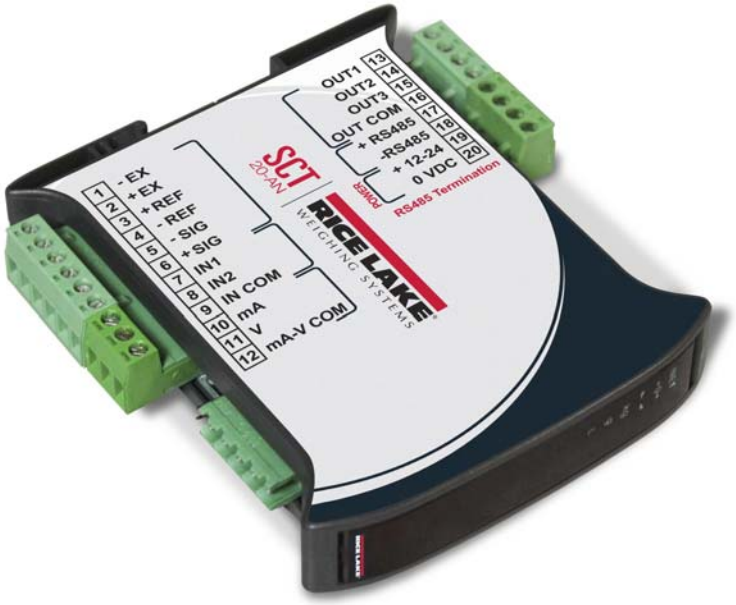
# SCT Weight Transmitter

*20 Series*

# Installation & Operator's Manual




RICE LAKE®
WEIGHING SYSTEMS
To be the best by every measure®

*131128 Rev C*

# Content

# 1.0 Introduction

Manuals can be viewed and downloaded from the Rice Lake Weighing Systems website at www.ricelake.com.

## 1.1 Safety

### Safety Symbol Definitions:

**WARNING** *Indicates a potentially hazardous situation that, if not avoided could result in death or serious injury, and includes hazards that are exposed when guards are removed.*

**Important** *Indicates information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.*

*Do not operate or work on this equipment unless you have read and understand the instructions and warnings in this Manual. Contact any Rice Lake Weighing Systems dealer for replacement manuals. Proper care is your responsibility.*

### General Safety

**WARNING**

*Failure to heed may result in serious injury or death.*

*Risk of electrical shock. No user serviceable parts. Refer to qualified service personnel for service.*

*The unit has no power switch, to completely remove D/C power from the unit, disconnect the D/C power cable from the main socket.*

*DO NOT allow minors (children) or inexperienced persons to operate this unit.*

*DO NOT operate without all shields and guards in place.*

*DO NOT use for purposes other then weighing applications.*

*DO NOT place fingers into slots or possible pinch points.*

*DO NOT use this product if any of the components are cracked.*

*DO NOT make alterations or modifications to the unit.*

*DO NOT remove or obscure warning labels.*

*DO NOT use near water.*

## 1.2 Equipment Recommendations

**Important** *Failure to follow the installation recommendations will be considered a misuse of the equipment.*

### To Avoid Equipment Damage

- Keep away from heat sources and direct sunlight.
- Protect the instrument from rain.
- Do not wash, dip in water or spill liquid on the instrument.
- Do not use solvents to clean the instrument.
- Do not install in areas subject to explosion hazard.

### 1.2.1 Correct Installation Of Weighing Instruments

- The terminals indicated on the instrument's wiring diagram to be connected to earth must have the same potential as the scale structure (ground). If you are unable to ensure this condition, connect a ground wire between the instrument and the scale structure.
- The load cell cable must be run separately to the instrument input and not share a conduit with other cables. A shielded connection must be continuous without a splice.
- Use "RC" filters (quench-arcs) on the instrument-driven solenoid valve and remote control switch coils.
- Avoid electrical noise in the instrument panel; if inevitable, use special filters or sheet metal partitions to isolate.
- The panel installer must provide electrical protection for the instruments (fuses, door lock switch, etc.).
- It is advisable to leave equipment always switched on to prevent the formation of condensation.
- Maximum Cable Lengths:
    - RS-485: 1000 meters with AWG24, shielded and twisted cables
    - RS-232: 15 meters for baud rates up to 19200

### 1.2.2 Correct Installation Of The Load Cells

#### Installing Load Cells:

The load cells must be placed on rigid, stable structures within 0.5% of plumb and level. It is important to use mounting modules for load cells to compensate for misalignment of the support surfaces.

#### Protection Of The Load Cell Cable:

Use water-proof sheaths and joints in order to protect the cables of the load cells.

#### Mechanical Restraints (pipes, etc.):

When pipes are present, we recommend the use of hoses, flexible couplings and rubber skirted joints. In case of rigid conduit and pipes, place the pipe support or anchor bracket as far as possible from the weighed structure (at a distance at least 40 times the diameter of the pipe).

#### Connecting Several Load Cells In Parallel:

Connect several load cells in parallel by using, if necessary, a watertight junction box with terminal box. The load cell connection extension cables must be shielded, run individually into their piping or conduit and laid as far as possible from the high voltage cables.

#### Welding:

Avoid welding with the load cells already installed. If this cannot be avoided, place the welder ground clamp close to the required welding point to prevent sending current through the load cell body.

### Windy Conditions - Shocks - Vibrations:

The use of weigh modules is strongly recommended for all load cells to compensate for misalignment of the support surfaces. The system designer must ensure that the scale is protected against lateral shifting and tipping relating to shocks and vibration, windy conditions, seismic conditions and stability of the support structure.

### Grounding The Weighed Structure:

By means of a 10ga solid or braided wire or braided grounding strap, connect the load cell upper support plate with the lower support plate, then connect all the lower plates to a single earth ground. Once installed electrostatic charges accumulated are discharged to the ground without going through or damaging the load cells. Failure to implement a proper grounding system might not affect the operation of the weighing system; this, however, does not rule out the possibility that the load cells and connected instrument may become damaged by ESD. It is forbidden to ensure grounding system continuity by using metal parts contained in the weighed structure.(see Figure 1-1.)

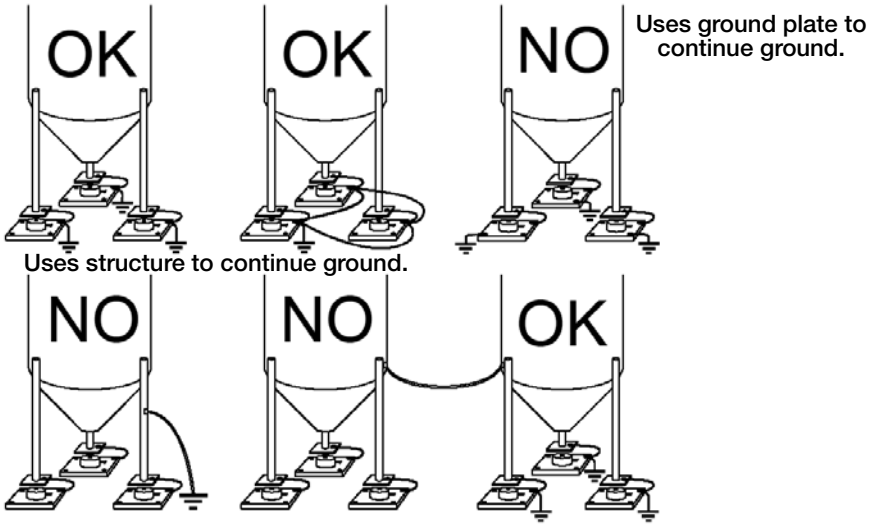



*Figure 1-1. Installation Recommendations*

## 1.3 Load Cells

### 1.3.1 Load Cell Input Test (Quick Access)

1. From the weight display, press ▲ for three seconds.
2. The display will read MV-CEL. Press ↵.
3. The response signal of the load cell is displayed, expressed in mV with four decimals. Press ✕ three times to exit test mode.

### 1.3.2 Load Cell Testing

#### Load Cell Resistance Measurement (Use A Digital Multimeter):

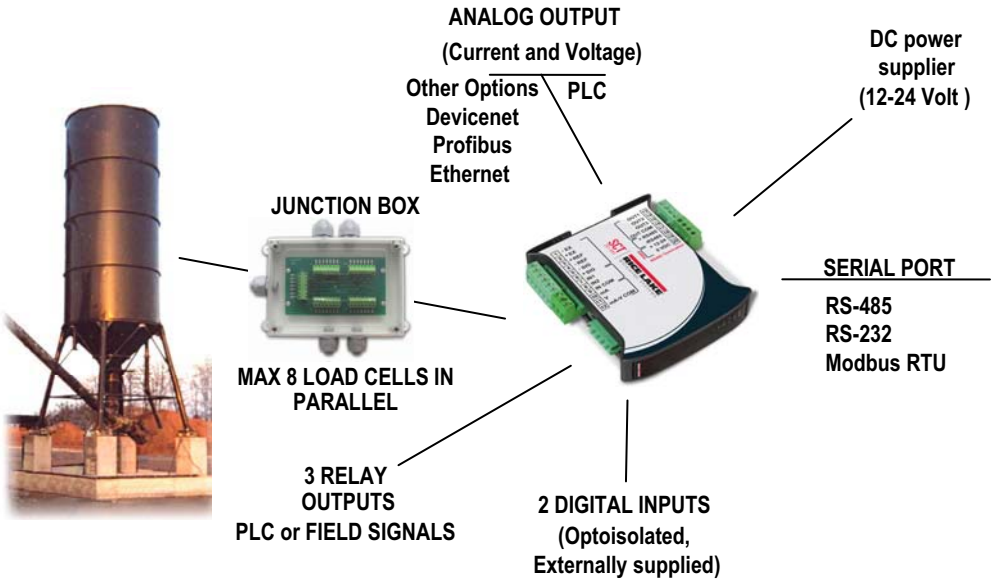
- Disconnect the load cells from the instrument and check that there is no moisture in the load cell junction box caused by condensation or water infiltration. If so, drain the system or replace it if necessary.
- The value between the positive signal wire and the negative signal wire must be equal or similar to the one indicated in the load cell data sheet (output resistance).
- The value between the positive excitation wire and the negative excitation wire must be equal or similar to the one indicated in the load cell data sheet (input resistance).
- The insulation value between the shield and any other load cell wire and between any other load cell wire and the body of the load cell must be higher than 20 Mohm (mega ohms).

### Load Cell Voltage Measurement (Use A Digital Multimeter):

- Remove weight of scale from load cell to be tested.
- Make sure that the excitation wires of the load cell connected to the instrument is 5 Vdc +/- 3%.
- Measure the millivolt signal between the positive and the negative signal wires by directly connecting them to the multi-meter, and make sure it reads between 0 and 0.5 mV (thousandths of a Volt).
- Apply load to the load cell and make sure that there is a signal increment.

**Important** *If one of the above conditions is not met, please contact the technical assistance service.*

## 1.4 Specifications




- Weight indicator and transmitter for Omega/DIN rail mounting suitable for back panel; space saving vertical shape. Six-digit semi alphanumeric display (18mm h), 7 segment. Four-key keyboard. Dimensions: 25x115x120 mm.
- Displays the gross weight; with an external contact capable of remote zeroing and gross/net switching.
- Peak weight function.
- Analog Output Option - Transmits the gross or net weight via opto-isolated analog output 16 bit, current 0-20mA, 4-20mA or voltage 0-10V, 0-5V (±0V / ±5V by closing a soldered in jumper).

  **DeviceNet Option** – It has a DeviceNet DP V0 Slave port that allows to exchange the main system parameters with a DeviceNet master.

  **Profibus Option** – It has a Profibus DP V0 Slave port that allows to exchange the main system parameters with a Profibus master.

  **Ethernet Option** – It has an Ethernet/IP device port that allows to exchange the main system parameters with an Ethernet/IP scanner.

  **Modbus/TCP Option** – It has a Modbus/TCP device port that allows to exchange the main system parameters with a Modbus/TCP master.
- Transmits the gross or net weight via RS-485 serial port, by means of protocols:
  - Modbus RTU
  - ASCII bidirectional protocol
  - Continuous transmission

| | |
|---|---|
| Power Supply and Consumption (VDC) | 12 - 24 VDC +/- 10% ; 5 W |
| No. of Load Cells in Parallel And Supply | max 8 ( 350 ohm ) ; 5VDC/120mA |
| Linearity / Analog Output Linearity | < 0.01% F.S. / < 0.01% F.S. |
| Thermal Drift | < 0.0005 % F.S. /°C ;<br>< 0.003 % F.S./°C (Analog Only) |
| A/D Converter | 24 bit (16.000.000 points) |
| Max Divisions (With Measurement Range: +/-10mv = Sens. 2mv/v) | +/- 999999 |
| Measurement Range | +/- 39 mV |
| Max Sensitivity of Usable Load Cells | +/-7mV/V |
| Max Conversions Per Second | 300 conversions/second |
| Display Range | - 999999 ; + 999999 |
| No. of Decimals / Display Increments | 0 - 4 / x 1 x 2 x 5 x 10 x 20 x 50 x 100 |
| Digital Filter / Readings Per Second | 0.060–7sec/5-300Hz (Analog,DeviceNet)<br>0.012-7sec/5-300Hz (Ethernet,Profibus) |
| Relay Logic Outputs | N.3 - max 115 VAC ; 150mA |
| Logic Inputs | N.2 - optoisolated 5 - 24 VDC PNP |
| Serial Ports | RS-485 (RS-232) |
| Baud Rate | 2400, 4800, 9600, 19200, 38400, 115200 |
| Humidity (Non Condensing) | 85 % |
| Storage Temperature | -22° to 176°F (- 30° to + 80°C) |
| Working Temperature | -4° to 140°F (- 20° to + 60°C) |
| Optoisolated Analog Output 16 Bit - 65535 Divisions | 0-20 mA; 4-20 mA (max 300 ohm); 0-10 VDC; 0-5 VDC;<br>+/- 10 VDC; +/- 5 VDC (min 10 kohm) |
| Ethernet/IP Port | RJ45 10Base-T or 100Base-TX (auto-sensing) |
| Profibus Port: Baud Rate<br>Profibus Port Addresses | to 12 Mbit/s<br>1-99 |
| DeviceNet Port: Baud Rate<br>DeviceNet Port: Addresses | 125kbit/s, 250kbit/s, 500kbit/s<br>1.63 |
| Modbus/TCP Port | RJ45 10Base-T or 100Base-TX (auto-sensing) |

*Table 1-1. Specifications*

c UL us LISTED File Number:E151461

# 1.5 Electrical Connections

## Basic Information

- It is recommended that the negative side of the power supply be grounded.
- It is possible to power up to eight 350 ohm load cells or sixteen 700 ohm load cells.
- For 4-wire load cells, jumper between EX- and REF- and between EX+ and REF+.
- Connect terminal “0 VDC” to the RS-485 common when interfacing to A/C powered equipment so that there is an opto-isolated RS-485 connection.
- In case of an RS-485 network with several devices it is recommended to activate the 120 ohm termination resistance on the two devices located at the ends of the network, see Section 2.9.1 “RS-485 Serial Communication” on page 26.

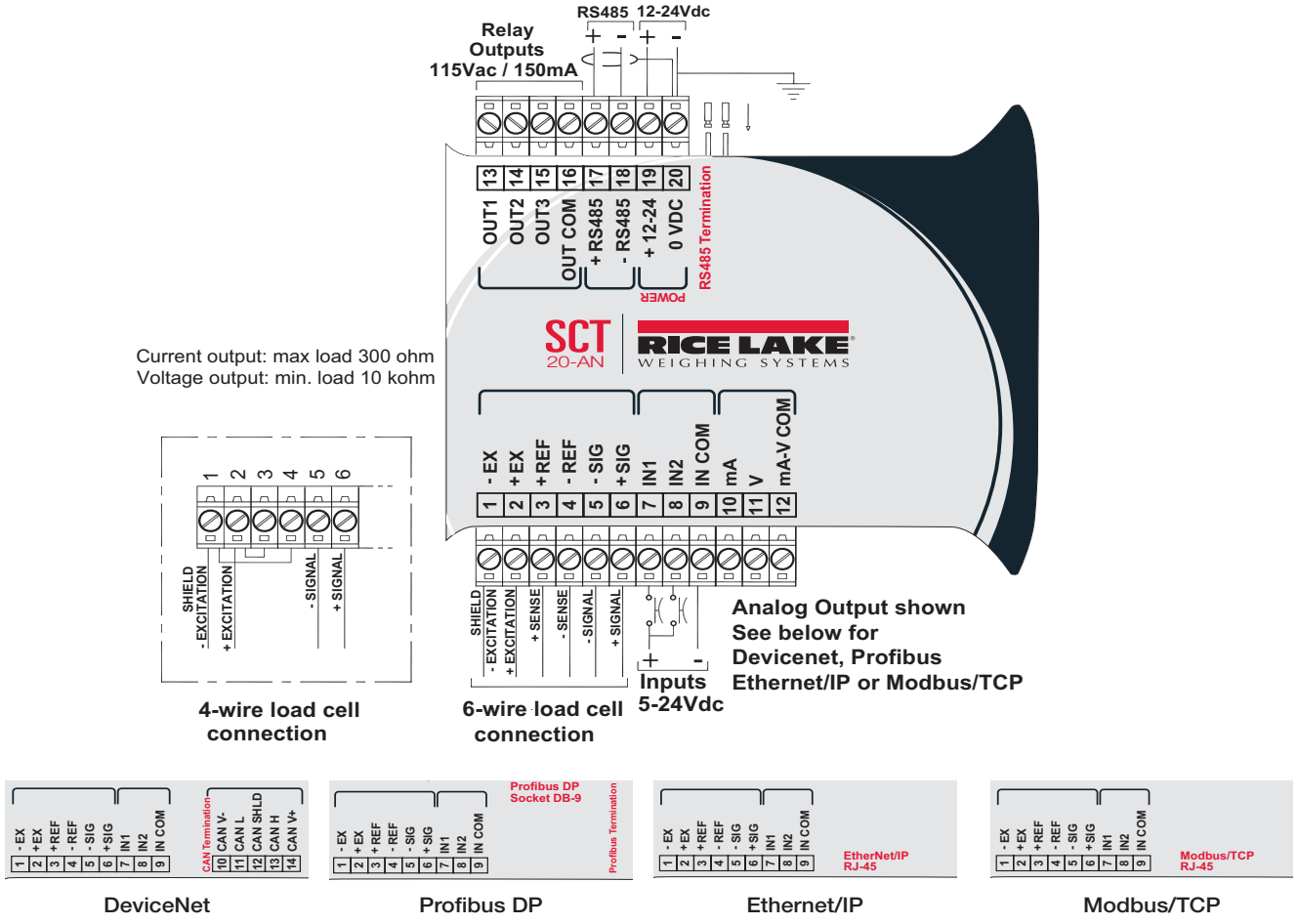



*Figure 1-2. Wiring Diagram*

**3 outputs**: configurable setpoints or remote output management via protocol.

**2 inputs** (Default: **SEMI-AUTOMATIC ZERO input 1**; **NET/GROSS input 2**) (see Section 2.10 “Outputs And Inputs Configuration” on page 27).

