# WE503D

*Dynamic Integrator for Belt Scales, Screw Weighers, Bulkslide Flowmeters and Impact Flowmeters*

*Program Version: From v3.06*

# Installation Manual


RICE LAKE®
WEIGHING SYSTEMS

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An ISO 9001 registered company


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The most current version of this publication, software, firmware and all other product updates can be found on our website:

**www.ricelake.com**

# Contents

# Contents

# 1.0 Introduction

This manual is intended for use by service technicians responsible for installing a WE503D Dynamic Integrator.

Manuals and additional resources are available from the Rice Lake Weighing Systems website at www.ricelake.com

Warranty information can be found on the website at www.ricelake.com/warranties

## 1.1 Safety

**Safety Signal Definitions:**

DANGER — ***Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. Includes hazards that are exposed when guards are removed.***

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

CAUTION — ***Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury.***

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

### General Safety

***Do not operate or work on this equipment unless this manual has been read and all instructions are understood. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Rice Lake Weighing Systems dealer for replacement manuals.***

WARNING

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

***Electric shock risk. Disconnect all power to the instrument before opening the enclosure.***

***Work inside the enclosure must be performed by qualified service personnel only.***

***Do not operate without the enclosure completely assembled.***

***Do not allow minors (children) or inexperienced persons to operate this unit.***

***Exercise the utmost care when performing tests and making adjustments that can actuate movable parts such as feeding devices, gates, flaps, conveyors, etc. Make absolutely sure that nobody is within reach of movable parts.***

***This unit must not be operated in a potentially explosive atmosphere. It is the sole responsibility of the user to classify the area of installation and make sure that absolutely no potentially explosive atmosphere can be present at any time.***

***For the storage of key data the terminal contains a battery on the CPU board. Risk of explosion if battery is replaced improperly. Replace only with a battery of the same type or with compatible type recommended by manufacturer. Only dispose of used batteries as indicated by the manufacturer.***

***The device uses short-circuit/over-current protection for the main supply.***

***Do not use for purposes other than weight taking.***

***Do not make alterations or modifications to the unit.***

***Do not exceed the rated specification of the unit.***

***Do not use this product if any of the components are cracked.***

***Do not remove or obscure warning labels.***

***Disconnect all power to this instrument before cleaning.***

***Do not use solvents or aggressive substances to clean the unit.***

***Do not submerge.***

**CAUTION** ***Failure to heed could result in minor or moderate injury.***

***If this device is used in an automatic or manual filling cycle, all users must provide a hard wired emergency stop circuit outside the device circuitry.***

***When this unit is a component of a system, the resulting system design must be reviewed by qualified personnel who are familiar with the construction and operation of all individual components in the system and the potential hazards involved.***

***This unit must be installed, serviced, and operated in strict compliance with all locally applicable safety regulations.***

***The power supply unit provides SELV voltage in accordance with EN 60950. Make sure that any peripheral device connected to the weighing terminal containing its own power supply also uses SELV voltage.***

***Input voltage of the instrument must comply with the local main power supply.***

***If the line cord with connector is used as the means to separate the instrument from the power supply, the wall outlet must be installed close to the instrument and must be easily accessible. If a permanently connected power cable is used, an easily accessible separator must be included in the power supply circuit.***

***Compliance with the following safety instruction is mandatory for UL approved units: For power supply of the WE503D use LPS and/or NEC class 2 power supply units only.***

**Note** ***Keep this manual for future reference.***

***The unit does not have a power switch and is operational immediately after connection to the main power supply.***

***All switch gear connected to the unit and/or installed close to it, such as relays and connectors, must be fitted with appropriate components (RC-modules, diodes) to suppress interference.***

***In order to avoid static discharge, all metallic parts of a system must be thoroughly grounded. Movable parts, such as portable scales on plastic wheels, must be grounded with earth clamps or earth leads of appropriate diameter.***

## 1.2 Electrical Safety Advice

- Main power supply is restricted to within ±10% of the rated voltage.
- Electric protections (fuses etc.) are provided by the technician installing the instrument.
- Respect the recommended minimal distances that are mentioned for the various cable categories.
- The extension leads of the load cells or signal amplifiers, used for the connection of the serial ports and analogue output must be within the allowed maximum lengths.
- The extension leads of the load cells or signal amplifiers must be screened. In addition, they must be laid on their own in a raceway or metal pipe as far away as possible from the power supply cables.
- Install "RC" filters on the contact coils, on the solenoid valves and on all devices producing electric disturbances.
- If it is possible that condensation could form inside the weight transmitter it is advisable to leave the instrument powered at all times.
- Every shielded cable or not (for instance PC cable, cell cable, power supply cable) connected to the indicator should be as shorter as possible, then you have to come out of the shield the minimum length of cable, then connect to the terminal box.
- If the indicator is situated inside an electric panel, the power supply cable should be a shielded cable as shorter as possible, distant from every coil supply cable, inverter, electromotive force, etc. and in addition dedicate an uncoupled transformer in order to feed the indicator only.

## 1.3 Cable Classification

The various cables are classified depending on the transmitted signals:

**Category I**

- Field bus, LAN
- Shielded data cables (RS232 …)
- Shielded cables for analogue/digital signals < 25V (sensors, load cells…)
- Low tension power supply cables (< 60V)
- Coaxial cables

**Category II**

- DC supply cables with tension > 60V and < 400V
- AC supply cables with tension > 25V and < 400V

**Category III**

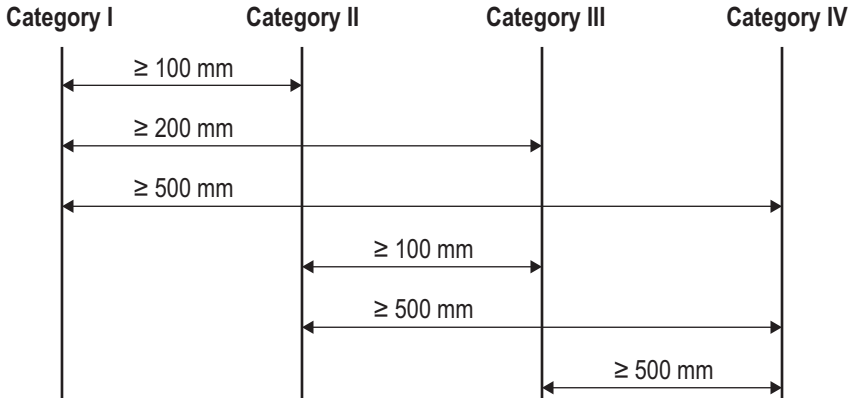
- Power supply cables with tension > 400V
- Telephone cables

**Category IV**

- Any cable subject to lightning

### 1.3.1 Recommended Cable Distances

- When the cables are laid next to each other, these must be at the distances in the table below.
- These distances are valid if in the air; these are reduced if the raceways are separated by grounded metallic shields.
- Different category cables can cross each other (90°).




### 1.3.2 Maximum Cable Length

**Load Cell Cable**

The maximum reachable length from the line using the appropriate load cell cable is:

- 50 m with cable 6 x 0,25 mm²
- 100 m with cable 6 x 0,5 mm²

**RS232 Cable**

The maximum reachable length from the line using the RS232 cable with a maximum baud rate of 19200, is about 15 m.

**RS485 Cable**

The maximum reachable length from the line with the use of the appropriate cable for RS 485 connections, and with baud rate up to 9600, is about 1200 meters.

### Analog Output/Input Cable

The maximum length of the analogue output cable in current is:

- 100 m with cable 2 x 0,25 mm²
- 150 m with cable 2 x 0,5 mm²
- 300 m with cable 2 x 1 mm²

The maximum length of the analogue output cable in voltage is:

- 50 m with cable 2 x 0,25 mm²
- 75 m with cable 2 x 0,5 mm²
- 150 m with cable 2 x 1 mm²

## 1.4 Earth Ground System

For the right earth grounding and the optimal functioning of the system, it is necessary to connect the indicator, the load cells, the possible junction box and the weighing structure to the earth.

### Common Earth Grounding Point

Create a common earth grounding point (indicator, load cells and serial cables) near the indicator, for example the panel board earth grounding (where present) a cup clamp, and ground it through copper cables having at least a 16 mm² cross-section.

### Indicator

Connect the terminal 24 (EARTH SHIELD) and the case earth grounding to the common earth grounding point.

### Load Cells and Junction Box

The earth grounding must be done by connecting the earth grounding cables to a ground bar with cables having a cross-section of at least 16 mm² and by connecting the ground bar to a ground pole with a cable having a cross-section of at least 50 mm².

- In the case the load cells are connected to the indicator through a junction box, it is necessary to connect the shielding of both of the cells cables and of the indicator cable to the earth ground of the junction box (refer to the junction box manual) and connect this to the earth through copper cables having at least a 16 mm² cross-section.
- If the load cells are connected directly to the indicator (without the use of the junction box), one should connect the shielding of the load cell cables to the grounding point (or earth grounding bar) inside the container.
- If the weighing system concerns large and/or outdoor structures, like a weighbridge, and the junction box is connected to the indicator in a distance that is greater than 10 m, or in the presence of noise, the cable shield must be earth grounded both in the junction box and in the indicator, and the two ground leads must be connected with an earth ground cable having a cross-section of at least 16 mm².

### Weighing Structure

Connect the weighing structure and the possible connected structures (for example silos that release material on the weighing structure) to the earth through copper cables having at least a 16 mm² cross-section.

Furthermore it is necessary that for each cell, one connects the upper part with the lower part of the load cell through a copper braid section not less than 16 mm²; the upper part must be short-circuited with the surface of the weighing structure and the lower part must be grounded through a copper braid section not less than 16 mm².

### Connected Serial Cables and Instruments

Ground the cable's shield both at the common earth grounding point (at the cable termination on the indicator side) and at the earth grounding of the connected instrument (at the cable termination on the connected instrument side) and ground the earth ground connection of the connected instrument using the copper cables having at least a 16 mm² cross-section.

To avoid possible side effects, the earth references of the connection and power supply cable of the indicator and of the connected instrument **must be at the same potential**.

## 1.5 General Notes

- All the grounding cables must have an adequate length, in order to obtain an overall resistance of grounding system less than 1 L.
- In the case the weighing system regards great and/or outdoor structures, like a weighbridge:
- The grounding connection is to be made by connecting the grounding cables to a grounding bar and the grounding bar to the grounding pole with a cable section not less than 50 mm².
- The cable cross-section must be greater (for example 50 mm² instead of 16 mm² and 100 mm² instead of 50 mm²), because the voltage into play is greater (for example thunderbolts);
- The ground pole must be positioned at a distance of at least 10 meters from the weighbridge structure;
- One needs to open the SENSE inside the indicator in order to offset the drifts due to the increase in temperature.
- One should check and remove, if necessary, the connection between the earth and the neutral wire of the electrical installation.

## 1.6 Technical Features

WE503D is a weighing terminal for totalizing dynamic weighers, like belt scales.

It connects to one scale with analog load cells.

Power supply through the built-in power supply unit is either for 110 - 240 VAC or 12 - 30 VDC.

Cables of all external components are connected at screw terminals.

## 1.7 Construction

WE503D is incorporated in a stainless steel housing, for wall-mount, desk-top and panel-mount installation. All cable connections are made at the rear of the housing through tight cable glands.

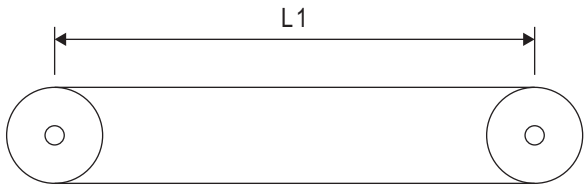
# 2.0 Definitions

This section provides definitions to assist in the installation of a WE503D Dynamic Integrator for the service technician.

## 2.1 Distance of Idlers

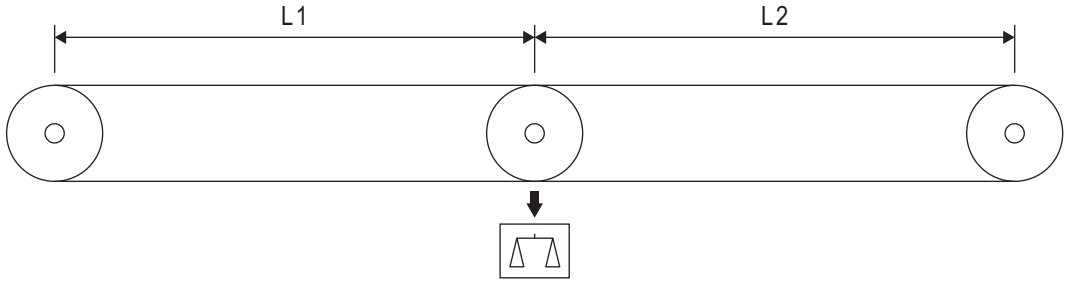
The Idlers distance, in the following paragraphs called Weighing length, to insert in the configuration depends on the system configuration.

