GB

Weight Indicator
TAD 3

Prog. name T131L240, T131L251

Recipe batching

Technical Manual

VISHAY PRECISION GROUP

Contents

1. Introduction

TAD 3 is a high performance weight indicator intended for industrial systems.
Its basic function is to convert the signals from strain gauge transducers to useful weight information. Transducer excitation is included as well as parameter controlled signal processing, indication of output levels, error supervision and operation of optional external equipment.
Two internal relays in TAD 3 can be used for output functions from level supervision, setpoints, etc. or 'In process' indication, reporting the operating status of TAD 3.

TAD 3 has two serial communication ports and can handle options such as analogue outputs, digital inputs and outputs, external serial ports, and a fieldbus gateway. Several TAD 3 units can be controlled from a master computer or PLC via a serial RS-485 communication interface using Modbus protocol.
It is also possible to load new software into TAD 3 using the serial interface.

All functions in TAD 3 are controlled by set-up parameters. Setting of parameter values can be performed with keys and display on the front panel, or via serial communication. A Windows programme for parameter set-up is delivered on a diskette together with TAD 3.

TAD 3 and all external equipment are powered by 24 V DC. All input and output signals are galvanically isolated from each other and from the power supply.

Legal weighing

TAD 3 is type tested according to the weighing directive 90/384/EEC and has a Test Certificate (TC), validating the use of TAD 3 as an indicator of a non-automatic weighing instrument (other parts are load cells and mechanics) for legal weighing. The TC is in accordance with class III 10000 divisions, industrial use, EN 45501:1992/AC:1993 and WELMEC 2.1. This makes legal weighing possible and TAD 3 includes different levels of security locks, that can be used in a quality system (ISO 9000). An additional manual, appropriate labels and Test Certificate (TC) for legal weighing installation can be requested.

Options

In TAD 3 with programme name T131L240 programme options Flow (02) and Recipe batching (05) are included. They are activated by entry of special codes that can be ordered from Nobel Weighing Systems.
In publication 'Weight indicator TAD 3 Operating instructions, Quick installation', with article number 600 326, section Batching is not valid for this programme (T131L240).

Additional units with an analogue output or with digital inputs/outputs and a serial port for external equipment are available. These units are described in section 9.

Hardware requirement

This programme (T131L240) can be used in Weight Indicator TAD 3 from serial number 12-2001.

Functions

Measurement with strain gauge transducers.
Both excitation voltage and output signal are measured at the transducer to avoid influence from voltage drop in the connection cable. Excitation to the transducer, from TAD 3 or from an external DC-power supply, is provided over separate wires.
A shielded 7-wire cable must be used to connect a distant transducer to TAD 3.

A/D conversion.
The analogue signals from the transducer are converted to digital form and filtered to give an internal transducer signal with high resolution.

Calculation.
The transducer excitation and signal values are combined to form an internal transducer signal, representing the load on the transducer. Influenced by calibration data, this signal is converted to a digital measurement value, the weight value, which can be presented at the local display window and at external equipment.

Error supervision.
As long as the error supervision detects no error, the signal 'In process' is present but if an error is detected, 'In process' will be off and a specific error message will be displayed. 'In process' can be set to control any digital output.

Levels.
Eight level comparators in TAD 3 can be set to switch at defined signal levels with any selected hysteresis added, meaning that the switch level can be different for increasing and decreasing signal. Output signals from these comparators are available on the serial communication. The level comparator outputs can also be set to control digital outputs from TAD 3 or external I/O units.

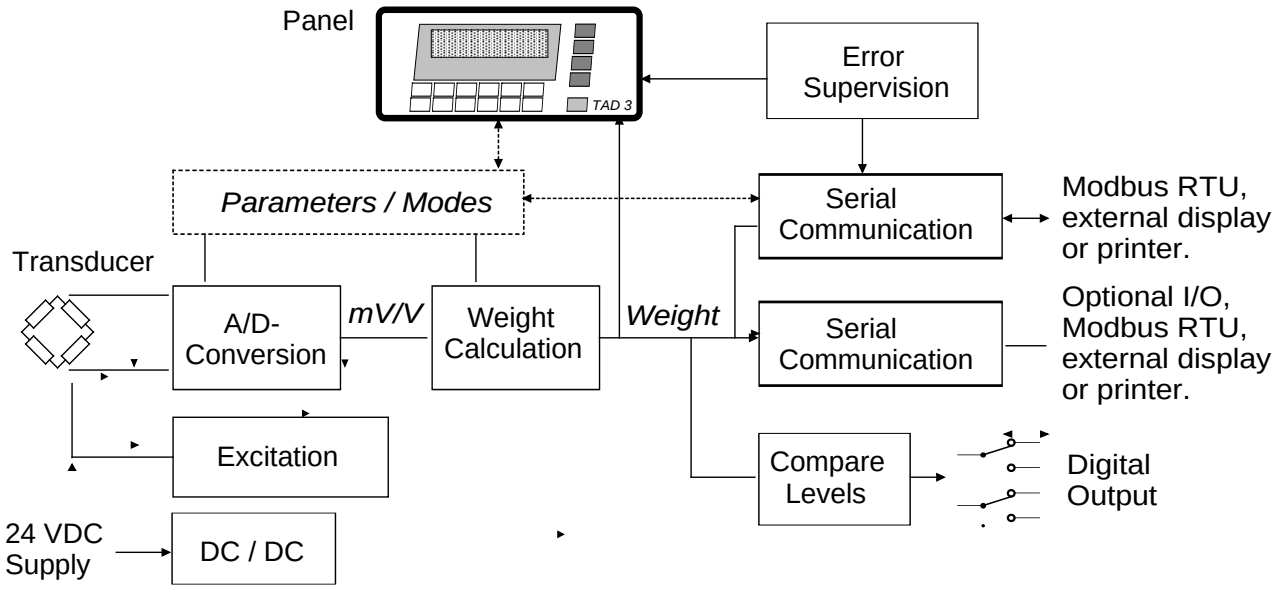


Figure 1. The Weight Indicator TAD 3 converts analogue transducer signals into precise measurement information, available by serial communication for use in industrial processes.

Serial communication.
TAD 3 utilises the serial interface RS-232, or RS-485/RS-422 on 2-wires or 4-wires, for communication with control computer, optional I/O units, or other external equipment. Set-up and calibration parameter values, weight values, level status, error status etc. are transmitted, using the Modbus protocol.

Instrument modes.
In normal operation mode TAD 3 is presenting the measurement value at the front panel.
For editing of the set-up parameters that control the operation, TAD 3 must be switched over into set-up mode where normal measuring operations are interrupted.
If an error is detected, TAD 3 automatically switches over to the error mode, displaying an error message, normal measuring functions will be interrupted, all digital outputs will be deactivated, analogue outputs will be set to 0 V / 0 mA and the signal 'In process' will be deactivated.

Parameter setting.
In TAD 3 all operating functions are controlled by set-up parameters with numerical values, string values, or pre-selected values from a list of alternatives. Parameter set-up is performed by the keys at the front panel of TAD 3, or by serial communication with Modbus from an external control unit.

Presentation.
TAD 3 can present measured or calculated values, status of levels, parameter settings etc. at the front panel, and the values can be transferred to external equipment by serial communication. An extensive system of menus gives the possibility to present various information about the instrument.

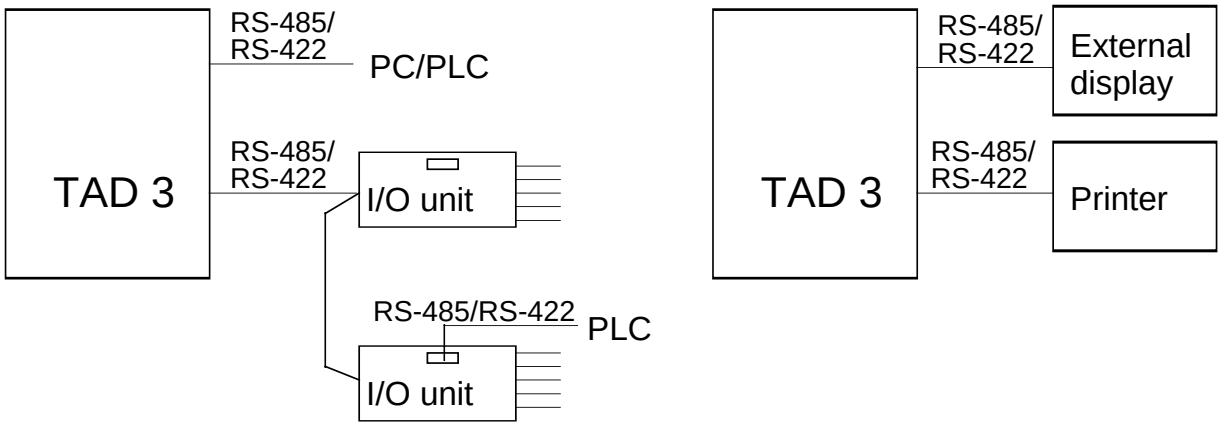


Figure 2. TAD 3 utilises serial communication to carry out different operational tasks.