# 1.6 LED and Key Functions

## LED Functions


| LED | Main function | Secondary function * |
|---|---|---|
| NET | Net weight LED: net weight display (semi-automatic tare or preset tare) | no meaning |
| →0← | Zero LED (deviation from zero not more than +/- 0.25 divisions) | LED lit: output 3 closed |
| ◣◢ | Stability LED | LED lit: output 2 closed |
| kg | Unit of measure: kg | LED lit: output 1 closed |
| g | Unit of measure: g | LED lit: input 2 closed |
| L | Unit of measure: lb | LED lit: input 1 closed |

* To activate the secondary LED function, press and hold ↵, then press ▲.

| DeviceNet Models | |
|---|---|
| DeviceNet Status | Blinks quickly: DeviceNet OK<br>Blinks slowly (about 0,5s): Initialization<br>LED lighted: Slave not initialized<br>LED off: DeviceNet KO |

| Profibus Models Only | |
|---|---|
| Profibus Status | Blinks quickly: Profibus OK<br>Blinks slowly (about 0.5s): Profibus error |

| Ethernet Models Only | |
|---|---|
| Ethernet/IP Status | Blinks quickly: Ethernet OK<br>Blinks slowly (about 0.5s): Ethernet/IP KO |
| RJ45 Connector<br>Left side [Link LED] | Off: no link<br>Amber: 10 Mbps<br>Green: 100 Mbps |
| RJ45 Connector<br>Right side [Activity LED] | Off: no activity<br>Amber: half duplex<br>Green: full duplex |

| Modbus/TCP Models Only | |
|---|---|
| Modbus/TCP Status | Blinks quickly: Modbus/TCP OK |
| RJ45 Connector<br>Left side [Link LED] | Off: no link<br>Amber: 10 Mbps<br>Green: 100 Mbps |
| RJ45 Connector<br>Right side [Activity LED] | Off: no activity<br>Amber: half duplex<br>Green: full duplex |

## Key Functions

| KEY | Short press | Long press (3 sec) | Into menus |
|---|---|---|---|
| ✕ Escape | | Zero Setting | Escape from a parameter or return to previous menu or operation mode. |
| ◀ Scroll/ Backspace | Captures Tare Gross → Net | Removes Tare Net → Gross | Move to the previous parameter in a level or scroll to the next digit in a parameter value. |
| ▲ Next/ Data Entry | Save to alibi memory (if present) | mV load cell test | Move to the next parameter in a level or increment a value in a parameter. |
| ↵ Enter | Setting setpoints and hysteresis | | Move to next level of configuration or select and edit a parameter. |
| ↵ + ✕ | Enter configuration for setting general parameters (press and hold ↵ then press ✕ to enter set-up menu. | | |
| ↵ + ◀ | Setting preset tare (press and hold ↵ then press ◀ to enter set-up menu. | | |

***The LEDs light up in sequence to indicate that a setting and not a weight is being viewed.***

***After pressing ▲ the first digit will flash and can be edited. All LEDs will be flashing, the value is a displayed weight.***

***For Numeric Entries:***

***Press ◀ to select desired digit.***

***Press ▲ to increment digit.***

## 1.7 Instrument Commissioning

1. Plug power cord in to outlet to turn on indicator, the display shows in sequence:
   - SU followed by the software code (e.g.: SU 5 );
   - r followed by the software version (e.g.: r 1.04.01);
   - HU followed by the hardware code (e.g.: HU 104);
   - The serial number (e.g.: 1005 15);
2. Check that the display shows the weight and that when loading the load cells there is an increase in weight.
3. If there is not, check and verify the connections and correct positioning of the load cells.

***Note*** ***If instrument has NOT been calibrated, complete Section 2.1 on page 12 before proceeding to next step***

4.Reset to zero. See Section 2.1.3 on page 14.

5. Check the calibration with test weights and correct the indicated weight if necessary. See Section 2.1.5 on page 15.
6. Set the desired analog output type and the full scale value.
   - Analog Output Model see Section 2.5 on page 19.
   - DeviceNet Model see Section 2.4 on page 18.
   - Ethernet Model see Section 2.7 on page 21.
   - Profibus Model see Section 2.6 on page 20.
   - Modbus/TCP see Section 3.10 on page 46.
7. If you use serial communication, set the related parameters (see Section 2.9 on page 24).
8. If setpoints are used, set the required weight values and the relevant parameters (see Section 2.12 on page 30 and Section 2.10 on page 27).

### 1.7.1 If The Instrument Has Not Been Calibrated

Missing plant system identification tag, proceed with calibration:

1. If load cells data are unknown, follow the procedure in Section 2.1.5 on page 15.
2. Enter the rated data of load cells following the procedure given in Section 2.1.1 on page 13.

# 2.0 Configuration

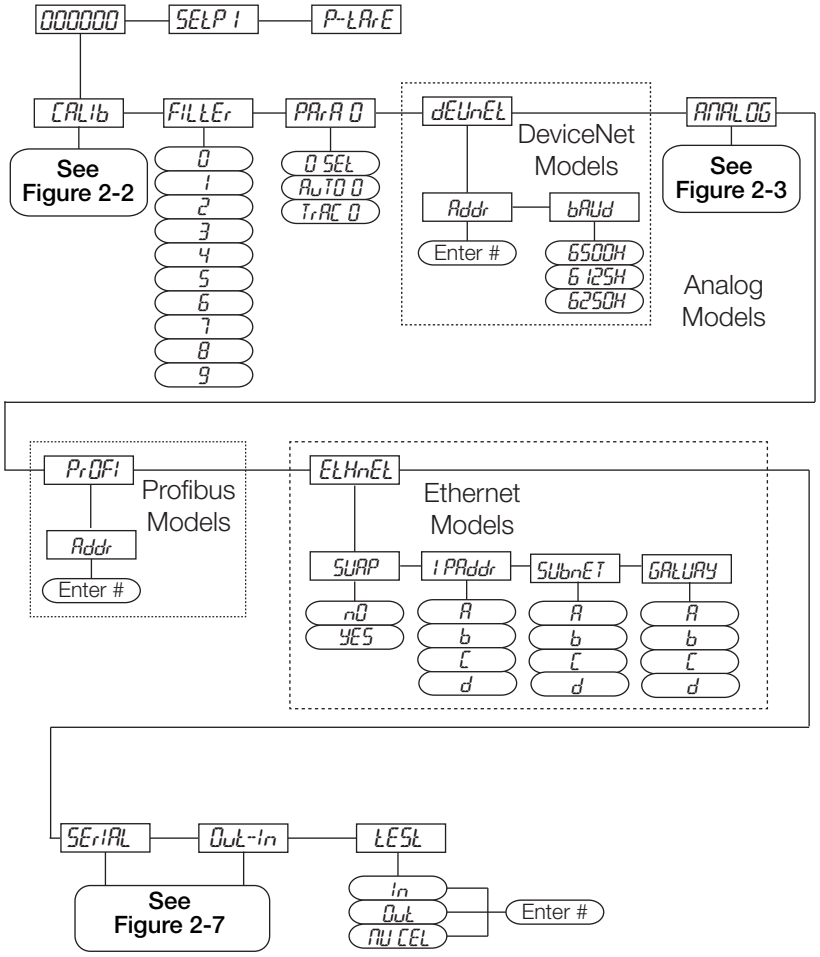



*Figure 2-1. Scale Menu Structure*

| Parameter | Choices | Description |
|---|---|---|
| CALib | FS-tEO<br>SEnS I b<br>dI UI S<br>MASS<br>ZErO<br>I MP 0<br>WEIGHt<br>unIt<br>COEFF | Calibration – see Section 2.1 on page 12. |
| FILtEr | 0-9<br>4 ✱ | Filter on weight – see Section 2.2 on page 17. |
| PArA 0 | 0 SEt<br>AutO 0<br>trAC 0 | Zero Parameters – see Section 2.3 on page 18. |
| dEUnEt | Addr<br>bAud | DeviceNet Options for outputs and inputs configuration – see Section 2.10 on page 27. |

| Parameter | Choices | Description |
|---|---|---|
| ANALOG | tYPE<br>MOdE<br>ANA 0<br>ANA FS<br>COr 0<br>COr FS | Analog Options for outputs and inputs configuration – see Section 2.10 on page 27. |
| PrOFI | Addr | Profibus settings – see Section 2.6 on page 20. |
| EtHnEt | SUAP<br>IPAddr<br>SUbnEt<br>GAtUAY | SCT20-IP (EtherNet/IP) settings – see Section 2.7 on page 21. |
| SErIAL | rS-485<br>bAud<br>Addr<br>HErtZ<br>dELAY<br>PAritY<br>StOP | Serial Communications settings – see Section 2.9 on page 24. |
| Out-In | Out 1<br>Out 2<br>Out 3<br>In 1<br>In 2 | Outputs and Inputs configuration – See Section 2.10 on page 27. |
| tESt | In<br>Out<br>MU-CEL | Test – see Section 2.11 on page 29. |
| * - indicates default value. | | |

# 2.1 Calibration

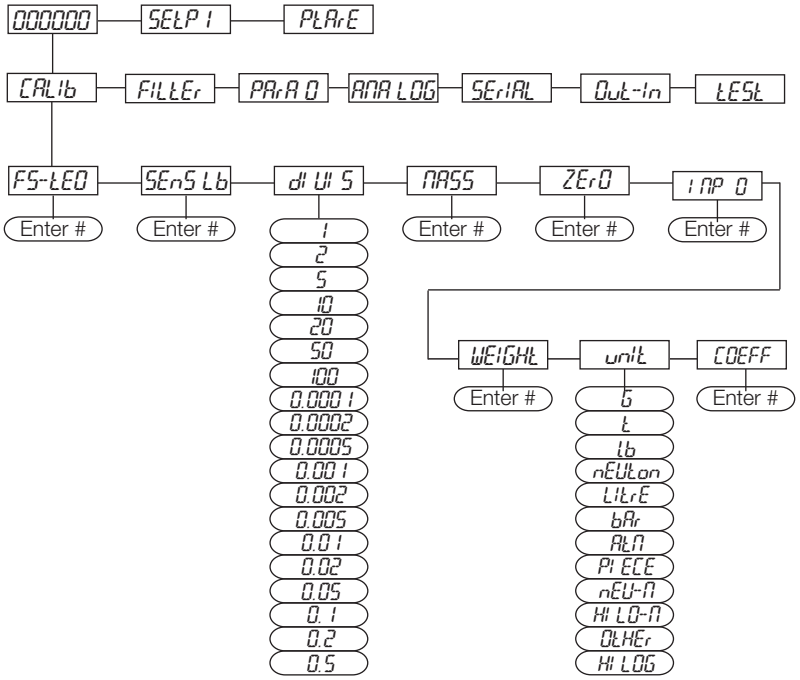



*Figure 2-2. Calibration Menu Structure*

| Parameter | Choices | Description |
|---|---|---|
| FS-tEO | Enter #<br>0=dEnO ✱ | **System Full Scale** is determined by multiplying one load cell capacity by the number of load cells used. Example of system full scale value calculation:<br>**4 cells of 1000kg ---->**<br>**FULL SCALE = 1000 X 4 = 4000**<br>***The instrument is supplied with a theoretical full scale value deno corresponding to 10000. To restore factory values, set 0 as full scale.*** |
| SEnSI b | Enter #<br>0.50000<br>to<br>7.00000<br>2.00000 ✱ | **Sensitivity** is a load cell rated parameter expressed in mV/V. Set the average sensitivity value indicated on the load cells. Example of 4-cell system with sensitivity<br>**2.00100, 2.00150, 2.00200, 2.00250;**<br>**enter 2.00175,**<br>**calculated as (2.00100 + 2.00150 + 2.00200 + 2.00250) / 4.** |
| dIVI S | 1<br>2 ✱<br>5<br>10<br>20<br>50<br>100<br>0.0001<br>0.0002<br>0.0005<br>0.001<br>0.002<br>0.005<br>0.01<br>0.02<br>0.05<br>0.1<br>0.2<br>0.5 | **Division (resolution)** - the weight increment (display division size) that the scale counts by. Selections are: 0.0001 and 100 with x1 x2 x5 x10 increments. |

| Parameter | Choices | Description |
|---|---|---|
| MASS | Enter #<br>0 ✱<br>to<br>max full scale | **Maximum Capacity (Live Load/Product)** that can be displayed. When the weight exceeds this value by 9 divisions, the display will go to dashes, indicating overload.<br>Setting this value to 0 will disable the over capacity function. |
| ZERO | 0 | **Used to capture the deadload of the scale system.** With the scale empty, the displayed value can be zeroed off. This menu may also be accessed directly from the weighing mode to compensate for zero changes or variations.<br>Press ▲ to display the accumulated deadload weight that has been zeroed off. |
| INPUT | Enter #<br>0 to 999999<br>0 ✱ | **Estimated dead load value** of the scale when a scale contains product that cannot be removed. The value entered is the dead load. This value will be replaced if the zero function is performed later. |
| WEIGHT | Enter #<br>0 ✱ | **Weight (Span) Calibration** - after the Theoretical Calibration has been completed and zero is set, the calibration can be adjusted with actual test weights by changing the displayed value in this parameter.<br>***If changes are made to the theoretical Full Scale (FS-LED), the Sensitivity (SENSIT) or Divisions (DIVIS) parameters, the Weight (Span) Calibration is cancelled and the Theoretical Calibration is initiated and applied.***<br>***If the theoretical full scale (FS-LED) and the capacity full scale (MASS) are equal in Weight (Span) Calibration (WEIGHT), then the calibration currently in use is theoretical; if they are different, the calibration in use is the Weight (Span) Calibration based on calibration weights.***<br>***If changes are made to the theoretical full scale (FS-LED), the capacity full scale (MASS) or divisions (DIVIS) parameters, all the system's parameters containing a weight value will be set to default values (setpoints, hysteresis, etc.).*** |
| UNIT | G<br>t<br>lb<br>NEWTON<br>LIBRE<br>BAR<br>ALN<br>PIECE<br>NEW-N<br>HILO-N<br>OTHER<br>HILOG ✱ | **Unit of Measure** - select to determine what unit of measure is displayed and printed.<br><br>See Section 2.1.6 on page 16 for description of units. |
| COEFF | Enter #<br>0-99.9999<br>0 ✱ | **Multiplier Value** entered will display an alternative unit of measure if the digital input is set for COEFF and is in a closed state. |
| ✱ - indicates default value. | | |

Note ***To calibrate the instrument, the Theoretical calibration, Section 2.1.1 on page 13, must be completed first. After Theoretical calibration is set, the scale can be set with actual weights (see Section 2.1.5 on page 15).***

## 2.1.1 Theoretical Calibration

This function allows load cell rated values to be set.

To perform the theoretical calibration set FS-LED, SENSLB and DIVIS (refer to Figure 2-2) in sequence:

1. Press and hold ↵, then press ✕ to enter set-up menu, CALIB will be displayed.
2. Press ↵, FS-LED is displayed. Press ↵ again.
3. Press ◀ or ▲ until total load cell capacity (system full scale) is displayed, press ↵.
4. Press ◀ or ▲ until SENSLB is displayed, press ↵.
5. Press ◀ or ▲ until desired load cell mV/V is displayed, press ↵.
6. Press ◀ or ▲ until DIVIS is displayed, press ↵.

7. Press ◀ or ▲ until desired display division size is displayed, press ↵.
8. This completes the Theoretical Calibration, press ✕ twice to exit set-up menu or continue to Section 2.1.2.

**Note** *By modifying the theoretical full scale, the sensitivity or divisions, the Weight (Span) Calibration is cancelled and the Theoretical Calibration only is considered valid.*

*If the theoretical full scale and the recalculated full scale in Weight (Span) calibration (see Section 2.1.5 on page 15) are equal, this means that the calibration currently in use is Theoretical Calibration; if they are different, the calibration in use is the Weight (Span) Calibration based on test weights.*

*By modifying the theoretical full scale, the sensitivity or divisions and all the system's parameters containing a weight value will be set to default values (setpoints, hysteresis, etc.).*

## 2.1.2 Maximum Capacity (MASS)

Maximum capacity (live load/product) that can be displayed. When the weight exceeds this value by 9 divisions the following is displayed '-------', indicating overload. To disable this function, set to 0.

1. Press and hold ↵, then press ✕ to enter set-up menu, CALib will be displayed.
2. Press ↵, FS-LEO is displayed.
3. Press ◀ or ▲ until MASS is displayed, press ↵.
4. Press ◀ or ▲ until desired capacity is displayed, press ↵.
5. Press ✕ twice to exit set-up menu.

## 2.1.3 Zero Setting

Perform this procedure after having set the Theoretical calibration, see Section 2.1.1 on page 13.

**Note** *This menu may also be accessed directly from the weight display, press and hold ✕ for 3 seconds.*

1. Press and hold ↵, then press ✕ to enter set-up menu, CALib will be displayed.
2. Press ↵, FS-LEO is displayed.
3. Press ◀ or ▲ until ZEr0 is displayed, press ↵.
4. The weight value to be set to zero is displayed. In this phase all of the LEDs are flashing. Press ↵, the weight is set to zero (the value is stored to the permanent memory).
5. Press ✕ twice to exit set-up menu.

**Note** *Press ▲ to display the accumulated deadload that has been zeroed off by the instrument, displaying the sum of all of the previous zero settings.*

## 2.1.4 Zero Value Manual Entry

**Important** *Perform this procedure only if it is not possible to zero off the scale structure, for example because it contains product that can not be unloaded.*

Enter the estimated structured dead load value that would be zeroed.

1. Press and hold ↵, then press ✕ to enter set-up menu, CALib will be displayed.
2. Press ↵, FS-LEO is displayed.
3. Press ◀ or ▲ until INP 0 is displayed, press ↵.
4. Press ◀ or ▲ until desired dead load value is displayed, press ↵.
5. Press ✕ twice to exit set-up menu.

## 2.1.5 Weight (Span) Calibration (With Test Weights)

After performing the Theoretical calibration (Section 2.1.1 on page 13) and the Zero setting (Section 2.1.3 on page 14), this function allows calibration to be done using test weights of known value. If adjustment is required, change the displayed value to display the test weight value.

1. Load the test weight onto the scale, use as high a percentage of the maximum quantity to be weighed as possible.
2. Press and hold ↵, then press ✕ to enter set-up menu, CALIb will be displayed.
3. Press ↵, FS-LEO is displayed.
4. Press ◀ or ▲ until UEIGHt is displayed, press ↵.
5. The value of the weight currently on the system will be flashing on the display. All of the LEDs are off. (If adjustment is not required, skip to step 8.)
6. Adjust the value on display to match weight loaded on the scale if necessary, by pressing ◀ or ▲. The LEDs will begin scrolling.
7. Press ↵, the new set weight will appear with all the LEDs flashing.
8. Press ↵, UEIGHt will be displayed again.
9. Press ✕ twice to exit set-up menu.