### 2.1.1 Complete Conveyor on Load Receptor



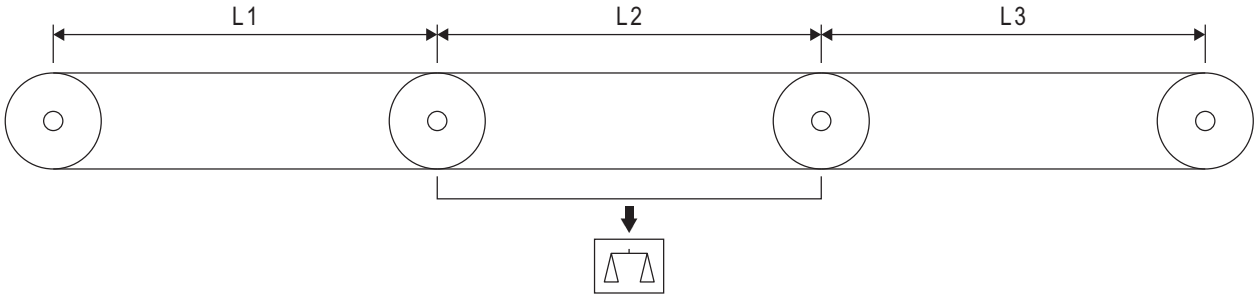

Weighing length = L1

### 2.1.2 Conveyor with 1 Roller on Load Receptor



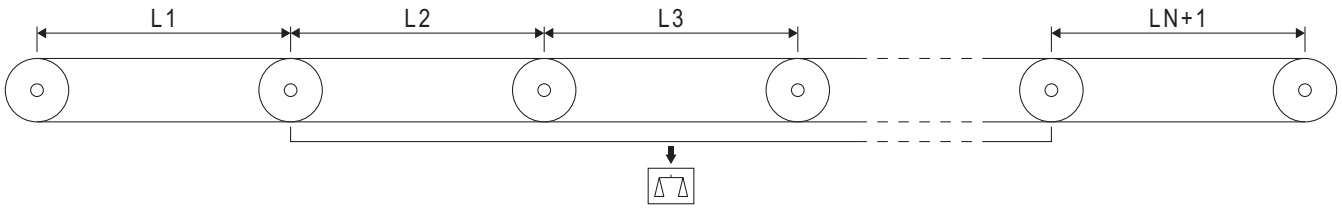

Weighing length = 1/2 * (L1 + L2)

### 2.1.3 Conveyor with 2 Adjacent Rollers on Load Receptor



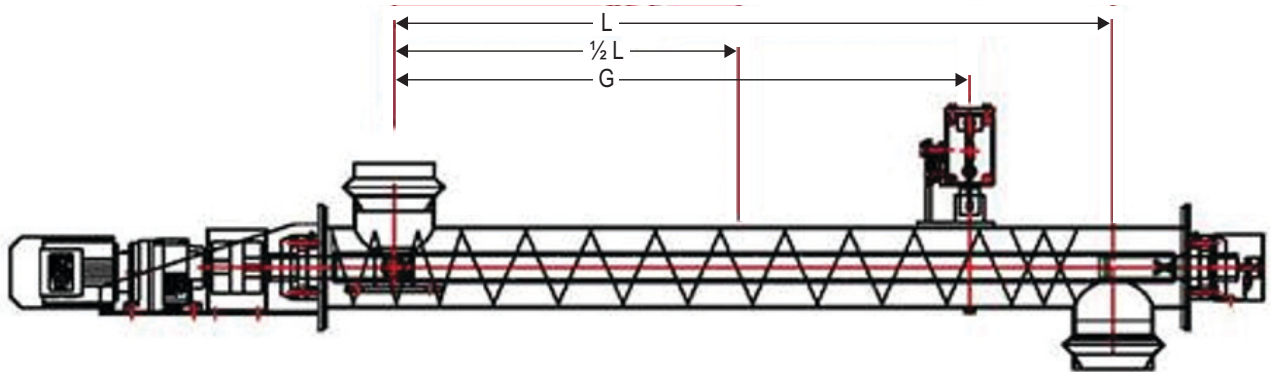

Weighing length = 1/2 * (L1 + L3) + L2

### 2.1.4 Conveyor with Additional Adjacent Rollers on Load Receptor




Weighing length = 1/2 * (L1 + LN+1) + L2 + LN

### 2.1.5 Screw Feeder




- Weighing length = L
- Pivot to LC distance = G
- Pivot to idler distance = ½ L

## 2.2 Length per Encoder Pulse

### 2.2.1 Belt

Every encoder roller (of diameter D) turn there are N pulses. The length per pulse is:

$LPP = \pi D / N$

### 2.2.2 Screw feeder

Every screw turn, screw with Pt pitch, there are N pulses. The length per pulse is:

$LPP = P_t / N$

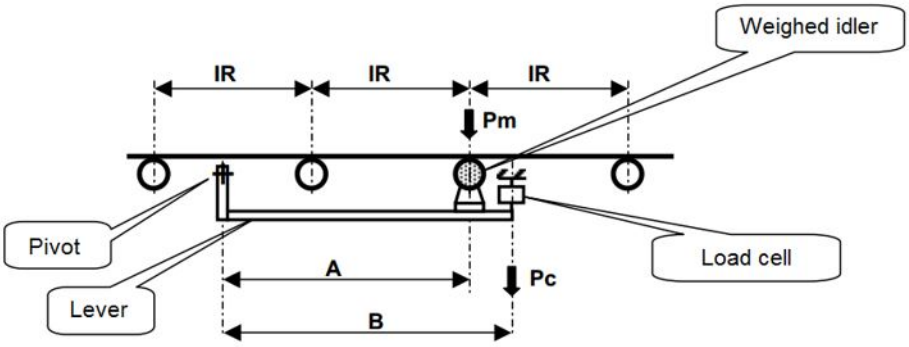
If the calculation step is used insert:

Pulses/turn: N

Diameter of encoder roller: $P_t / \pi$

## 2.3 Belt Ratio

Belt ratio = (Pivot to LC distance) / (Pivot to idler distance) * 1 / cos(Belt angle)




Pm = Cn * IR

Pc = Pm * A / B

## 2.4 Belt Factor

Belt factor = 1 / (Idler distance) * (Belt ratio)

## 2.5 Belt Load

Belt load = ((LC signal) - Zero) / (Max LC signal) * (LC capacity) * (Belt factor) * (Correction factor)

Zero: (see Section 2.9 on page 8)

## 2.6 Belt Speed

Belt speed = (Encoder frequency) * (length per pulse)

## 2.7 Add to Total

Add to total on every encoder pulse = (Belt load) * (Length per pulse)

## 2.8 Flow Rate

Flow rate = (Belt load) * (Belt speed) * (Flow correction)

## 2.9 Zero

Load cell signal used as reference to calculate the weight on the cell. It is composed of:

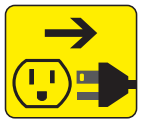
Zero = (static zero) + (zero belt) + (automatic zero belt)

- Static zero: signal with belt structure on load cell and empty and stopped belt
- Zero belt: average difference of load cell signal from static zero during the belt zero procedure
  After the zero belt procedure is executed the automatic zero belt is set equal to zero
- Automatic zero belt: average difference of load cell signal from (static zero) + (zero belt) during the automatic zero belt procedure
- When the static zero is executed, zero belt and automatic zero belt values are set equal to zero.

# 3.0 Setup

This section describes procedures to setup a WE503D Dynamic Integrator.


***Risk of electrical shock.***
***Risque de choc.***



***Disconnect power before servicing.***
***Débranchez l'alimentation avant l'entretien.***


***Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to state and local regulations.***

***Risque d'explosion si la batterie est remplacée par un type incorrect. Mattre au rebus les batteries usagées selon les règlements d'état et locaux.***

***Use anti-static protection for grounding and to protect components from electrostatic discharge (ESD) when working inside the enclosure. Procedures requiring work inside the enclosure must be performed by qualified service personnel only.***

***The power supply to the unit must be easily accessible.***

## 3.1 To Enter the Setup Environment

1. With the unit on, press and hold the **CLR** key for 3 seconds. The instrument restarts.
2. When the firmware version displays, press the **TARE** key once.
3. When *"USER - PRESS KEY"* displays, press the **TARE** key again.

See Section 5.0 on page 39 for the Setup Password.

## 3.2 Initial Settings

| Parameter | Description |
|---|---|
| Language | Selection of the systems language; *Settings: ITALIANO,* ***ENGLISH*** *(default), FRANÇAIS, DEUTSCH, ESPAÑOL* |
| System Units | Selection of the system units for weight, flow-rate and length; *Settings:* ***METRIC*** *(default), US* |
| Operating Mode | Selection of the operating mode; *Settings: BELT,* ***BULKSLIDE*** *(default)* |

*Table 3-1. Initial Settings*

**Parameters are set depending on the operating mode.**

When mode **BELT** is selected:

- Encoder is enabled
- Function of input 2 is set to encoder
- Zero time is set to 60 seconds

When mode **BULKSLIDE** is selected:

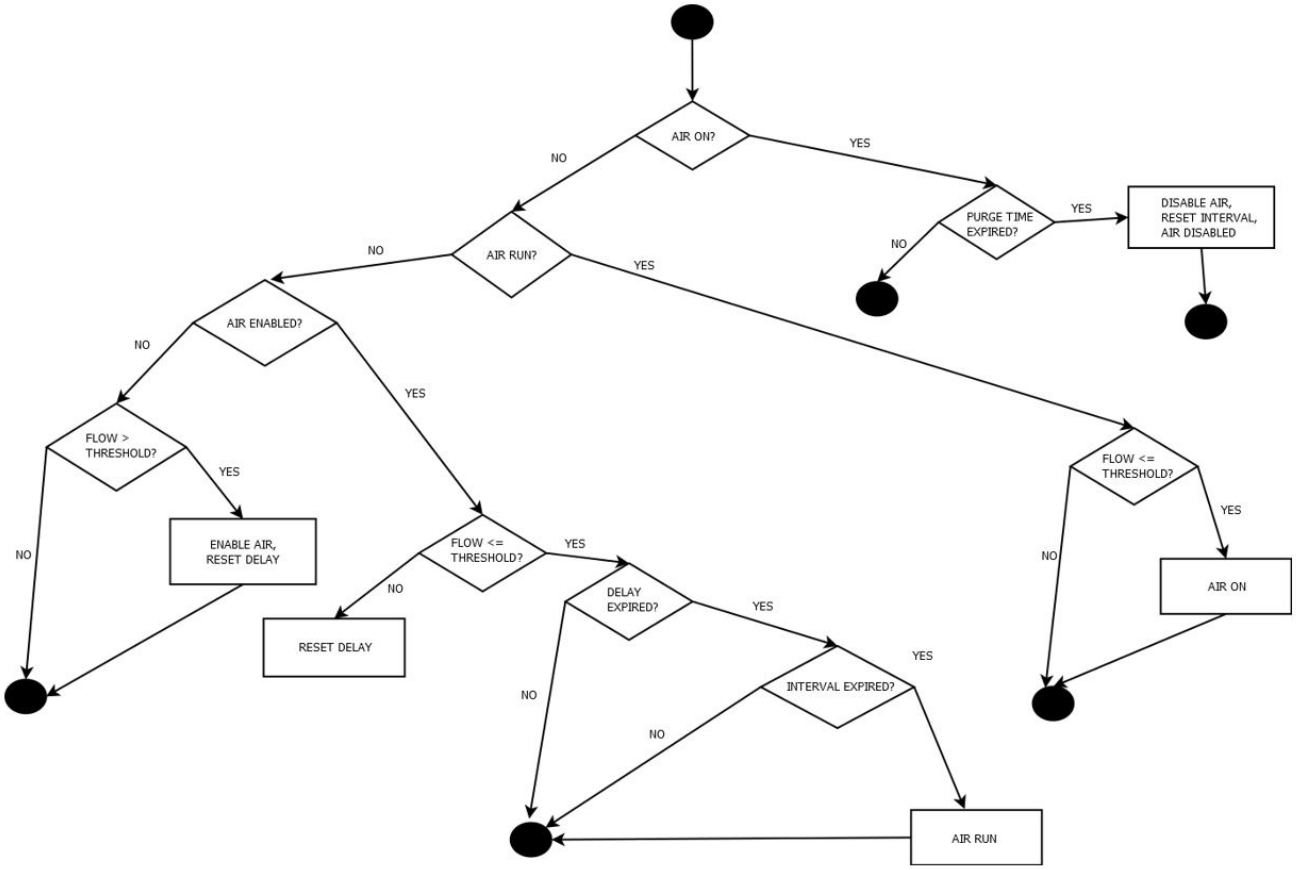
- Encoder is disabled
- Function of input 2 is set to None
- Fixed speed is set to 3.00 m/s
- Zero time is set to 5 seconds
- Idlers distance is set to 1000mm and parameter is not visible
- Pivot to load cell distance is set equal to 0mm and parameter is not visible
- Pivot to idler distance is set equal to 0mm and parameter is not visible
- Serial inclinometer is disabled and parameter is not visible
- Belt angle is set equal to 0° and parameter is not visible
- Test weight is set equal to zero and parameter is not visible
- Test weight delay is set equal to zero and parameter is not visible
- Air purge configuration enabled under General parameters