Technical data

Transducer input

Transducers	Max. 8, 350 ohms each.
Excitation	Depending on the number of 350 ohms transducers connected:
	9.7 VDC ±5 % with 1 transd. 9.4 VDC ±5 % with 2 transd.
	8.4 VDC ±5 % with 3 transd. 7.6 VDC ±5 % with 4 transd.
	6.4 VDC ±5 % with 6 transd. 5.5 VDC ±5 % with 8 transd.
Signal input	Bipolar up to 3.3 mV/V.
Sensitivity	0.3 μV/div (0.5 μV/div at legal weighing)
Sense input	1.5 – 10 VDC.

Conversion

A/D conversion	13 800 000 counts. Patented own design.
Temperature influence	
Gain	<± 1.5 ppm/°C of shown weight.
Zero	<± 0.01 μV/°C.
Noise	<0.15 μV p-p during 60 s.
Linearity	<± 20 ppm of range.
Repeatability	<± 10 ppm of range.
Graduation	1, 2, 5, with 0 to 3 decimals and 10, 20 or 50.
Conversion	Ratiometrically integrating, 0.5 to 50 conversions per second.
Resolution	10 000 / 1 000 000 divisions (fastest / slowest conversion rate at input signal: 1.0 mV/V).
Filter	Adaptive digital filter.
Step response	3 – 11 updates.
Fastest update rate:	50 Hz.
Slowest conversion rate:	0.5 Hz.
Linearization	Can be calibrated in 6 points.

Serial communication, Com 1

Used for Modbus RTU communication, fieldbus communication (via GATE 3/GATE 3S), remote display or printer.

Interface	RS-485/RS-422 or RS-232 with D-sub.	
Baud rate	Up to 115.2 kbaud.	
Response times:	Modbus	> 3 ms (Baud rate > 38400 => > 1 ms).
	Modbus Auto	> 0.5 ms.

Serial communication, Com 2

Used for Modbus RTU communication, fieldbus communication (via GATE 3/GATE 3S), optional I/O units, remote display or printer.

Interface	RS-485/RS-422.	
Baud rate	Up to 460 kbaud.	
Response times:	Modbus	> 3 ms (Baud rate > 38400 => > 1 ms).
	Modbus Auto	> 0.5 ms.

Digital inputs

Number of inputs	2.
High voltage range	19 – 29 VDC.
Low voltage range	0 – 6 VDC.
Input current	6 mA at 24 V in.

Relay outputs

Number of relays	2
Relay load	Max 1 A, 30 V AC or DC.

Spark suppression required at inductive load.

Calibration

Methods	Data sheet, Shunt (with internal 80kohm resistor), Table or Deadweight.

Calendar clock

Internal real time clock with backup battery.

Power supply

Supply voltage	24 VDC ±20 %, 8 W.

Environmental

Temperature range	
Rated performance	–10 to +50 °C.
Storage	–25 to +85 °C.
CE conformity	EMC, industrial for process control.

Mechanical data

Front panel	100 x 200 mm (may replace E-1-TAD/E-2-TAD).
Panel cut-out	92 x 186 mm, r <5 mm (may replace E-1-TAD/E-2-TAD).
Depth behind panel	135 mm. Add 50 mm if D-sub connector is used for RS-232.
Panel thickness	Up to 10 mm.
Protection	IP65 at the front end by panel mounting.

Front panel

Display	248 x 60 pixel graphic LCD with backlighting.
Keys	10 keys for digit and character entry, – sign, decimal point, ENTER, 4 function keys, Tare, Gross/Net, Print, Zero.

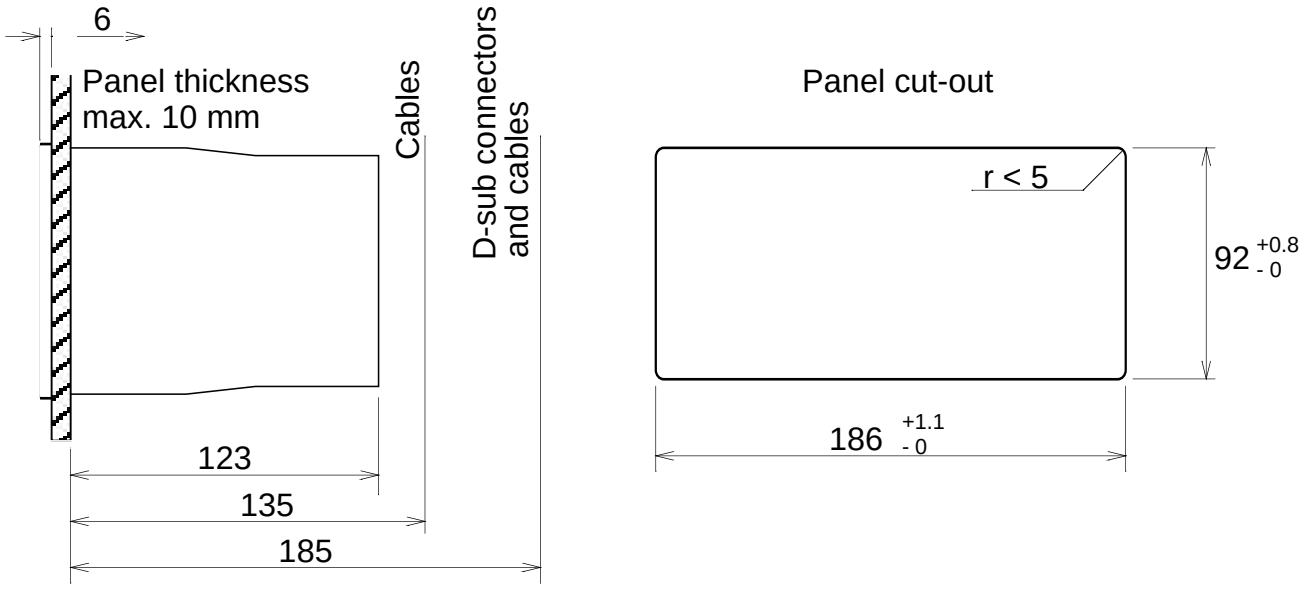


Figure 3. Mechanical dimensions and panel cut-out for TAD 3.

Additional units

Separate units, rail mounted on DIN 46 277/3 or DIN EN 50022 (35 mm), connected to output Com 2 of TAD 3. The units should be supplied by 24 VDC.

DIO 3R Digital I/O + serial port RS-485

Up to four units can be connected to Com 2 on TAD 3.
Switches to set the unit to ‘Dig.I/O 1’, 'Dig.I/O 2', 'Dig.I/O 3' or ‘Dig.I/O 4’.

Inputs	8 per unit.
voltage, current	24 VDC nom. at 13 mA input current.
transition levels	17.5 V low to high, 11 V high to low.
Outputs	8 closing relays, 250 VAC or 125 VDC, max. 1 A.
	Spark suppression required at inductive load.

Serial communication port RS-485 (I/O bus)

Baud rate	Max. 460.8 kbaud.
Application	Connection to control host TAD 3.

Extra serial communication port RS-485 (Com 3 or Com 4)

Com 3 and Com 4 can only be used on 'Dig.I/O 1' and 'Dig.I/O 2'.

Baud rate	Max. 115.2 kbaud.
Application	Modbus, remote display or printer.

Switches for line termination and fail safe.

Power	24 VDC ±20 %, 5 W.
Mechanical size	75 x 150 x 110 mm.

ANA 3 Analogue output unit

One or two units can be connected to TAD 3.
Internal jumper to set ‘Analogue output 1’ or ‘Analogue output 2’.

Analogue output

Bipolar voltage or current output:

Voltage output	±10 V over 500 ohms or more.
Current output	±20 mA in 500 ohms or less.

Configured (bipolar, monopolar, 4–20 mA) by set-up parameters in TAD 3.

Resolution	16 bits.
Linearity	< 0.01 % of range.
Zero drift	< 0.005 % of range / °C.
Gain drift	< 0.003 % of actual value / °C.
Update rate	As in TAD 3, however max. 25 Hz.
	Can be set slower by set-up parameter in TAD 3.