***Example:***

*For a system of maximum capacity of 1000 kg and 1 kg division, two test weights are available, one 500 kg and one 300 kg. Load both weights onto the system and correct the indicated weight to 800. Now remove the 300 kg weight, the system must show 500; remove the 500 kg weight, too; the system must read zero. If this does not happen, it means that there is a mechanical problem affecting the system linearity.*

**Important** *Identify and correct any mechanical problems before repeating the procedure.*

**Note** *If theoretical full scale and recalculated full scale in Weight (Span) Calibration are equal, it means that the Theoretical Calibration is currently in use; otherwise, the Weight (Span) Calibration based on test weights is in use.*

*If the correction made changes the previous full scale for more than 20%, all the parameters with settable weight values are reset to default values.*

### Linearization Option On Max 5 Points:

It is possible to perform a linearization of the weight repeating the above described procedure up to a maximum of five points, using five different test weights. **The procedure ends by pressing ✕ or after entering the fifth value;** at this point it will no longer be possible to change the calibration value, but only to perform a new Weight (Span) Calibration. To perform a new calibration, return to the weight display and then re-enter the calibration menu.

By pressing ▲ after having confirmed the test weight that has been set, the full scale appears, recalculated according to the value of the maximum test weight entered and making reference to the cell sensitivity set in the theoretical calibration (SEnSI b).

## 2.1.6 Setting Units of Measure

1. Press and hold ↵, then press ✕ to enter set-up menu, CALIb will be displayed.
2. Press ↵, FS-LEO is displayed.
3. Press ◀ or ▲ until unit is displayed, press ↵.
4. Press ◀ or ▲ until desired unit is displayed, press ↵.
5. Press ✕ twice to exit set-up menu.

| | |
|---|---|
| HI LOG | kilograms |
| G | grams |
| t | tons |
| Lb | pounds* |
| nEULon | newton* |
| LI tre | litres* |
| bAr | bar* |

| | |
|---|---|
| LI tre | litres* |
| bAr | bar* |
| ALN | atmospheres* |
| PI ECE | pieces* |
| nEU-n | newton metres* |
| HI LO-n | kikgram metres* |
| OtHEr | units of measure not included* |

* Indicates it is possible to set the display coefficient. To use COEFF it is necessary to enable it, closing the COEFF input. See Section 2.1.7 on page 16.

**Note** ***If the print function is enabled, the symbol of the selected unit of measure will be printed after the measured value.***

## 2.1.7 Display Coefficient

By setting the coefficient the display is changed accordingly.

If one of the inputs is set to COEFF mode (see Section 2.10 on page 27) when the input is closed the value will be displayed modified according to the coefficient; when the input is opened the standard weight display will be restored.

1. Press and hold ↵, then press ✕ to enter set-up menu, CALIb will be displayed.
2. Press ↵, FS-LEO is displayed.
3. Press ◀ or ▲ until COEFF is displayed, press ↵.
4. Press ◀ or ▲ until desired number is displayed, press ↵.
5. Press ✕ twice to exit set-up menu.

| | | |
|---|---|---|
| HI LOG | kilograms | |
| G | grams | |
| t | tons | |
| Lb | pounds | Value set in COEFF will be multiplied by the weight value currently displayed |
| nEULon | newton | Value set in COEFF will be multiplied by the weight value currently displayed |
| LI tre | litres | in COEFF set the specific weight in kg/l, assuming that the system is calibrated in kg |
| bAr | bar | Value set in COEFF will be multiplied by the weight value currently displayed |
| ALN | atmospheres | Value set in COEFF will be multiplied by the weight value currently displayed |
| PI ECE | pieces | in COEFF set the weight of one piece |
| nEU-n | newton metres | Value set in COEFF will be multiplied by the weight value currently displayed |
| HI LO-n | kikgram metres | Value set in COEFF will be multiplied by the weight value currently displayed |
| OtHEr | other generic units of measure not included in list | Value set in COEFF will be multiplied by the weight value currently displayed |

**Important** ***All other settings (setpoints, hysteresis, calibration ...) are expressed in weight value. If you want to convert them to the new unit of measurement, perform one of the following procedures for changing the system calibration.***

***The parameter must remain set to 1.0000.***

### Theoretical Calibration For Other Units Of Measure

Set in the parameter the F.SCALE value divided by the conversion coefficient from kg to the new unit of measure.

***Example: The 4 load cells of 1000 kg are placed under a scale for olive oil, which has a specific gravity of 0.916 kg / l. Setting the F.SCALE = (4x1000) / 0916 = 4367, the system works in liters of olive oil. If you set the unit to litres, the system will display and print the symbol 'l' instead of 'kg'. See Section 2.1.6 on page 16.***

### Weight (Span) Calibration For Other Units Of Measure

Load a known quantity of product litres on the scale (use as high a percentage of the maximum quantity to be weighed as possible) and enter in the parameter UEIGHL, the product loaded value in litres. If you set the units to litres, the system will display and print the symbol 'l' instead of 'kg'. See Section 2.1.6 on page 16.

## 2.2 Filter On The Weight

The filtering selection is used to eliminate environment noise, and is typically a compromise between responsiveness and stability. The lower the number, the more responsive the display will be to weight changes. The filter is used to stabilize a weight as long as the variations are smaller than the corresponding "Response Time". The filter setting is dependent on the type of application and the required update rate.

Setting the parameter allows a stable weight display to be obtained. To increase the effect (weight more stable), increase the value.

1. Press and hold ↵, then press ✕ to enter set-up menu, CALib will be displayed.
2. Press ◀ or ▲ until FILtEr is displayed, press ↵. The currently programmed filter value is displayed.
3. Press ◀ or ▲ until desired filter value is displayed, press ↵.
4. The current weight is displayed (all LED's flashing) and the displayed stability can be experimentally verified. Press ↵.
5. If stability is not satisfactory, press ↵, this returns indicator to FILtEr option and the filter may be modified again until an optimum result is achieved.
6. Press ✕ to exit set-up menu.

**Note** ***The filter enables to stabilize a weight as long as its variations are smaller than the corresponding "Response Time". It is necessary to set this filter according to the type of application and to the full scale value set.***

| Filter Value | Response times [ms] | Display and serial port refresh frequency [Hz] |
|---|---|---|
| 0 | 12 | 300 |
| 1 | 150 | 100 |
| 2 | 260 | 50 |
| 3 | 425 | 25 |
| 4* | 850 | 12.5 |
| 5 | 1700 | 12.5 |
| 6 | 2500 | 12.5 |
| 7 | 4000 | 10 |
| 8 | 6000 | 10 |
| 9 | 7000 | 5 |
| ** indicates default setting* | | |

## 2.3 Zero Parameters

1. Press and hold ↵, then press ✕ to enter set-up menu, CALIb will be displayed.
2. Press ◀ or ▲ until PArA 0 is displayed, press ↵.
3. Press ◀ or ▲ until desired parameter (see Table 5 ) is displayed, press ↵. The currently programmed value is displayed.
4. Press ◀ or ▲ until desired value is displayed, press ↵.
5. Press ✕ twice to exit set-up menu.

| Parameter | Choices | Description |
|---|---|---|
| 0 SEt | Enter #<br>0-max full scale<br>300 ✱<br>Considered decimals:<br>300 – 30.0 – 3.00 – 0.300 | **Maximum zero range**<br>Indicates the maximum weight value that can be zeroed off by external contact, keypad or serial protocol |
| AutO 0 | Enter #<br>0 - max 20% of full scale<br>0 ✱ | **Automatically zeroes the scale at power-on**<br>If the weight value is lower than the value set in this parameter, the scale will zero itself provided the weight does not exceed the value in the 0 SET parameter. To disable this function set to 0. |
| trAC 0 | nOnE ✱<br>1-5 | **Zero tracking**<br>Automatically zeroes the scale when within the range specified, as long as the weight is within the 0 SET parameter and the scale is at standstill for at least one second.<br>To disable this function, set to none<br>***Example: if the parameter div 5 is set to 5 and trAC 0 is set to 2, the weight will be automatically set to zero for variations smaller than or equal to 10 (div 5 x trAC 0).*** |
| ✱ *- indicates default value.* | | |

## 2.4 SCT20-DN (DeviceNet) Settings

1. Press and hold ↵ and ✕ to enter set-up menu. CALIb will be displayed.
2. Press ◀ or ▲ until dEUnEt is displayed, press ↵.
3. Press ◀ or ▲ until desired parameter is displayed, press ↵.
4. Press ◀ or ▲ until desired value is displayed, press ↵.
5. Press ✕ twice to exit set-up menu.

| Parameter | Choices | Description |
|---|---|---|
| Addr | 1-63<br>1 ✱ | Set instrument address in the DeviceNet network. |
| bAud | 6 125K<br>6250K<br>6500K ✱ | Set instrument address in the DeviceNet network. |
| ✱ *- indicates default value.* | | |

DeviceNet

## 2.5 Analog Output

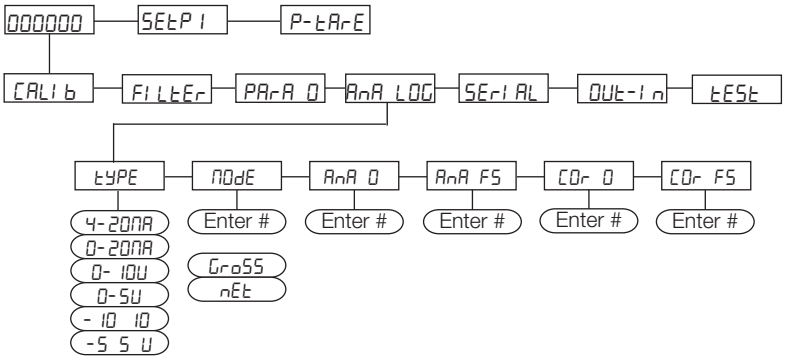



*Figure 2-3. Analog Menu Structure*

| Parameter | Choices | Description |
|---|---|---|
| tYPE | **4-20 mA *** | Selects the analog output type. |
| | 0-20 mA | |
| | 0-10 V | |
| | 0-5 V | |
| | -10 +10 V | See "Soldered Jumper" on page 19 |
| | -5 +5 V | See "Soldered Jumper" on page 19 |
| nOdE | Enter # | Select mode to be tracked, gross or net. If the net function is not active, the analog output varies according to gross weight. |
| | Gross | |
| | nEt | |
| AnA 0 | Enter # | Set the weight value for the minimum analog output value.<br>Note ***Only set a value different from zero to limit the analog output range.***<br>***For instance: for a full scale value of 10000 kg, a 4 mA signal at 5000 kg is required, and 20 mA at 10000 kg, in this case, instead of zero, set 5000 kg.*** |
| AnA FS | Enter # | Set the weight value for the maximum analog output value; it must correspond to the value set in the PLC program (default: calibration full scale).<br>***E.g.: if using a 4-20 mA output and in the PLC program a 20 mA = 8000 kg is desired, set the parameter to 8000.*** |
| COr 0 | | Analog output correction to zero: if necessary adjust the analog output, allowing the PLC to indicate 0. The sign '-' can be set for the last digit on the left.<br>***E.g.: For a 4-20 mA output and a minimum analog setting, the PLC or tester reads 4.1 mA. Set the parameter to 3.9 to obtain 4.0 on the PLC or tester. (See "Analog Output Type Scale Corrections" on page 20)*** |
| COr FS | | Full scale analog output correction: if necessary adjust the analog output, allowing the PLC to indicate the value set in the parameter.<br>***E.g. For a 4-20 mA output with the analog set to full scale and the PLC or tester reads 19.9 mA, set the parameter to 20.1 to obtain 20.0 on the PLC or tester. (See "Analog Output Type Scale Corrections" on page 20)*** |
| * ***Indicates default value.*** | | |

### Soldered Jumper

For the output -10 +10 V and -5 +5 V the soldered jumper (SW4) must be closed:

- Release the locking tabs, both sides, to open enclosure.
- Locate the soldered jumper (SW4), on the circuit board. See Figure 2-4.
- Close the jumper shorting the pads with a solder bridge.

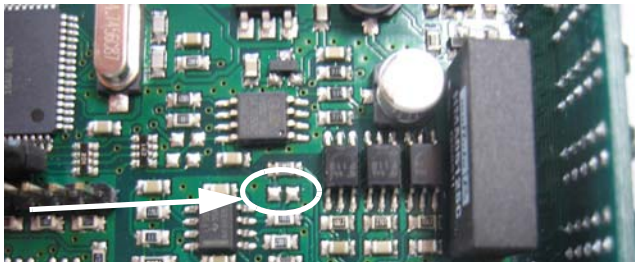


*Figure 2-4. Soldered Jumper*

### Analog Output Type Scale Corrections

Minimum and maximum values which can be set for the zero and full scale corrections Refer to COr 0 and COr FS.

| Analog Output Type | Minimum | Maximum |
|---|---|---|
| 0–10 V | -0.15 | 10.2 |
| 0–5 V | -0.15 | 5.5 |
| -10 +10 V | -10.3 | 10.2 |
| -5 +5 V | -5.5 | 5.5 |
| 0-20 mA | -0.2 | 22 |
| 4-20 mA | -0.2 | 22 |


***The analog output may also be used in the opposite manner, i.e. the weight setting that corresponds to the analog zero may be greater than the weight set for the analog full scale. The analog output will increase towards full scale as the weight decreases; the analog output will decrease as the weight increases.***

***E.g.: analog output type having selected 0-10V***
***ANA 0 = 10000 ANA FS = 0***
***Weight = 0 kg analog output = 10 V***
***Weight = 5000 kg analog output = 5 V***
***Weight = 10000 kg analog output = 0 V***

## 2.6 Profibus Settings

1. Press and hold ↵ and ✕ to enter set-up menu. CALib will be displayed.
2. Press ◀ or ▲ until PrOFI is displayed, press ↵.
3. Addr is displayed, press ↵.
4. Press ◀ or ▲ until desired value is displayed, press ↵.
5. Press ✕ twice to exit set-up menu.

| Parameter | Choices | Description |
|---|---|---|
| Addr | 1-99<br>1* | Set instrument address in the Profibus network. |
| **** - indicates default value.*** | | |

## 2.7 SCT20-IP (EtherNet/IP) Settings

1. Press and hold ↵ and ✕ to enter set-up menu. CALIb will be displayed.
2. Press ◀ or ▲ until EtHnEt is displayed, press ↵.
3. Press ◀ or ▲ until desired parameter is displayed, press ↵.
4. Press ◀ or ▲ until desired value is displayed, press ↵.
5. Press ✕ twice to exit set-up menu.

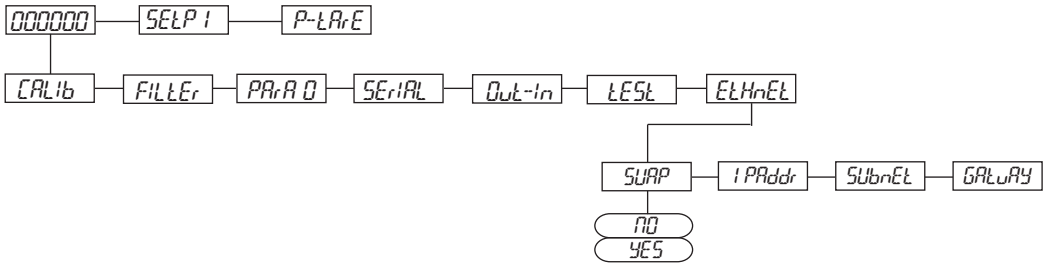



*Figure 2-5. SCT20-IP Menu Structure*

| Parameter | Choices | Description |
|---|---|---|
| SWAP | nO ✱ Little Endian<br>YES Big Endian | Allows selection of reading/writing of bytes. |
| IPAddr | A<br>b<br>C<br>d<br>192.8.0.141 ✱ | Set IP address in the Ethernet/IP network. |
| SUbnEt | A<br>b<br>C<br>d<br>255.255.255.0 ✱ | Set Subnet mask |
| GAtWAY | A<br>b<br>C<br>d<br>192.8.0.111 ✱ | Set the Gateway address |
| ✱ - indicates default value. | | |

## 2.8 SCT20-IP (Ethernet TCP/IP) Settings

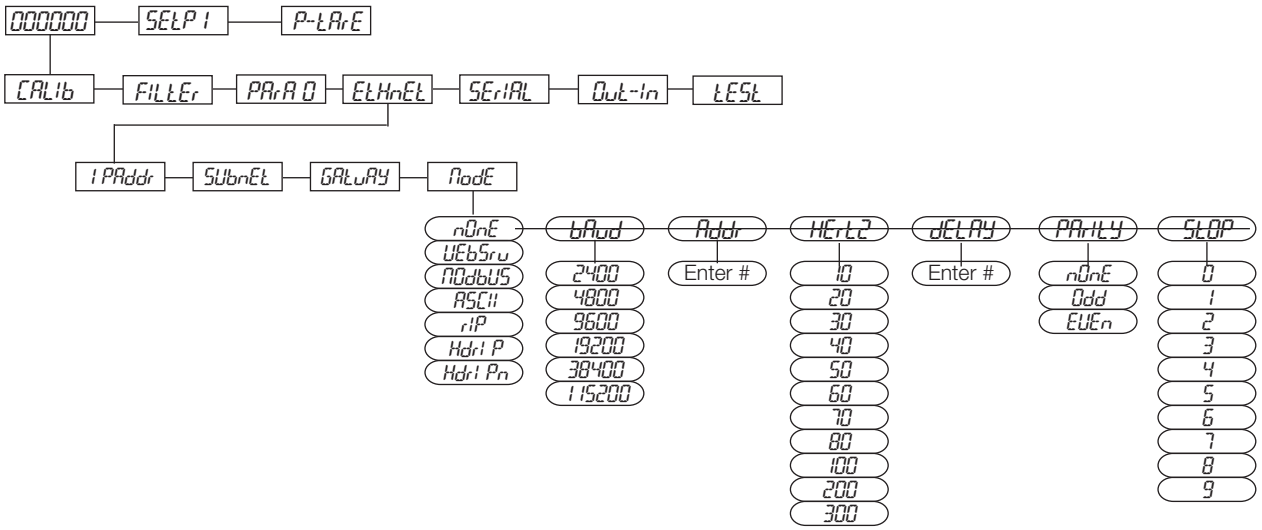



*Figure 2-6. SCT20-TCP/IP Menu Structure*

| Parameter | Choices | Description |
|---|---|---|
| IPAddr XX | A<br>b<br>C<br>d<br>192.8.0. 141 X | Set IP address in the Ethernet/IP network. |
| SUbnEt XX | A<br>b<br>C<br>d<br>255.255.255.0 X | Set Subnet mask. |
| GALUAY XX | A<br>b<br>C<br>d<br>192.8.0. 111 X | Set the Gateway address. |
| ModE (Comm Port) | nOnE X | Disables any type of communication. |
| | UEbSru | Web Server |
| | MOdbuS | MODBUS-RTU protocol; possible addresses: from 1 to 99 (see Section 3.11) |
| | ASCII | ASCII bidirectional protocol; possible addresses: from 1 to 99 (see Section 3.12)<br>**NOdU6-**<br>**NOd td** |
| | COntIn | Continuous weight transmission protocol (see Section 3.13), at the frequency set in HERTZ parameter (from 10 to 300).<br>**NOd t(set: PARITY=none, STOP=1)**<br>**NOd td(set: PARITY=none, STOP=1)** |
| | rIP | Continuous weight transmission protocol, streams net and gross (see Section 3.14)<br>(set: BAUD=9600,PARITY=none, STOP=1) |

| Parameter | Choices | Description |
|---|---|---|
| nodE (Continued) | Hdr 1P | Continuous weight transmission protocol, streams net and gross including decimal. (see Section 3.14) (set: BAUD=9600,PARITY=none, STOP=1) |
| | Hdr 1PN | Continuous weight transmission protocol (see Section 3.14) (set: BAUD=9600,PARITY=none, STOP=1)<br>*When the remote display is set to gross weight:*<br>*- if the instrument displays the gross weight, the remote display shows the gross weight.*<br>*- if the instrument shows the net weight the remote display shows the net weight alternated with the message "net"* |
| baud | 2400<br>4800<br>9600 ✱<br>19200<br>38400<br>115200 | Transmission speed.<br>***Note*** ***The baud rate must be the same as the baud rate setting in the Serial Communications Settings, see Section 2.9.*** |
| ADDR | 1-99<br>1 ✱ | Instruments address |
| HERTZ | | Maximum Transmission Frequency<br>To be set when the CONTIN transmission protocol is selected. (see Figure 2-7) |
| | 10Hz ✱ | |
| | 20Hz | Max setting with min 2400 baud rate |
| | 30Hz | |
| | 40Hz | Max setting with min 4800 baud rate |
| | 50Hz | |
| | 60Hz | |
| | 70Hz | |
| | 80Hz | Max setting with min 9600 baud rate |
| | 100Hz | Max setting with min 19200 baud rate |
| | 200Hz | Max setting with min 38400 baud rate |
| | 300Hz | Max setting with min 38400 baud rate |
| dELAY | 0-200 msec<br>0 ✱ | Delay in milliseconds which elapses before the instrument replies |
| PArity | nonE ✱<br>EUEn<br>Odd | parity none<br>even parity<br>odd parity |
| StOP | 1 ✱<br>2 | Stop bit |
| ✱ - ***indicates default value.***<br>✱✱ - ***These settings do not function with Firmware 1.02.00 or lower.*** | | |

## Front Panel Configuration

1. Press and hold ↵ and ✕ to enter set-up menu. CALib will be displayed.
2. Press ◀ or ▲ until ELHnEL is displayed, press ↵.
3. Press ◀ or ▲ until desired parameter is displayed, press ↵.
4. Press ◀ or ▲ until desired value is displayed, press ↵.
5. Press ✕ twice to exit set-up menu.