## 3.3 General Parameters

| Parameter | Description |
|---|---|
| Batch Enable | Batch function enable; *Settings:* ***NO*** *(default), YES* |
| PID Enable | PID controller function enable; *Settings:* ***NO*** *(default), YES* |
| Pulse Weight | Insertion of the weight added to the totals between 2 pulses or between 2 pulse output level change; Value is displayed with the totals decimals and unit; *Enter value: 0 – 999999,* ***0*** *(default)* |
| Pulse Time Width | Insertion of the pulse time duration; If the value is equal to 0.0 seconds the output is toggled every time the *Pulse Weight* is added to the totals; *Enter value: 0.0s – 25.5s,* ***0.0s*** *(default)* |
| Analog Input | Analog input mode; *Settings:*<br>***NONE*** *(default) – No analog input*<br>*SETPOINT – Only if PID is enabled, sets flow-rate setpoint; sets Remote target input source to ANALOG INPUT*<br>*CORRECTION – Change the Correction Factor; Calculation used for Correction Factor:*<br>*Correction Factor = (Ainput - AiZero) / (AiMax - AiZero) * 10*<br>*INCLINATION – Change the Inclination of the belt; Calculation used for Inclination:*<br>*Inclination = (Ainput - AiZero) / (AiMax - AiZero) * 60° (Range -60° – 60°)* |
| | Analog input V/I input; *Settings:* ***VOLT*** *(default), CURR* |
| | Analog input start/stop batch; Used analog input as RUN command to start the batch/control process if PID is enabled and analog input mode is SETPOINT; If the analog input signal is over the minimum set value the RUN command is issued to the instrument; *Settings:* ***NO*** *(default), YES* |
| | Analog input max value; Maximum analog input signal in converted DAC points; This value is related to the remote flow-rate value; *Enter value: 0 – 32767,* ***0*** *(default)* |
| | Analog input zero value; Analog input signal in converted DAC points related to the remote system zero flow-rate; *Enter value: 0 – 32767,* ***0*** *(default)* |
| | Analog input min value; This is value is used in conjunction with the Analog input start/stop batch parameter; *Enter value: 0 – 32767,* ***0*** *(default)* |
| Analog Output Slot 1 | Analog output function; *Settings:*<br>***FLOW-RATE*** *(default) – Proportional to flow-rate*<br>*LOAD – Proportional to load*<br>*PID – Used to control the flow-rate (PID enabled)* |
| | Analog output mode; *Settings:* ***4-20 mA*** *(default), 0-20 mA, 2-10 V, 0-10 V* |
| | Analog output calibration; *Available values:*<br>MIN VALUE; *Enter value: 0 – 65535,* ***11650*** *(default)*<br>MAX VALUE; *Enter value: 0 – 65535,* ***58250*** *(default)* |
| | Manual belt speed; *Range: 0-20 mA / 0-10 V,* ***0 mA / V*** *(default)*<br>Fixed analog output signal used in the following cases, if the value is different from zero:<br>- PID is disabled or analog output mode is set to FLOW or LOAD and the state is BATCH (neither in slow nor in flight phases) or RUN<br>- PID is enabled, analog output mode is set to PID and the state is STOP or BATCH in the flight phase<br>- Zero belt procedure<br>- Measurement of the length per pulse state<br>- Belt load phase |
| Analog Output Slot 2 | Same configuration as Analog Output Slot 1 |
| Inputs Configuration | Functions to link to the digital 8 (2+6) inputs; *Available values: NONE, F1–F10, Keyboard lock (LOC.IN), Off instrument (OFF), Any function linkable to keys (MNU.FUN), Run, Enable, Off track, Start, Pause, Stop, Clear P.T., Zero belt, Extern alarm, Encoder*, Article 1-5 selection (ART.1-5)***<br>(*) Available for Input 2 only; Encoder defaults to 2 for BELT<br>(**) Article is selected on input rising edge |
| Outputs Configuration | Selection of the NO/NC configuration and the functions to link the 16 (4+12) digital outputs; *Available values: NONE, Run / Batch active, Batch finished, System pause, Off track, > Upper flow, < Lower flow, Alarm, Lock, Weight impulse (totalizer pulse), Material enable, Slow flow-rate, Belt speed > 0, Zero belt active, Flow-rate in dead band, Test weight, Air purge* |
| Air Purge Configuration | Only visible when operating mode BULKSLIDE is selected; *Available values:*<br>Air purge interval – The interval time of activating the air purge output (min); *Enter value: 0 – 255,* ***20*** *(default)*<br>Air purge time – Active time of the air purge output (sec); *Enter value: 0 – 255,* ***5*** *(default)*<br>Air purge max flow threshold – The air purge output is only activated if the flow remains below the threshold for the air purge delay time; *Enter value: 0 – Max flow rate,* ***4 t/h*** *(default)*<br>Air purge delay – The air purge output is only activated if the flow remains below the threshold for the air purge delay time (sec); *Enter value: 0 – 255,* ***2*** *(default)* |

*Table 3-2. General Parameters*

## Diagram of Air Purge Management



## 3.4 Belt Parameters

| Parameter | Description |
|---|---|
| Total Resolution | The units displayed depends on the Unit system setting; *Settings: 0.1 kg/lb, 0.2 kg/lb, 0.5 kg/lb, 1 kg/lb, 2 kg/lb, 5 kg/lb,* ***0.01 t*** *(default), 0.02 t, 0.05 t, 0.1 t, 0.2 t, 0.5 t, 1 t, 2 t, 5 t* |
| Flow-rate Resolution | The units displayed depends on the Unit system setting; *Settings: 1 kg/h / lb/h, 0.01 t/h,* ***0.1 t/h*** *(default), 1 t/h* |
| Maximum Flow-rate | Maximum flow-rate value used as reference for analog output; Unit depends on the Flow-rate Resolution setting; *Enter value: 0 – 999999,* ***200.0 t/h*** *(default)* |
| Maximum Load | Maximum belt load used as a reference for analog output; Unit depends on the Unit system setting (kg/m or lb/ft); *Enter value: 0 – 999999,* ***10 kg/m*** *(default)* |
| Encoder Enable | Enable/disable encoder management for belt speed measurement; When enabled output 2 function should be set to Encoder; *Settings: NO,* ***YES*** *(default)* |
| Length per Pulse | Not visible if the Encoder is not enabled; Length per encoder pulse; Resolution depends on the Unit system setting (0.01 mm or 0.0001 in); *Enter value: 0 – 999999,* ***3.14 mm**** *(default)*<br>(*) Considering 100mm as diameter for the encoder roller and 100 pulses/turn for the encoder<br>This step has 3 sub-items:<br>• Insert length per pulse: Direct insertion of the pulse length.<br>• Calculate value: Insert encoder's pulses/turn and Encoder's roller diameter and the length per pulse is automatically calculated by indicator.<br>• Measure value: Insert the total belt length and the belt revolutions, then press enter to start the measure and enter again after the inserted belt revolutions to finish the measuring.<br>Belt length resolution depends on the Unit system setting (0.001 m or 0.001 ft) |
| Fixed Belt Speed | Not visible if the Encoder is enabled; Belt speed considered in the flow-rate computation when the system is used without a measurement encoder; Unit depends on the Unit system setting (0.1 m/s or 0.1 ft/min);<br>*Enter value: 0 – 6553.5,* ***0 m/s*** *(default) or* ***3 m/s*** *(BULKSLIDE)*<br>Notes: If the encoder is enabled this value is automatically set equal to zero.<br>If the encoder is disabled and fixed belt speed is set to zero, the encoder is automatically enabled. |
| Slow Flow-rate Fixed Speed | Not visible if the Encoder is enabled; Belt speed considered in the flow-rate computation in the slow flow phase when the system is used without a measurement encoder; Unit depends on the Unit system setting (0.1 m/s or 0.1 ft/min);<br>*Enter value: 0 – 6553.5,* ***0 m/s*** *(default)* |
| Dead Band | Flow-rate band in which the totals are not increased; The value is in percentage of the maximum flow-rate (%);<br>*Enter value: 0 – 99.9,* ***2*** *(default)* |
| Show Flow-rate in Dead Band | Enable/disable; *Settings:* ***NO*** *(default), YES* |
| Totalize in Negative | Enable/disable the totals decrement when the flow-rate is negative, and in absolute value greater than the dead band percentage of the maximum flow-rate; *Settings:* ***NO*** *(default), YES* |
| Flow Filtering Time | Interval time considered in the average flow-rate computation (seconds); *Enter value: 0 – 50,* ***5*** *(default)* |
| Hourly Filtering Time | Average filter items; *Available values:*<br>*N.WIN – Enter value: 0 – 32,* ***20*** *(default)*<br>*N.MED – Enter value: 0 – N.WIN,* ***20*** *(default)*<br>*N.PIT – Enter value: 0 – (N.WIN-2),* ***0*** *(default)* |
| Start and Stop Delay | Time delay to switch from STOP/READY state to RUN/BATCH and to switch to RUN/BATCH state to STOP/READY state (seconds); *Enter value: 0 – 6553.5,* ***0*** *(default)* |

*Table 3-3. Belt Parameters*

## 3.5 Calibration Parameters

| Parameter | Description |
|---|---|
| Load Cell Capacity | Insertion of the load cell capacity; Unit depends on the Unit system setting (kg or lb);<br>*Enter value: 0 – 999999,* ***200 kg*** *(default) or* ***20 kg*** *(BULKSLIDE)* |
| Load Cell Sensitivity | Insertion of the load cell sensitivity (mV/V); *Enter value: 0.1 – 9.99999,* ***2*** *(default)* |
| Zero Scale | Insertion or acquisition of the load cell signal with empty belt (dead load);<br>Zero Scale Insertion – Direct insertion of the dead load (mV/V); *Enter value: 0.1 – 9.99999,* ***0*** *(default)*<br>Zero Scale Capture – Acquisition of the dead load value; Belt must be empty and running; The stored value is an average value of 2 seconds of load cell signal sampling time |
| Integration Filtration | Load cell signal filter; See Section 3.5.1 on page 14 for available values and their settings |
| Idlers Distance | Not visible if Operating mode is Bulkslide (set fixed to 1000 mm); Unit depends on the Unit system setting (mm or in);<br>Metric (mm): Resolution = 1 mm; *Available values: 0 – 65535,* ***1000*** *(default)*<br>US (in): Resolution = 0.01 in; *Available values: 0 – 655.35* |
| Pivot to Load Cell Distance | Not visible if Operating mode is Bulkslide (set fixed to 0 mm); Unit depends on the Unit system setting (mm or in);<br>Metric (mm): Resolution = 1 mm; *Available values: 0 – 65535,* ***0*** *(default)*<br>US (in): Resolution = 0.01 in; *Available values: 0 – 655.35* |
| Pivot to Idler Distance | Not visible if Operating mode is Bulkslide (set fixed to 0 mm); Unit depends on the Unit system setting (mm or in);<br>Metric (mm): Resolution = 1 mm; *Available values: 0 – 65535,* ***0*** *(default)*<br>US (in): Resolution = 0.01 in; *Available values: 0 – 655.35* |
| Serial Inclinometer Enable | Enable/disable specified port; *Settings:* ***NO*** *(default), AUX PORT, PRN PORT*<br>Belt angle can be sent by a serial inclinometer connected to AUX or PRN port; The current supported inclinometers are single and dual axle models by Level Developments; It has to send continuously a string of the form:<br>*+025.430<CR> or*<br>*+025.430,-012.220<CR> only first part (x axle) is considered* |
| Belt Angle | Not visible if the Analog input mode is set to INCLINATION or if serial inclinometer is enabled or if Operating mode is Bulkslide (in this case it is set to 0°); *Enter value: 0 – 60.0,* ***0*** *(default)* |
| Belt Factor | By pressing Enter the value can be changed; Press F1 to recalculate the value; *Enter value: 0 – 9.99999,* ***1*** *(default)*<br>Belt Factor calculation uses values for Idlers Distance, Belt Angle, Pivot to Load Cell Distance and Pivot to Idler Distance |
| Correction Factor | Insertion of the add total correction factor; *Enter value: 0 – 9.99999,* ***1*** *(default)* |
| Test Weight | Not visible if the Analog input mode is set to CORRECTION or if Operating mode is Bulkslide (in this case it is set to 0 t);<br>Insertion of the test weight used in the procedure to calculate the Correction Factor; *Enter value: 0 – 999999,* ***0*** *(default)* |
| Test Weight Delay | Not visible if the Analog input mode is set to CORRECTION or if Operating mode is Bulkslide (in this case it is set to 0 sec); Interval time delay before start the test weight procedure to allow the test mass to be positioned; If either this value is zero or there is no test weight output configured a key press is needed (in seconds); *Enter value: 0 – 6553.5,* ***0*** *(default)* |
| Flow Rate Correction | Flow rate only correction factor; *Enter value: 0 – 9.99999,* ***1*** *(default)* |
| Zero Time | Not visible if the Encoder is enabled; Time duration of the zero belt procedure when fixed speed is used instead of encoder (in seconds); *Enter value: 0 – 600.00,* ***60*** *(default) or* ***5*** *(BULKSLIDE)* |
| Belt Length | Not visible if the Encoder is disabled; Total belt length used to calculate the number of pulses to read by the encoder during the zero belt procedure; Unit depends on the Unit system setting (m or ft);<br>Metric (m): Resolution = 0.001 m; *Available values: 0 – 999.999,* ***10*** *(default)*<br>US (ft): Resolution = 0.001 ft; *Available values: 0 – 999.999* |
| Belt Revolutions | Not visible if the Encoder is disabled; Number of belt revolutions to be executed during the zero belt procedure;<br>*Enter value: 1 – 9,* ***1*** *(default)* |
| Zero Range | Percentage range of the maximum flow-rate within which the zero procedure is allowed to be executed; If the absolute value of the flow rate related to static zero is out of the zero range the zero belt procedure will not start (%);<br>*Enter value: 0 – 99.9,* ***10*** *(default)* |
| Auto Zero Range | Percentage range of the maximum flow-rate within which the auto zero procedure will be started; If the absolute value of the current flow-rate is out of the set range the auto zero belt procedure will not start; If the absolute value of the flow-rate value during the auto zero belt procedure exceeds the set range the procedure will be aborted (%);<br>*Enter value: 0 – 99.9,* ***0*** *(default) NOTE: 0% means auto zero procedure is disabled* |
| Auto Zero Limit | Percentage range of the maximum flow-rate within which the auto zero procedure will be started; If the absolute value of the current flow-rate, calculated respect to (static zero) + (zero belt) value only, is out of the set range the auto zero belt procedure will not start; If at the end of the auto zero procedure the current flow-rate, calculated respect to (static zero) + (zero belt) value only, is out of the set range the auto zero component value is not stored (%);<br>*Enter value: 0 – 99.9,* ***0*** *(default) NOTE: 0% means there is no limit* |