Serial communication port RS-485 (I/O bus)

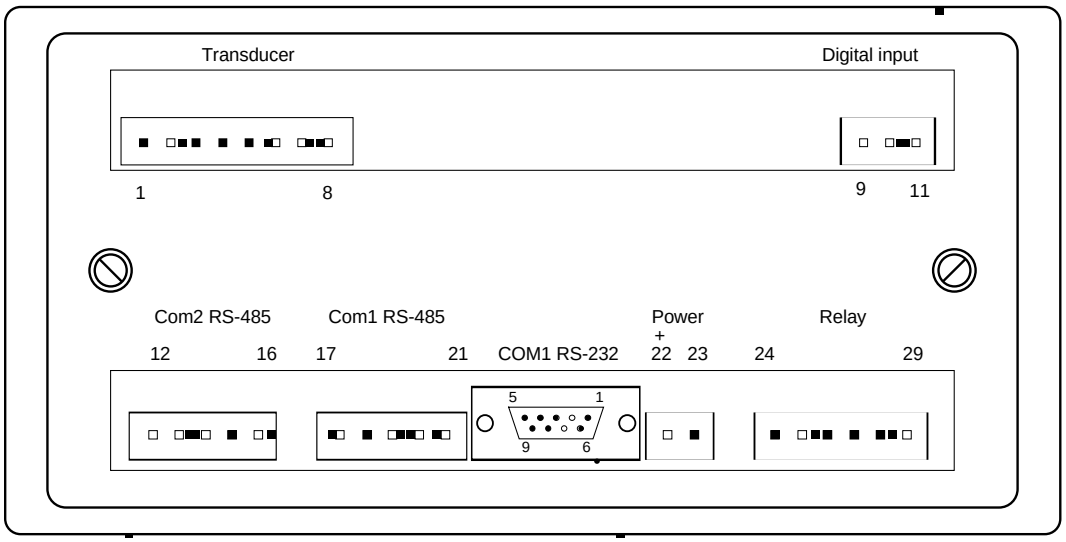
Baud rate	Max. 115.2 kbaud.
Application	Connection to control host TAD 3.
Power	24 VDC ±20 %, 5 W.
Mechanical size	75 x 100 x 110 mm.

Accessories

GATE 3/GATE 3S Fieldbus unit

See separate product sheets for Field bus units GATE 3 or GATE 3S.

The Field bus units with standard configuration cannot be used together with the programme for recipe batching (T131L240).
If Fieldbus units should be used, they must have a special programme installed.



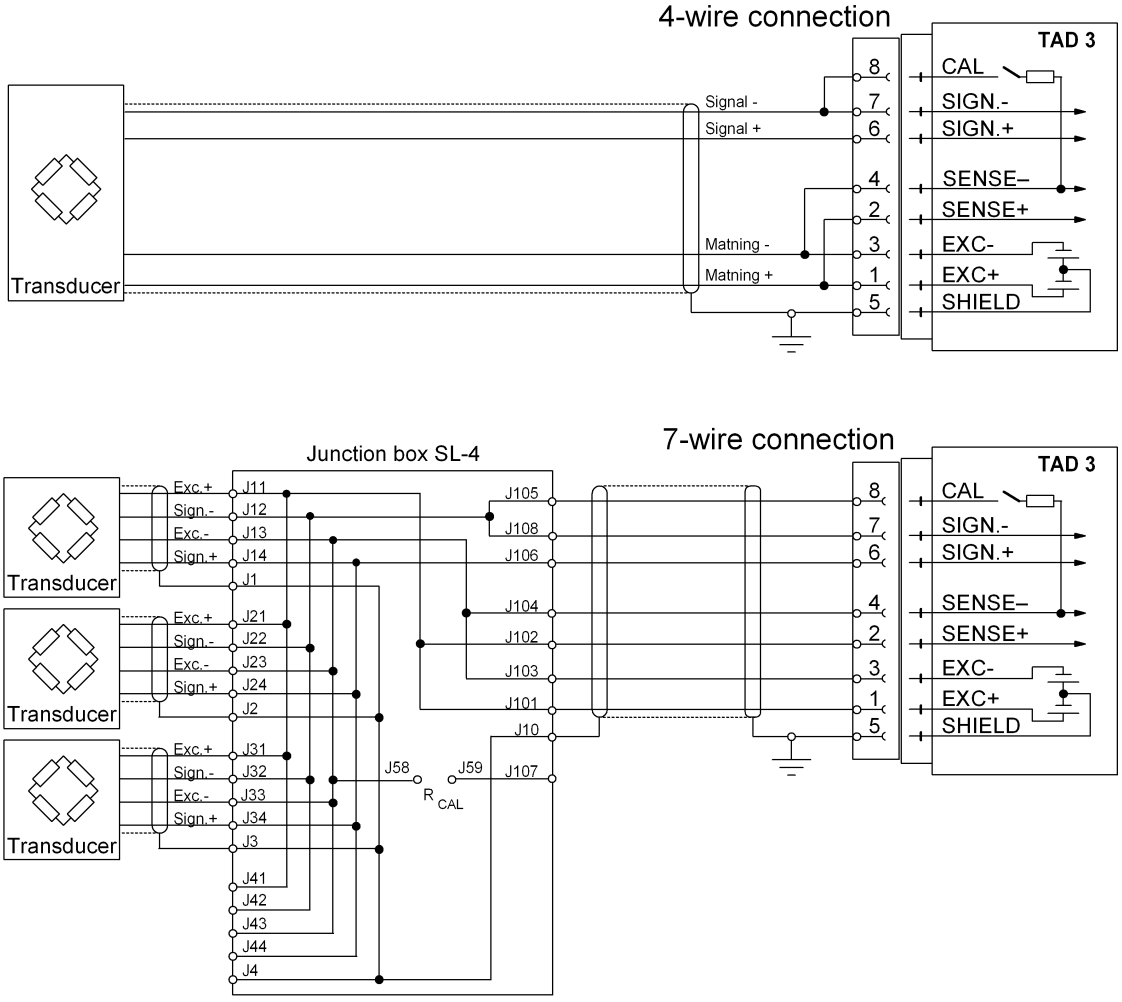


Figure 6. A transducer may be connected directly to terminals at TAD 3. For several transducers or long distance, a junction box and lengthening cable is needed.

2. Installation

Mechanical installation

Weight Indicator TAD 3 is designed with a smooth housing, mainly for panel mounting. It fits into the same panel cut-out as for Weight Indicator E-1-TAD and E-2-TAD. An integrated gasket at the instrument front gives a sealed attachment to mounting panels, up to 10 mm thick.

See figure 3 for mechanical dimensions.

Electrical installation

All electrical connections to the TAD 3 unit, including possible connection to ground, are made via plug-in terminal blocks with polarisation tabs and a D-sub connector. The installation must be carried out with shielded cables, routed to avoid electromagnetic interference from power cables.
The inputs and outputs for TAD 3 are galvanically isolated from each other to facilitate connection of various external equipment.

Transducer input

Terminals 1 – 8.
Transducer connection should be handled with great care to achieve good measuring data. Integrated transducer cables may not be shortened.

NOTE!
Transducer cables must be routed at least 200 mm away from 230/380 V, 50/60 Hz power cables. By cables with other frequencies or high power, an even wider distance is preferable.

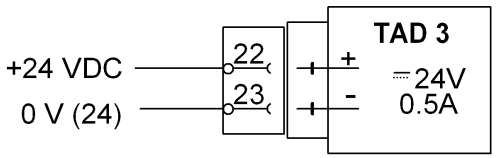
4-wire connection can be used if the integrated transducer cable is long enough to be connected directly at TAD 3. By 4-wire connection, some terminals at TAD 3 must be interconnected as shown in figure 6.
The cable shield and terminal 5 must be connected to earth in one point.

7-wire connection should be used if the integrated cable must be lengthened or if several transducers should be connected to one TAD 3 unit.
The cable shields and terminal 5 must be connected to earth in one point.

In the junction box SL-4 from Nobel Weighing Systems, see figure 6, all necessary terminals and interconnections are provided.

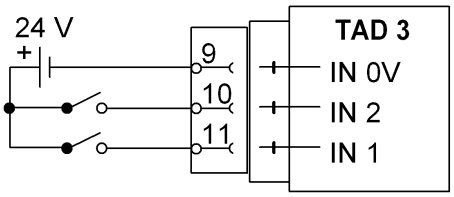
Power supply

Terminals 22, 23.
The weight indicator TAD 3 should be powered by 20 – 28 V DC, see Technical data, connected according to the diagram.
Nobel Weighing Systems provides a range of mains operated power supplies, intended for various numbers of TAD 3 units.



Digital inputs

Terminals 9 – 11.
Two digital inputs are provided, with functions that can be set in the TAD 3 set-up.