# 2.9 Serial Communication Settings

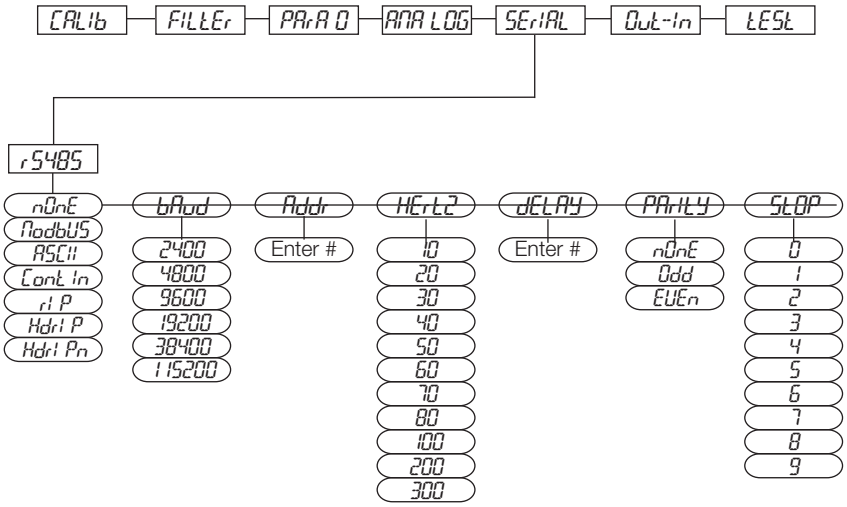



*Figure 2-7. Serial Communications Menu Structure*

| Parameter | Choices | Description |
|---|---|---|
| rS-485 (Communication Port) | nOnE ✱ | Disables any type of communication. |
| | MOdbuS | MODBUS-RTU protocol; possible addresses: from 1 to 99 (see Section 3.11) |
| | ASCII | ASCII bidirectional protocol; possible addresses: from 1 to 99 (see Section 3.12)<br>**NOdU6-**<br>**NOd td** |
| | CONtIn | Continuous weight transmission protocol (see Section 3.13), at the frequency set in HERTZ parameter (from 10 to 300).<br>**NOd t(set: PARITY=none, STOP=1)**<br>**NOd td(set: PARITY=none, STOP=1)** |
| | rIP | Continuous weight transmission protocol, streams net and gross (see Section 3.14)<br>(set: BAUD=9600,PARITY=none, STOP=1) |
| | HdrIP | Continuous weight transmission protocol, streams net and gross including decimal. (see Section 3.14) (set: BAUD=9600,PARITY=none, STOP=1) |
| | HdrIPN | Continuous weight transmission protocol (see Section 3.14)<br>(set: BAUD=9600,PARITY=none, STOP=1)<br>*When the remote display is set to gross weight:*<br>*- if the instrument displays the gross weight, the remote display shows the gross weight.*<br>*- if the instrument shows the net weight the remote display shows the net weight alternated with the message "net"* |
| bAud | 2400<br>4800<br>9600 ✱<br>19200<br>38400<br>115200 | Transmission speed. |
| ADDR | 1-99<br>1 ✱ | Instruments address |

| Parameter | Choices | Description |
|---|---|---|
| HERTZ | | Maximum Transmission Frequency<br>To be set when the CONTIN transmission protocol is selected. |
| | 10Hz * | |
| | 20Hz | Max setting with min 2400 baud rate |
| | 30Hz | |
| | 40Hz | Max setting with min 4800 baud rate |
| | 50Hz | |
| | 60Hz | |
| | 70Hz | |
| | 80Hz | Max setting with min 9600 baud rate |
| | 100Hz | Max setting with min 19200 baud rate |
| | 200Hz | Max setting with min 38400 baud rate |
| | 300Hz | Max setting with min 38400 baud rate |
| dELAY | 0-200 msec<br>0 * | Delay in milliseconds which elapses before the instrument replies |
| PArtY | nOnE *<br>EVEn<br>Odd | parity none<br>even parity<br>odd parity |
| SLOP | 1 *<br>2 | Stop bit |
| **** - indicates default value.*** | | |

## 2.9.1 RS-485 Serial Communication

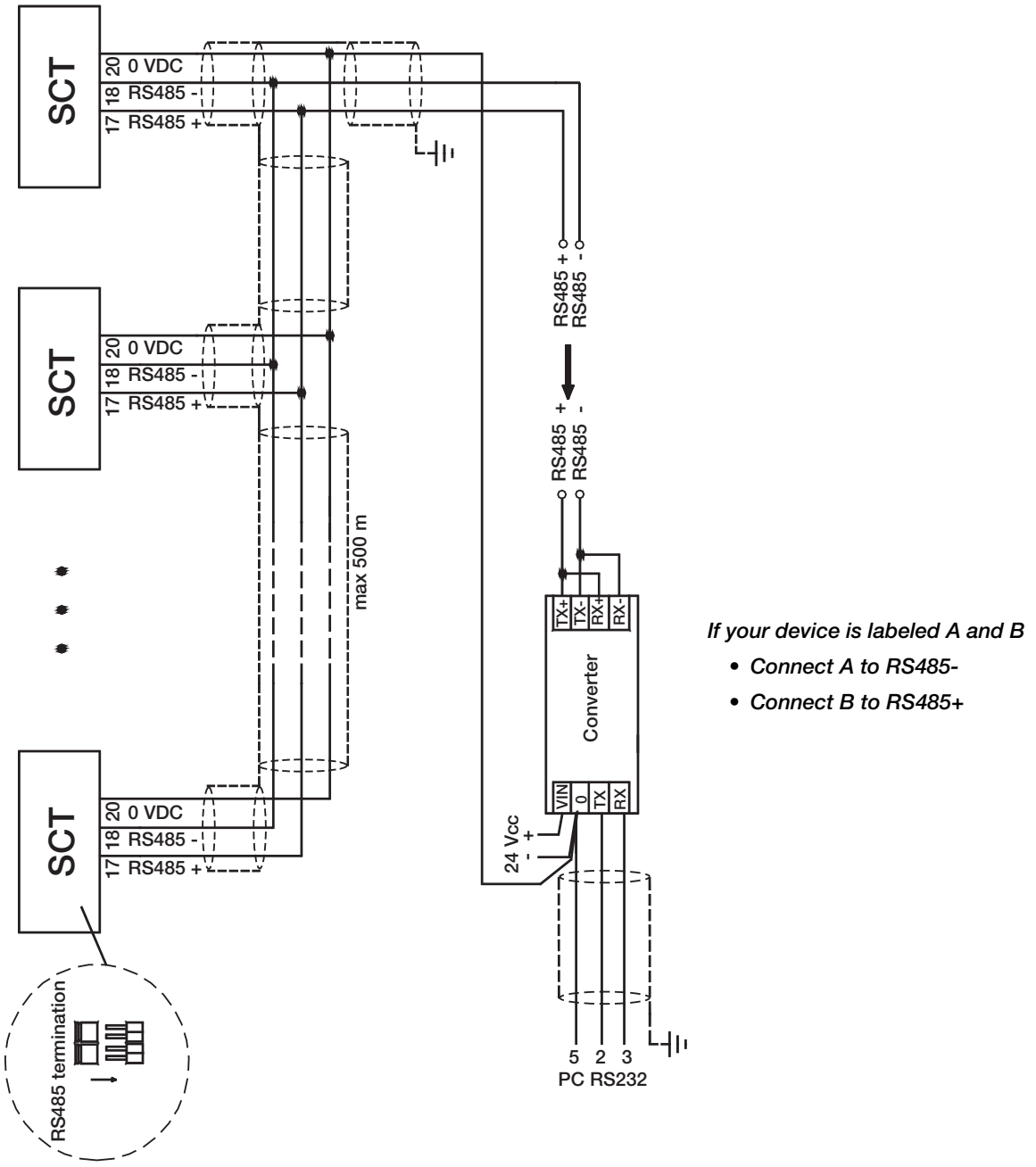



*Figure 2-8. RS-485 Serial Communications*

**Note** *If the RS-485 network exceeds 100 metres in length or baud rate over 9600 are used, close the two jumpers, called "RS-485 termination", to activate two 120 ohm terminating resistors between the '+' and '–' terminals of the line, on the terminal strip of the furthest instrument. Should there be different instruments or converters, refer to the specific manuals to determine whether it is necessary to connect the above-mentioned resistors.*

### Direct Connection Between RS-485 And RS-232 Without Converter

Since a two-wire RS-485 output may be used directly on the RS-232 input of a PC or remote display, it is possible to implement instrument connection to an RS-232 port in the following manner:

| Instrument | RS-232 |
|---|---|
| RS-485 - | RXD |
| RS-485 + | GND |

**Note** *This type of connection allows a SINGLE instrument to be used in a ONE WAY mode.*

## 2.10 Outputs And Inputs Configuration

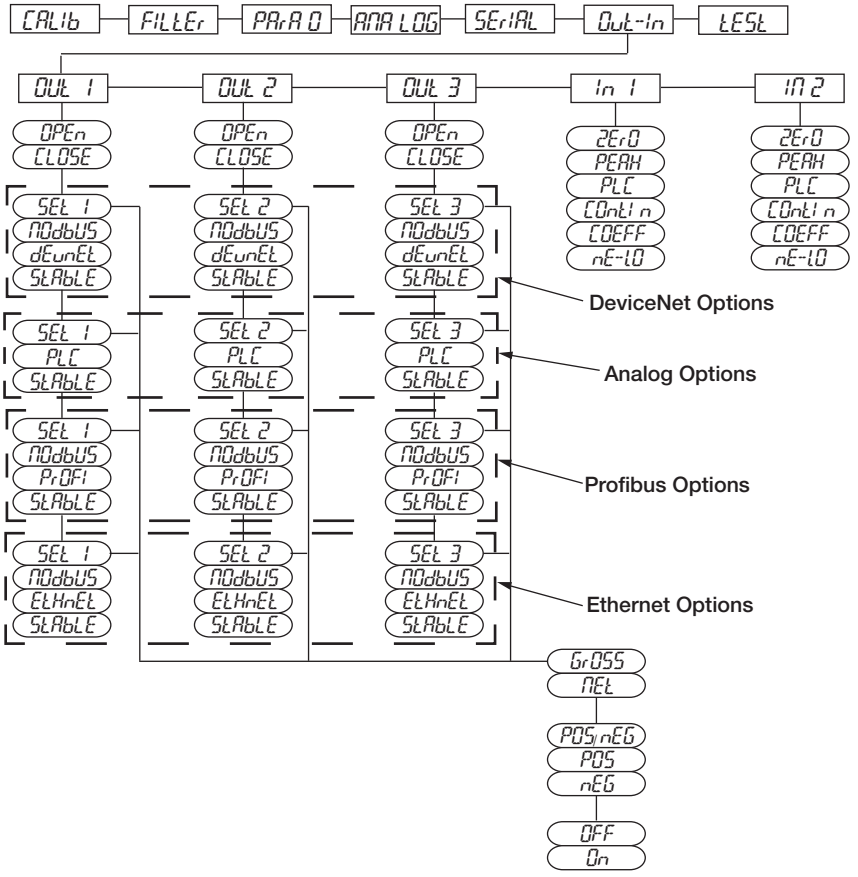



*Figure 2-9. Outputs and Inputs Menu Structure*

| Parameter | Choices | Description |
|---|---|---|
| OUt 1<br>OUt 2<br>OUt 3 | OPEn | **Normally Open:** the relay is de-energized and the contact is open when the weight is lower than the programmed setpoint value; it closes when the weight is higher than or equal to the programmed setpoint value. |
| | CLOSE ✱ | **Normally closed:** the relay is energized and the contact is closed when the weight is lower than the programmed setpoint value; it opens when the weight is higher than or equal to the programmed setpoint value. |
| OUt 1<br>OUt 2<br>OUt 3 | SEt 1<br>SEt 2<br>SEt 3 | Number corresponds with OUT 1, 2 or 3.<br>The contact will switch on the basis of weight, according to setpoints (see Section 2.12 “Setpoints Programming” on page 30) Select:<br>**Gross** (default) - the contact will switch on the basis of gross weight or<br>**Net** - the contact will switch on the basis of net weight (If the net function is not active, the contact will switch on the basis of gross weight). |
| | MOdbUS | The contact will not switch on the basis of weight, but is controlled by remote Modbus protocol commands. (DeviceNet, Profibus, Ethernet Only) |
| | dEUnEt | The contact will not switch on the basis of weight, but is controlled by DeviceNet. (DeviceNet Model Only) |
| | PrOFI | The contact will not switch on the basis of weight, but is controlled by Profibus. (Profibus Model Only) |
| | EtHnEt | The contact will not switch on the basis of weight, but is controlled by Ethernet. (Ethernet Model Only) |
| | PLC | The contact will not switch on the basis of weight, but is controlled by remote protocol commands. (Analog Only) |
| | StAbLE | Relay switching occurs when the weight is stable. |
| SEt 1<br>SEt 2<br>SEt 3 | POSnEG ✱ | Relay switching occurs for both positive and negative weight values. |
| | POS | Relay switching occurs for positive weight values only. |
| | nEG | Relay switching occurs for negative weight values only. |
| SEt 1<br>SEt 2<br>SEt 3 | OFF ✱ | Relay switching will not occur if the setpoint value is ‘0’. |
| | On | Setpoint = ’0’ and nodbus=posneg, relay switching occurs when the weight is ‘0’; the relay will switch again when the weight is different from zero, taking hysteresis into account (both for positive and for negative weights).<br>Setpoint = ’0’ and nodes=pos, relay switching occurs for a weight higher than or equal to ‘0’, the relay will switch again for values below ‘0’, taking hysteresis into account.<br>Setpoint = ’0’ and nodes=neg, relay switching occurs for a weight lower than or equal to ‘0’, the relay will switch again for values above ‘0’, taking hysteresis into account. |
| In 1<br>In 2 | nEt-LO ✱<br>**(In 2 default)** | (NET/GROSS): by closing this input for less than one second, it performs a SEMI-AUTOMATIC TARE and the display will show the net weight. To display the gross weight again, hold the NET/GROSS input closed for 3 seconds. |
| | 2Er0 ✱<br>**(In 1 default)** | By closing the input for less than one second, the weight is set to zero (see Section 3.3 “Semi-automatic Zero (Weight Zero-setting For Small Variations)” on page 33) |
| | PEAH | With the input closed the maximum weight value reached remains on display. Opening fthe input the current weight is displayed. |
| | PLC | Closing the input no operation is performed, the input status may however be read remotely by way of the communication protocol. |
| | COntIn | Closing the input for less than one second the weight is transmitted via the serial connection according to the fast continuous transmission protocol one time only (only if contin is set in the item serial). |
| | COEFF | When the input is closed the weight is displayed based on the set coefficient (see Section 2.1.7 “Display Coefficient” on page 16), otherwise the weight is displayed. |
| ✱ ***- indicates default value.*** | | |

## 2.11 Test

1. Press and hold ↵ and ✕ to enter set-up menu. CALIb will be displayed.
2. Press ◀ or ▲ until tESt is displayed, press ↵.
3. Press ◀ or ▲ until desired parameter is displayed, press ↵.
4. For In and MV-CEL, current reading is displayed, press ↵.
   For Out, press ◀ until corresponding value of the out you want to change is flashing, press ▲ to change the value, press ↵.
5. Press ✕ twice to exit set-up menu.

| Parameter | Choices | Description |
|---|---|---|
| In | N/A | Input Test - for each open input 0 is displayed, 1 is displayed when the input is closed. |
| Out | 0 ✱<br>1 | Output Test -<br>Setting 0 opens the corresponding output .<br>Setting 1 closes the corresponding output . |
| ANALOG | ANALOG | Allows the analog signal to range between the minimum and the maximum values starting from the minimum. |
| | mA | Current output test |
| | VOLt | voltage output test |
| MV-CEL | N/A | Millivolt Test - displays the load cell response signal in mV with four decimals. |
| ✱ *- indicates default value.* | | |

## 2.12 Setpoints Programming

1. Press ↵ to enter setpoints and hysteresis settings.
2. Press ◀ or ▲ until desired setpoint or hysteresis parameter is displayed, press ↵ to enter.
3. Press ◀ or ▲ until desired value is displayed, press ↵ to confirm.
4. Press ✖ to exit setpoints and hysteresis settings.