*Table 3-4. Calibration Parameters*

### 3.5.1 Integration Filtration Values

| Available Values | ADC Rate (Hz) | Win | Avg | Pit |
|---|---|---|---|---|
| FLT 0 | 25 | 8 | 2 | 0 |
| FLT 1 | 25 | 12 | 4 | 0 |
| FLT 2 | 25 | 16 | 8 | 0 |
| **FLT 3** (default) | **25** | **24** | **16** | **0** |
| H.R.0 | 6 | 8 | 4 | 2 |
| H.R.1 | 6 | 10 | 4 | 2 |
| DYN.0 | 6 | 12 | 4 | 0 |
| DYN.1 | 6 | 12 | 8 | 2 |
| DOS.0 | 50 | 8 | 2 | 0 |
| DOS.1 | 50 | 12 | 4 | 0 |
| DOS.2 | 50 | 16 | 8 | 0 |
| DOS.3 | 50 | 24 | 16 | 0 |
| SLW.0 | 12 | 8 | 2 | 0 |
| SLW.1 | 12 | 12 | 4 | 0 |
| SLW.2 | 12 | 16 | 8 | 0 |
| SLW.3 | 12 | 24 | 16 | 0 |
| H.R.2 | 6 | 12 | 6 | 2 |
| H.R.3 | 6 | 12 | 8 | 6 |
| H.R.4 | 6 | 24 | 8 | 0 |
| H.R.5 | 6 | 24 | 16 | 0 |
| H.R.6 | 6 | 32 | 16 | 0 |
| H.R.7 | 6 | 32 | 20 | 0 |
| DYN.2 | 6 | 12 | 12 | 6 |
| DYN.3 | 6 | 12 | 12 | 10 |
| Custom | | | | |

*Table 3-5. Integration Filtration Values*

## 3.6 Batching Parameters

Not visible if the BATCH is disabled.

| Parameter | Description |
|---|---|
| Dosage Target | The dosage ends when the dosage reaches the dosage target value; *Enter value: 0 – 999999,* ***0*** *(default)* |
| Dosage Time | The dosage ends when the dosage reaches the dosage time value; *Enter value: 0 – 999999,* ***0*** *(default)* |
| Low Flow-rate Weight | Threshold to enable the "slow flow" function; If PID is enabled, in dosage state, when the dosage target is missing and the dosage reached the low flow-rate weight, the "slow flow" function is enabled; If the value is 0, the function is disabled; *Enter value: 0 – 999999,* ***0*** *(default)* |
| Low Flow-rate | If the "slow flow" function is enabled, the analogue output is frozen at the value which obtain the low flow-rate; If the value is 0, the function is disabled; *Enter value: 0 – 999999,* ***0*** *(default)* |
| Weight in Flight | In flight weight, dosage ends when the dosage reached Target - flight weight; If the value is 0, the function is disabled; *Enter value: 0 – 999999,* ***0*** *(default)* |
| Flight Wait Time | In flight time, dosage ends when the dosage reached the dosage target and the in flight time; If the value is 0, the function is disabled; *Enter value: 0 – 99999,* ***0*** *(default)* |
| Jog Time | Time to activate the jog output; *Enter value: 0 – 99999,* ***0*** *(default)* |

*Table 3-6. Batching Parameters*

# 3.7 Regulator Mode Parameters

Not visible if the PID is disabled.

## 3.7.1 Dosage Start Optimization

| Parameter | Description |
|---|---|
| Belt Quick Start | Enable/disable belt quick start; *Settings:* ***NO*** *(default), YES*<br>If the PID start, the analog output is set to a fixed value that allows to have a flow-rate near the target; In the start state the PID is disabled; During the flow control phase, the analog output that allows to have a flow-rate in the set tolerance is stored to be used on next start, if Quick start recalculation is enabled; If disabled in the start phase the PID target is linearly increased up to the set target flow |
| Flow Rate Reach Time | This parameter sets the flow control start phase time (in seconds); *Enter value: 0 – 655.35,* ***0*** *(default)* |
| Quick Start Recalculation | Enable/disable quick start recalculation; *Settings:* ***NO*** *(default), YES*<br>If enabled when the target flow-rate is changed, start phase fixed analog output value is calculated in a proportional way |
| PID Start Value | As a percentage (%); *Enter value: 0.00 – 100.00,* ***50*** *(default)* |

*Table 3-7. Dosage Start Optimization Parameters*

## 3.7.2 PID Regulator Parameters

| Parameter | Description |
|---|---|
| Proportional K | *Enter value: 0 – 655.35,* ***3*** *(default)* |
| Integral Gain | *Enter value: 0 – 655.35,* ***1*** *(default)* |
| Differential Gain | *Enter value: 0 – 655.35,* ***0*** *(default)* |
| Derivative Counter Action | *Enter value: 0 – 255,* ***0*** *(default)* |
| Error Sum Upper Bound | *Enter value: 0 – 999999,* ***0*** *(default)* |
| Action Interval | In seconds; *Enter value: 0 – 25.5,* ***1*** *(default)* |
| Interval Time in Tolerance | In seconds; *Enter value: 0 – 25.5,* ***10*** *(default)* |
| Flow Rate Tolerance | As a percentage (%); *Enter value: 0 – (Max % of Flow Error),* ***0*** *(default)* |
| Change Interval Delay | In seconds; *Enter value: 0 – 99,* ***0*** *(default)* |

*Table 3-8. PID Regulator Parameters*

### 3.7.3 Remote Target Settings

In this menu the parameters related to the target flow-rate setting with analog input or serial string can be managed.

| Parameter | Description |
|---|---|
| Remote Target Input Source | *Settings:* ***NONE*** *(default), ANALOG INPUT, COM PRN, COM AUX*<br>Serial string format for COM PRN or COM AUX is: xxxxxxxxxcc<CR><LF><br>x = 9 decimal, or space or +/- sign or dot (.) character<br>cc = Checksum sum mod 256 of the previous data expressed in ASCII hex<br>For test purposes the checksum is ignored when cc = "xx"<br>Example with remote flow-rate equal to 30.0 t/h:<br>String = \| __ \| __ \| __ \| __ \| __ \| __ \| 3 \| 0 \| . \| 0 \| 8 \| 1 \| CR \| LF \|<br>ASCII = \| 32 \| 32 \| 32 \| 32 \| 32 \| 32 \| 51 \| 48 \| 46 \| 48 \| 56 \| 49 \| 13 \| 10 \|<br>Checksum = (32+32+32+32+32+32+51+48+46+48) Mod 256 = 385 Mod 256 = 129 → 81 hex |
| Remote System Flow Decimals | Number of decimals of the remote flow rate value; *Enter value: 0 – 3,* ***1*** *(default)*<br>If Remote target input source is set to COM PRN or COM AUX this value is ignored, the decimals value is recognized by received string |
| Remote System Flow Rate | Remote flow-rate maximum value (t/h); *Enter value: 0 – 60000,* ***200*** *(default)*<br>Insertion decimals are those set in Remote system flow decimals; Insertion unit is the same as Flow-rate resolution |
| % Remote Flow Rate | As a percentage (%); *Enter value: 1 – 200,* ***100*** *(default)*<br>The target flow-rate will be set to:<br>Target flow = Airatio * (Remote Flow Rate) * (% Remote Flow Rate)<br>Where:<br>Airatio = (Ai - Alz) / (Almax - Alz)<br>Ai: analog input value<br>Alz: analog input zero value<br>Aimax: analog input max value<br>With Remote target input source set to COM AUX or COM PRN:<br>Target flow = (Received Flow) * (% Remote Flow Rate) |

*Table 3-9. Remote Target Settings*

### 3.7.4 PID Flow Rate Target Correction

These parameters are used only if Batch is enabled. These parameters allow to automatically set the target flow rate to have in the elapsed batch time the theoretical dosed material related to the target flow rate.

| Parameter | Description |
|---|---|
| Flow Rate Error Correction Time | Correction flow rate checking interval (in seconds); *Enter value: 0 – 65535,* ***0*** *(default)* |
| Maximum % Flow Correction | The target flow rate is corrected if the value within the maximum percentage of the target flow rate (%);<br>*Enter value: 0 – 10,* ***0*** *(default)* |

*Table 3-10. PID Flow Rate Target Correction Parameters*

## 3.8 Alarm Settings

In this sub menu, it is possible enable/disable the managed alarms. For every type of managed alarm there are 3 common parameters to set:

- Error enabling
- Alarm delay: the alarm will start after the delay since the alarm condition started
- Lock delay: the indicator goes into locked state after the delay since the alarm condition started; If the Lock delay is set to zero the instrument lock will be disabled

### 3.8.1 Managed Alarms

| Alarm | Considered | Alarm Condition | Alarm State Output Together with ALARM One | Lock State Output Together with ALARM and LOCK Ones |
|---|---|---|---|---|
| Belt off track | Always | Off track input active | OFF TRACK | OFF TRACK |
| Flow overload | Always | Flow-rate over set upper bound | | |
| Flow rate | PID enabled | Flow-rate beyond tolerance | < LOWER FLOW or > UPPER FLOW | < LOWER FLOW or > UPPER FLOW |
| Under/over weight | Always | Scale weight beyond limits | | |
| External alarm | Always | External alarm input active | | |
| Cell overload | Always | Scale weight over load cell capacity + 9e | | |

*Table 3-11. Managed Alarms*

### 3.8.2 Belt Off Track

Off track alarm management. To use this alarm one of the digital inputs of the instrument is to be configured with the Off Track function.

| Sub Menu | Available Values / Ranges | Default Value |
|---|---|---|
| Error Enabling | NO, YES | **NO** |
| Alarm Delay | 0 – 6553.5 sec | **0 sec** |
| Lock Delay | 0 – 65535.5 sec | **0 sec** |

*Table 3-12. Belt Off Track Menu*

Alarm condition: Off Track input active

### 3.8.3 Flow Overload Error

Flow overload alarm management.

| Sub Menu | Available Values / Ranges | Default Value |
|---|---|---|
| Error Enabling | NO, YES | **NO** |
| Alarm Delay | 0 – 6553.5 sec | **0 sec** |
| Lock Delay | 0 – 65535.5 sec | **0 sec** |
| Flow Overload % | 0 – 99.9% | **0%** |

*Table 3-13. Flow Overload Error Menu*

Alarm condition: Flow-rate, in absolute value, over the (Flow Overload %) percentage value of the maximum flow rate

### 3.8.4 Flow Rate Error (PID)

Flow rate tolerance alarm management. This alarm is managed only when PID is enabled.

| Sub Menu | Available Values / Ranges | Default Value |
|---|---|---|
| Error Enabling | NO, YES | **NO** |
| Alarm Delay | 0 – 6553.5 sec | **0 sec** |
| Lock Delay | 0 – 65535.5 sec | **0 sec** |
| Max % of Flow Error + | 0 – 99.9% | **0%** |

*Table 3-14. Flow Rate Error (PID) Menu*

Alarm condition: Flow-rate is beyond the upper or lower bound
Flow lower bound = (Target Flow) - (Max % of Flow Error -) (Target Flow)
Flow upper bound = (Target Flow) + (Max % of Flow Error +) (Target Flow)

### 3.8.5 Flow Rate Error

Flow rate limits alarm management.

| Sub Menu | Available Values / Ranges | Default Value |
|---|---|---|
| Error Enabling | NO, YES | **NO** |
| Alarm Delay | 0 – 6553.5 sec | **0 sec** |
| Lock Delay | 0 – 65535.5 sec | **0 sec** |
| Minimum Flow Rate | 0 – 65535 | **0** |
| Maximum Flow Rate | 0 – 65535 | **0** |

*Table 3-15. Flow Rate Error Menu*

### 3.8.6 Under/Over-Weight Error

Weight under/over-load alarm management.

| Sub Menu | Available Values / Ranges | Default Value |
|---|---|---|
| Error Enabling | NO, YES | **NO** |
| Alarm Delay | 0 – 6553.5 sec | **0 sec** |
| Lock Delay | 0 – 65535.5 sec | **0 sec** |
| Min. Weight on Load Receiver | 0 – 999999 | **0 kg** |
| Max. Weight on Load Receiver | 0 – 999999 | **0 kg** |

*Table 3-16. Under/Over-Weight Error Menu*

(*) Unit depends on the Unit system setting (kg or lb)
Alarm condition: Weight on the load receiver lower than Min. Weight or greater than Max. Weight

### 3.8.7 External Alarm Error

External input alarm management. To use this alarm one of the digital inputs of the instrument is to be configured with the Extern alarm function.

| Sub Menu | Available Values / Ranges | Default Value |
|---|---|---|
| Error Enabling | NO, YES | **NO** |
| Alarm Delay | 0 – 6553.5 sec | **0 sec** |
| Lock Delay | 0 – 65535.5 sec | **0 sec** |

*Table 3-17. External Alarm Error Menu*

Alarm condition: Extern Alarm input active

### 3.8.8 Cell Overload Error

Load cell overload error management.

| Sub Menu | Available Values / Ranges | Default Value |
|---|---|---|
| Error Enabling | NO, YES | **NO** |
| Alarm Delay | 0 – 6553.5 sec | **0 sec** |
| Lock Delay | 0 – 65535.5 sec | **0 sec** |

*Table 3-18. Cell Overload Error Menu*

## 3.9 Function Keys

It's possible to modify the function of the F1 - F10 keys, and the combination of these with the 2nd F or Fn keys (i.e. "2nd F + F1", "Fn + F2", etc...).