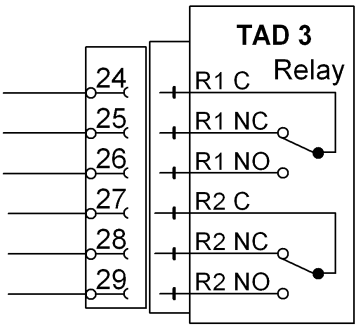


Relay outputs

Terminals 24 – 26 and 27 – 29.

Two digital (relay) outputs are provided with contact rating given in Technical data.

When the relays are used, the operator has to observe the requirements of interference emission for electrical and electronic devices (EN 50081) on the contact side and take appropriate measures, if necessary.

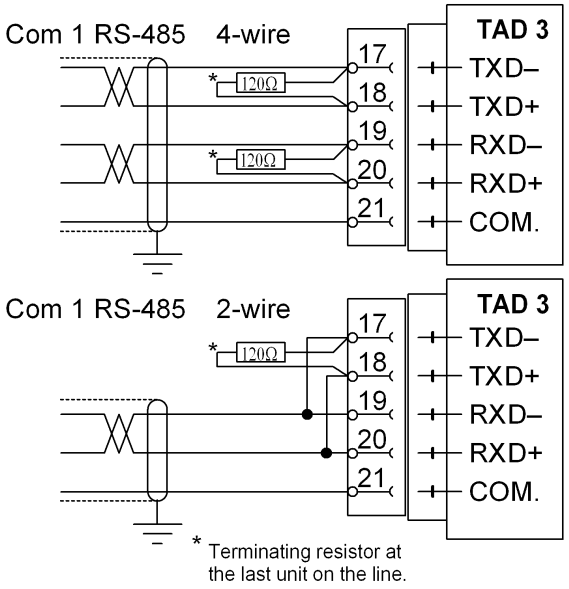


Serial communication Com 1

Communication port Com 1 can be used for serial communication with: computer/PLC (Modbus), printer, or external display unit.

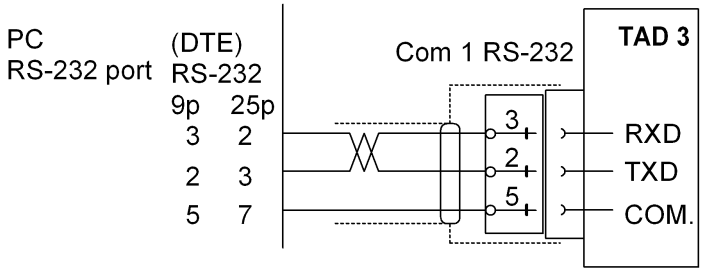
Connection alternatives:

Terminals 17 – 21.
Serial communication interface:
RS-485/RS-422 for 2-wire or 4-wire with common earth (COM).
The communication lines must have 120 ohm termination at both ends.



or

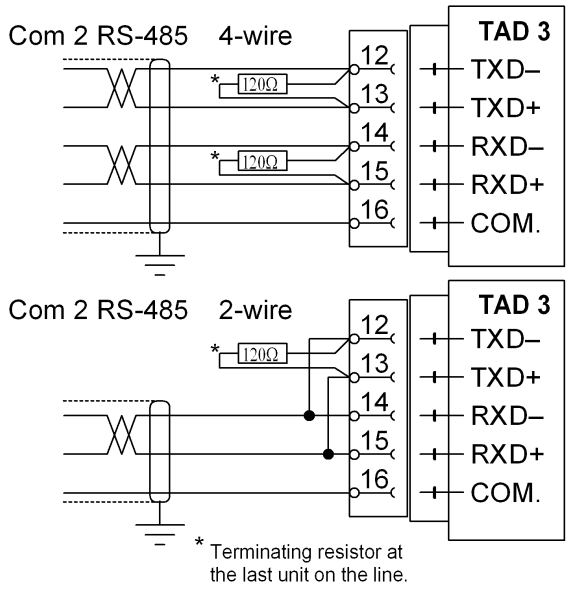
9-pole D-sub (socket at TAD 3).
Serial communication interface:
RS-232. Point to point, only one TAD 3 unit connected to the computer/PLC, printer, or external display unit.



Serial communication Com 2

Terminals 12 – 16.
Serial communication interface:
RS-485/RS-422 for 2-wire or 4-wire with common earth (COM).
The communication lines must have 120 ohm termination at both ends.

Communication port Com 2 should be used for serial communication with: computer/PLC (Modbus), printer, external display unit, or additional I/O units.



Front panel

The instrument has a flat, waterproof front panel with a back lighted LCD display, function keys, symbol keys, and keys for entry of numbers and letters.

Display

At normal operation TAD 3 displays a weight value digitally (the text Net is added for net weight) and, in most cases, the gross weight as a graphic bar.
Presentation, together with the weight value, of date and time, preset tare, status for digital I/O's or status for the level supervision can also be selected.

If an error occurs, the weighing function is stopped and the instrument switches over to Error mode, indicating a code for the error at the display window.

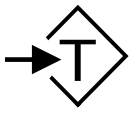
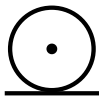
TAD 3 can be switched to information mode, displaying a Main menu with sub menus for display of actual data and entry of new data. In these sub menus a triangular blinking cursor, controlled by the function keys, is used to select menu and parameter.

Function keys

Just below the display there are four function keys, marked with arrows, and with the actual key functions indicated at the lower line of the display. When there is no text above a key, that key has no function.
An ENTER key in the lower right corner of the panel is used to open a selected menu, finish the entry of a value, etc. In many cases it has the same function as the function key to the right.

Symbol keys

To the right of the display there are four keys, marked with the weighing symbols for taring, gross/net, printing and zeroing. A brief description of these keys is given in the table below. Refer to section 5. Operation for a more detailed description of the symbol key functions.

Key	Name	Function
	TARE	Taring, i.e. entry of the gross weight as auto tare value and display of net weight zero. Depending on actual setting taring may be prevented if 'Motion' is displayed.
	GROSS/NET	Toggling between display of gross weight and net weight. Net weight can be displayed only if a tare weight has been entered.
	PRINT	Printing of the displayed weight value on a connected printer (according to parameter settings in TAD 3) and addition of the weight value to the accumulated weight 'Printed'.
	ZERO	Setting the gross weight value to zero (provided the value is in the zeroing range: -1 % to +3 % of the capacity) and setting the auto tare value to zero.

Definition of digit keys

The digit keys, including keys with minus sign and decimal point, are used for entry and editing of numerical parameter values.

Digit keys 2 through 9 are also marked with letters and can, in some menus, be used for text entry. Then the digit and the letters of a key will be displayed in sequence as the key is activated several times.

The digit key 0 (zero) also has a special function, indicated by the letter i:

When TAD 3 displays the weight value and the i key is pressed, the instrument switches over to display of the instrument Main menu. In sub menus to that menu parameter values and data can be shown, and in some cases edited.

When TAD 3 displays the instrument Main menu, pressing the i key will open the menu 'Edit set-up'. Another way is to position the cursor at sub menu name 'Edit set-up' and press function key ENTER, or the ↵ key.
As menu 'Edit set-up' is open all normal measuring functions are stopped and the parameter values can be edited.

The digit keys 1 through 4, - and . may have special functions, stop and start functions when optional programmes are activated.

Figure 7. Front panel of TAD 3 with LCD-display, four function keys below the display, four keys with weighing symbols to the right, twelve keys with digits and letters, and an ENTER key.

3. Set-up

General

All operating functions in TAD 3 are controlled by parameters. The parameter values are permanently stored in TAD 3 and will not be lost when the module is switched off. At delivery the parameters are factory-set to default values, giving the weight indicator an initial standard function.

The actual setting of the parameter values can be read during normal measuring operation in sub menus to 'Show set-up'. The parameter values in these menus can also be printed out on a connected printer.
Editing cannot be performed in menu 'Show set-up'.

Editing of parameter values can be performed in sub menus to 'Edit set-up', using the display and keys on the front panel of TAD 3, but this will interrupt the normal measuring operation.
Editing can also be performed by serial communication. During such remote editing the panel keys are disabled and TAD 3 displays the following message:

```
Remote set-up
Please wait!
```

In TAD 3 two security locks are provided to protect from unauthorised editing of parameters and values. The locks are opened by four-digit codes.

When TAD 3 is first taken into service, setting of a few parameters will quickly adapt the instrument to the transducers and give desired weighing function.
This 'Quick set-up' is described in a separate publication:

Weight indicator TAD 3
Operating instructions, Quick installation

Menu 'Show set-up'

Menu 'Show set-up' with sub menus contain all used set-up parameters, arranged according to figure 8 on next page.
When menu 'Show set-up' is open, TAD 3 is performing normal measuring operations while actual parameter settings can be shown or printed out.
No parameter values can be edited from menu 'Show set-up'.