***These values are set to zero if the calibration is changed significantly (see Section 2.1.1 "Theoretical Calibration" on page 13 and Section 2.1.5 "Weight (Span) Calibration (With Test Weights)" on page 15).***

| Parameter | Choices | Description |
|---|---|---|
| SELP 1<br>SELP 2<br>SELP 3 | **0**-Full Scale<br>0 ✱ | Setpoint; relay switching occurs when the weight exceed the value set in this parameter. The type of switching is settable (see Section 2.10 "Outputs And Inputs Configuration" on page 27). |
| HYSLE 1<br>HYSLE 2<br>HYSLE 3 | **0**-Full Scale<br>0 ✱ | Hysteresis, value to be subtracted from the setpoint to obtain contact switching for decreasing weight. For example with a setpoint at 100 and hysteresis at 10, the switching occurs at 90 for decreasing weight. |
| ***✱ - indicates default value.*** | | |

# 2.13 Reserved For The Installer

## 2.13.1 Menu Locking

Through this procedure, it is possible to block the access to any menu on the instrument.

1. Press and hold ↵ then press ✕ to enter set-up menu.
2. Press ◀ or ▲ until menu to be locked is displayed.
3. Press ✕, ◀ and ▲ simultaneously for 3 seconds, the display shows C.ALib (a decimal point appears between the first and second letter that indicates this menu is now locked). If the operator tries to enter this menu, access is denied and the display reads bLOC.

## 2.13.2 Menu Unlocking

1. Press and hold ↵ then press ✕ to enter set-up menu.
2. Press ◀ or ▲ until menu to be un-locked is displayed.
3. Press ↵, ◀ and ▲ simultaneously for 3 seconds, the display shows CALib (the decimal point between the first and second letter is gone indicating the menu is un-locked).

## 2.13.3 Temporary Menu Unlocking

1. Press and hold ↵ then press ✕ to enter set-up menu.
2. Press ◀ or ▲ until menu to be temporarily un-locked is displayed.
3. Press ◀ and ▲simultaneously for 3 seconds, the display shows CALib (the decimal point between the first and second letter is gone indicating the menu is un-locked).
4. It is now possible to enter and modify all menus including those which are locked. By returning to the weight display, the menu lock is restored.

## 2.13.4 Default Scale

**Important** *Operation must only be performed after contacting technical assistance*

1. With power off, press and hold ✕, then power on. Display shows PrOG.
2. Press ↵, bASE is displayed.
3. Press ◀, PASSU is displayed.
4. Press ↵, 000000 is displayed.
5. Press ◀ and ▲ to enter 6935.
6. Press ↵, UAIL is displayed.
7. Instrument will reboot.

**Note** *By confirming the displayed program, the system variables are set to default values.*

## 2.13.5 Program Selection - Reverse:

Scale capacity is displayed when scale is empty. As weight is added display will count down.

1. With power off, press and hold ✕, then power on. PrOG is displayed.
2. Press ↵, bASE is displayed.
3. Press ◀, rEvEr is displayed.
4. Press ↵, UNIt is displayed.
5. Instrument will reboot.

## 2.13.6 Program Selection - Not Legal:

Scale approval state is preset for not-legal. For other choices please contact technical assistance:

nOtLEG: Not Legal for Trade.

LEGAL: Legal for Trade (OIML)

MuLt: Legal for Trade, multi-interval (OIML)

1. With power off, press and hold ✕, then power on. PrOG is displayed.
2. Press ↵, bASE is displayed.
3. Press ↵, NOtLEG is displayed.
4. Press ↵, UNIt is displayed.
5. Instrument will reboot.

By pressing ✕ you will quit the program without introducing any changes and without deleting any of the set variables.

**Note** *If you do not have a specific manual for the newly set program, you can request it from technical assistance.*

## 2.13.7 Keypad Or Display Locking

1. Press ✕ immediately followed by ▲, hold them down for about 5 seconds (this operation is also possible via the MODBUS and ASCII protocols):
2. Press ◀ or ▲ until desired parameter is displayed, press ↵.

| Parameter | Description |
|---|---|
| FrEE | no lock |
| KEY | keypad lock: if active, when key is pressed the message bLOC is displayed. |
| di SP | Keypad and Display lock: if active, the keypad is locked and the display shows the instrument model (weight is not displayed); by pressing a key the display shows bLOC for 3 seconds. |

# 3.0 Operation

## 3.1 Semi-automatic Tare (Net/Gross)

*The semi-automatic tare value is lost upon instrument power-off.*

*The semi-automatic tare operation is not allowed if the gross weight is zero.*

1. To capture tare and weigh in net mode (SEMI-AUTOMATIC TARE), close the NET/GROSS input or press ◀ for 3 seconds. The instrument displays the net weight (zero) and the NET LED lights up.
2. To display the gross weight again, keep the NET/GROSS input closed or press ◀ for 3 seconds.
3. This operation can be repeated by the operator to allow the loading of several products.

*Press and hold ▲ to display the gross weight temporarily. When ▲ is released, the net weight will be displayed again.*

## 3.2 Preset Tare (Subtractive Tare Device)

It is possible to manually set a preset tare value to be subtracted from the display value provided that the P-tArE ≤ max capacity.

1. Press and hold ↵ and ◀ to display P-tArE, press ↵.
2. Press ◀ or ▲ until desired value is displayed, press ↵.
3. Press ✕ to exit P-tArE.
4. After setting the tare value, go back to the weight display, the display shows the net weight (subtracting the preset tare value) and the NET LED lights up to show that a tare has been entered.

*Press and hold ▲ for 3 seconds to display the gross weight temporarily. When ▲ is released, the net weight will be displayed again.*

To delete a preset tare and return to the gross weight display:

1. Press hold ◀ for 3 seconds or keep the NET/GROSS input (if any) closed for the same length of time (3 seconds). The preset tare value is set to zero. The NET LED is turned off when the gross weight is displayed once again.

*If a semi-automatic tare (net) is entered, it is not possible to access the enter preset tare function.*

*If a preset tare is entered, it is still possible to access the semiautomatic tare (net) function. The two different types of tare are added.*

*All the semi-automatic tare (net) and preset tare functions will be lost when the instrument is turned off.*

## 3.3 Semi-automatic Zero (Weight Zero-setting For Small Variations)

By closing the SEMI-AUTOMATIC ZERO input, the weight is set to zero. The zero setting will be lost when the instrument is turned off.

This function is only allowed if the weight is lower than the 0 set value (see 0 SET in Section 2.3 on page 18), otherwise the t----- alarm appears and the weight is not set to zero.

## 3.4 Peak

By keeping the input closed the maximum weight value reached remains displayed. Opening the input the current weight is displayed.

*If you wish to use this input to view a sudden variation peak, set the FILTER ON THE WEIGHT to 0.*

# 3.5 Alarms

| Display | Description |
|---|---|
| ErCEL | Load cell is not connected or is incorrectly connected; the load cell signal exceeds 39 mV; the conversion electronics (A/D converter) is malfunctioning; the load cell is a 4-wire and there are no jumpers between EX- and REF- and between EX+ and REF+. |
| Er OL | Weight display exceeds 110% of the full scale. |
| Er Ad | Internal instrument converter failure; check load cell connections, if necessary contact Technical Assistance. |
| --------- | The weight exceeds the maximum weight by 9 divisions. |
| Er OF | Maximum displayable value exceeded (value higher than 999999 or lower than -999999). |
| L------ | Weight too high: zero setting not possible. |
| MAX-PU | This message appears in the test weight setting, in Weight (Span) Calibration, after the fifth test weight value has been entered. |
| ErrOr | The value set for the parameter is beyond the permitted values; press ✖ to quit the setting mode leaving the previous value unchanged.<br>***Example: a number of decimals is selected for full scale which exceeds the instrument's display potential; value above the maximum setting value; the weight value set in test weight verification does not match the detected mV increase.*** |
| bLOC | Lock is active on menu item, keypad or display. |
| nOdL SP | It's not possible to display the number properly because it is greater than 999999 or less than -999999. |

*Table 3-1. Alarm Descriptions*

**DeviceNet Error (DeviceNet Models Only):** A problem in the DeviceNet communication is marked by a lack of flashing or a slow flashing (duration about 0.5 s) of the DeviceNet status LED.

**Profibus Error (Profibus Models Only):** A problem in the Profibus communication is marked by a lack of flashing or a slow flashing (duration about 0.5 s) of the Profibus status LED.

**Ethernet Error (Ethernet Models Only):** A problem in the Ethernet communication is marked by a slow flashing (duration about 0.5 s) of the Ethernet status LED.

**Modbus/TCP Error (Modbus/TCP Models Only):** A problem in the Modbus/TCP communication is marked by a slow flashing (duration about 0.5 s) of the Modbus/TCP status LED.

| MODE | ErCEL | Er OL | Er Ad | --------- | Er OF | L----- |
|---|---|---|---|---|---|---|
| Bit LSB<br>Status Register MODBUS RTU | 76543210 xxxxxxx1 | 76543210 xxxx1xxx | 76543210 xxxxxx1x | 76543210 xxxxx1xx | 76543210 On gross: xxx1xxxx On net: xx1xxxxx | The response to the zero command is a 'value not valid' error (error code 3) |
| ASCII | __O-F_ | __O-L_ | __O-F_ | __O-L_ | __O-F_ | &aa#CR |
| RIP * | __O-F_ | __O-L_ | __O-F_ | __O-L_ | __O-F_ | __O-F_ |
| HDRIP-N | _ERCEL | _ER_OL | _ER_AD | ###### | _ER_OF | O__SET |
| CONTIN | _ERCEL | _ER_OL | _ER_AD | ^^^^^^ | _ER_OF | O__SET |

*Table 3-2. Serial Protocols Alarms*

*** For RIP remote displays, if the message exceeds 5 digits the display reads ------.**

**Note** ***In case of alarm the relays, not managed by Modbus, Modbus/TCP or DeviceNet, open.***

In **Analog Models** only, if an alarm becomes active the relays open and the analog outputs go to the lowest possible value according to the following table:

| Range | 0/20mA | 4/20 mA | 0/5 V | 0/10 V | -10/10 V | -5/5 V |
|---|---|---|---|---|---|---|
| Output Value | -0.2 mA | 3.5 mA | -0.5 V | -0.5 V | 0 V | 0 V |

## 3.6 SCT20-DN (DeviceNet)

The instrument works as a slave in a DeviceNet network.

Load the included eds file (TLBDNT.eds) in the DeviceNet master's development instrument.

The data exchanged by SCT20-DN are:

| Outgoing Data from SCT20-DN (Read) | Addresses |
|---|---|
| Gross Weight [4 bytes] | 0x0000-0x0003 |
| Net Weight [4bytes] | 0x0004-0x0007 |
| Setpoint [4 bytes] | 0x0008-0x000B |
| Status Register [2 bytes] | 0x000C-0x000D |
| Digital Inputs Status [1 byte] | 0x000E |
| Digital Outputs Status [1 byte] | 0x000F |
| | |
| **Input Data to SCT20-DN (Write)** | **Addresses** |
| Command Register [2 bytes] | 0x0000-0x0001 |
| Digital Outputs Command [2 bytes] | 0x0002-0x0003 |
| Setpoint [4 bytes] | 0x0004-0x0007 |

### Possible Command To Send To The Command Register

| | | | |
|---|---|---|---|
| **0** | No command | **90** | Read setpoint 1 |
| **7** | Semi-automatic tare (NET display) | **91** | Read setpoint 2 |
| **8** | SEMI-AUTOMATIC ZERO | **92** | Read setpoint 3 |
| **9** | GROSS display | **93** | Write setpoint 1 |
| **21** | Keypad lock | **94** | Write setpoint 2 |
| **22** | Keypad and display unlock | **95** | Write setpoint 3 |
| **23** | Keypad and display lock | **99** | Save data in EEPROM |
| | | **9999** | Reset (reserved) |

Note ***If it is necessary to perform the same command twice in a row, send the command 0 between a command and the other.***

### Gross Weight, Net Weight:

The weight values are expressed as positive integer numbers, including decimal figures but without decimal point.

Read the "Status Register" to obtain information about sign and possible errors on the weight.

### Setpoints:

The Setpoints are weight values expressed as positive integer numbers, including decimal figures but without decimal point.

- READING: send to the Command Register the reading command of the required setpoint (e.g. 90 for reading setpoint 1) and read the content of the "Setpoint" register.
- WRITING: write the weight value to be set in the "Setpoint" and send to the Command Register, the writing command of the required setpoint (e.g. 93 for writing setpoint 1).

Note ***Setpoints are stored to the RAM volatile memory and lost upon instrument power off. To save them permanently in the EEPROM memory, so that they are maintained upon the instrument power on, it is necessary to send the command 99 "Save data in EEPROM" of the Command Register.***

### Digital Inputs Status

| | | | |
|---|---|---|---|
| **Bit 0** | INPUT 1 status | **Bit 4** | |
| **Bit 1** | INPUT 2 status | **Bit 5** | |
| **Bit 2** | | **Bit 6** | |
| **Bit 3** | | **Bit 7** | |

Bit a 1: input high; Bit a 0: input is low

### Digital Outputs Status

| | | | |
|---|---|---|---|
| **Bit 0** | OUTPUT 1 status | **Bit 4** | |
| **Bit 1** | OUTPUT 2 status | **Bit 5** | |
| **Bit 2** | OUTPUT 3 status | **Bit 6** | |
| **Bit 3** | | **Bit 7** | |

### Digital Outputs Command

It allows to control the outputs status in dEUnEt mode (see Section 2.10 on page 27)

| | | | |
|---|---|---|---|
| **Bit 0** | OUTPUT 1 status | **Bit 8** | |
| **Bit 1** | OUTPUT 2 status | **Bit 9** | |
| **Bit 2** | OUTPUT 3 status | **Bit 10** | |
| **Bit 3** | | **Bit 11** | |
| **Bit 4** | | **Bit 12** | |
| **Bit 5** | | **Bit 13** | |
| **Bit 6** | | **Bit 14** | |
| **Bit 7** | | **Bit 15** | Force Outputs |

Bit a 1: output is closed; Bit a 0: output is open.

**Note** ***Setting bit 15 to 1 on the PLC, DeviceNet takes control of all the outputs, even if they are in different modes.***

### Status Register

| | |
|---|---|
| **Bit 0** | Cell Error |
| **Bit 1** | A/D Converter Malfunction |
| **Bit 2** | Maximum weight exceeded by 9 divisions |
| **Bit 3** | Gross weight higher than 110% of full scale |
| **Bit 4** | Gross weight beyond 999999 or less than -999999 |
| **Bit 5** | Net weight beyond 999999 or less than -999999 |
| **Bit 6** | |
| **Bit 7** | Gross weight negative sign |
| **Bit 8** | Net weight negative sign |
| **Bit 9** | Peak weight negative sign |
| **Bit 10** | Net display mode |
| **Bit 11** | Weight stability |
| **Bit 12** | Weight within +/-¼ of a division around ZERO |
| **Bit 13** | |
| **Bit 14** | |
| **Bit 15** | |

## 3.7 Profibus

- The instrument works as a Profibus DP V0 slave in a Profibus DP network.
- Load the included gsd file (LAU_0C91.gsd) attached to the instrument in the development system of the Profibus master.
- The available modules are:
  - **R** = the register can be read only
  - **W** = the register can be written only
  - **R/W** = the register can be both read and written

| MODULE | Saving to EEPROM | N. Byte R | N. Byte W | ACCESS |
|---|---|---|---|---|
| GROSS WEIGHT) | | 4 | | R |
| NET WEIGHT | | 4 | | R |
| PEAK WEIGHT | | 4 | | R |
| SETPOINT 1 | Only after command '99' of the COMMAND REGISTER | 4 | 4 | R/W |
| SETPOINT 2 | | 4 | 4 | R/W |
| SETPOINT 3 | | 4 | 4 | R/W |
| HYSTERESIS 1 | | 4 | 4 | R/W |
| HYSTERESIS 2 | | 4 | 4 | R/W |
| HYSTERESIS 3 | | 4 | 4 | R/W |
| Divisions and Units of measure | | 2 | | R |
| Visualization Coefficient | | 4 | | R |
| INPUTS | | 2 | | R |
| OUTPUTS | NO | 2 | 2 | R/W |
| STATUS REGISTER | | 2 | | R |
| COMMAND REGISTER | NO | | 2 | W |
| Sample Weight for calibration | Use with command '101' of the COMMAND REGISTER | 4 | 4 | R/W |

## GROSS WEIGHT – NET WEIGHT – PEAK

The weight values are expressed as positive integer numbers, include decimal figures but without decimal point.

Read the "Status Register" to obtain information about sign and possible errors on the weight.

To find out the decimal figures use the Division module value; E.g.: the net weight is 100000 and the division is 0.001 (three decimals), the real weight value is 100.000kg

## Setpoints – Hysteresis

The weight values are expressed as positive integer numbers, include decimal figures but without decimal point.

- to set the value to 0; write the hexadecimal value hex 80000000 to the register (the most significant bit is 1 and all the other bits are 0).
- to set them correctly consider the module Division value; E.g. if you want to set a set-point to 100kg and the verification division value is 0.001, set the set-point value to 100000 (you remove the decimal points from the value that would be 100.000 with decimals).
- If from PLC you set a value out of the permitted interval (from 0 (not included) to full scale) the value is ignored and the bit 13 "Writing error" rises in the "Status Register".


***Setpoints and Hysteresis are stored to the RAM volatile memory and lost upon instrument power off. To save them permanently in the EEPROM memory, so that they are maintained upon the instrument power on, it is necessary to send the command 99 "Save data in EEPROM" of the Command Register.***

## Divisions And Units Measure Registry (40014)

This register contains the current setting of the divisions (parameter dIUI5) and of the units of measure (UnIt parameter).

| H Byte | L Byte |
|---|---|
| Units of measure | division |

Use this register together with the coefficient registers to calculate the value displayed by the instrument.

| Least significant byte (L Byte) | | |
|---|---|---|
| Division value | Divisor | Decimals |
| 0 | 100 | 0 |
| 1 | 50 | 0 |
| 2 | 20 | 0 |
| 3 | 10 | 0 |
| 4 | 5 | 0 |
| 5 | 2 | 0 |
| 6 | 1 | 0 |
| 7 | 0.5 | 1 |
| 8 | 0.2 | 1 |
| 9 | 0.1 | 1 |
| 10 | 0.05 | 2 |
| 11 | 0.02 | 2 |
| 12 | 0.01 | 2 |
| 13 | 0.005 | 3 |
| 14 | 0.002 | 3 |
| 15 | 0.001 | 3 |
| 16 | 0.0005 | 4 |
| 17 | 0.0002 | 4 |
| 18 | 0.0001 | 4 |

| Most significant byte (H Byte) | | |
|---|---|---|
| Units of measure value | Units of measure description | Utilization of the Coefficient value with the different units of measure settings compared to the gross weight detected |
| 0 | Kilograms | Does not intervene |
| 1 | Grams | Does not intervene |
| 2 | Tons | Does not intervene |
| 3 | Pounds | Does not intervene |
| 4 | Newton | Multiples |
| 5 | Litres | Divides |
| 6 | Bar | Multiples |
| 7 | Atmspheres | Multiples |
| 8 | Pieces | Divides |
| 9 | Newton Meter | Multiples |
| 10 | Kilogram Meter | Multiples |
| 11 | Other | Multiples |

## Coefficient Display

The Profibus register contains the value of parameter COEFF, expressed as integer number, with 4 decimal figures but without decimal point.

