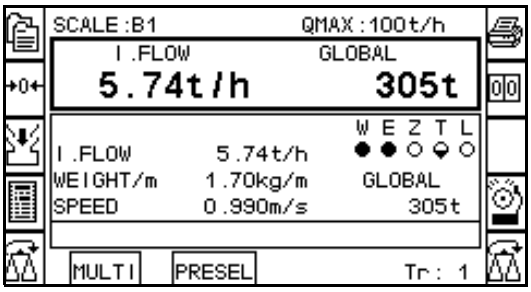
PRECIA MOLEN™
WORLDWIDE WEIGHING



I 410 BS (Belt Scale)

User manual

04-41-80-1 MU / 03/2015

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General Description 1

Introduction

Purpose of manual

This manual provides all the information needed for using the I 410 BS.

The metrological configuration and the installation of the I 410 system equipment (terminal, sender, etc.) are described in the Installation Manuals for the Terminal and the I 400 Transmitter, reference: 04-43-01-0 MI and 04-32-10-0 MI. The configuration and installation of the I 400 Terminal is described in the I 410 Terminal Installation Manual (ref: 04-41-80-0 MI).

Overview

The I 410 Application SBS/MBS is a software for single and multiple scales that provides continuous measurement of the flow of bulk materials with variable flow and performs the aggregation of weights.

Its main features are:

Weighing function

- Acquisition of weight/speed.
- Measurement of the instantaneous and average flow rate.
- Partial and overall totalling.
- Load preselection.
- Min and max timer thresholds - Alarms.
- Automatic zero.

Preselection function

- Automatic correction of belt tail end.
- Management of 8 extractors.
- Opportunity to start empty or loaded belt.
- Control on/off of the extractor and weighing device without the need for external automation.

Monitoring function

- Storing the last 5 "Resets" (date, time, deviation).
- Analysis of a production.

Printing function

- Weighing ticket text configurable on keyboard (legal name).
- Automatic (at end of preselection), clocked (at programmable time intervals) or manual printing.

Communication function

- J-BUS/MODBUS protocol.
- MODBUS/TCP
- PROFIBUS-DP

Auxiliary functions

- Digital Inputs/Outputs with programmable functions*.
- Programmable analog output*.

Basic Configuration

The implementation of the I 410 BS software requires the basic configuration shown below:

- One I 410 D indicator (flush version) or I 410 DS (stainless steel housing version).
- One or more integration belt scales consisting of:
  - I 400 TB CT transmitter (galvanized housing) or I 400 TB CT-S (stainless steel housing).
  - Weighing infrastructure.
- Speed pick-up detector (PV roll or other device).

Intervention levels

The I 410 system manages several levels of intervention:

- Installer - Input/Output (I/O) measurement adjustment and configuration.
- Supervisor - Definition of operating modes (settings).
- Operator - Launch:
  - Launching is controlled by the operator, a digital input or the communication protocol.
  - The current steps can be viewed in real-time on the screen.

This parameter segmentation makes the I 410 system adaptable and easy to integrate in most industrial processes. This also allows to secure the operation of the application by forbidding access to unauthorized operators.

Warnings

Please note that the change in the configuration of the software operation can affect the safety of the machine. Ensure all precautions and checks are carried out before modifying this file.

** Options*

Terminology and abbreviations

This paragraph defines the main weighing terms used in this document.

Main general weighing terms

Term	*Definition*
Scale division	Basic weight measurement unit.
Extent	Interval between minimum and maximum capacity of the scale.
Range	Maximum weight the scale is able to measure.
Non legal for trade	Non-regulated use.
Legal for trade	For trade use.

Main terms related with bulk weighing

Term	*Definition*
Extractor	Part ensuring the arrival of the product on the belt.
Belt tail end	Quantity of product between the extraction point and the weighing point.
In-flight error	Additional weight of product flowing from the weigh hopper, after the close feed gate signal.
Filling set point	Net weight referred to the full bucket, at the end of a weighing cycle filling step.
Preselection	Total weight target as a result of a weighing operation.