To open 'Show set-up', first press digit key $\dot{1}$ to open the instrument Main menu.

Then press function key DOWN several times to position the curser at 'Show set-up'.

Press function key ENTER, and menu 'Show set-up' will be opened. In this menu the cursor can be positioned, by UP and DOWN, at any sub menu name.

Press function key ENTER to show the parameters in the chosen sub menu.

Printing of Set-up parameter values
If a printer is connected and PRINT is pressed when menu 'Show set-up' is open, printing of a complete list of all parameter values can be started.
The printout will take several minutes to conclude.

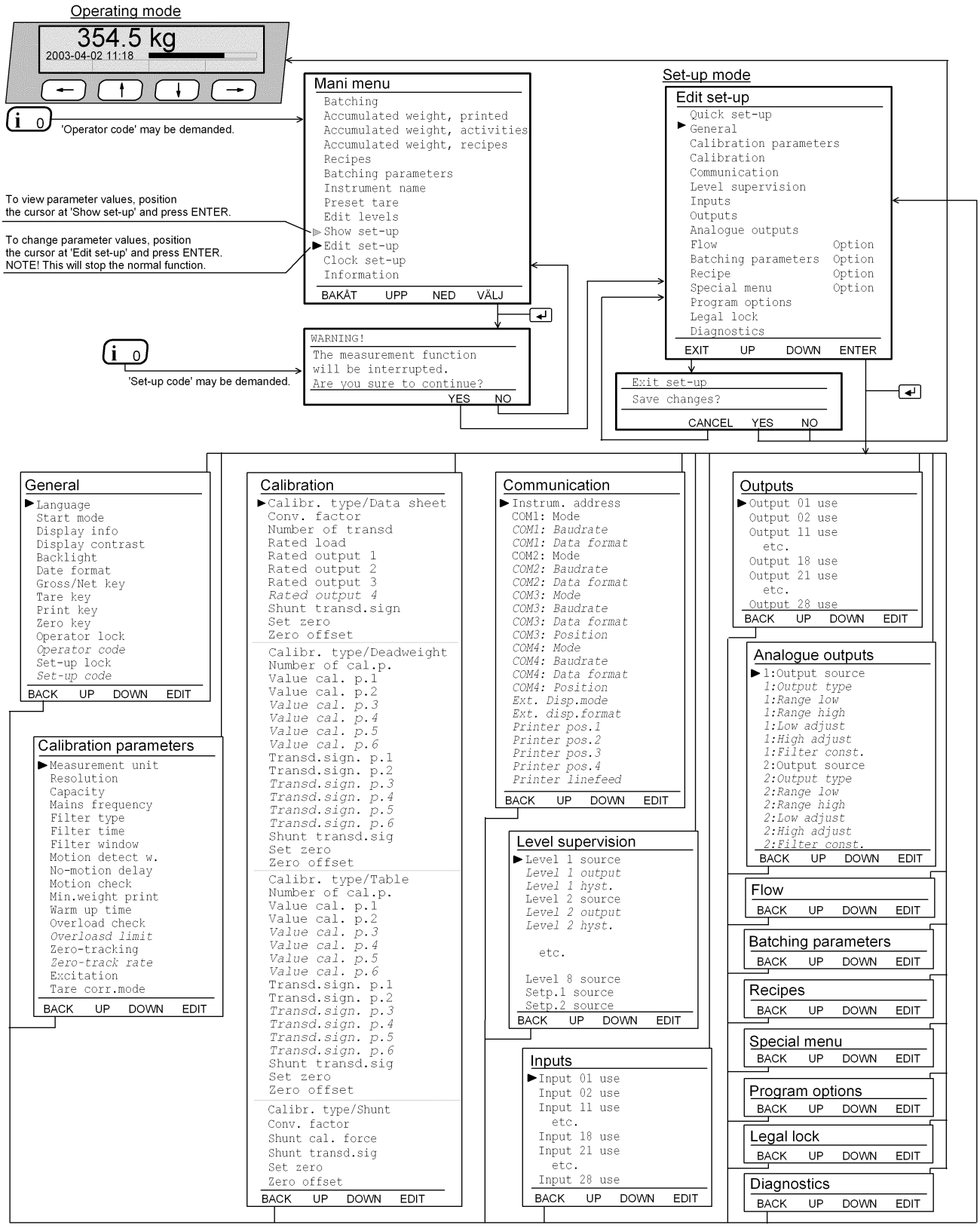


Figure 8. The parameters are arranged in a number of menus. For some parameters, viewing is conditional. Parameter editing can only be performed when the normal measuring operation is interrupted. Consequently, the selection of 'Edit set-up' must be acknowledged, and a valid code for a security lock may be demanded.

Complete set-up

At delivery, the TAD 3 parameters are set to default values. In a set-up operation these values can be edited to appropriate values for the actual installation. These values will be permanently saved in the instrument memory.
Parameter editing can be performed at TAD 3 in sub menus to 'Edit set-up' or by serial communication.

Enter menu 'Edit set-up'

Warning! Entering 'Edit set-up' will stop all measuring operations!

The digit key for 0 (zero), also marked i, should be used to open the menus.

When TAD 3 is in normal operation, and the key i is pressed, switch over to the instrument Main menu will be performed.
If demanded, the Operator code must be entered for entry in the Main menu.

When TAD 3 displays the Main menu, and the key i is pressed again, switch over to menu 'Edit set-up' will be performed.
If demanded, the Set-up code must be entered for entry in 'Edit set-up'.

Before 'Edit set-up' is opened, and the measurement function is interrupted, a warning will be displayed.
Press function key NO to stay in normal measuring operation.
Press YES to continue, and TAD 3 will switch to menu 'Edit set-up'.

Sub menus

The set-up parameters in TAD 3 are presented in sub menus, see figure 8 and 9, with titles indicating the type of parameters in the sub menu.
In menu 'Edit set-up', a flashing cursor can be positioned at any sub menu name by the function keys UP/DOWN. The list of sub menu names will scroll as the cursor reaches the border of the list.
Press function key ENTER, or the ↵ key, to open the sub menu at the cursor.

Parameters

When a sub menu is opened, the flashing cursor can be positioned at any parameter name by the function keys UP/DOWN. The list of parameters will scroll as the cursor reaches the border of the list.

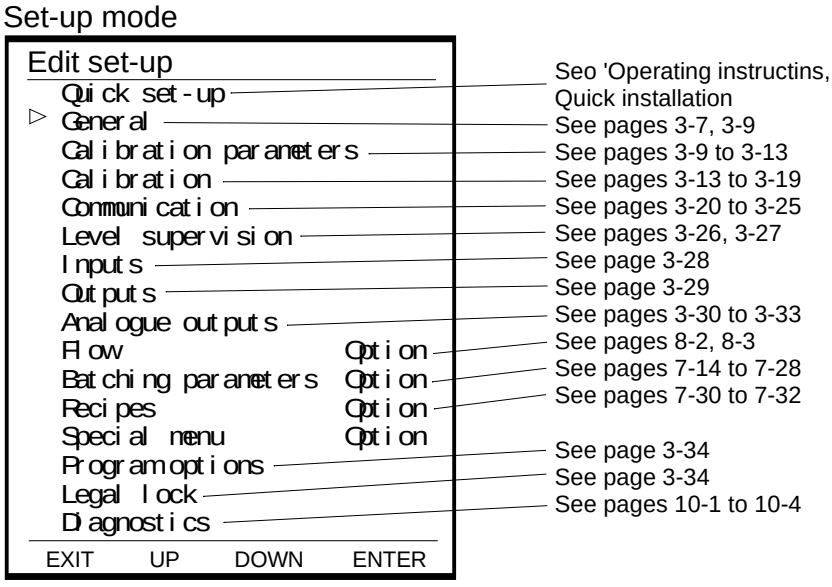


Figure 9. Menu 'Edit set-up' presents the names of the sub menus and has a cursor that can be positioned at any name.

Editing procedure

Parameter editing can only take place in menu ‘Edit set-up’. Because all normal measuring functions will be interrupted, a warning will be given before menu ‘Edit set-up’ is opened. The codes for the ‘Operator lock’ and the ‘Set-up lock’ may also be demanded.

In menu ‘Edit set-up’ a sub menu can be selected by positioning of the cursor and pressing the key ENTER.

In the sub menu the cursor should be positioned at the parameter to edit.

When the indicated parameter has been selected, by function key EDIT, the cursor moves to the parameter value and the function keys will get editing functions.