1. Select the desired key with F6/F7.
2. Press ENTER to modify the setting.
3. Enter the desired code through the numeric keyboard and confirm with ENTER.

**Key Functions:**

▼ scrolls forward inside the list of the keys.

▲ scrolls backward inside the list of the keys.

**F1** performs the default of the function coupling of the keys.

**F2** inserts the preamble.

**ENTER** modifies the code of the function in the current key; while entering it confirms the entered code.

**2nd F** displays the list of the functions; press ENTER to select the desired function.

### 3.9.1 Function Codes

Codes can also be entered in normal operation mode, confirm with ENTER.

| ID Code | Function | Default Lined to Key |
|---|---|---|
| 100 | | |
| 101 | | |
| 102 | | |
| 103 | Printer on | |
| 104 | Simple print | **F5** |
| 105 | Repeat last print | **2nd F + F5** |
| 106 | Switch main value area data | **2nd F + F8** |
| 107 | Switch 2nd LCD line data | **F6** |
| 108 | Lock keyboard | |
| 109 | Display weight x10 | |
| 110 | Set date and time | |
| 111 | Diagnostic menu | |
| 112 | | |
| 113 | Free texts configuration | |
| 114 | Calculator | |
| 115 | Print and clear partial total | **F8** |
| 116 | Print and clear general total | **F9** |
| 117 | | |

*Table 3-19. Function Codes*

| ID Code | Function | Default Lined to Key |
|---|---|---|
| 118 | Digital input/output and analog output diagnostic | |
| 119 | Serial communication diagnostic | |
| 120 | Custom display switch | **Fn + F9** |
| 121 | Free text 1 configuration | |
| 122 | Free text 2 configuration | |
| 123 | Free text 3 configuration | |
| 124 | Free text 4 configuration | |
| 125 | Free text 5 configuration | |
| 126 | Free text 6 configuration | |
| 127 | Free text 7 configuration | |
| 128 | Free text 8 configuration | |
| 129 | Free text 9 configuration | |
| 130 | Free text 10 configuration | |
| 131 | Clear free texts | |
| 132 | Send print format | |

*Table 3-19. Function Codes (Continued)*

## Other Function Codes

| ID Code | Function | Default Lined to Key |
|---|---|---|
| 200 | Link print format to print function | |
| 201 | Direct link 2nd print format to print function | |
| 202 | Setpoints values | |
| 203 | | |
| 204 | | |
| 205 | | |
| 206 | | |
| 207 | | |
| 208 | Switch 1st LCD line (zoom disabled) | **F7** |

*Table 3-20. Other Function Codes*

## Belt Function Codes

| ID Code | Function | Default Lined to Key |
|---|---|---|
| 300 | Dynamic belt zeroing | |
| 301 | Static zeroing | |
| 302 | Enable/disable flow-rate visualization inside dead band | |
| 303 | Run belt | |
| 304 | Set target flow-rate (PID enabled) | **F4** |
| 305 | Set target dosage weight (Batch enabled) | |
| 306 | Set pulse weight | |
| 307 | Set dosage time | |
| 308 | Set slow speed weight (Batch enabled) | |
| 309 | Set slow speed flow-rate (Batch and PID enabled) | |
| 310 | Set flying weight (Batch enabled) | |
| 311 | Set flying time (Batch enabled) | |

*Table 3-21. Belt Function Codes*

| ID Code | Function | Default Lined to Key |
|---|---|---|
| 312 | Start | **F1** |
| 313 | Pause | **F2** |
| 314 | Stop | **F3** |
| 315 | Flow-rate graphic | |
| 316 | Articles database management | |
| 317 | Article selection in alphabetical order | |
| 318 | Print and clear article total | **2nd F + F1** |
| 319 | Print and clear articles totals | |
| 320 | PID settings | |
| 321 | Controller diagnostics | |
| 322 | Jog time (Batch enabled) | |
| 323 | Set correction factor inserting real material weight (Analog input not used for correction) | |
| 324 | Set correction factor (Analog input not used for correction) | **F10** |
| 325 | Set flow-rate correction factor | |
| 326 | Enable/disable visualization of PID target flow-rate when in tolerance | |
| 327 | Flow-rate sampling interval for graphic | |
| 328 | Test weight procedure to set correction factor (Analog input not used for correction) | |
| 329 | PID P setting | |
| 330 | PID I setting | |
| 331 | PID D setting | |
| 332 | PID interval time setting | |
| 333 | Start analog output value (%) | |

*Table 3-21. Belt Function Codes (Continued)*

## Total Function Codes

| ID Code | Function | Default Lined to Key |
|---|---|---|
| 400 | Progressive digits | |
| 401 | Ticket counter value | |
| 402 | | |
| 403 | Partial total display | |
| 404 | Partial total print | |
| 405 | Partial total clear | |
| 406 | General total display | |
| 407 | General total print | |
| 408 | General total clear | |
| 409 | Article total display | |
| 410 | Article total print | |
| 411 | Article total clear | |
| 412 | Articles totals clear | |
| 413 | Clear all totals | |

*Table 3-22. Other Function Codes*

## 3.10 Serial Configuration

The indicator is fitted with two bi-directional serial ports, both having the output in ASCII code compatible with a wide range of printers, remote displays, PCs and other devices; in the set-up it is possible to freely combine these ports to the available configurations ("ComPC", "ComPrn", and "ComAux").

| | AMP Connector | | Terminal Board | | |
|---|---|---|---|---|---|
| Signal | COM1/COM3 (RS232) | COM2 (RS232) | COM1 (RS232) | COM2 (RS232) | COM3 (RS485) |
| TX | 1 | 1 | 14 | 18 | 22 A(+) |
| RX | 2 | 2 | 15 | 19 | 23 B(-) |
| GND | 6 | 6 | 16 | 16 | – |
| CTS | 2 | 3 | 15 | 17 | – |

*Table 3-23. Serial*

### 3.10.1 Serial Port Configuration

Select the function of the serial ports.

| Parameter | COM 1 | COM 2 | COM 3 |
|---|---|---|---|
| PC.PR.AX | PC | PRN | AUX |
| PC.AX.PR | PC | AUX | PRN |
| PR.PC.AX | PRN | PC | AUX |
| PR.AX.PC | PRN | AUX | PC |
| AX.PC.PR | AUX | PC | PRN |
| AX.PR.PC | AUX | PRN | PC |

*Table 3-24. Serial Port Configuration*

PC: Data transmission/reception to PC/PLC, printer, repeater, fieldbus module

PRN: Data transmission to printer, repeater

AUX: Data transmission/reception to printer, repeater, reception remote scale, barcode reader, inclinometer

### 3.10.2 Print Serial Configuration

| Parameter | Description |
|---|---|
| Baud Rate | *Settings: 1200, 2400, 4800, **9600** (default), 19200, 38400, 57600, 115200* |
| Set Parity | *Settings: **None** (default), Odd, Even* |
| Set Word | *Settings: 7 bit, **8 bit** (default)* |
| Set Stop Bit | *Settings: **1 bit** (default), 2 bit* |
| Signal Synchronism | *Settings: **No CTS** (default), Low, High, Emucts, Xon/Xoff* |
| CTS Status Error | *Settings: **Disable** (default), Enable* |
| Power Supply Printer | *Settings: **Internal** (default), External, External auto off* |
| Selection Protocol | *Settings: **Standard** (default), Repeater 6, Continuous, Flow rate continuous* |

*Table 3-25. Print Serial Configuration*

### 3.10.3 PC Serial Configuration

| Parameter | Description |
|---|---|
| Baud Rate | *Settings: 1200, 2400, 4800,* ***9600*** *(default), 19200, 38400, 57600, 115200* |
| Set Parity | *Settings:* ***None*** *(default), Odd, Even* |
| Set Word | *Settings: 7 bit,* ***8 bit*** *(default)* |
| Set Stop Bit | *Settings:* ***1 bit*** *(default), 2 bit* |
| Signal Synchronism | *Settings:* ***No CTS*** *(default), Low, High, Emucts* |
| Address 485 | *Enter value: 00 – 99,* ***01*** *(default)* |
| Selection Protocol | *Settings:* ***KD Standard*** *(default), Afox type, Repeater 6, Monodirectional, Flow rate continuous, SMA, Type sysway, Modbus RTU, Fieldbus* |
| Fieldbus Type | Only visible if fiedlbus protocol is selected; *Settings:* ***Profinet*** *(default), EtherCAT, CanOpen, DeviceNet, Modbus TCP, Profibus, EtherNet/IP* |
| Fieldbus Timeout Display | Allows to enable continuous visualization of bus master timeout; Only visible if fiedlbus protocol is selected; *Settings:* ***No*** *(default), Yes* |
| IP Address | The device name will be dini-(last 3 numbers of the IP Address); Only visible if Profinet or EtherNet/IP fieldbus protocol is selected; For example, if the IP address is 192.168.001.005, the name will be dini-005; *Enter value: 0.0.0.0 – 255.255.255.255,* ***0.0.0.0*** *(default)* |
| Network Mask | Only visible if Profinet or EtherNet/IP fieldbus protocol is selected; *Enter value: 0.0.0.0 – 255.255.255.255,* ***255.255.255.0*** *(default)* |
| Network Gateway | Only visible if Profinet or EtherNet/IP fieldbus protocol is selected; *Enter value: 0.0.0.0 – 255.255.255.255,* ***0.0.0.0*** *(default)* |
| Automatic Configuration | Only visible if Profinet or EtherNet/IP fieldbus protocol is selected; If Yes is selected the IP Address will be configured from the PLC; *Settings:* ***No*** *(default), Yes* |
| Node Address CanOpen | Only visible if CanOpen fieldbus protocol is selected; *Enter value: 001 – 127,* ***001*** *(default)* |
| Baud Rate CanOpen | Only visible if CanOpen fieldbus protocol is selected; *Settings:* ***1 MB*** *(default), 800 KB, 500 KB, 250 KB, 125 KB, 100 KB, 50 KB, 20 KB, 10 KB* |
| DeviceNet Mac ID | Only visible if DeviceNet fieldbus protocol is selected; *Enter value: 00 – 63,* ***01*** *(default)* |
| Baud Rate DeciveNet | Only visible if DeviceNet fieldbus protocol is selected; *Settings:* ***500 KB*** *(default), 250 KB, 125 KB* |
| Profibus Node ID | Only visible if Profibus fieldbus protocol is selected; *Enter value: 000 – 126,* ***001*** *(default)* |
| Type Transmission | *Settings:* ***Upon Request*** *(default), Continuous, 485 Mode* |

*Table 3-26. PC Serial Configuration*

### 3.10.4 AUX Serial Configuration

| Parameter | Description |
|---|---|
| Baud Rate | *Settings: 1200, 2400, 4800,* ***9600*** *(default), 19200, 38400, 57600, 115200* |
| Set Parity | *Settings:* ***None*** *(default), Odd, Even* |
| Set Word | *Settings: 7 bit,* ***8 bit*** *(default)* |
| Set Stop Bit | *Settings:* ***1 bit*** *(default), 2 bit* |
| Signal Synchronism | *Settings:* ***No CTS*** *(default), Low, High, Emucts* |
| Selection Protocol | *Settings:* ***No Protocol*** *(default), KD Standard, Repeater 6, Flow rate continuous, Upon Request, 485 Mode* |

*Table 3-27. AUX Serial Configuration*

## 3.11 Diagnostics Menu

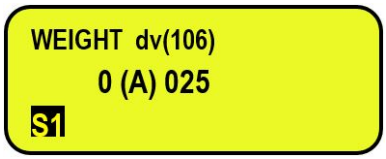
| Parameter | Description |
|---|---|
| Firmware | Software version check |
| Weight |  <br>Dv(106): Converter point per division<br>0 (A): Static weight and type of load cells, (A)= Analogue and (D)= Digital<br>025: Data per second of the converter<br>S1: Checked scale, possible to select with F6/F7 keys |
| Millivolt | Measured millivolts per scale/channel |
| ADC Points | A/D converter points |
| Display | Display version; By pressing of any key, LCD pixels turn on for a few seconds |
| Keyboard | By pressing a key it will show the relative number of the key; Exit by pressing one key three times |
| CTS Status | CTS signal of the connected printer |
| Battery Level | Voltage of the battery input on the motherboard |
| Power Supply Voltage | Voltage of the power adapter input on the motherboard |
| Relay Test | Testing the relay outputs by selecting the relay number with F6/F7 keys |
| Input Test | Status of all of the inputs |
| Analog Output | Enter a value between 0 and 65535 and confirm with enter, the instrument will supply the corresponding analogue value in the output |
| Analog Input | Value of the analogue input |
| Serial Ports Test | Redirect the data received by any serial port on other serial ports |
| Serial Number | Serial number of the instrument |
| Print Test | Select the format to print, if zero is selected all formats will prints sequentially |
| Event Log Viewer | View and print all the events of the instrument;<br>The indicator stores the following types of event:<br>• Metric events (calibration, equalization)<br>• Battery events (turn-on, turn-off, change supply, ...)<br>• Keyboard events (pressing of a keys)<br>• Event to change the SETUP (default, backup, saving setup, ...)<br>• Update firmware events (updating firmware)<br>• Network events<br>For each type are stored the last 10 events with date/time of registration; In this step is possible select which event shows and scrolls the last 10 events; By pressing the F5 key, it is possible to print this list |
| Belt Diagnostics | Belt Diagnostics:<br>• Belt load (kg/m)<br>• Belt speed (m/s)<br>• Encoder pulses (puls./sec)<br>• Encoder rollers (rev./min)<br>• Inclination (degrees)<br>• Flow rate (t/h)<br>• Flow rate to static zero (t/h)<br>• Flow rate to dynamic zero (t/h) |
| PID Values Visualization | PID values stored during the last dosage:<br>• PID<br>• Derivative<br>• Sum<br>• Error |
| Flow Rate Related to Analog Output | Visualization of the hourly flow in respect to the programmed analogue output value; Enter a value between 0-65535, confirm with ENTER, instrument display the flow rate |