Description of the interface

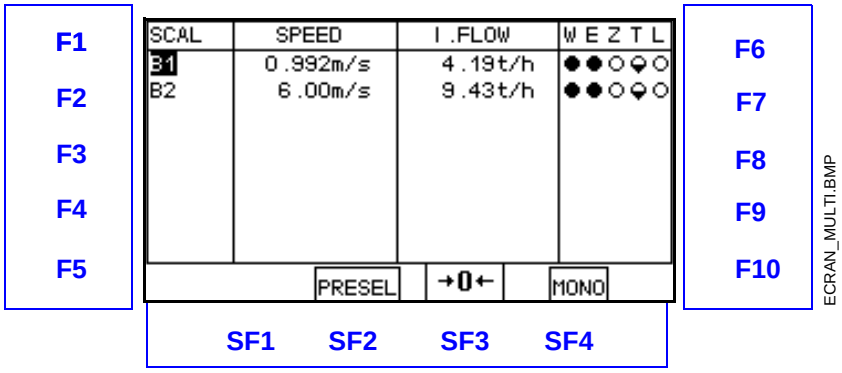
The commands are keyed in either directly on the I 410 graphic terminal or using an external keyboard (see installation instructions).

I 410 graphic terminal - User interface

ECRAN_MULTI.BMP

Keys		Description
I 410 Terminal	*External keyboard*	
F1 to **F5**		The function keys are structured in several levels. They apply to all sheets. A same key has a different function on each level, as indicated in the following pages.
F6 to **F10**		
SF1 to **SF4**	Shift + F1 to F4	
▽	-	STOP
◈	-	START
Ⓜ	Ctrl + F1	Access to the Metrological screen
?	Ctrl + F2	Access to the operator identification screen - work level choice.
↵	↵	Validation key

Main screen if multiple scales

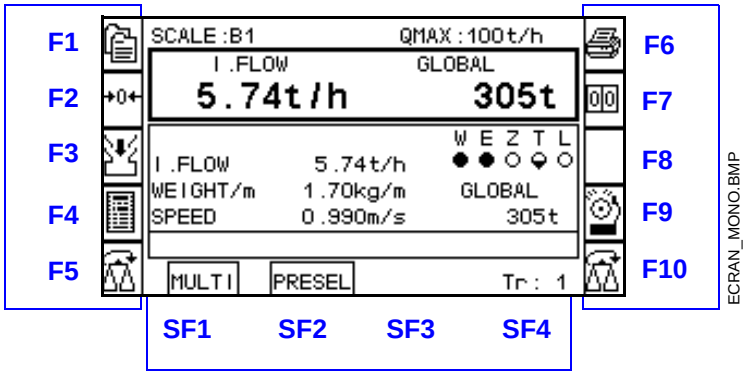


F1	Switch to settings mode of terminal operating functions (minimum supervisor).
F4	Display choice column 1 (instant flow rate, responsible, global, etc ...)
F5	Change scale (next)

Reset Totalisers	**F7**
	F8
Display choice column 2 (instant flow rate, responsible, global, etc ...)	**F9**
Change scale (previous)	**F10**

SF2 or Shift + F2	Access to PRESELECTION screen of the selected scale.
SF4 or Shift + F4	SINGLE SCALE access Screen
SF3 or Shift + F3	Reset scales.

Main screen if single scale



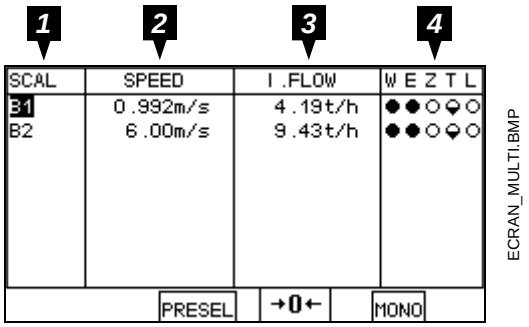
F1	Switch to settings mode of terminal operating functions (minimum supervisor).
F2	Reset scales.
F3	Preselection.
F4	Access to BATCH screen.
F5	Change scale (previous).