Selecting a parameter in ‘Edit set-up’:

Press the key marked i (digit key 0).
(The Operator code may be demanded.)
The instrument Main menu will be shown.

Press i (digit key 0) again to enter in menu ‘Edit set-up’.
(The Set-up code may be demanded.)
A warning menu will be shown.

Press YES to enter in ‘Edit set-up’.
Normal measuring will be interrupted and editing will be possible.

Position the cursor, by UP/DOWN, at a sub menu name.

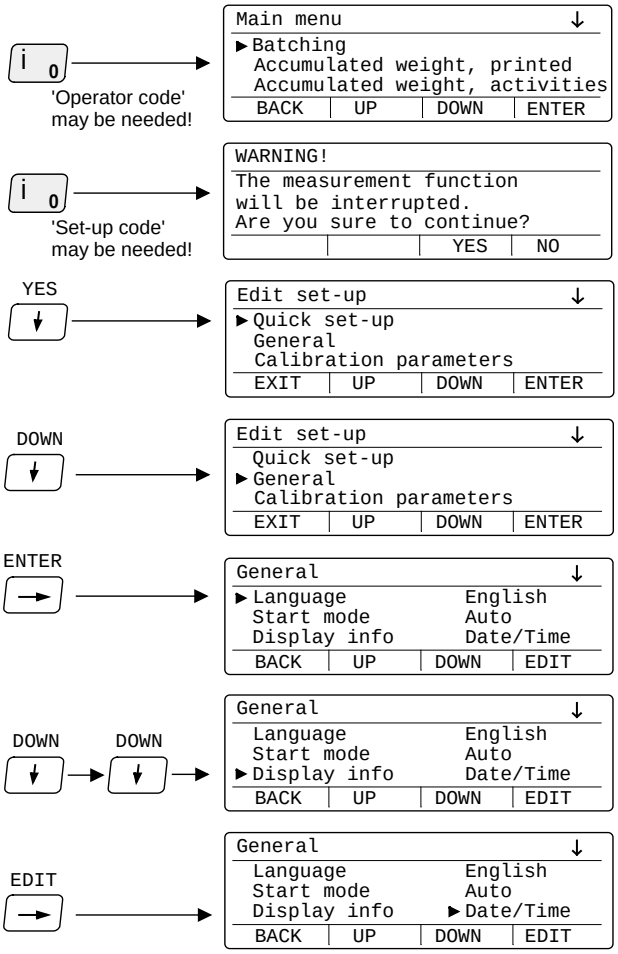
Press ENTER (or ↵) to open the indicated sub menu.

A list of the parameters in the sub menu will be shown.

Position the cursor, by UP/DOWN, at a parameter name.

Press EDIT (or ↵) to start editing of the indicated parameter.

The cursor moves from the parameter name to the parameter value.
(If the parameter value is ”numerical” an underscore line will replace the value.)



Editing of selected parameter values:

Parameter values in TAD 3 can be of ”choice” type: a pre-set value or function, selected from a list of alternatives.
Or the values can be ”numerical”: a new parameter value should be entered by the digit keys.

- For ”choice” parameters, function keys PREV./NEXT can be used to step through the list of value alternatives.
  The displayed alternative is entered and made active as key ↵ is pressed.
- For ”numerical” parameters, a parameter value can be entered by the digit keys.
  The last digit can be removed by function key <– .
  The displayed numerical value is entered and made active as key ↵ is pressed.

When the editing of one parameter value is terminated by the ↵ key, the cursor will move to the parameter name. If another parameter in the same sub menu should be edited, function keys UP/DOWN can be used to position the cursor.
See previous page.

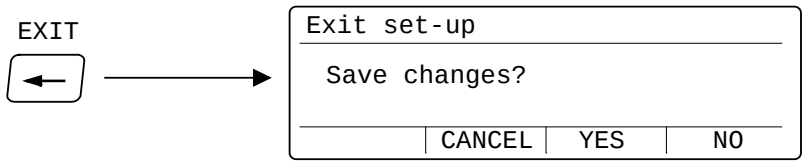
Press function key BACK to switch over to menu ‘Edit set-up’.
In that menu keys UP/DOWN can be used to position the cursor at another sub menu name. Pressing function key ENTER will open that menu.
See previous page.

Leaving menu ‘Edit set-up’:

In sub menus to ‘Edit set-up’ function key BACK can always be pressed to switch TAD 3 back to menu ‘Edit set-up’.

To leave menu ‘Edit set-up’, function key EXIT should be pressed.
If no parameters have been edited, TAD 3 will switch over to normal operation, displaying the weight value.

If any parameter value has been edited, the menu ‘Exit set-up Save changes?’ will be displayed.



Save: Press function key YES.
All edited parameter values will be saved permanently.
TAD 3 will switch over to normal weight display.

Don’t save: Press function key NO.
The edited values will not be saved, the parameters resume the values that were valid before the editing started.
TAD 3 will switch over to normal weight display.

Don’t exit: Press function key CANCEL.
Menu ‘Edit set-up’ will stay open and editing can be continued.
The edited parameter values will stay active but the values are not permanently saved.

Sub menus to ‘Edit set-up’

Quick set-up
A separate publication, ‘TAD 3 Operating instructions, Quick installation’ describes this menu and how editing is performed. The parameters in ‘Quick set-up’ are included in sub menus General, Calibration parameters, and Calibration.

General
This menu contains parameters used to define the properties of the display window and the keys at the TAD 3 panel.

Calibration parameters
This menu contains parameters defining the measuring properties for the scale installation with TAD 3.

Calibration
This menu contains parameters for calibration of the scale.
Data sheet: Values from transducer data sheets are used to perform fast calibration with good accuracy.
Deadweight: The scale is loaded with known weights in up to six calibration points, and the instrument is set to display corresponding weight values.
Table: Recorded values from an earlier deadweight calibration of the scale are transferred to a replacement TAD 3 unit.
Shunt: Connecting a shunt resistor to the transducer gives a signal change, corresponding to a certain load on the transducer, defined in the data sheet.

Communication
This menu contains parameters for two internal and two external serial communication ports, and for the remote display and printer that can be connected.

Level supervision
This menu contains parameters for the level supervision and setpoint functions in the instrument.

Inputs
This menu contains parameters for the function of internal and external digital inputs to TAD 3.

Outputs
This menu contains parameters for the function of internal and external digital outputs from TAD 3.

Analogue outputs
This menu contains parameters for the function of optional analogue output units that can be connected to TAD 3.

Batching parameters
This menu contains parameters defining the function of program option Recipe batching.

Recipes
This menu contains parameters for the defined recipes (program option Recipe batching).

Special menu
This menu contains parameters for special programs.

Program options
This menu is used for activation of program options in TAD 3.

Diagnostics
This menu can be used by troubleshooting to check input and output functions of TAD 3 and external units.

Parameters

On the following pages a survey of all parameters is presented. The parameters are divided in groups following the menu they belong to.
The first line indicates the parameter name and the Modbus address, used for set-up by serial communication. The parameters are saved in two different float value formats, and consequently also in two different memory registers.

For choice parameters an index in [ ] is given for each alternative.
(These indices are used for set-up by serial communication.)

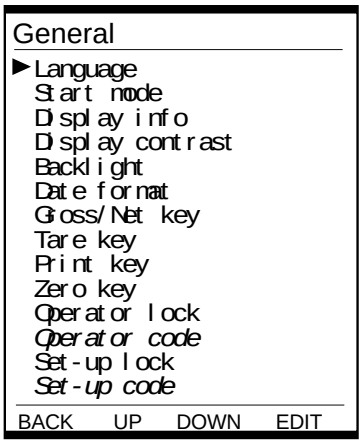
For numerical parameters, a value range is given.

At the end of the table, the default value is given in < >.