*Table 3-28. Diagnostics Menu*

## 3.12 Printout Configuration

| Parameter | Description |
|---|---|
| Insertion Headings | *Settings: Heading 0 (txt.i0), Heading 1 (txt.i1), Heading 2 (txt.i2)* |
| Printout Formats | See Section 3.12.1 |
| Set Type Terminator | *Settings: CR, CR LF, **LF** (default), NO.TERM* |
| Default Printout | Sets printout to default values |

*Table 3-29. Printout Configuration*

### 3.12.1 Printout Formats

| Available Values | Default Value |
|---|---|
| c.F. 01 (Simple printout) | 331; 301; 301; 301; 300 |
| c.F. 02 (Start dosage) | 310; 301; 308; 301; 301; 301; 300 |
| c.F. 03 (Restart dosage) | 311; 301; 308; 301; 301; 301; 300 |
| c.F. 04 (End dosage) | 312; 301; 308; 331; 301; 301; 301; 300 |
| c.F. 05 (Block belt) | 313; 301; 308; 301; 301; 301; 300 |
| c.F. 06 (Stop dosage) | 316; 301; 308; 331; 301; 301; 301; 300 |
| c.F. 07 (Pause dosage) | 317; 301; 308; 301; 301; 301; 300 |
| c.F. 08 (Partial total) | 329; 301; 301; 301; 300 |
| c.F. 09 (General total) | 330; 301; 301; 301; 300 |
| c.F. 10 (Handled article total) | 416; 417; 424; 301; 301; 301; 300 |
| c.F. 11 (Result of the calculator) | 339; 032; 396; 301; 394; 032; 061; 301; 413; 395; 414; 300 |
| c.F. 12 (Start-up printout) | 300 |
| c.F. 13 ... c.F. 30 | 300 |

*Table 3-30. Printout Formats*

All data blocks available in DiniTools or RiceLakeTools
Press F1: Enter a block or ASCII character
Press F2: Delete the line with the block or ASCII character
Press F3: Insert a print end (300)
Press Enter: Modifies the code in the current line
Press CLR: Exit

## 3.13 Database

| Parameter | Description |
|---|---|
| Databases | *Settings: Disable,* ***Enable*** *(default)* |
| Article Field Enabling | Article fields:<br>Description 2 – ***Enable*** *(default)*<br>Description 3 – ***Enable*** *(default)*<br>Description 4 – ***Enable*** *(default)*<br>Description 5 – ***Enable*** *(default)*<br>INI.VAL.PID (PID start value) – ***Enable*** *(default)*<br>Flow rate target – ***Enable*** *(default)*<br>Dosage target – ***Enable*** *(default)*<br>Correction factor – ***Enable*** *(default)* |
| Set Access Password (Database) | Sets access password for article database; Zero value means password disabled |
| Initialize | Resets databases, articles and texts; ENTER = Yes, CLR = No |

*Table 3-31. Database*

## 3.14 Input Text Configuration

Press F1: New input text, selected index or first free index

Press F2: Edit selected input text

Press F3: Delete selected input text

| Available Values | Default Value |
|---|---|
| Description | |
| Text | |
| Threshold (max characters) | **32** |
| Mandatory input | **Disable** |
| Only void input | **Disable** |

*Table 3-32. Input Text Configuration*

## 3.15 Set User Access Password

Sets the access password for all user functions. It is only possible to enable the password per function in DiniTools or RiceLakeTools.

## 3.16 Weight Zoom Enabling

Enable the zoom function of the flow display.

| Available Values | Default Value |
|---|---|
| Disable | **Disable** |
| Enable | |
| Zoom delay | **5 sec** |

*Table 3-33. Weight Zoom Enabling*

*Delay to activate the zoom, only visible when zoom is enabled

## 3.17 Start-up Text

Set 2 lines of 16 character which will show during start-up.

## 3.18 Instrument Data Backup

Execute a backup of all settings. Confirm by pressing enter and enable the backup password (BAK.PWD) by entering a password.

## 3.19 External PC Keyboard Language

| Available Values | Default Value |
|---|---|
| US.EN | **US.EN** |
| ITAL | |
| FRAN | |
| DEUT | |

*Table 3-34. External PC Keyboard Language*

## 3.20 Instrument Sound Enabling

| Available Values | Default Value |
|---|---|
| Disable | **Disable** |
| Enable | |

*Table 3-35. Instrument Sound Enabling*

## 3.21 Reset Buffered RAM

Reset of the buffered RAM memory which contains database data, input texts, print formats and the headings.

## 3.22 Technical Default

Set all parameters to default, by pressing enter it's possible to choose:

Enter = Factory default

F1 = Load from backup

## 3.23 PID

PID algorithm is used to control the flow-rate. Analog output signal is managed to have the set target flow-rate.

Analog output is usually connected to the input of an inverter that will control the belt motor. Motor speed is proportional to the analog signal read by inverter.

PID value could also be directly read through Modbus/Fieldbus by a PLC that will use it to control the flow-rate.

In the PID algorithm are involved 3 main parameters:

- Kp: proportional gain
- Ki: integral gain
- Kd: derivative gain

On each PID algorithm iteration the following values are calculated:

- Error = (current value) - (target value)
- (Error sum) = (Error sum) + Error
- (Differential error) = Error - (Previous error)
- (Previous error) = Error

The PID algorithm output is:

**PID = Kp * Error + Ki * (Error sum) + Kd * (Differential error)**

Other PID parameters:

- Derivative counter: if set to a value greater than zero the derivative component of the PID algorithm is considered every set counter iterations, in other iterations the derivative component is set to zero
- Error sum upper bound: if the (Error sum) component, in absolute value, is greater than this parameter, (Error sum) is set to the parameter. Zero value means no limit.
- Action interval: time interval between 2 PID iterations
- Action interval in tolerance: time interval between 2 PID iterations when the flow-rate value is inside the tolerance range
- Flow rate tolerance: percentage of the target flow
- Change interval delay: when the flow-rate is inside the tolerance range for this time the PID action interval is switched to the Action interval in tolerance

Analog output management:

On every PID iteration the analog output signal is set to:

Analog output = PID value (%) * (Analog output span) / 100 + (Analog output zero value)

If the PID value remains below minimum value (0%) or over maximum value (100%) for more than 5 iterations sum error is not updated. When the Error makes Sum error, in absolute value, decrease Sum error is updated again. This is to recover quickly from an empty belt condition lasted for long time.

## 3.24 Article Database

To modify or select an article from the database use the user function codes from the main screen. Enter the function code and press enter.

Function code 316: Article database management

Press F1: New article, selected index or first free index.

Press F2: Edit selected article.

Press F3: Delete selected article.

Press F4: Search article.

Press F5: Print article.

Press Enter: Select article.

Press Alt: Unselect article.

Function code 317: Select article in alphabetical order.

Press enter: Select the selected article.

# 4.0 Electrical Connections

The following sections provide graphic representations of the electrical connections for a WE503D Dynamic Integrator.

## 4.1 Mother Board

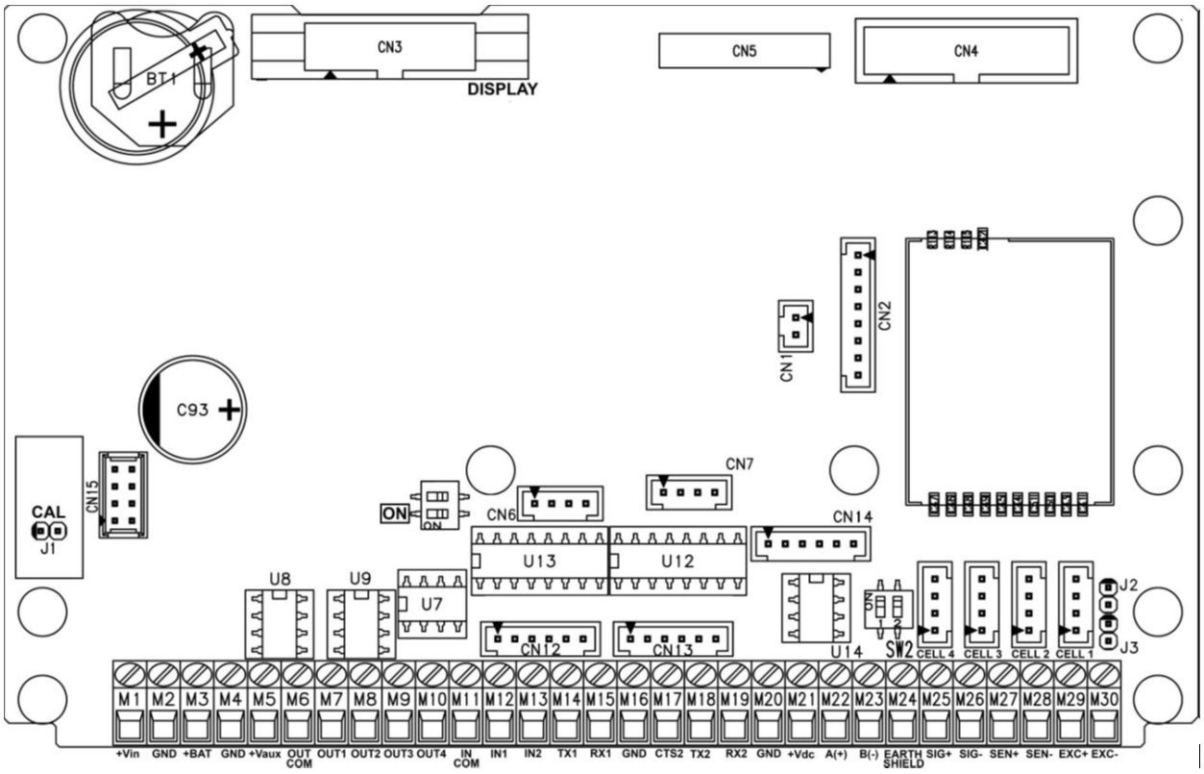



*Figure 4-1. Mother Board*

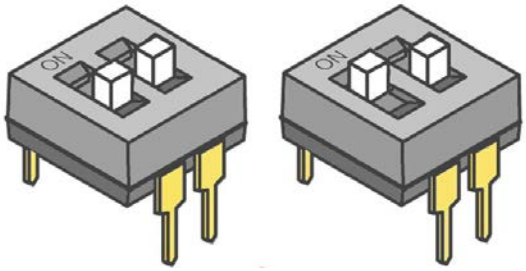



*Figure 4-2. Switches*

**WARNING** ***There aren't any differences between the two switches pictured in Figure 4-2. It doesn't matter which is "ON" and it is enough to activate only one.***

**ON SW:** If closed, one can automatically turn on the instrument, as soon as the power voltage is supplied, one must also turn off the instrument by removing the mains voltage.

If open, one can turn the instrument on and off by just pressing the ON key.

**J2, J3 (SENSE):** If closed, Excitation + and Sense +, Excitation - and Sense - are bridged on the board.

**J1:** If opened it enables the access to the metrological parameters, when configuring.

### 4.1.1 Serial Ports

| COM 1 | COM 2 | COM 3 |
|---|---|---|
| Connector AMP CN12: Serial 232<br>Terminals 14-15-16: Serial 232 | Connector AMP CN13: Serial 232<br>Terminals 16-17-18-19: Serial 232 | Connector AMP CN14: Serial 232<br>Terminals 22-23: Serial 485 (U14) |

*Table 4-1. Serial Ports*

### 4.1.2 Power Supply

| 6 VDC Battery Power Supply | +VDC Power Supply | V-AUX Auxiliary Power Supply | +VDC (OUT) Power Supply |
|---|---|---|---|
| 3 +BAT (+6 VDC)<br>4 GND (0 VDC) | 1 +VDC (+12 VDC, 8 ÷ 36 VDC with I/O expansion board connected)<br>2 GND (0 V) | 4 GND (0 V)<br>5 +Vaux (5, 3-8 VDC 400 mA max) | 20 GND (0 V)<br>21 +VDC (+12 VDC only if connected to the power supply) |

*Table 4-2. Power Supply*

### 4.1.3 Load Cell Connection (Terminal Board Connection)

| | | |
|---|---|---|
| 25 | SIG+ | SIGNAL+ |
| 26 | SIG- | SIGNAL- |
| 27 | SENS+ | SENSE+ |
| 28 | SENS- | SENSE- |
| 29 | EXC+ | EXCITATION+ |
| 30 | EXC- | EXCITATION- |

### 4.1.4 Inputs (Optoisolator Photocouplers)

Power Supply: 12 VDC ÷ 24 VDC max 20 mA

### 4.1.5 Photomosfet Outputs

Maximum Power: 48 VAC or 60 VDC, 150 mA max., 10 ohm max

**IMPORTANT** ***The optoisolation of the inputs and outputs is obtained by powering the common of the outputs and/or of the inputs by using a voltage outside the instrument.***