Printing.	**F6**
Reset Totalisers.	**F7**
	F8
View the faults:	**F9**
Change scale (next).	**F10**

SF1 or Shift + F1.	MULTI SCALE access screen.
SF2 or Shift + F2	PRESELECTION access screen.

Main screen

This screen displays up to 8 scales in a table on a same screen.



ECRAN_MULTI.BMP

The following is displayed for each scale:

- Its name (field 1)
- Two different parameters (fields 2 and 3)
- States of indicators (field 4)

This screen disappears automatically if only one scale is connected.

Definition of the indicators

Indicator	*Status*	*Meaning*	*Comments*
P		Weigh belt running	Speed measured > 50% of minimum speed or Constant speed and "Weighing device running" input = ON
E		Extractor ON	"Extractor running" input = ON
Z		ZERO in progress	Weighing device ZERO operation in progress
		ZERO complete and OK	Weighing device ZERO operation complete and OK
S		MIN threshold activated	Value monitored < MIN threshold
		MAX threshold activated	Value monitored > MAX threshold
		MIN and MAX thresholds activated	
C		Load paused (preselection)	See preselection operation
		Loading in progress (preselection)	

Displayable parameters

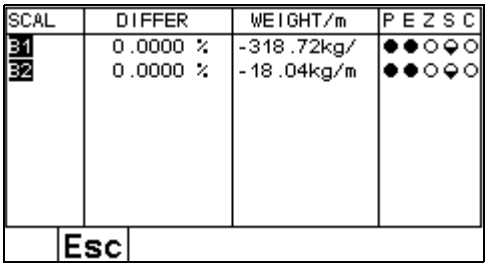
Either in field 2 using key F4, or in field 3 using key F9.

Displayed	*No*	*Definition*	*Unit*
FLOW I	1	**instantaneous flow**	t/h or kg/h
FLOW M	2	**mean rate** programmable filter	t/h or kg/h
WEIGHT/M	3	**material weight per metre of belt** weight measured on the weighing cell divided by the weighing length	kg or g
SPEED	4	**Linear belt passage speed** Measured by the speed cell or simulated	m/s
PARTIAL	5	**Partial totalling** According to "partial totalling unit" with simple reset using the keyboard.	t or kg
GLOBAL	6	**Global totalling** According to "partial totalling unit" with reset on keyboard, protected by access level	t or kg

Numbering the parameters allows to allocate them to the different functions configurable.

Resetting all the scales

This function can be used to simultaneously reset all scales connected!

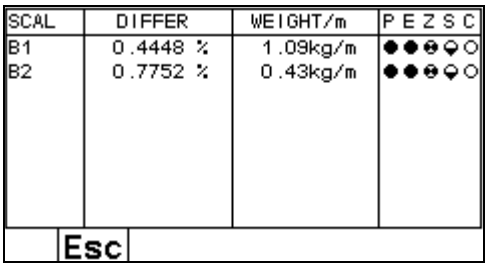


MAZ.BMP

Touch SF3 in the main screen

Displays the difference from zero in the right-hand parameter labelled "Difference" and expressed in %

Confirm using SF4

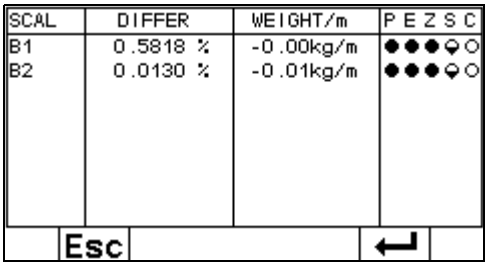


MAZ_ENCOURS.BMP

➔ Launching of reset for all connected scales

The Z indicators switch to "resetting in progress" if the conditions are OK (half lit)

The scale label is in reverse display if the conditions are not met and resetting is not possible.