To the right there is a short parameter explanation and, *in italic,* the results for the different alternatives.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Menu 'General'



Language **Modbus: 41000 (46000)**

[0]	Svenska	Defines the language to be used in menus and messages.
[1]	English	
[2]	Deutsch	
[3]	Français	
[4]	Suomi	
[5]	Espanol	
[6]	Nederlands	
	<English>	

Start mode **Modbus: 41002 (46002)**

[0]	Command	Defines the start mode after power-on or reset.
[1]	Auto	***Command:*** *A 'start operation' command from control computer or panel key is required for start up.*
	<Auto>	***Auto:*** *Automatic start up.*

Display info **Modbus: 41004 (46004)**

[0]	Off	Defines the additional information displayed by Operating mode.
[1]	Level status	***Off:*** *Normally no additional information, but if option 'Flow rate' is activated, a line with the actual weight value (alt. flow rate) is displayed.*
[2]	Preset tare	***Level status:*** *A line of boxes for Level indication.*
[3]	Date/Time	***Preset tare:*** *A line with the actual 'Preset Tare' (PT) value.*
[4]	I/O status	***Date/Time:*** *A line with date and time.*
	<Date/Time>	***I/O status:*** *A line of boxes with indication for internal digital inputs and relay outputs.*

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Display contrast		**Modbus: 41006 (46006)**
[0]	0	Defines the text contrast for the display window.
[1]	1	***Low values*** *giving paler characters but better*
[2]	2	*readability at slanted display.*
[3]	3	***High values*** *giving sharper characters but reduced*
[4]	4	*readability at slanted display.*
[5]	5	
[6]	6	
[7]	7	
	<4>	
Backlight		**Modbus: 41008 (46008)**
[0]	0	Defines the backlight intensity for the display.
[1]	1	***0 - 9:*** *Low to high light intensity.*
[2]	2	
[3]	3	
[4]	4	
[5]	5	
[6]	6	
[7]	7	
[8]	8	
[9]	9	
	<5>	
Date format		**Modbus: 41010 (46010)**
[0]	YYYY-MM-DD	Defines the date format on printouts.
[1]	YYYY-DD-MM	***YYYY:*** *= year.* ***MM:*** *= month.* ***DD:*** *= day.*
[2]	DD-MM-YYYY	
	<YYYY-MM-DD>	
Gross/Net key		**Modbus: 41012 (46012)**
[0]	Off	Disables/enables front panel key Gross/Net.
[1]	On	
	<On>	
Tare key		**Modbus: 41014 (46014)**
[0]	Off	Disables/enables front panel key Tare.
[1]	On	
	<On>	
Print key		**Modbus: 41016 (46016)**
[0]	Off	Disables/enables front panel key Print.
[1]	On	
	<On>	
Zero key		**Modbus: 41018 (46018)**
[0]	Off	Disables/enables front panel key Zero.
[1]	On	
	<On>	

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Operator lock **Modbus: 41020 (46020)**

[0] Off
[1] On
<Off>

Off: *Operator lock is not activated.*
On: *Operator lock is activated, preventing unauthorised display and editing of settings in TAD 3.*

Operator code **Modbus: 41022 (46022)**

Range:
1 - 9999
<1937>

Defines the valid code for Operator lock.
Only shown if Operator lock is 'On'.
If 'Set-up lock' (see below) is 'On' this code will not give access to 'Edit set-up'.

Set-up lock **Modbus: 41024 (46024)**

[0] Off
[1] On
<Off>

Off: *Set-up lock is not activated.*
On: *Set-up lock is activated, preventing parameter editing in Edit set-up.*

Set-up code **Modbus: 41026 (46026)**

Range:
1 - 9999
<1937>

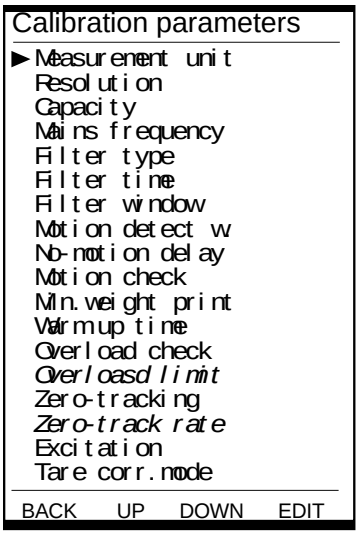
Defines the valid code for Set-up lock.
Only shown if Set-up lock is 'On'.
If 'Operator lock' (see above) is 'On' this code will still give access to all menus in the Main menu.

Menu 'Calibration parameters'

Measurement unit **Modbus: 41028 (46028)**

[0] NONE
[1] g
[2] kg
[3] t
[4] lb
[5] N
[6] kN
[7] oz
[8] psi
[9] kPa
[10] MPa
[11] bar
[12] l
[13] lbf
[14] kgf
[15] PLI
[16] N/m
[17] kN/m
[18] Nm
[19] daN
[20] mV/V
[21] pls
<kg>

Defines the engineering unit that should be used for the measured value and for related set-up parameters.



[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Resolution		**Modbus: 41030 (46030)**
[0]	0.001	Defines the decimal point position and resolution format for the displayed value. All set-up parameters using the measurement unit will be written with the decimal point position selected in this menu. If the last digits of the weight value are not stable, a more coarse resolution can be selected to get a stable reading.
[1]	0.002	
[2]	0.005	
[3]	0.01	
[4]	0.02	
[5]	0.05	
[6]	0.1	
[7]	0.2	
[8]	0.5	
[9]	1	
[10]	2	
[11]	5	
[12]	10	
[13]	20	
[14]	50	
	<0.1>	
Capacity		**Modbus: 41032 (46032)**
	Range: 0.5 to 999999 Unit: Measurem. unit <500>	Nominal range of scale. Capacity / Resolution = Number of divisions.
Mains frequency		**Modbus: 41034 (46034)**
[0]	50 Hz	Defines a filter for suppression of mains frequency noise. ***50 Hz:*** *50 Hz filter activated.* ***60 Hz:*** *60 Hz filter activated.*
[1]	60 Hz	
	<50 Hz>	
Filter type		**Modbus: 41036 (46036)**
[0]	Short	Used to filter transducer signal for optimum stability. ***Short****: Decreases weighing accuracy. (Fast response to a transducer signal change.)* ***Standard****: Normal setting.* ***Long****: Improves the suppression of unstable force on the transducers. (Delays response to a transducer signal change.)* ***Special****: Filter time set in parameter 'Filter Time'.*
[1]	Standard	
[2]	Long	
[3]	Special	
	<Standard>	
Filter time		**Modbus: 41038 (46038)**
	Range: 200 to 20000 for 50 Hz, 167 to 20000 for 60 Hz. Unit: ms <800>	When 'Filter type' is set to Short, Standard or Long the filter time is automatically calculated by TAD 3 and can be read here. When 'Filter type' is set to 'Special' the filter time can be defined here, giving more flexibility. For more information, see Filter function in section 5 Operation.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Filter window		**Modbus: 41040 (46040)**
	Range: 0 to 999999 Unit: Measurem. unit <10 * Resolution>	TAD 3 produces unfiltered and filtered weight internally. If the difference between the two latest filtered weights is less than 'Filter window' the filtered weight is used. Otherwise the unfiltered weight is used. This parameter value has one decimal more than parameter Resolution, to allow 'Filter window' to be smaller than the resolution.
Motion detect w.		**Modbus: 41042 (46042)**
	Range: 0 to 999999 Unit: Measurem. unit <1 * Resolution>	Motion status is 'on' when the weight value is not stable. It goes off when the weight has been stable for the 'No motion delay time'. Motion condition exists if the change in weight between two conversions is greater than the window 'Motion detect w.'. This parameter value has one decimal more than parameter Resolution, to allow 'Motion detect w.' to be smaller than the resolution.
No-motion delay		**Modbus: 41044 (46044)**
	Range: 0 to 10.0 Unit: s <1.0>	Delay in seconds from detection of stable weight until the Motion status goes off.
Motion check		**Modbus: 41046 (46046)**
[0] [1]	Off On <Off>	***Off:*** *Only zero adjustment is inhibited during motion.* ***On:*** *Inhibits zero adjustment, taring, and printing during motion.*
Min.weight print		**Modbus: 41048 (46048)**
	Range: 0 to 999999 Unit: Measurem. unit <0>	The smallest weight value that is allowed to be printed. 0 gives no restrictions.
Warm up time		**Modbus: 41050 (46050)**
	Range: 0 - 200 Unit: min <0>	Defines the delay time in minutes from power up until the weight presentation has full accuracy. Indicated in the display with the text 'Warming up!'.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Overload check		**Modbus: 41052 (46052)**
[0]	Off	Check of overload is performed according to this set-up.
[1]	Unipolar	***Off:*** *No check is performed. Weight will be reported up to the limits of the AD converter.*
[2]	Bipolar	***Unipolar:*** *Overload status will be set if 'Overload limit' is exceeded. Underload status will be set if the gross weight is below minus (-)9 * Resolution.*
	<Off>	***Bipolar:*** *Overload status will be set if Overload limit is exceeded.* *Underload status will be set if the gross weight is below minus (-) Overload limit.*
Overload limit		**Modbus: 41054 (46054)**
	Range: 0.5 to 999999 Unit: Measurem. unit <Capacity + 9 * Resolution>	Should be set to the max gross weight that the weight indicator is allowed to report. This parameter is always set to default value when changing Resolution or Capacity. If 'Bipolar' overload check is selected the weight will be reported up to the Overload limit and down to the minus (-) Overload limit.
Zero-tracking		**Modbus: 41056 (46056)**
[0]	Off	With this parameter automatic zero-tracking can be
[1]	On	selected, or a combination of automatic zero-tracking
[2]	On+AutoZero	and automatic zero setting.
	<Off>	The functions are described on page 5-6.
Zero-track.rate		**Modbus: 41058 (46058)**
	Range: 0 to 1500 Unit: /min <1>	Maximum weight change speed for zero-tracking to be performed. 'Zero-track.rate' must be less than (30 * Resolution). Unit for the Zero-track rate is: Measurem. unit/min, expressed as ' /min' to save space.
Excitation		**Modbus: 41060 (46060)**
[0]	DC	Selection of excitation for the transducers connected to
[1]	AC	the TAD 3.
[2]	External	***DC:*** *Transducer excitation is taken from the internal DC power supply.*
	<DC>	***AC:*** *NOT INCLUDED (Transducer excitation with alternating polarity is taken from the internal power supply. This gives compensation for thermal e.m.f. effects in transducer connections.)*
		External: *Transducer excitation is assumed to be taken from an external power supply, so only sense and transducer signal should be connected to TAD 3.*