### 4.1.6 RS232 Serial Port (RJ11 Connector)

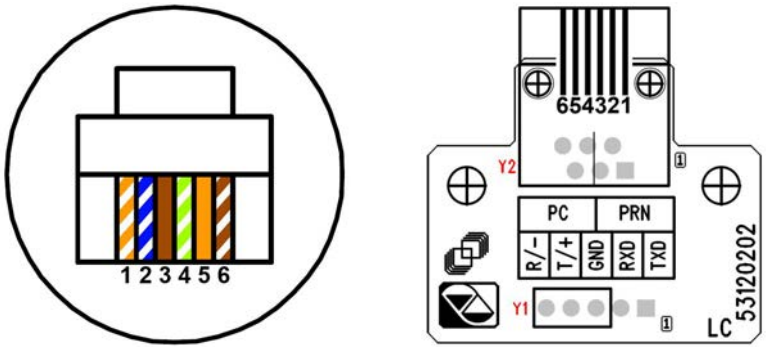



*Figure 4-3. RJ11 Connector*

### RJ11 Connections

| Y2 | RJ11 | DB9 | COLOR | | MEANING |
|---|---|---|---|---|---|
| 1 | 1 | | ORANGE | WHITE | |
| 2 | 2 | 3 | BLUE | WHITE | RX |
| 3 | 3 | | BROWN | | |
| 4 | 4 | 5 | GREEN | WHITE | GND |
| 5 | 5 | 2 | ORANGE | | TX |
| 6 | 6 | | BROWN | WHITE | |

## 4.2 I/O Expansion Board

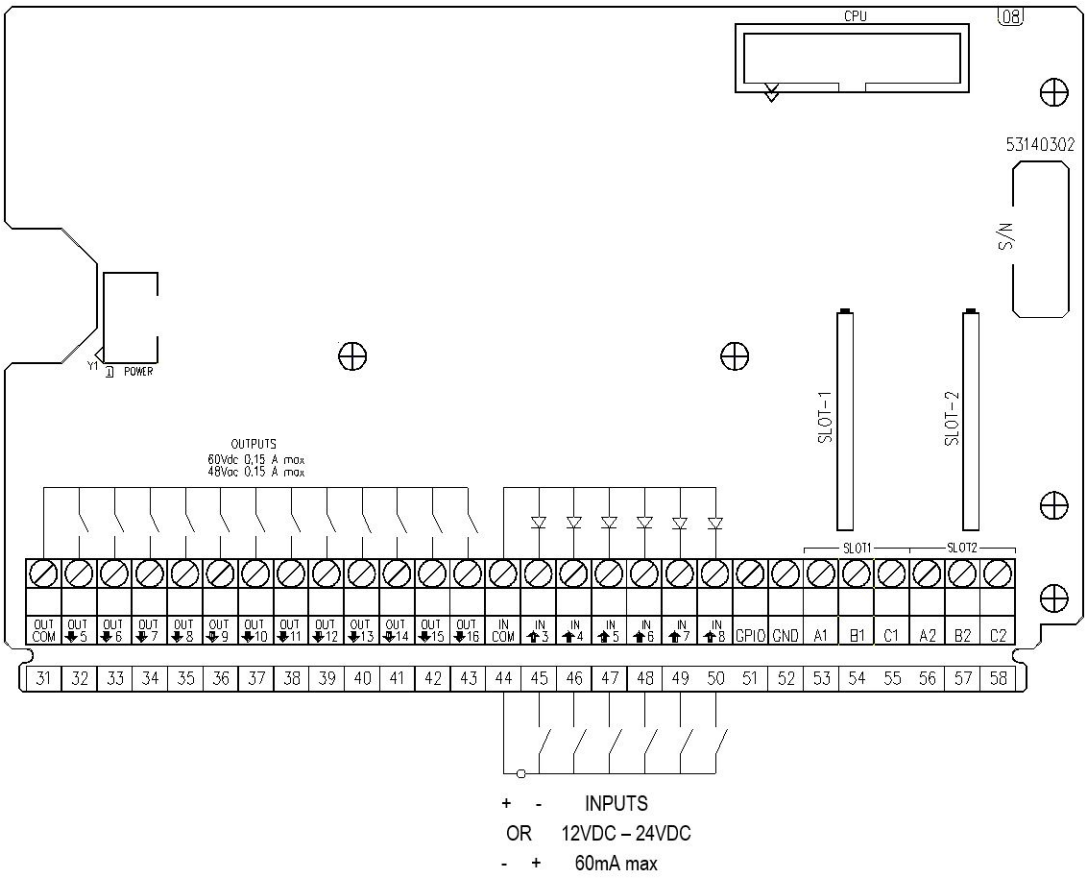



*Figure 4-4. I/O Expansion Board*

### 4.2.1 Analog Output

| I/O1 (Slot 1) | I/O2 (Slot 2) |
|---|---|
| 53 I+ (A1) + 20 mA<br>54 COM- (B1) 0 mA / V<br>55 V+ (C1) + 10 V | 56 I+ (A2) + 20 mA<br>57 COM- (B2) 0 mA / V<br>58 V+ (C2) + 10 V |

*Table 4-3. Analog Output*

Note ***the maximum resistance applicable on the output current is 350 Ohm and the minimum resistance applicable on the output voltage is 10 Kohm.***

### 4.2.2 Inputs (Optoisolator Photocouplers)

Power Supply: 12 VDC ÷ 24 VDC max 20 mA

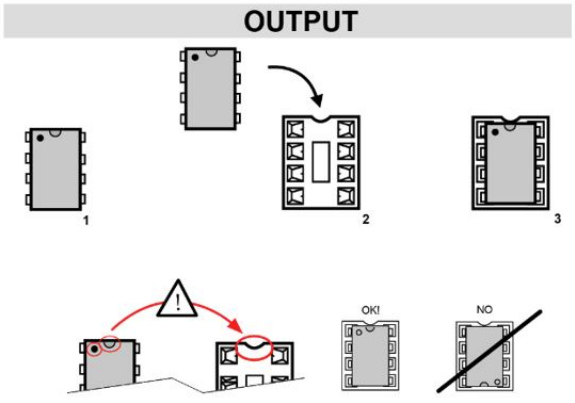
### 4.2.3 Photomosfet Outputs

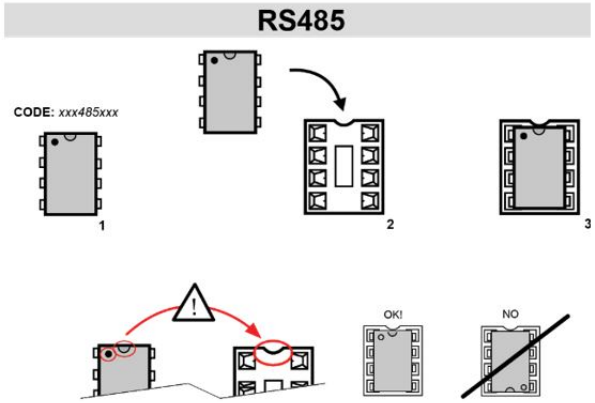
Maximum Power: 48 VAC or 60 VDC, 150 mA max., 10 ohm max

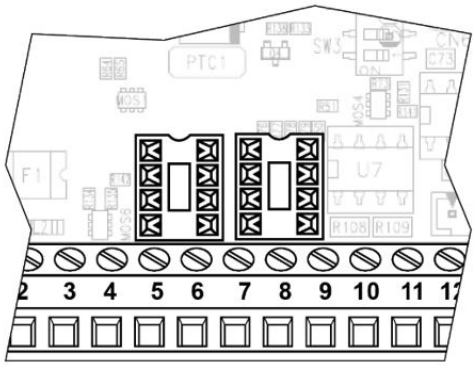
IMPORTANT ***The optoisolation of the inputs and outputs is obtained by powering the common of the outputs and/or of the inputs by using a voltage outside the instrument.***

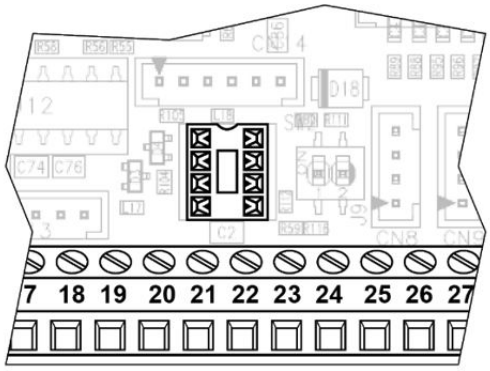
## 4.3 Integrated Circuits Installation

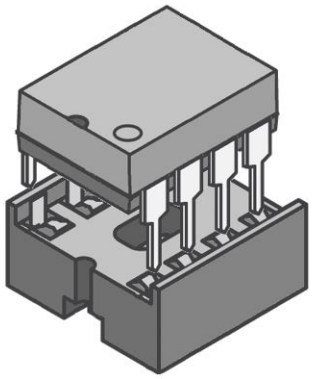
It is necessary to follow this procedure to install Output, RS485 and Input integrated circuits.