MAZ_EFFECTUES.BMP

Once all RESETS are completed:

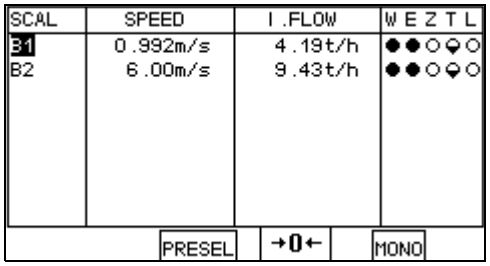
- SF4 to accept all the corrections
- SF1 to refuse all the corrections

The names of scales for which resetting was impossible have their name in inverted display.

Please note each scale can be reset individually in the screen specific to this scale.

Resetting totalisers for all scales

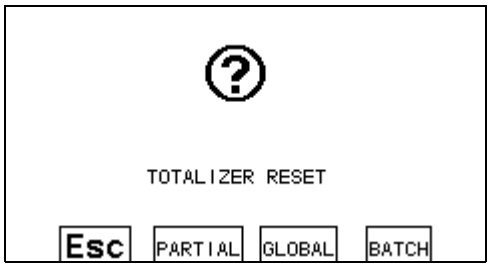
This function allows the resetting the totals on all the scales.



ECRAN_MULTI.BMP

Touch F7 in the main screen

➔ Display partial, global or batch totalisers.



RAZ-TOT.BMP

Select the type of totalisations to be reset:

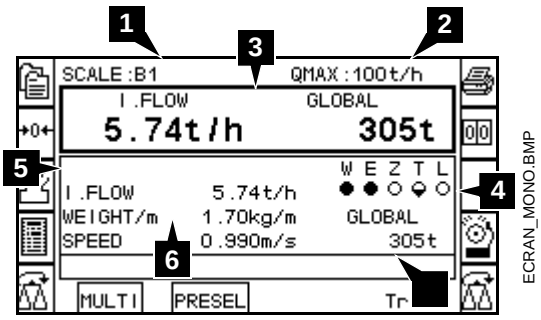
- PARTIAL
- GLOBAL
- BATCH

Confirmation message with YES / NO.

In LT, the "Global" reset is only possible with "SUPERVISOR" level.
In NLT, "Global" reset is possible at all levels.

Scale screen 4

The scale screen is displayed directly if only one scale is connected. In the case of several scales, the multi-scale screen is displayed. The SF4 key (MONO) returns to the scale screen.



Display description:

1. Scale name using up to 6 characters (Ex: B1).
2. Maximum flow rate Qmax (100t/ h).
3. Display instantaneous flow rate and global total (by default, configurable).
4. Display scale indicators
5. Displaying the product.
6. Reduced display for instantaneous flow rate, weight per meter and speed.
7. Display global total in lower right

Assigning the keys

F1 Switch to settings mode of terminal operating functions (minimum supervisor).

F2 Reset scale

F3 Preselection

F4 Access to BATCH screen

F5 Change scale (previous next).

F6 Request manual print

F7 Reset totalisers for the scale displayed

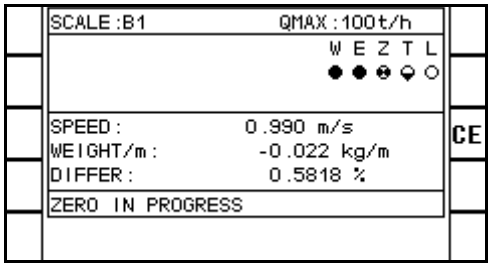
F9 View the faults

F10 Change scale (next)

Semi-automatic resetting

When it is neither possible nor desired to perform automatic resets, a reset can be activated from the terminal keyboard.

This request must be made as regularly as possible (at least once daily). This operation ensures the proper operation of the scale.



MONO_ZERO_EN_COURS.BMP

Press F2

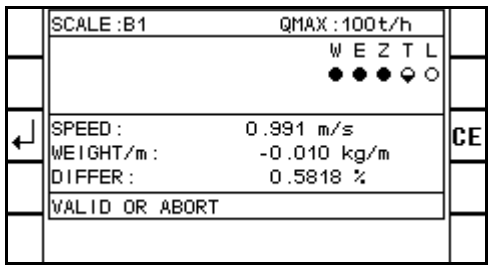
If conditions are met, i.e.