E.g.: If COEFF is 1.2000, the Profibus register contains 12000

### Digital Inputs Status

| | | | |
|---|---|---|---|
| **Bit 0** | INPUT 1 status | **Bit 8** | |
| **Bit 1** | INPUT 2 status | **Bit 9** | |
| **Bit 2** | | **Bit 10** | |
| **Bit 3** | | **Bit 11** | |
| **Bit 4** | | **Bit 12** | |
| **Bit 5** | | **Bit 13** | |
| **Bit 6** | | **Bit 14** | |
| **Bit 7** | | **Bit 15** | |

Bit a 1: input high; Bit a 0: input is low

### Digital Outputs Command

It allows control to the outputs status in PrOFI (see Section 2.10 on page 27)

| | | | |
|---|---|---|---|
| **Bit 0** | OUTPUT 1 status | **Bit 8** | |
| **Bit 1** | OUTPUT 2 status | **Bit 9** | |
| **Bit 2** | OUTPUT 3 status | **Bit 10** | |
| **Bit 3** | | **Bit 11** | |
| **Bit 4** | | **Bit 12** | |
| **Bit 5** | | **Bit 13** | |
| **Bit 6** | | **Bit 14** | |
| **Bit 7** | | **Bit 15** | Force Outputs |

Bit a 1: output is closed; Bit a 0: output is open.

**Note** ***Setting bit 15 to 1 on the PLC, Profibus takes control of all the outputs, even if they are in different modes.***

## Status Register

| | |
|---|---|
| **Bit 0** | Cell Error |
| **Bit 1** | A/D Converter Malfunction |
| **Bit 2** | Maximum weight exceeded by 9 divisions |
| **Bit 3** | Gross weight higher than 110% of full scale |
| **Bit 4** | Gross weight beyond 999999 or less than -999999 |
| **Bit 5** | Net weight beyond 999999 or less than -999999 |
| **Bit 6** | |
| **Bit 7** | Gross weight negative sign |
| **Bit 8** | Net weight negative sign |
| **Bit 9** | Peak weight negative sign |
| **Bit 10** | Net display mode |
| **Bit 11** | Weight stability |
| **Bit 12** | Weight within +/-¼ of a division around ZERO |
| **Bit 13** | Writing error |
| **Bit 14** | |
| **Bit 15** | |

Bit 13 (writing error) rises if the PLC tries to write a value out of a parameter's permitted interval. In this case the writing has no effect and the previous parameter value is maintained.

## Possible Command To Send To The Command Register

| | | | |
|---|---|---|---|
| 0 | No command | 17 | Reserved |
| 7 | NET display | 18 | Reserved |
| 8 | SEMI-AUTOMATIC ZERO | 21 | Keypad lock |
| 10 | Reserved | 22 | Keypad and display unlock |
| 11 | Reserved | 23 | Keypad and display lock |
| 12 | Reserved | 99 | Save data in EEPROM |
| 13 | Reserved | 100 | Zero-setting for calibration |
| 14 | Reserved | 101 | Sample weight storage for calibration |
| 15 | Reserved | 9999 | Reset (reserved) |
| 16 | Reserved | | |


***Commands are sent only once; to reassert it write the value 0 to the Command register and then the command again***

## Real Calibration Commands (With Sample Weight)

The instrument calibration can be changed via PROFIBUS.

To correctly set the sample weight, consider the value of the division module (e); e.g. if you want to set the value to 100kg and the division value is 0.001, set the register value to 100000 (you remove the decimal points form the value that would be 100.000 with decimals).

To perform the edit calibration procedure, it needs to unload the system and zero-setting the displayed weight value with the command 100 "Zero-setting for calibration" of Command Register. Then, put a sample weight onto the system, write the correct known weight value to the "Sample Weight for calibration" register; to save in memory the sample weight value, send the command 101 "Sample weight storage for calibration".

To verify the correct execution of the calibration command:

- Write the sample weight value to the “Sample Weight for calibration” module;
- Write the value 0 to the “”Sample Weight for calibration” module;
- Send the command 101 “Sample weight storage for calibration” to the Command Register;
- The operation works correctly if the module value “Sample Weight for calibration” goes to zero.

***Note*** ***Changing some instrument parameters via keyboard can take the Profibus network out of the data exchange status and put the PLC in stop status; when programming the instrument the plant must be in stand-by status***

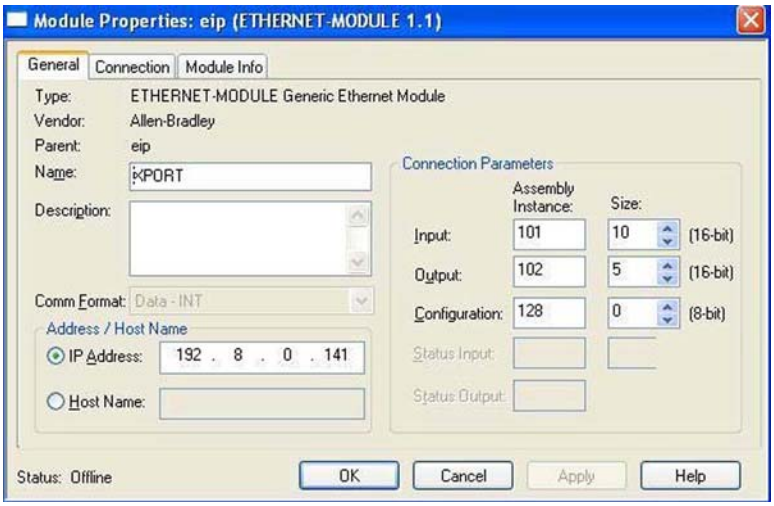
## 3.8 SCT20-IP (EtherNet/IP)



The instrument works as a device in a Ethernet/IP network.

Load the included eds file (TLBEIP.eds) in the Ethernet/IP scanner’s development instrument. Or you can open Class 1 I/O Connection with the following settings:

- Assembly Instance = 101; Size = 10
- Assembly Instance = 102; Size = 5
- Assembly Instance = 128; Size = 0




The data exchanged by SCT20-IP are:

| Outgoing Data from SCT20-IP (Read) | Addresses |
|---|---|
| Internal Status [2 bytes] | 0x0000-0x0001 |
| Gross Weight [4 bytes] | 0x0002-0x0005 |
| Net Weight [4bytes] | 0x0006-0x0009 |
| Setpoint [4 bytes] | 0x000A-0x000D |
| Status Register [2 bytes] | 0x000E-0x000F |
| Digital Inputs Status [2 byte] | 0x0010-0x0011 |
| Digital Outputs Status [2 byte] | 0x0012-0x0013 |

| Input Data to SCT20-IP (Write) | Addresses |
|---|---|
| Write Enable [2 bytes] | 0x0000-0x0001 |
| Command Register [2 bytes] | 0x0002-0x0003 |
| Digital Outputs Command [2bytes] | 0x0004-0x0005 |
| Setpoint [4 bytes] | 0x0006-0x0009 |

## Possible Command To Send To The Command Register

| | | | |
|---|---|---|---|
| **0** | No command | **90** | Read setpoint 1 |
| **7** | Semi-automatic tare (NET display) | **91** | Read setpoint 2 |
| **8** | SEMI-AUTOMATIC ZERO | **92** | Read setpoint 3 |
| **9** | GROSS display | **93** | Write setpoint 1 |
| **21** | Keypad lock | **94** | Write setpoint 2 |
| **22** | Keypad and display unlock | **95** | Write setpoint 3 |
| **23** | Keypad and display lock | **99** | Save data in EEPROM |
| | | **9999** | Reset (reserved) |


***If it is necessary to perform the same command twice in a row, send the command 0 between a command and the other.***

## Internal Status

When it is not 0 there is an internal error, so data from SCT20-IP are not reliable.

When it is 0 data from SCT20-IP are reliable.

## Write Enable

Write 0x0000 in **Write Enable** register if you want that **no** data are written to SCT20-IP.

Write 0xFFFF in **Write Enable** register if you want to enable that data are written to SCT20-IP.

## Gross weight, Net weight:

The weight values are expressed as positive integer numbers, include decimal figures but without decimal point.

Read the “Status Register” to obtain informations about sign and possible errors on the weight.

## Setpoints:

The Setpoints are weight values expressed as positive integer numbers, include decimal figures but without decimal point.

- READING: send to the Command Register the reading command of the required setpoint (e.g. 90 for reading setpoint 1) and read the content of the "Setpoint" register.
- WRITING: write the weight value to be set in the “Setpoint” and send to the Command Register, the writing command of the required setpoint (e.g. 93 for writing setpoint 1).


***Setpoints are stored to the RAM volatile memory and lost upon instrument power off. To save them permanently in the EEPROM memory, so that they are maintained upon the instrument power on, it is necessary to send the command 99 “Save data in EEPROM” of the Command Register.***

## Digital Inputs Status

| | | | |
|---|---|---|---|
| **Bit 0** | INPUT 1 status | **Bit 4** | |
| **Bit 1** | INPUT 2 status | **Bit 5** | |
| **Bit 2** | | **Bit 6** | |
| **Bit 3** | | **Bit 7** | |

Bit a 1: input high; Bit a 0: input is low

## Digital Outputs Status

| | | | |
|---|---|---|---|
| **Bit 0** | OUTPUT 1 status | **Bit 4** | |
| **Bit 1** | OUTPUT 2 status | **Bit 5** | |
| **Bit 2** | OUTPUT 3 status | **Bit 6** | |
| **Bit 3** | | **Bit 7** | |

## Digital Outputs Command

It allows control to the outputs status in ELHnEt mode (see Section 2.10 on page 27)

| | | | |
|---|---|---|---|
| **Bit 0** | OUTPUT 1 status | **Bit 8** | |
| **Bit 1** | OUTPUT 2 status | **Bit 9** | |
| **Bit 2** | OUTPUT 3 status | **Bit 10** | |
| **Bit 3** | | **Bit 11** | |
| **Bit 4** | | **Bit 12** | |
| **Bit 5** | | **Bit 13** | |
| **Bit 6** | | **Bit 14** | |
| **Bit 7** | | **Bit 15** | Force Outputs |

Bit a 1: output is closed; Bit a 0: output is open.

**Note** ***Setting bit 15 to 1 on the PLC, DeviceNet takes control of all the outputs, even if they are in different modes.***

## Status Register

| | |
|---|---|
| **Bit 0** | Cell Error |
| **Bit 1** | A/D Converter Malfunction |
| **Bit 2** | Maximum weight exceeded by 9 divisions |
| **Bit 3** | Gross weight higher than 110% of full scale |
| **Bit 4** | Gross weight beyond 999999 or less than -999999 |
| **Bit 5** | Net weight beyond 999999 or less than -999999 |
| **Bit 6** | |
| **Bit 7** | Gross weight negative sign |
| **Bit 8** | Net weight negative sign |
| **Bit 9** | Peak weight negative sign |
| **Bit 10** | Net display mode |
| **Bit 11** | Weight stability |
| **Bit 12** | Weight within +/-¼ of a division around ZERO |
| **Bit 13** | |
| **Bit 14** | |
| **Bit 15** | |

# 3.9 SCT20-TCP/IP (Ethernet TCP/IP)

To configure Ethernet TCP/IP port of SCT20-TCP/IP, the Lantronix DeviceInstaller must be installed on a Windows PC (launch DevInst.exe on the CD to install it).

1. Connect the PC and SCT20-TCP/IP through a LAN (point-to-point or with hub/switch), and then launch the Lantronix DeviceInstaller.
2. Select the **Search** button and the application will find the SCT20-TCP/IP in the LAN.

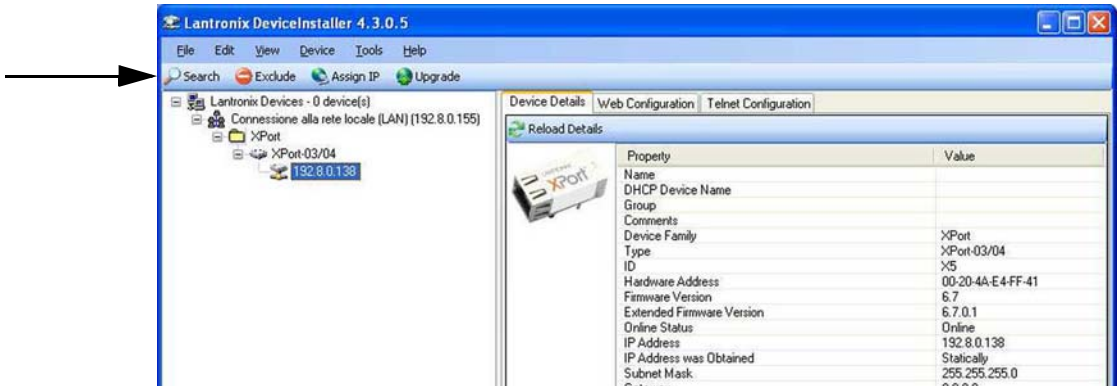
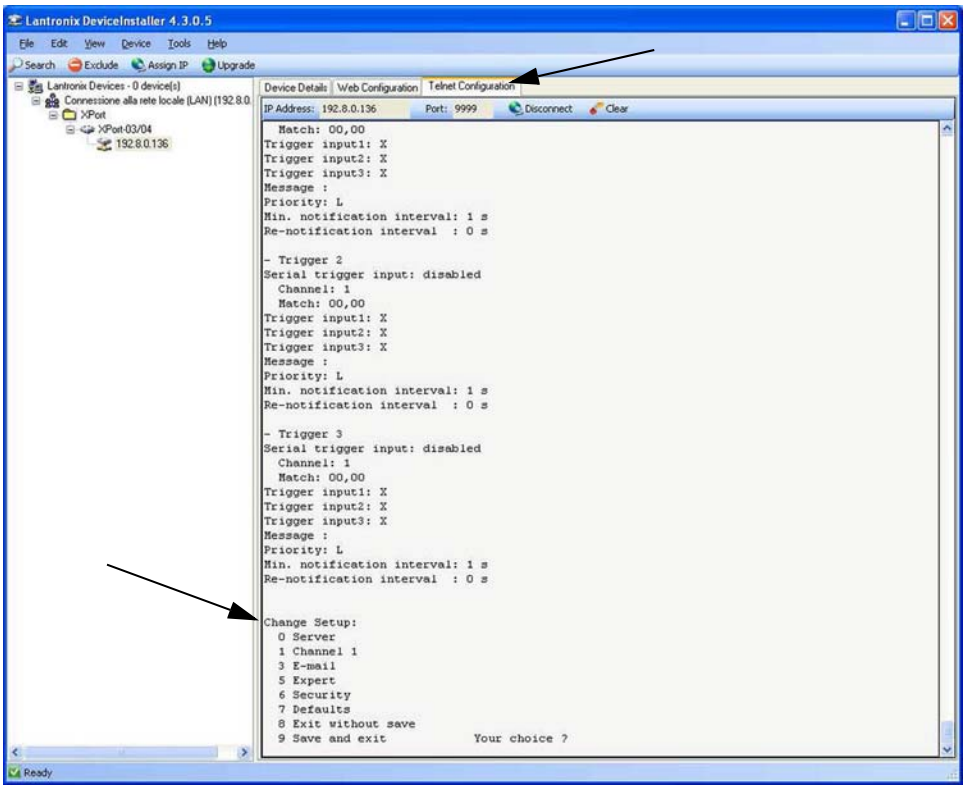



*Figure 3-1. Find SCT20-TCP/IP in LAN*

3. Select the device and then select the **Telnet Configuration**.
4. Select the **Connect** button and then press Enter.




5. Press **0 [Server]** and change only IP Address four fields (don't change other parameters: press **Enter** to confirm). It is strongly recommended to set a fixed IP Address.
6. Press **1 [Channel 1]** if you want to change serial BaudRate of the Ethernet Module to match the BaudRate set in SCT20-TCP/IP Protocol Selection (default 9600) (don't change other parameters: press **Enter** to confirm.

### To connect to the SCT20-TCP/IP using a socket (for example Winsock), the port to use is 10001.

To connect to SCT20-TCP/IP via Ethernet TCP/IP through a serial virtual port (virtual COM port of a PC) perform the following steps.

1. Run TCPIP.exe found on the CD
2. Then enter IP Address of SCT20-TCP/IP and press **ACTIVATE**. It activates socket connection.
3. Type the ASCII command (without CR) and press **SEND**. You can see the answer in Received box.

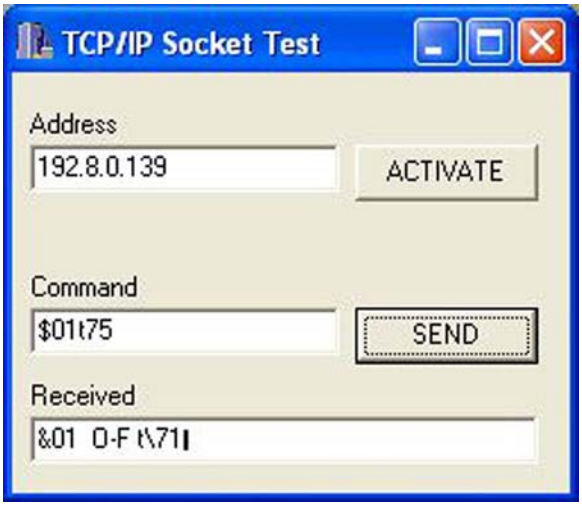



*Figure 3-2. TCP/IP Socket Test Screen*

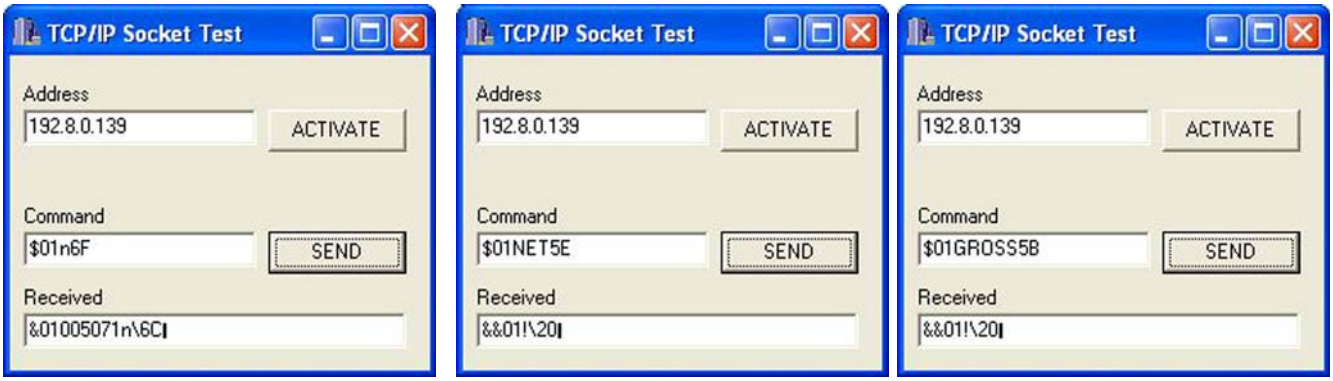



*Figure 3-3. TCP/IP Socket Test Screen (Examples)*

Use the added COM to communicate with SCT20-TCP/IP using the selected protocol.