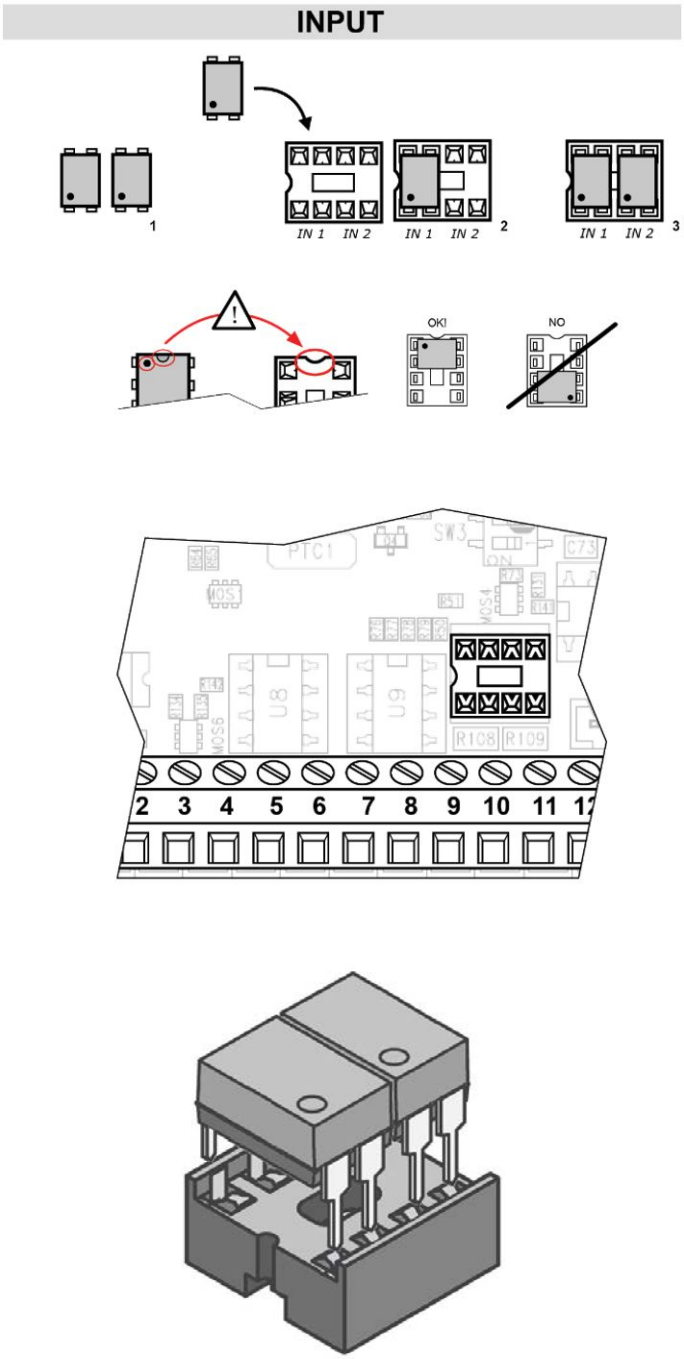



## Integrated Circuits Installation (Continued)



## 4.4 Display Board

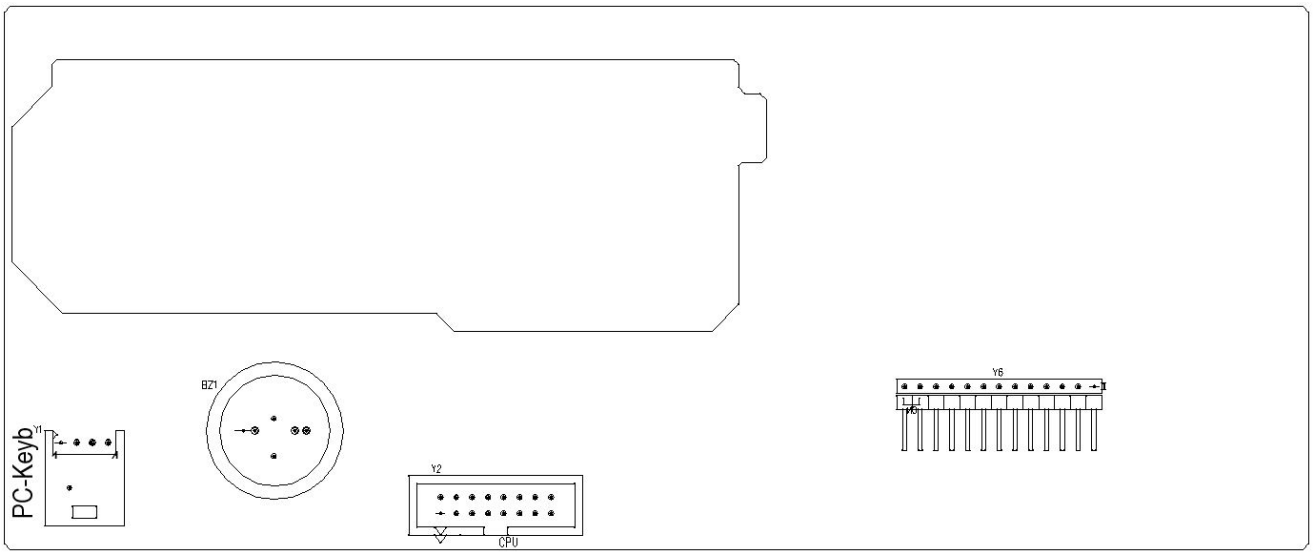


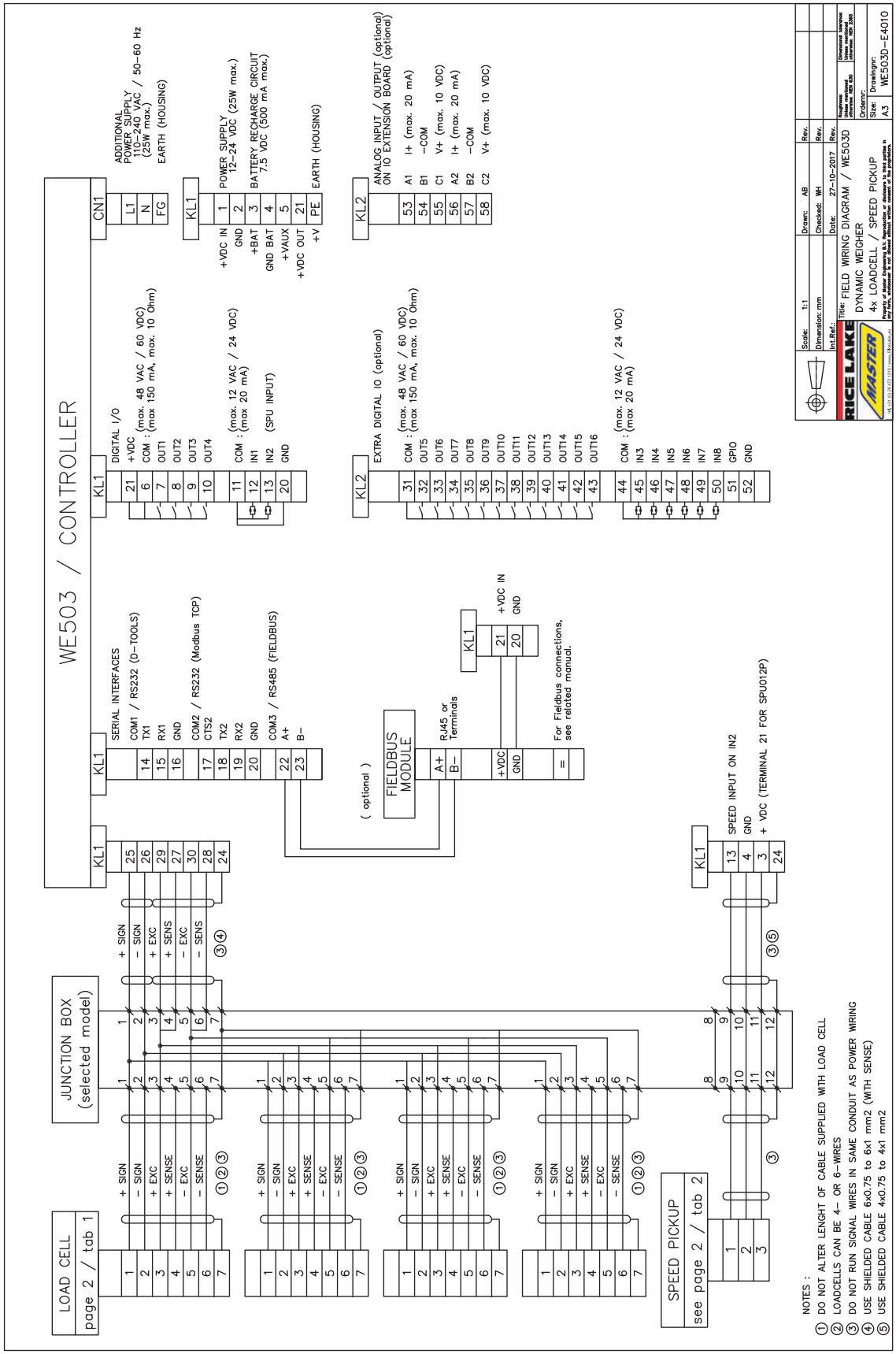

*Figure 4-5. Display Board*

### 4.4.1 PC-KEYB – PC Keyboard Connector

Keyboard emulation input, usable for the connection of the instrument to the PC keyboard or the badge/bar code reader.

| PC-KEYB | | PS/2 |
|---|---|---|
| 1 | +5 V | 4 |
| 2 | GND | 3 |
| 3 | DATA | 1 |
| 4 | CLK | 5 |

## 4.5 Connection Diagrams



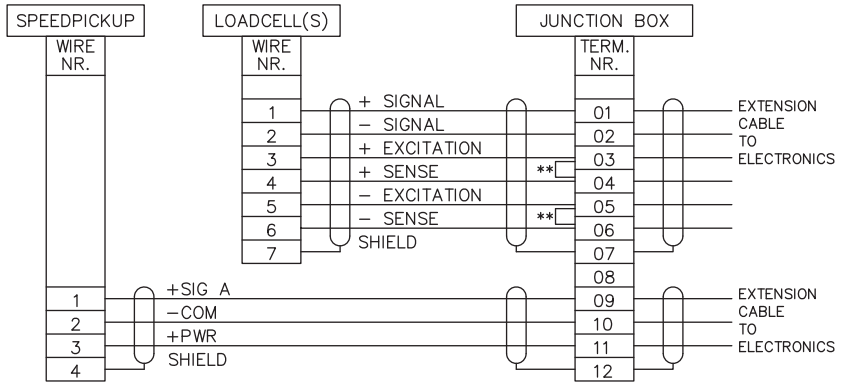
TAB 1

| WIRE NR. | LOADCELL MODEL / FUNCTION | RLx4xx RL9x | RL19 RL30 RL35 RL42 RL46 RL65 RL74 RLx3xx H8H | | B3G B8D BM8D H8C H9C L6D L6B L6E L6L CHP 9123 | BM11 BM8H SHB ACB BM6A B6Q HPS HCB PCB 10–31H SENSOR | SSB BSP ALC CSP–M B6N | L6T L6N 652 642C | L6G L6W BM6G P PX | (I)BM CS CF CSI | H8CH | BM24R RLC | L6Q 1040 1140 1250 1510 640 | T95 T61 VC3500 T93 BSM SSM | | | | EXTENSION CABLE RICE LAKE | EXTENSION CABLE LYCY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | + SIGNAL | GREEN | RED | | GREEN | WHITE | WHITE | GREEN | GREEN | GREEN | WHITE | BROWN | RED | GREEN | | | | GREEN | PINK |
| 2 | – SIGNAL | WHITE | WHITE | | WHITE | RED | RED | WHITE | WHITE | WHITE | GREEN | WHITE | WHITE | YELLOW | | | | WHITE | WHITE |
| 3 | + EXCITATION | RED | GREEN | | RED | GREEN | GREEN | RED | RED | RED | RED | PINK | GREEN | RED | | | | RED | GREEN |
| 4 | + SENSE | YELLOW | BLUE* | | x | YELLOW* | BLUE* | BLUE | BLUE | VIOLET* | x | x | BLUE | x | | | | YELLOW | YELLOW |
| 5 | – EXCITATION | BLACK | BLACK | | BLACK | BLACK | BLACK | BLACK | BLACK | BLACK | BLACK | GRAY | BLACK | BLUE | | | | BLACK | GRAY |
| 6 | – SENSE | BLUE | YELLOW* | | x | BLUE* | YELLOW* | BROWN | YELLOW | GRAY* | x | x | BROWN | x | | | | BLUE | BROWN |
| 7 | SHIELD | | CLEAR | | ORANGE CLEAR | ORANGE CLEAR | ORANGE CLEAR | CLEAR | CLEAR | CLEAR | ORANGE CLEAR | CLEAR | CLEAR | CLEAR | | | | MANTLE | MANTLE |

* = OPTIONAL TYPE

TAB 2

| WIRE NR. | SPEEDPICKUP MODEL / FUNCTION | 5020 5026 7020 | M12 Connector CABLE | 2160N 2160EN | 6012C 6012EN | 012P E57 (pnp) | EXTENSION CABLE RICE LAKE | EXTENSION CABLE LYCY |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| 1 | + SIGNAL A | GREEN | GREEN | 1 | 15 | BLACK 4 | GREEN | GREEN |
| 2 | – COM | WHITE | WHITE | 2 | 16 | BLUE 3 | WHITE | WHITE |
| 3 | + POWER | BROWN | BROWN | 3 | 17 | BROWN 1 | BROWN | BROWN |
| 4 | SHIELD | MANTLE | MANTLE | – | – | – | MANTLE | MANTLE |




** : MAKE JUMPERS ONLY IF THE LOADCELL HAS NO SENSE–WIRE

| | | | |
|---|---|---|---|
| Scale: 1:1 | Drawn: | Rev. | |
| Dimension: mm | Checked: WH | Rev. | |
| Int.Ref.: | Date: 27–10–2017 | Rev. | |

RICE LAKE MASTER

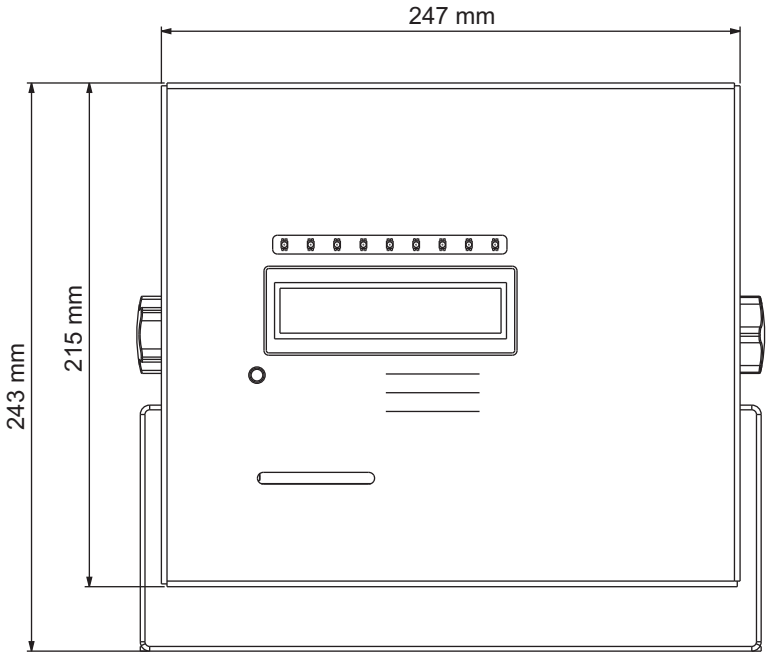
Title: COLOR CODING LOADCELLS AND SPEEDPICKUPS

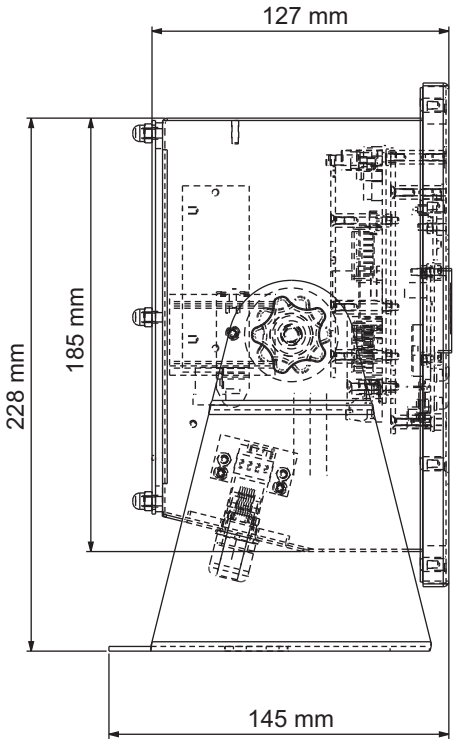
Roughness: Unless mentioned otherwise: NEN 630 | Dimensional tolerance: Unless mentioned otherwise: NEN 2365

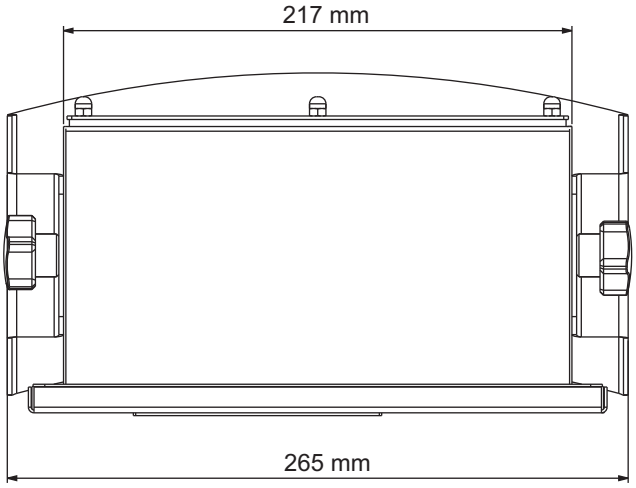
Ordernr:

Size: A4 | Drawingnr: LC–SPU–E5030

## 4.6 Dimension Drawings



# 5.0 Setup Password

Password: 41042

RICE LAKE®
WEIGHING SYSTEMS



Rice Lake Weighing Systems Europe B.V. • Weiland 11 • NL-6666 MH Heteren • The Netherlands
Europe +31 (0)26 472 1319 • U.S. 800-472-6703 • Canada/Mexico 800-321-6703 • International 715-234-9171