- belt running
- weight < ZERO threshold

Start RESET:

Indicator Z lit (zero in progress).

➔ Calculation and dynamic display of the total difference from zero in the right-hand side of the main screen.



MONO_ZERO.BMP

After the RESET:

- **F3** to accept the correction
- **F8** to refuse the correction

Indicator Z lit (zero OK)

If resetting cannot be completed because one of the initial conditions has been lost before the end of the calculation, i.e.

- Weighing device running
- weight < ZERO threshold

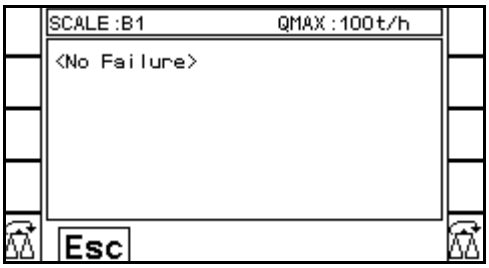
Display an alert message:

" **Abandon zero !!** " meaning that the reset cold not be performed.

When the gap found is outside the correction range authorized, a fault message is displayed.

This error message indicates that a maintenance operation is required as the zero is too offset (supervisor mode)

Display of faults



DEFAULT.BMP

By touching the F9 key

Display a screen of "Faults"

F5: switch to the next scale

F10: return to preceding scale.

Flow rate out-of-limit In ML, flow out of the Qmin-to-Qmax interval.

Converter fault Weight acquisition fault.

Parameter fault

Slip fault Belt slip detected.

Seg. zero fault The segmented zero operation failed.

Zero limit fault The difference from zero exceeds MAXIMUM ZERO.

(Requires a maintenance operation by a supervisor!)

Belt Centring default A belt position default is detected.

Reset counters

Follow the same procedure as the RESET of all scales.

In LT, the "Global" RESET is only possible with "SUPERVISOR" level.

In NLT, "Global" RESET is possible at all levels.

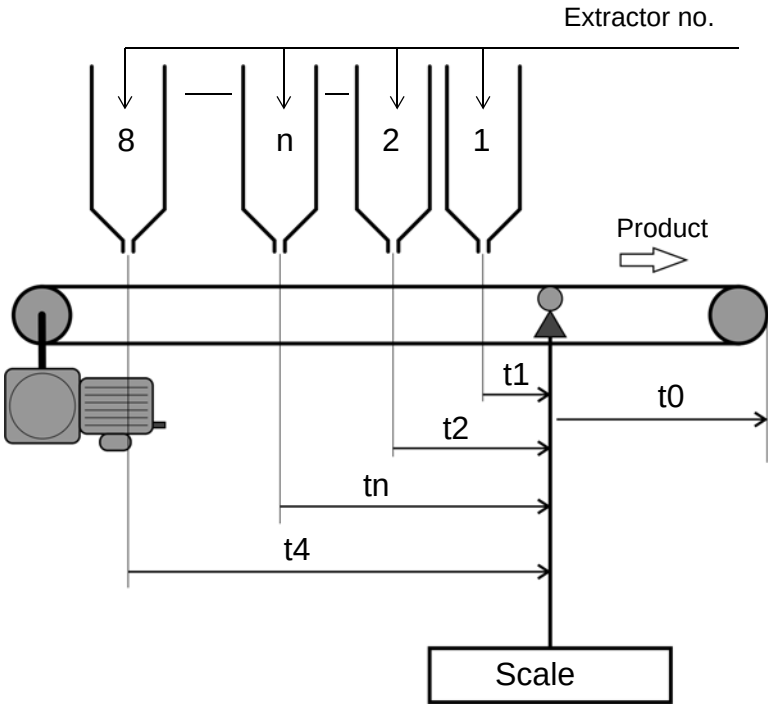
Preselection operation

The following functions are available in the preselection algorithm:

1. Automatic calculation of the belt tail with early stop of the extractor
2. Management of 8 extractors and therefore 8 different times
3. Opportunity to choose a product associated with an extractor and a material factor.
4. Commanding the extractor and weighing device is possible.
5. Ability to force the execution of an automatic ZERO before starting the loading:

   In this case, upon starting a cycle, only the weighing starts, thus automatically triggering a reset. When Zero OK appears, the extractor starts.
6. Possibility of performing a loading with start and stop of a loaded belt.