Note

***SCT20 TCP/IP.exe is included on the CD for testing commands, it only works with Port 10001.***

***Do not include the <CR> with the command.***

***Supports the same commands as ASCII, see Section 3.12.***

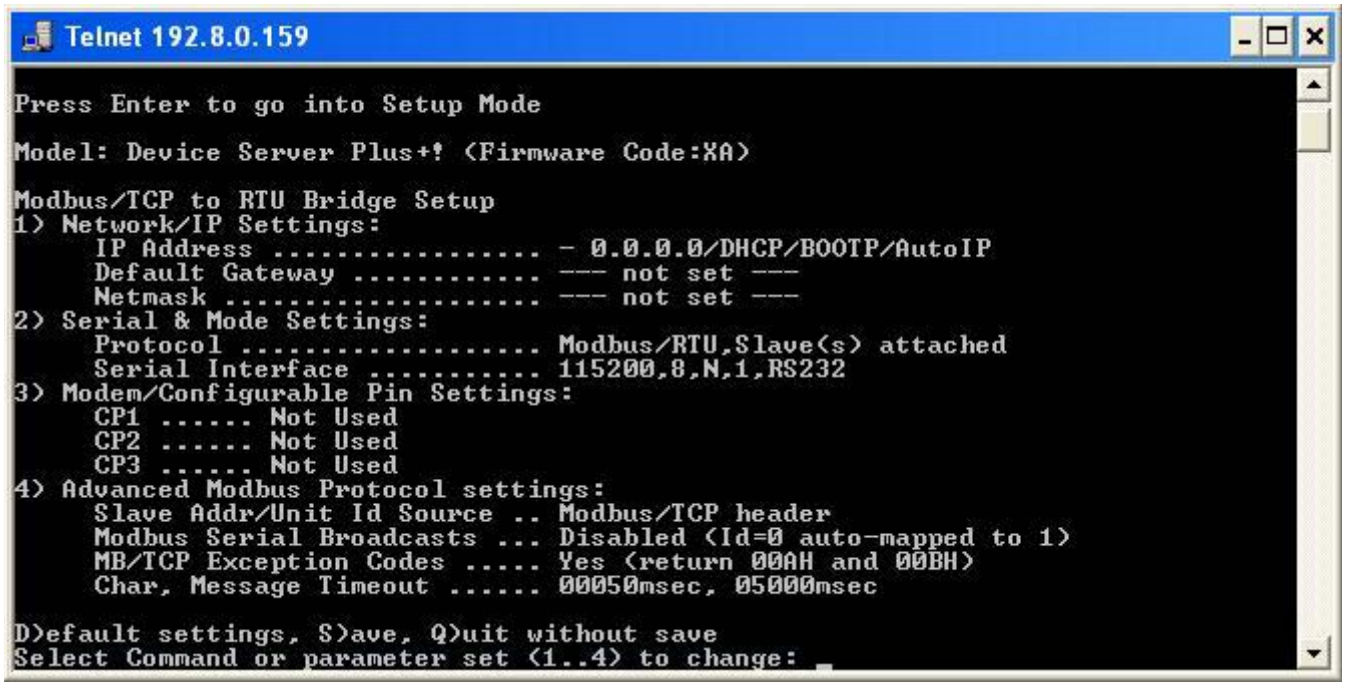
## Protocol Selection

To select the protocol to use on the Ethernet port, you can choose one of the following:

- *EthNet - Mode* lines of the list below (*none, Modbus, ASCII, Contin, Rip, Hdrip, Hdripn*). For details about these protocols see Section 2.8.
- *IPAddr*, *SUbNET*, *GALuAY* are not used yet, IPAddress, Subnet Mask or Gatway address cannot be assigned directly through the keyboard: use configuration SW Lantronix DeviceInstaller.
- *UEbSrv* protocol is not implemented yet.

## 3.10 Modbus/TCP

The instrument works as a slave in a Modbus/TCP network. TLBMODBUSTCP instrument is configured with DHCP (default). IP Address can be automatically assigned by DHCP or manually via Telnet. To manually set the IP address via PC, type "telnet <ipaddress> 9999" and press Enter to confirm. The following screen appears:




1. Type “1” if you want to manually configure IP Address, Default Gateway Address and Netmask.
2. Then type “S” to save.

Modbus/TCP commands and registers of TLBMODBUS/TCP are the same as ModbusRTU protocol (see Section 3.11).

## 3.11 Modbus-RTU Protocol

The MODBUS-RTU protocol enables management of the reading and writing of the registers listed here below according to the specifications contained in the reference document for this standard Modicon PI-MBUS-300.

To select the communication with MODBUS-RTU, refer to Section 2.9 on page 24.

When specifically indicated certain data will be written directly to EEPROM type memories. This memory has a limited number of writing operations (100.000), therefore unnecessary operations at said locations must be avoided. The instrument, in any case, ensures that no writing occurs if the value to be stored is equal to the stored value.

The numerical data listed below are expressed in decimal notation, or hexadecimal notation if preceded by 0x.

### Modbus-RTU Data Format

The data received and transmitted via MODBUS-RTU protocol have the following characteristics:

- 1 start bit
- 8 data bits, *least significant bit* sent first
- Instrument settable parity bit
- Instrument settable stop bit

## Modbus Supported Functions

Among the commands available in the MODBUS-RTU protocol, only the following are used to manage communication with the instruments. Other commands may not be interpreted correctly and could generate errors or system shut-downs:

| FUNCTIONS | DESCRIPTION |
|---|---|
| 03 (0x03) | Read Holding Register (Programmable Register Reading) |
| 16 (0x10) | Preset Multiple Registers (Multiple Register Writing) |

The interrogation frequency is linked with the preset communication rate (the instrument will stand by for at least 3 bytes before beginning to calculate a possible response to the query). The dELAY parameter (see Section 2.9 on page 24) allows for a further delay in the instrument response, and this directly influences the number of possible queries in the unit of time.

For additional information on this protocol, refer to the general technical specification PI_MBUS_300. In general, the query and response to and from a slave instrument are organized as follows:

## Function 3: Read Holding Registers (Programmable Register Reading)

| *QUERY* | | | | |
|---|---|---|---|---|
| **Address** | **Function** | **Add. Reg. 1** | **No. register** | **2 bytes** |
| A | 0x03 | 0x0000 | 0x0002 | CRC |

Tot. bytes = 8

| *RESPONSE* | | | | | |
|---|---|---|---|---|---|
| **Address** | **Function** | **No. bytes** | **Register1** | **Register 2** | **2 bytes** |
| A | 0x03 | 0x04 | 0x0064 | 0x00C8 | CRC |

Tot. bytes = 3+2*No. registers+2

in which:

No. registers= number of Modbus register to be read, starting from the Address 1° register;

No. bytes = number of data bytes to follow;

## Function 16: Preset Multiple Registers (Multiple Register Writing)

| *QUERY* | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Address** | **Function** | **Add. reg. 1** | **No. reg.** | **No. bytes** | **Val. reg.1** | **Val. reg.2** | **2 bytes** |
| A | 0x10 | 0x0000 | 0x0002 | 0x04 | 0x0000 | 0x0000 | CRC |

Tot. bytes = 7+2*No. registers+2

| *RESPONSE* | | | | |
|---|---|---|---|---|
| **Address** | **Function** | **Add. Reg. 1** | **No. register** | **2 bytes** |
| A | 0x10 | 0x0000 | 0x0002 | CRC |

Tot. bytes = 8

in which:

No. registers= number of Modbus register to be read, starting from the Address 1° register;

No. bytes = number of data bytes to follow;

Val. reg. 1 = register contents beginning from the first.

The response contains the number of records changed starting from the Address 1° register.

## Communication Error Management

The communication strings are controlled by CRC (Cyclical Redundancy Check).

In case of a communication error the slave will not respond with any string. The master must allow for a time-out before response reception. If no response is received it infers that a communication error has occurred.

In the event of a string received correctly but not executable, the slave responds with an EXCEPTIONAL RESPONSE. The "FUNCTION" field is transmitted with the msb at 1.

| *EXCEPTIONAL RESPONSE* | | | |
|---|---|---|---|
| **Address** | **Function** | **Code** | **2 bytes** |
| A | Funct + 0x80 | | CRC |

| CODE | DESCRIPTION |
|---|---|
| 1 | ILLEGAL FUNCTION (Function not valid or not supported) |
| 2 | ILLEGAL DATA ADDRESS (The specified data address is not available) |
| 3 | ILLEGAL DATA VALUE (The data received have no valid value) |

## List Of Usable Registers

The MODBUS-RTU protocol implemented on this instrument can manage a maximum of 32 registers read and written in a single query or response.

**R** = the register can be read only
**W** = the register can be written only
**R/W** = the register can be both read and written
**H** = high half of the DOUBLE WORD forming the number
**L** = low half of the DOUBLE WORD forming the number

| REGISTER | DESCRIPTION | Saving to EEPROM | ACCESS |
|---|---|---|---|
| **40001** | Firmware version | - | **R** |
| **40002** | Type of instrument | - | **R** |
| **40003** | Year of Production | - | **R** |
| **40004** | Serial Number | - | **R** |
| **40005** | Active program | - | **R** |
| **40006** | COMMAND REGISTER | **NO** | **W** |
| **40007** | STATUS REGISTER | - | **R** |
| **40008** | GROSS WEIGHT H | - | **R** |
| **40009** | GROSS WEIGHT L | - | **R** |
| **40010** | NET WEIGHT H | - | **R** |
| **40011** | NET WEIGHT L | - | **R** |
| **40012** | PEAK WEIGHT H | - | **R** |
| **40013** | PEAK WEIGHT L | - | **R** |
| **40014** | Divisions and Units of measure | - | **R** |
| **40015** | Coefficient H | | **R** |
| **40016** | Coefficient L | | **R** |

| REGISTER | DESCRIPTION | Saving to EEPROM | ACCESS |
|---|---|---|---|
| 40017 | SETPOINT 1 H | Only after command '99' of the COMMAND REGISTER | R/W |
| 40018 | SETPOINT 1 L | | R/W |
| 40019 | SETPOINT 2 H | | R/W |
| 40020 | SETPOINT 2 L | | R/W |
| 40021 | SETPOINT 3 H | | R/W |
| 40022 | SETPOINT 3 L | | R/W |
| 40023 | HYSTERESIS 1 H | | R/W |
| 40024 | HYSTERESIS 1 L | | R/W |
| 40025 | HYSTERESIS 2 H | R/W | |
| 40026 | HYSTERESIS 2 L | R/W | |
| 40027 | HYSTERESIS 3 H | R/W | |
| 40028 | HYSTERESIS 3 L | R/W | |
| 40029 | INPUTS | - | R |
| 40030 | OUTPUTS | NO | R/W |
| 40037 | Test weight for calibration H | Use with command '101' of the COMMAND REGISTER | R/W |
| 40038 | Test weight for calibration L | | R/W |
| 40043 | Weight value corresponding to ZERO of the analog output H | Only after command '99' of the Command Register. (Analog Models Only) | R/W |
| 40044 | Weight value corresponding to ZERO of the analog output L | | R/W |
| 40045 | Weight value corresponding to Full Scale of the analog output H | | R/W |
| 40046 | Weight value corresponding to Full Scale of the analog output L | | R/W |

**Important** *At the time of writing, the setpoints, hysteresis values are saved to the RAM and will be lost upon the next power-off; to store them permanently to the EEPROM so that they are maintained at power-on, the '99' command of the Command Register must be sent.*

## Weight (Span) Calibration Commands (With Test Weights)

The instrument calibration can be changed via MODBUS. To carry out this procedure, the system must be unloaded and the weight value display reset to zero with the command '100' of the Command Register. Then, a load must be placed on the system and the correct weight value must be sent to the registers 40037-40038; to save this value, send the control '101' from the Command Register. If the operation is successfully completed, the two test weight registers are set to zero.

## Analog Output Setting (Analog Models Only)

Write the weight in the registers "Weight value corresponding to the Full Scale of analog output H" (40045) and "Weight value corresponding to the Full Scale of analog output L" (40046) or write the weight in the registers "weight value corresponding to the ZERO of the analog output H" (40043) and "weight value corresponding to the ZERO of the analog output L" (40044). After writing the value, send the command 99 from the Command Register to save it to EEPROM memory.

| Status Register (40007) | |
|---|---|
| **Bit 0** | Cell Error |
| **Bit 1** | AD Convertor Malfunction |
| **Bit 2** | Maximum weight exceeded by 9 divisions |
| **Bit 3** | Gross weight higher than 110% of full scale |
| **Bit 4** | Gross weight beyond 999999 or less than -999999 |
| **Bit 5** | Net weight beyond 999999 or less than -999999 |
| **Bit 6** | |
| **Bit 7** | Gross weight negative sign |
| **Bit 8** | Net weight negative sign |
| **Bit 9** | Peak weight negative sign |
| **Bit 10** | Net display mode |
| **Bit 11** | Weight stability |
| **Bit 12** | Weight within +/-¼ of a division around ZERO |
| **Bit 13** | |
| **Bit 14** | |
| **Bit 15** | |

| INPUTS REGISTER (40029) (Read Only) | |
|---|---|
| Bit 0 | INPUT 1 Status |
| Bit 1 | INPUT 2 Status |
| Bit 2 | |
| Bit 3 | |
| Bit 4 | |
| Bit 5 | |
| Bit 6 | |
| Bit 7 | |
| Bit 8 | |
| Bit 9 | |
| Bit 10 | |
| Bit 11 | |
| Bit 12 | |
| Bit 13 | |
| Bit 14 | |
| Bit 15 | |

| OUTPUTS REGISTER (40030) (Read and Write) | |
|---|---|
| Bit 0 | OUTPUT 1 Status |
| Bit 1 | OUTPUT 2 Status |
| Bit 2 | OUTPUT 3 Status |
| Bit 3 | |
| Bit 4 | |
| Bit 5 | |
| Bit 6 | |
| Bit 7 | |
| Bit 8 | |
| Bit 9 | |
| Bit 10 | |
| Bit 11 | |
| Bit 12 | |
| Bit 13 | |
| Bit 14 | |
| Bit 15 | |

Note

***The output status can be read at any time but can be set (written) only if the output has been set as nOdbUS or dEUnEt (see Section 2.10 on page 27); otherwise, the outputs will be managed according to the current weight status with respect to the relevant setpoints.***

## Divisions And Units Measure Registry (40014)

This register contains the current setting of the divisions (parameter dIUS) and of the units of measure (UnIt parameter).

| H Byte | L Byte |
|---|---|
| Units of measure | division |

Use this register together with the Coefficient registers to calculate the value displayed by the instrument.

| Least significant byte (L Byte) | | |
|---|---|---|
| Division value | Divisor | Decimals |
| 0 | 100 | 0 |
| 1 | 50 | 0 |
| 2 | 20 | 0 |
| 3 | 10 | 0 |
| 4 | 5 | 0 |
| 5 | 2 | 0 |
| 6 | 1 | 0 |
| 7 | 0.5 | 1 |
| 8 | 0.2 | 1 |
| 9 | 0.1 | 1 |
| 10 | 0.05 | 2 |
| 11 | 0.02 | 2 |
| 12 | 0.01 | 2 |
| 13 | 0.005 | 3 |
| 14 | 0.002 | 3 |
| 15 | 0.001 | 3 |
| 16 | 0.0005 | 4 |
| 17 | 0.0002 | 4 |
| 18 | 0.0001 | 4 |

| Most significant byte (H Byte) | | |
|---|---|---|
| Units of measure value | Units of measure description | Utilization of the Coefficient value with the different units of measure settings compared to the gross weight detected |
| 0 | Kilograms | Does not intervene |
| 1 | Grams | Does not intervene |
| 2 | Tons | Does not intervene |
| 3 | Pounds | Does not intervene |
| 4 | Newton | Multiples |
| 5 | Litres | Divides |
| 6 | Bar | Multiples |
| 7 | Atmspheres | Multiples |
| 8 | Pieces | Divides |
| 9 | Newton Meter | Multiples |
| 10 | Kilogram Meter | Multiples |
| 11 | Other | Multiples |

### Possible Commands To Send To The Command Register (40006)

| | | | |
|---|---|---|---|
| **0** | No command | **17** | Reserved |
| **1** | | **18** | Reserved |
| **2** | | **19** | |
| **3** | | **20** | |
| **4** | | **21** | Keypad lock |
| **5** | | **22** | Keypad and display unlock |
| **6** | | **23** | Keypad and display lock |
| **7** | NET display | **24** | |
| **8** | SEMI-AUTOMATIC ZERO | **99** | Save data in EEPROM |
| **9** | GROSS display | **100** | Zero-setting for calibration |
| **10** | Reserved | **101** | Test weight storage for calibration |
| **11** | Reserved | | |
| **12** | Reserved | | |
| **13** | Reserved | | |
| **14** | Reserved | | |
| **15** | Reserved | | |
| **16** | Reserved | **9999** | Reset (reserved) |

## 3.12 ASCII Bidirectional Protocol

***All the sample commands use address 1. If a different address is used it will need a different Check-Sum calculated.***

The instrument replies to the requests sent from a PC/PLC.

It is possible to set a delay time for the instrument before it transmits a response (see *dELAY* parameter in Section 2.9 on page 24).

The following communication modes available (see Section 2.9 on page 24):

- NOdU60:
- *nOd Ld*

### Data Identifiers

**$:** Beginning of a request string (36 ASCII);

**& o &&:** Beginning of a response string (38 ASCII);

**aa:** 2 characters for instrument address (48 ÷ 57 ASCII);

**!:** 1 character to indicate the correct reception(33 ASCII);

**?:** 1 character to indicate a reception error (63 ASCII);

**#:** 1 character to indicate an error in the command execution (23 ASCII);

**ckck:** 2 ASCII characters for Check-Sum (for further information, see “Check-Sum Calculation” on page 56);

**CR:** 1 character for string end (13 ASCII);

**\:** 1 character for separation (92 ASCII).

### Setpoint Values Setting:

The PC transmits : **$aaxxxxxxyckckCR**

in which:

**xxxxxx** = 6 characters for the setpoint value (48 ? 57 ASCII);

**y** = A (set the value in the Setpoint 1)*$01010000A40CR*

**y** = B (set the value in the Setpoint 2)*$01010000B42CR*

**y** = C (set the value in the Setpoint 3)*$01010000C43CR*

Possible instrument responses:

- correct reception: **&&aa!\ckckCR**

- incorrect reception: **&&aa?\ckckCR**

### Setpoints Storage Into EEPROM Memory:

The setpoints value relevant to the two setpoints programmed via the PC are stored to the RAM volatile memory and lost upon instrument power off. It is necessary to send a special command to save them permanently in the EEPROM memory. Please note that the number of writes allowed in the EEPROM memory is limited (about 100000).

