
<td>Reset zero calibration</td>
<td>-</td>
<td>YES</td>
</tr>
<tr>
<td>0019 (13 Hex)</td>
<td>Reset full scale calibration</td>
<td>-</td>
<td>YES</td>
</tr>
<tr>
<td>0032 (20 Hex)</td>
<td>Back-up E2prom</td>
<td>-</td>
<td>YES</td>
</tr>
</tbody>
</table>

### List of the functions “Status register”

<table>
<thead>
<tr>
<th>Function Codes</th>
<th>Description</th>
<th>Function Status Data Register</th>
<th>Stored in E2prom</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000 (00 Hex)</td>
<td>None of the functions are activated</td>
<td>-</td>
<td>NO</td>
</tr>
<tr>
<td>0003 (03 Hex)</td>
<td>Analog output zero offset adjustment</td>
<td>-</td>
<td>YES</td>
</tr>
<tr>
<td>0004 (04 Hex)</td>
<td>Analog output full scale offset adjustment</td>
<td>-</td>
<td>YES</td>
</tr>
<tr>
<td>0005 (05 Hex)</td>
<td>Test input / output</td>
<td>-</td>
<td>NO</td>
</tr>
<tr>
<td>0006 (06 Hex)</td>
<td>Test analog output</td>
<td>Analog output (0-64000)</td>
<td>NO</td>
</tr>
</tbody>
</table>

For additional information regarding the Modbus protocol, please refer to the Modbus Protocol Manual PI-MBUS-300 Rev J.
Options

PS-121, 24 Volt Power Supply

Installation

- Make sure the installation complies with local regulations and electrical codes.
- Connect AC voltage to the terminals marked “L” and “N”.
- The DC voltage is available on the terminals marked “+” and “-”.
- A red LED is illuminated when the power supply is “ON”.

Notes: The power supply should be used to power two transmitters only when a single load cell is connected to each transmitter. For multiple load cell applications it is recommended that an individual power supply be used for each transmitter. This enables the power supply to compensate for any fluctuations in the incoming line voltage. Recent field experiences have shown that voltage drops of greater than 10% can cause the transmitters to drift and become unstable.

Fuse Replacement

- The following procedures require work inside the power supply enclosure and should be performed by qualified Nobel Weighing Systems service personnel.
- Before opening the unit, disconnect the AC voltage.
- Remove the front cover from the power supply.
- Press down gently on the cover of the fuse holder, and turn counter-clockwise.
- Pull out the cover and fuse as an assembly, replace fuse with a new one.
- Re-install fuse and cover as an assembly, press down gently and turn clockwise.
- Replace the front cover on the power supply.
- Re-apply AC voltage to the unit.

In the event of a malfunction, please contact Nobel Weighing Systems Field Service for assistance. Any attempt to modify or repair the power supply will void the manufacturers warranty.
EC DECLARATION OF CONFORMITY

We: Vishay Nobel AB
    Box 423
    S-691 27 KARLSKOGA
    SWEDEN

Hereby declares that the product: **PS-1040**
Complies with the essential requirements of the directives 73/23/CEE, 89/336/CEE,
93/68/CEE, when used for its intended purpose

The product is made in accordance with the following standards

**ELECTROMAGNETIC COMPATIBILITY:**

EN 61000-3-2
EN 61000-3-3
EN 61000-6-2
EN 61000-6-3
EN 61326-1

**ELECTRICAL SAFETY:**

EN 61010-1

The CE mark has been applied on the product

Karlskoga, May 07, 2004

[Signature]

Bertil Schultz, Managing director
EC DECLARATION OF CONFORMITY

We: Vishay Nobel AB
    Box 423
    S-691 27 KARLSKOGA
    SWEDEN

Hereby declares that the product: PS-1045
Complies with the essential requirements of the directives 73/23/CEE, 89/336/CEE,
93/68/CEE, when used for its intended purpose

The product is made in accordance with the following standards

ELECTROMAGNETIC COMPATIBILITY:

EN 61000-3-2
EN 61000-3-3
EN 61000-6-2
EN 61000-6-3
EN 61326-1

ELECTRICAL SAFETY:

EN 61010-1

The CE mark has been applied on the product

Karlskoga, May 07, 2004

Bengt Schultz, Managing director
EC DECLARATION OF CONFORMITY

We: Vishay Nobel AB
Box 423
S-691 27 KARLSKOga
SWEDEN

Hereby declares that the product: PS-121
Complies with the essential requirements of the directives 73/23/CEE, when used for its
intended purpose

The product is made in accordance with the following standards

ELECTROMAGNETIC COMPATIBILITY:

EN 61000-3-2
EN 61000-3-3

ELECTRICAL SAFETY:

EN 61010-1

The CE mark has been applied on the product

Karlskoga, May 07, 2004

[Signature]
Bengt Schultz, Managing director