Functions 5 and 6 are selectable in the "scale" file



In operation with empty belt start

- The "Loaded" counter is reset at cycle start.
- The extractor and weighing device start.
- The belt tail is calculated permanently, by performing the operation:
  belt tail end = mean flow x tn (+ adaptation to the unit).
- Active extractor "n" is stopped once the weight is passed, it is equal to set point - belt tail end.
- The weighing device is stopped (tn + t0) seconds after the extractor stops.

In operation with loaded belt start

In this mode, there is no longer any notion of belt tail end calculation, nor choice of extractor.

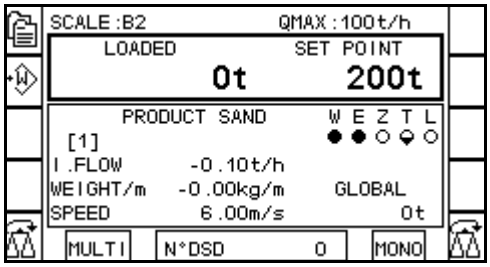
- The extractor and weighing device start simultaneously.
- When the weight passed is equal to the setting, the "Load" counter is reset by a pulse.
- The weighing device and extractor are stopped "t0" seconds after this reset. At this time, the "Load" counter contains the quantity of material present over the distance t0 and to be loaded during the **next** cycle

If automatic printing is enabled, a printout is made as soon as the weighing device and extractor stop.

The weighing device ON order is always emitted first. The extractor ON order is only given if the weighing device operation has been confirmed by speed pick-up cues and/or "weighing device ON" input.

Preselection screens

By pressing SF2 from the scale screen.



PRESELECTION.BMP

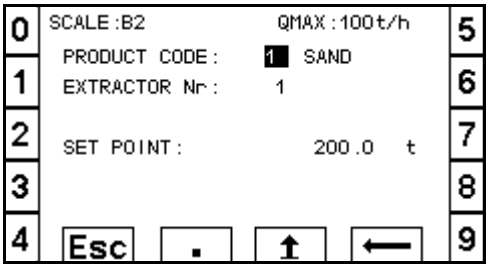
Load preselection screen display:

- Main screen: Weight already loaded and weight requested
- Name of the product from the selected extractor, followed with the extractor number [x]
  Screen example: PEA GRAVEL- extractor no. 1

SF4: back to the previous menu

Product change and set point

By pressing the F2 key from the preselection screen:



PRESELECTION_PRODUIT.BMP

Product choice

The product is selected by its code (previously created in the "PRODUCT" file.

The extractor associated with the product is displayed.

Screen example: PEA GRAVEL- extractor no. 1

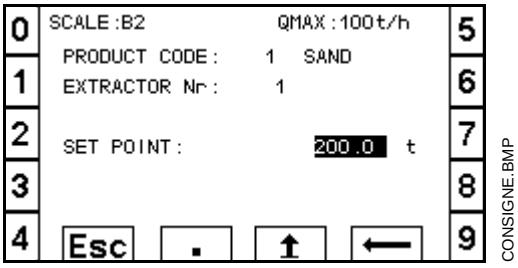
Validation.

If no extractor is present in the product file, entering the extractor is proposed.

it is only possible to modify the extractor using the keyboard if this option has been confirmed in the "scale" file.

Changing the loading set point

By pressing the F2 key from the preselection screen:



CONSIGNE.BMP

The value entered can be limited to the "Min preselection" and "Max preselection" values defined in the "scale" file.

In LT use, "Min preselection" cannot be less than "minimum totalling".

Back to menu using ESC (SF1).

Launching the loading

At keyboard

You must always display the preselection screen of the affected scale.