The PC transmits: **$aaMEMckckCR** ***$01MEM44CR***

Possible instrument responses:

- correct reception: **&&aa!\ckckCR**

- incorrect reception: **&&aa?\ckckCR**

### Reading Weight, The Setpoint And The Peak (If Present) From The Pc:

The PC transmits: **$aajckckCR**

in which:

**j** = a to read setpoint 1*$01a60CR*

**j** = b to read setpoint 2*$01b63CR*

**j** = c to read setpoint 3*$01c62CR*

**j** = t to read gross weight*$01t75CR*

**j** = n to read net weight*$01n6FCR*

**j** = p to read the gross weight peak if the ASCII parameter is set as nOdU60; if, instead the ASCII parameter is set on nOd Ld the gross weight will be read.
**To read the points, set the FS LE0 equal to 50000.** ***$01p71CR***

Possible instrument responses:

- correct reception: **&aaxxxxxxj\ckckCR**

- incorrect reception: **&&aa?\ckckCR**

- if the peak is not configured: **&aa#CR**

in which:

**xxxxxx** = 6 value characters of the required weight;


*In case of negative weight, the first character on the left acquires the value « - » (minus sign - ASCII 45).*

*In case of weight value is under -99999, the minus sign ('-') is sent alternated with the most significant figure.*

**Error messages:**

In case of an instrument alarm for exceeding 110% of the full scale or 9 divisions above the value of the parameter nAS5, the instrument sends the string:

**&aassO-Lst\ckck**

In case of faulty connection of the load cells or of another alarm, the instrument sends:

**&aassO-Fst\ckck**

in which:

**s** = 1 separator character (32 ASCII – space-).

Generally refer Section 3.5 “Alarms” on page 34.

## Semi-Automatic Zero (Weight Zero-Setting For Small Variations)

**Important** *The zero-setting will not be maintained after an instrument power-off.*

The PC transmits: **$aaZEROckckCR** ***$01ZERO03CR***

Possible instrument responses:

- correct reception: **&&aa!\ckckCR**
- incorrect reception: **&&aa?\ckckCR**
- the current weight is over the maximum value resettable: **&aa#CR**

## Switching From Gross Weight To Net Weight

The PC transmits: **$aaNETckckCR** ***$01NET5ECR***

Possible instrument responses:

- correct reception: **&&aa!\ckckCR**
- incorrect reception: **&&aa?\ckckCR**

## Switching From Net Weight To Gross Weight

The PC transmits: **$aaGROSSckckCR** ***$01GROSS5BCR***

Possible instrument responses:

- correct reception: **&&aa!\ckckCR**
- incorrect reception: **&&aa?\ckckCR**

## Reading Of Decimals And Number Of Divisions

The PC transmits: **$aaDckckCR** ***$01D45CR***

Possible instrument responses:

- correct reception: **&aaxy\ckckCR**
- incorrect reception: **&&aa?\ckckCR**

in which:

**x** = number of decimals

**y** = division value

The **y** field acquires the following values:

'3' for division value = 1;

'4' for division value = 2;

'5' for division value = 5;

'6' for division value = 10;

'7' for division value = 20;

'8' for division value = 50;

'9' for division value = 100;

## Tare Weight Zero Setting

The PC transmit the following ASCII string containing the zeroing command:
**$aazckckCR** ***$01z7BCR***

in which:

**z** = weight zeroing command (122 ASCII)

Possible instrument responses:

- correct reception: **&aaxxxxxxt\ckckCR**
- incorrect reception: **&&aa?\ckckCR**
- If the instrument is not in gross weight displaying condition, the response is: **&aa#CR**

in which:

**xxxxxx** = 6 characters for the required weight value;

**t** = weight identification code (116 ASCII).

**Example:** Weight zero setting for instrument with address 2:

For the calibration, make sure that the scale is empty and the instrument measures a corresponding mV signal.

query: **$02z78(Cr)** response: **&02000000t\76(Cr)**

In case of correct weight zero setting the read value (response) must be 0 (in the string "000000").

**Important** *The zero values are stored to the EEPROM memory, please note that the number of writes allowed is limited (about 100000). If it is necessary to reset the weight quite often, it is recommended to perform it by PC or PLC program, keeping in mind the weight deviation respect to the zero instrument.*

## Weight (Span) Calibration (With Test Weights)

After having performed the TARE WEIGHT ZERO SETTING, this function allows correct calibration to be done using test weights of known value and, if necessary, any deviations of the indicated value from the correct value to be corrected.

Load the test weight onto the scale, use as high a percentage of the maximum quantity to be weighed as possible. Otherwise make sure that the instrument measures a corresponding mV signal.

The PC sends the following ASCII string containing the calibration command:

**$aasxxxxxxckckCR**

in which:

**s** = calibration command (115 ASCII)

**xxxxxx** = 6 characters for test weight value.

Possible instrument responses:

- correct reception: **&aaxxxxxxt\ckckCR**
- incorrect reception or full scale equal to zero: **&&aa?\ckckCR**

in which:

**t** = gross weight identification code (116 ASCII).

**xxxxxx** = 6 characters to indicate the current weight value.

In case of correct calibration, the read value must be equal to test weight.

**Example:** Calibration for instrument with address 1 and test weight of 20000 kg:

query: **$01s02000070(Cr)** response: **&01020000t\77(Cr)**

In case of correct calibration the read value has to be "020000".

## Keypad Lock (Access Protection To The Instrument)

The PC transmits: **$aaKEYckckCR** ***$01KEY56CR***

Possible instrument responses:

- correct reception: **&&aa!\ckckCR**
- incorrect reception: **&&aa?\ckckCR**

## Keypad Unlock

The PC transmits: **$aaFREckckCR** ***$01FRE50CR***

Possible instrument responses:

- correct reception: **&&aa!\ckckCR**
- incorrect reception: **&&aa?\ckckCR**

## Display And Keypad Lock

The PC transmits: **$aaKDISckckCR** ***$01KDIS14CR***

Possible instrument responses:

- correct reception: **&&aa!\ckckCR**
- incorrect reception: **&&aa?\ckckCR**

## Check-Sum Calculation

The two ASCII control characters **(ckck)** are the representation of a hexadecimal digit in ASCII characters. The check digit is calculated by performing the operation XOR (exclusive or) 8-bit ASCII codes of the only part of the underlined string.

The procedure to calculate the check- sum is the following:

- Consider only the string characters highlighted with underlining;
- Calculate the EXCLUSIVE OR (XOR) of the ASCII codes for the characters;

Example:

| Character | Decimal ASCII Code | Hexadecimal ASCII Code | Binary ASCII Code |
|---|---|---|---|
| 0 | 48 | 30 | 00110000 |
| 1 | 49 | 31 | 00110001 |
| t | 116 | 74 | 01110100 |
| XOR = | 117 | 75 | 01110101 |

- The result of the XOR operation expressed in hexadecimal notation is made up of 2 hexadecimal digits (numbers from 0 to 9 or letters from A to F). In this case the hexadecimal code is 0x75.
- The check-sum inserted in the strings transmitted is made up of the 2 characters which represent the result of the XOR operation in hexadecimal notation (in our example the character " 7 " and the character " 5)

## 3.13 Fast Continuous Transmission Protocol

This protocol allows for continuous serial output at high update frequencies. Up to 300 strings per second are transmitted (with a minimum transmission rate of 38400 baud). See Section 2.9 on page 24 for limitations.

Following communication modes available (see Section 2.9 on page 24):

- nOd t: communication compatible with TX RS485 instruments;
- nOd td: communication compatible with TD RS485 instruments.
- If nOd t is set, the following string is transmitted to PC/PLC: **xxxxxxCRLF**

in which:

**xxxxxx** = 6 ASCII characters for gross weight (48 ÷ 57 ASCII).

**CR** = 1 character of carriage return (13 ASCII).

**LF** = 1 character of line feed (10 ASCII).

In case of negative weight, the first character on the left acquires the value « - » (minus sign - ASCII 45).

**In case of error or alarm, the 6 weight characters are replaced by the messages found in Table 3-1 on page 34.**

- If nOd td is set, the following string is transmitted to PC/PLC: **&TzzzzzzPzzzzzz\ckckCR**

in which:

**&** = 1 character of string start (38 ASCII).

**T** = reference character for gross weight.

**P** = reference character for gross weight.

**zzzzzz** = 6 ASCII characters for gross weight (48 ? 57 ASCII).

\ = 1 character of separation (92 ASCII).

**ckck** = 2 ASCII control characters calculated considering that the characters between **&** and \ are excluded. The control value is obtained by carrying out the XOR (or exclusive) operation for the 8 bit ASCII codes of the characters considered. A character expressed in hexadecimal is thus obtained, with 2 digits which may acquire values from “0” to “9” and from “A” to “F”. “**ckck”** is the ASCII code of the two hexadecimal digits.

**CR** = 1 character for string end (13 ASCII).

In case of negative weight, the first character on the left acquires the value « - » (minus sign - ASCII 45).

In case of error or alarm, the 6 gross weight characters are replaced by the messages found in the table of the ALARMS.

**Fast Transmission Via External Contact:** A single string can be transmitted by closing a digital input, not exceeding 1 sec. (see Section 2.10 on page 27 and Section 2.9 on page 24).

## 3.14 Continuous Transmission Protocol

Using this protocol, the instrument transmits, in continuous mode, the weight to remote displays; the communication string is transmitted 10 times per second. Following communication modes are available (see Section 2.9 on page 24):

- rL P: remote display shows the net or gross weight, depending on the remote display setting.
- HdrL P: remote display shows the net or gross weight, depending on the remote display setting.
- HdrL Pn:


**Note** *See following page for more information.*

The instrument sends the following string to the remote display:

&NxxxxxxLyyyyyy\ckckCR

in which:

**&** = 1 character of string start (38 ASCII).

**N** = 1 reference character for net weight. (78 ASCII).

**xxxxxx** = 6 ASCII characters for net or peak weight if present (48 ÷ 57 ASCII).

**L** = 1 reference character for gross weight (76 ASCII).

**yyyyyy** = 6 ASCII characters for gross weight (48 ? 57 ASCII).

\ = 1 character for separation (92 ASCII).

**ckck** = 2 ASCII control characters calculated considering that the characters between "**&**" and "\" are excluded. The control value is obtained by carrying out the XOR (or exclusive) operation for the 8 bit ASCII codes of the characters considered. character expressed in hexadecimal is thus obtained, with 2 digits which may acquire values from "0" to "9" and from "A" to "F". "**ckck**" is the ASCII code of the two hexadecimal digits.

**CR** = 1 character for string end (13 ASCII).

In case of negative weight, the first character on the left acquires the value « - » (minus sign - ASCII 45).

If the protocol on *HdrL P* has been set, the decimal point at the position shown on the instrument's display can also be transmitted. In this case, if the value exceeds 5 digits, only the 5 most significant digits are transmitted, while if the value is negative, no more than the 4 most significant digits are transmitted. In both cases, however, the decimal point shifts consistently with the value to display.

If *HdrL Pn* has been set, in addition to what stated in *HdrL P* protocol, the instrument transmits the prompt net every 4 seconds in the gross weight field, if the instrument is in net mode. (see Section 3.1 "Semi-automatic Tare (Net/ Gross)" on page 33).

In case weight value is under -99999, the minus sign ('-') is sent alternated with the most significant figure.

In case of error or alarm, the 6 characters of the gross and net weight are replaced by the messages found in Table 3-1 on page 34.

## 3.15 Interface to Remote Display

### Remote Display (Laser Light)

1. Press and hold ↵, then press ✕ to enter set-up menu, *CALib* is displayed.
2. Press ◀ or ▲ until *SErIAL* is displayed, press ↵. *rS485* is displayed.
3. Press ↵, *nOnE* is displayed.
4. Press ◀ or ▲ until *COntIn* is displayed, press ↵.
5. Press ◀ or ▲ until *MOd Ld* is displayed.
6. Press ◀ or ▲ until desired protocol is displayed, press ↵.
7. Press ✕ twice to exit set-up menu.

Laser Light Setup
E CHAR = CR
LWPOS = 7
LENGTH = 19

| Laser Light | | SCT |
|---|---|---|
| Connector | Pin | Connector |
| J8 (RS-232) | 3 | RS-485 RX- |
| | 5 | RS-485 RX+ |
| OR | | |
| J9 (RS-485) | 1 | RS-485 RX+ |
| | 2 | RS-485 RX- |

## 3.16 Communication Examples

The numerical data below are expressed in hexadecimal notation with prefix h.

### Example 1

Command for multiple writing of registers (hexadecimal command 16, h10):

Assuming that we wish to write the value 0 to the register 40017 and the value 2000 to the register 40018, the string to generate must be:

h01 h10 h00 h10 h00 h02 h04 h00 h00 h07 hD0 hF1 h0F

The instrument will respond with the string:

h01 h10 h00 h10 h00 h02 h40 h0D

| Query Field Name | Hex | Response Field Name | Hex |
|---|---|---|---|
| Instrument Address | h01 | Instrument Address | h01 |
| Function | h10 | Function | h10 |
| Address of the first register H | h00 | Address of the first register H | h00 |
| Address of the first register L | h10 | Address of the first register L | h10 |
| Number of registers to send H | h00 | Number of registers H | h00 |
| Number of registers to send L | h02 | Number of registers L | h02 |
| Byte Count | h04 | CRC16 H | h40 |
| Datum 1 H | h00 | CRC16 L | h0D |
| Datum 1 L | h00 | | |
| Datum 2 H | h07 | | |
| Datum 2 L | hD0 | | |
| CRC16 H | hF1 | | |
| CRC16 L | h0F | | |

## Example 2

Command for multiple writing of registers (hexadecimal command 16, h10):

Assuming that we wish to write the two setpoint values on the instrument, at 2000 and 3000 respectively, the string must be sent:

h01 h10 h00 h10 h00 h04 h08 h00 h00 h07 hD0 h00 h00 h0B hB8 hB0 hA2

The instrument will respond with the string:

h01 h10 h00 h10 h00 h04 hC0 h0F

| Query Field Name | Hex | Response Field Name | Hex |
|---|---|---|---|
| Instrument Address | h01 | Instrument Address | h01 |
| Function | h10 | Function | h10 |
| Address of the first register H | h00 | Address of the first register H | h00 |
| Address of the first register L | h10 | Address of the first register L | h10 |
| Number of registers to send H | h00 | Number of registers H | h00 |
| Number of registers to send L | h04 | Number of registers L | h04 |
| Byte Count | h08 | CRC16 H | hC0 |
| Datum 1 H | h00 | CRC16 L | h0F |
| Datum 1 L | h00 | | |
| Datum 2 H | h07 | | |
| Datum 2 L | hD0 | | |
| Datum 3 H | h00 | | |
| Datum 3 L | h00 | | |
| Datum 4 H | h0B | | |
| Datum 4 L | hB8 | | |
| CRC16 H | hB0 | | |
| CRC16 L | hA2 | | |

## Example 3

Multiple command reading for registers (hexadecimal command 3, h03):

Assuming that we wish to read the two gross weight values (in the example 4000) and net weight values (in the example 3000), reading from address 40008 to address 40011 must be performed by sending the following string:

H01 h03 h00 h07 h00 h04 hF5 hC8

The instrument will respond with the string:

H01 h03 h08 h00 h00 hF hA0 h00 h00 h0B hB8 h12 h73

| Query Field Name | Hex | Response Field Name | Hex |
|---|---|---|---|
| Instrument Address | h01 | Instrument Address | h01 |
| Function | h03 | Function | h03 |
| Address of the first register H | h00 | Address of the first register H | h08 |
| Address of the first register L | h07 | Address of the first register L | h00 |
| Number of registers to send H | h00 | Datum 1 H | h00 |
| Number of registers to send L | h04 | Datum 1 L | h00 |
| CRC16 H | hF5 | Datum 2 H | h0F |
| CRC16 L | hC8 | Datum 2 L | hA0 |
| | | Datum 3 H | h00 |
| | | Datum 3 L | h00 |
| | | Datum 4 H | h0B |
| | | Datum 4 L | hB0 |
| | | CRC16 H | h12 |
| | | CRC16 L | h73 |

For additional examples regarding the generation of correct control characters (CRC16) refer to the manual **Modicon PI-MBUS-300.**

# SCT Weight Transmitter Limited Warranty

Rice Lake Weighing Systems (RLWS) warrants that all RLWS equipment and systems properly installed by a Distributor or Original Equipment Manufacturer (OEM) will operate per written specifications as confirmed by the Distributor/OEM and accepted by RLWS. All systems and components are warranted against defects in materials and workmanship for one year.

RLWS warrants that the equipment sold hereunder will conform to the current written specifications authorized by RLWS. RLWS warrants the equipment against faulty workmanship and defective materials. If any equipment fails to conform to these warranties, RLWS will, at its option, repair or replace such goods returned within the warranty period subject to the following conditions:

- Upon discovery by Buyer of such nonconformity, RLWS will be given prompt written notice with a detailed explanation of the alleged deficiencies.
- Individual electronic components returned to RLWS for warranty purposes must be packaged to prevent electrostatic discharge (ESD) damage in shipment. Packaging requirements are listed in a publication, *Protecting Your Components From Static Damage in Shipment*, available from RLWS Equipment Return Department.
- Examination of such equipment by RLWS confirms that the nonconformity actually exists, and was not caused by accident, misuse, neglect, alteration, improper installation, improper repair or improper testing; RLWS shall be the sole judge of all alleged non-conformities.
- Such equipment has not been modified, altered, or changed by any person other than RLWS or its duly authorized repair agents.
- RLWS will have a reasonable time to repair or replace the defective equipment. Buyer is responsible for shipping charges both ways.
- In no event will RLWS be responsible for travel time or on-location repairs, including assembly or disassembly of equipment, nor will RLWS be liable for the cost of any repairs made by others.

These warranties exclude all other warranties, expressed or implied, including without limitation warranties of merchantability or fitness for a particular purpose. Neither RLWS nor distributor will, in any event, be liable for incidental or consequential damages.

RLWS and buyer agree that RLWS' sole and exclusive liability hereunder is limited to repair or replacement of such goods. In accepting this warranty, the buyer waives any and all other claims to warranty.

Should the seller be other than RLWS, the buyer agrees to look only to the seller for warranty claims.

No terms, conditions, understanding, or agreements purporting to modify the terms of this warranty shall have any legal effect unless made in writing and signed by a corporate officer of RLWS and the Buyer.



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# For More Information

## Web Site

Frequently Asked Questions (FAQs) at

- http://www.ricelake.com/faqs

## Contact Information

### Hours of Operation

Knowledgeable customer service representatives are available:

- 6:30 a.m. - 6:30 p.m. Monday through Friday
- 8 a.m. to 12 noon on Saturday. (CST)

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- Sales/Technical Support 800-472-6703
- Canadian and Mexican Customers 800-321-6703
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### Immediate/Emergency Service

For immediate assistance call toll-free 1-800-472-6703 (Canadian and Mexican customers please call 1-800-321-6703). If you are calling after standard business hours and have an urgent scale outage or emergency, press 1 to reach on-call personnel.

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