Press key ◈:

1. Activation of output WEIGHING DEVICE ON
2. When weighing device ON is observed by the presence of speed pulses, the P LED "weighing device on" is lit.
3. Indicator C "loading in progress" is lit:
   - if ZERO AT STARTUP = NO, outputs EXTRACTOR ON and LOADING IN PROGRESS are activated.
   - if ZERO AT STARTUP = YES, wait for Zero OK before activating the output: EXTRACTOR ON

NOTES:

⇨ 1st press on ▽: Load in progress is held.

When in hold mode, the "Weighing device on" and "Extractor on" outputs cease, but the "Loading in progress" output remains active.

Press again on ◈ to CONTINUE the loading, otherwise:

⇨ 2nd press on ▽: implies a **FINAL** STOP of the loading.

Please note:

- When activating the NO choice in the "No safety" option, the loading can start only if the setting is between "Max preselection" and "Min preselection".

- **The choice of the extractor** is selected either on the keyboard or by external inputs (depending on programming in the I/O file) .

- The choice between stopping an empty belt and a loaded belt is made in the "scale" file.

By external inputs

The I/O assignment is defined in the I/O file (at installation).

Reminder:

I/O type	*Allocation value*	Function	Operation
Input	101	Load request	Loading starts upon the closing of this input, which must remain closed throughout loading. Early opening is considered as a definitive emergency stop
Input	102	Hold loading	Input closed, the loading is suspended Weighing device ON and extractor ON outputs are open until the "Hold" input is opened
Input	103	Abort loading	When running from the keyboard, this input acts as an emergency stop. When programmed, it must be normally CLOSED, and the loading will stop when the input is opened
Input	104	Select 2 extractors	
Input	105	Select 4 extractors	
Input	106	Select 8 extractors	

Output	33	Loading in progress	Indicates that loading is in progress Closed from loading start until the weighing device and extractor are stopped
Output	34	Extractor command	Extractor running order, controlled by weighing device operation. If the weighing device stops, the extractor stops
Output	35	Scale command	Weighing device belt ON command

Results analysis functions

The Results are used to analyse a production BATCH for a specific period.

Recorded data:

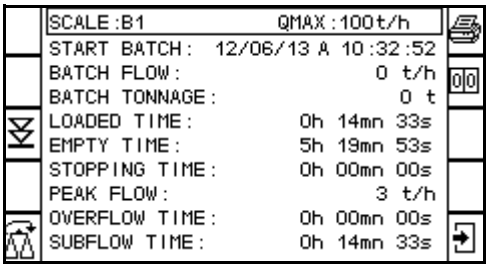
Date and time of the last RESET	Can be used to determine the period covered by the statistics
Batch tonnage	Total product quantity since last RESET
Mean batch flow	Equal to batch tonnage divided by the sum of empty and loaded running times OR running time only. ➔ select using the OPTION menu – INSTALLATION/MEASUREMENT menu
Stopped time	Period during which the weighing device belt is stopped
Empty running time	Period during which the belt runs without product, i.e. with a weight threshold below one quarter of the ZERO THRESHOLD
Loaded running time	Period during which the belt runs with product, i.e. with a weight threshold above one quarter of the ZERO THRESHOLD
Peak flow	Highest flow detected for the batch
Overflow time	Period during which flow exceeded Qmax
Underflow time	Period during which flow was below Qmin
Reset date, time and correction	The last five automatic or semi-automatic resets are systematically saved with date, time and the correction made

Launching a batch

- Starting, holding and stopping are performed in the same manner to load preselection.
- The conveyor and extractor commands are active permanently. They are only deactivated during holding or if the batch is intentionally stopped. The notion of a stop at a target weight value therefore no longer exists.
- Printing is activated at the stop when automatic printing has been selected. The batch ticket printing must have been configured (see "Ticket" file).

Batch screen

Press the F4 key to display the first screen of the Results display:

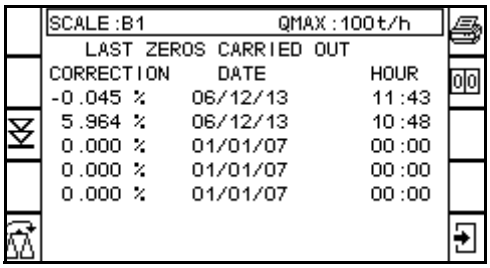


LOT_1.BMP

- Main screen ➔ Batch flow rate and Batch tonnage
- Batch start date and time
- Running time loaded, empty and with the belt stopped
- Peak flow rate
- Overflow rate: period during which flow measured exceeded Qmax ≠ threshold
- Underflow rate: period during which flow measured is less than Qmin ≠ threshold

F10 ➔ back to the previous menu.

Press F3 to go to second screen:



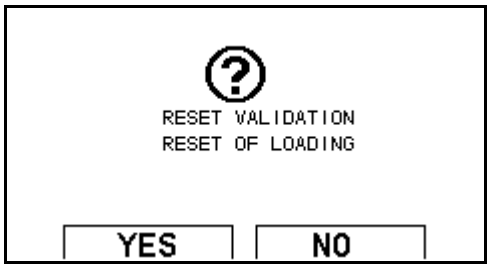
LOT_2.BMP

Display the last five RESETS performed:

- Date of reset.
- Time of reset.
- Correction performed.

F10 ➔ back to the previous menu

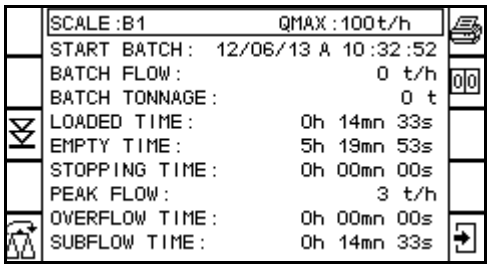
Manual printing



IMPRESSION_EN_COURS_RAZ.BMP

At the end of printing, batch RESET request:

- Confirmation using SF3, leading to the additional printing of "Reset performed"
- Cancel using SF4

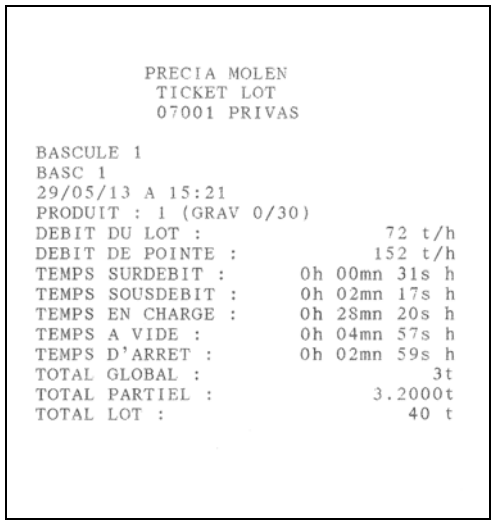


LOT_1.BMP

Resetting the batch

- either at the end of manual printing ➔ see above,
- or using key F7 in the RESULTS screen,
- or by an external "reset batch" input,
- or automatically, after automatic printing (if this function has been programmed in the "batch ticket" file).

Example of printed results



PRECIA MOLEN
TICKET LOT
07001 PRIVAS

BASCULE 1
BASC 1
29/05/13 A 15:21
PRODUIT : 1 (GRAV 0/30)

DEBIT DU LOT :	72 t/h
DEBIT DE POINTE :	152 t/h
TEMPS SURDEBIT :	0h 00mn 31s h
TEMPS SOUSDEBIT :	0h 02mn 17s h
TEMPS EN CHARGE :	0h 28mn 20s h
TEMPS A VIDE :	0h 04mn 57s h
TEMPS D'ARRET :	0h 02mn 59s h
TOTAL GLOBAL :	3t
TOTAL PARTIEL :	3.2000t
TOTAL LOT :	40 t

Threshold monitoring

Two thresholds are monitored permanently in the WEIGHING function:

1. a MIN. ACTIVE threshold is when the parameter monitored is BELOW the programmed threshold.
2. a MAX. ACTIVE threshold is when the parameter monitored is ABOVE the programmed threshold.

For each threshold, you can program the trigger value, a trigger timeout and define the parameter to monitor.

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WORLDWIDE WEIGHING