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Tare corr.mode **Modbus: 41062 (46062)**

[0] Auto
[1] Preset
[2] Auto+preset
<Auto>

The tare value can be calculated in three different ways:
Net weight = Gross weight – Tare value
Auto: *Auto tare value is used.*
Preset: *Tare value is entered through the serial communication or keypad.*
Auto+preset: *Tare value is the sum of the preset tare value and auto tare value.*

Menu 'Calibration'

Calibration type **Modbus: 41064 (46064)**

[0] Data sheet
[1] Deadweight
[2] Table
[3] Shunt
<Data sheet>

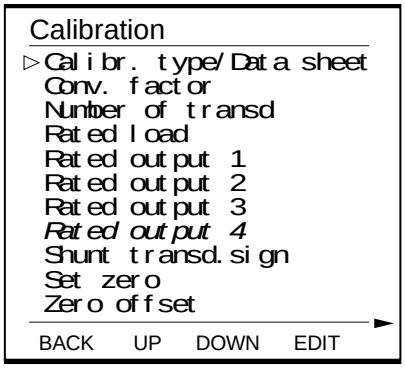
Defines the type of calibration to be performed.
A new calibration is initiated as a 'Calibration type' is selected.
Data sheet: *Data sheet calibration is easy to use and doesn't demand any reference equipment, except data from the transducer data sheets.*
Deadweight: *Deadweight calibration is normally the most accurate calibration type. It requires known weights to at least 2/3 of the wanted measuring range.*
Table: *Table calibration is used to enter recorded values from a previous calibration into a replacement instrument.*
Shunt: *Shunt calibration with shunt calibration values of the transducers.*

Data sheet calibration

Conv. factor **Modbus: 41066 (46066)**

Range:
0.01 to 100
<9.80665>

Defines the relationship between a measured value expressed in data sheet unit and expressed in the selected measurement unit.



Number of transd **Modbus: 41068 (46068)**

Range:
1 to 4
<3>

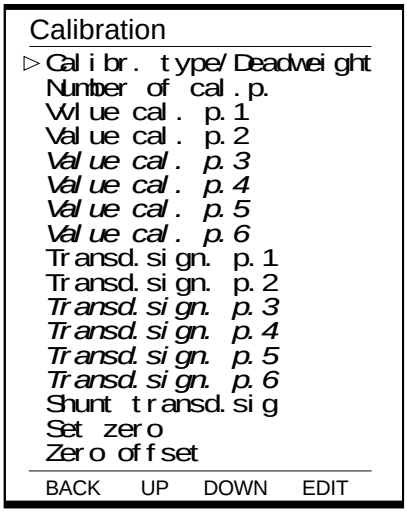
Defines the number of transducers and fixed support points in the scale installation. All transducers must have equal rated load.
If the total number is over 4: enter 1 here!

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Rated load		**Modbus: 41070 (46070)**
	Range: 1 to 999999 Unit: Data sheet unit <2000.0>	Defines the rated load for one transducer, expressed in the data sheet unit. The value is specified in the transducer data sheet. NOTE! If the data sheet value is 5 kN, the parameter should be set to 5000 (N). If the total number of transducers and fixed supports is over 4: multiply that number with the rated load for one transducer and enter the result here!
Rated output 1		**Modbus: 41072 (46072)**
	Range: 0 to 9.99999 Unit: mV/V <2.03900>	Defines the rated output signal for transducer 1. The value is specified in the transducer data sheet for transducer 1. If the total number of transducers and fixed supports is over 4: add up all rated output values, divide by the number of transducers, and enter the result here!
Rated output 2		**Modbus: 41074 (46074)**
	Range: 0 to 9.99999 Unit: mV/V <2.03900>	Defines the rated output signal for transducer 2. The value is specified in the transducer data sheet for transducer 2.
Rated output 3		**Modbus: 41076 (46076)**
	Range: 0 to 9.99999 Unit: mV/V <2.03900>	Defines the rated output signal for transducer 3. The value is specified in the transducer data sheet for transducer 3.
Rated output 4		**Modbus: 41078 (46078)**
	Range: 0 to 9.99999 Unit: mV/V <2.03900>	Defines the rated output signal for transducer 4. The value is specified in the transducer data sheet for transducer 4.
Shunt transd.sig		**Modbus: 41108 (46108)**
	Range: +/–9.99999 Unit: mV/V <2.03900>	The transducer signal offset when the shunt resistor is connected can be entered or automatically read with a command.
Set zero		**Modbus: 41110 (46110)** and
Zero offset		**Modbus: 41112 (46112)**

See under ‘Deadweight calibration’.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Deadweight calibration



Number of cal. p **Modbus: 41080 (46080)**

Range: 2 to 6 <2>
Number of calibration points.

Value cal. p.1 **Modbus: 41082 (46082)**

Range: +/–999999
Unit: Measurem. unit
<0>
This parameter defines the load on the scale in the lowest calibration point, normally 0.

Value cal. p.2 **Modbus: 41084 (46084)**

Range: +/–999999
Unit: Measurem. unit
<500>
This parameter defines the load on the scale in the second calibration point.

Value cal. p.3 **Modbus: 41086 (46086)** ►

Range: +/–999999
Unit: Measurem. unit
<0>
This parameter defines the load on the scale in the third calibration point.

Value cal. p.4 **Modbus: 41088 (46088)**

Range: +/–999999
Unit: Measurem. unit
<0>
This parameter defines the load on the scale in the fourth calibration point.

Value cal. p.5 **Modbus: 41090 (46090)**

Range: +/–999999
Unit: Measurem. unit
<0>
This parameter defines the load on the scale in the fifth calibration point.

Value cal. p.6 **Modbus: 41092 (46092)**

Range: +/–999999
Unit: Measurem. unit
<0>
This parameter defines the load on the scale in the sixth calibration point.

Transd.sign. p.1 **Modbus: 41094 (46094)**

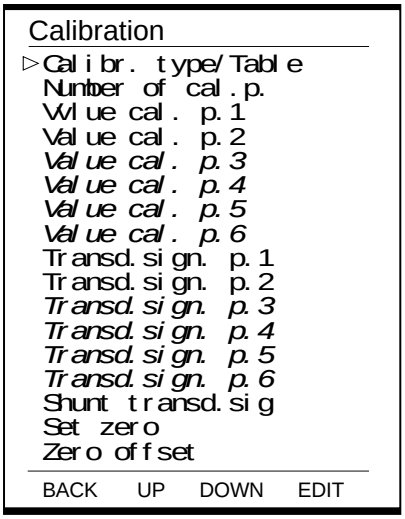
Range: +/–9.99999
Unit: mV/V
<0.00000>
In this parameter, the transducer signal in the lowest calibration point is displayed, but the value cannot be edited.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Transd.sign. p.2		**Modbus: 41096 (46096)**
	Range: +/–9.99999 Unit: mV/V <1.66631>	In this parameter, the transducer signal in the second calibration point is displayed, but the value cannot be edited.
Transd.sign. p.3		**Modbus: 41098 (46098)**
	Range: +/–9.99999 Unit: mV/V <2.03900>	In this parameter, the transducer signal in the third calibration point is displayed, but the value cannot be edited.
Transd.sign. p.4		**Modbus: 41100 (46100)**
	Range: +/–9.99999 Unit: mV/V <2.03900>	In this parameter, the transducer signal in the fourth calibration point is displayed, but the value cannot be edited.
Transd.sign. p.5		**Modbus: 41102 (46102)**
	Range: +/–9.99999 Unit: mV/V <2.03900>	In this parameter, the transducer signal in the fifth calibration point is displayed, but the value cannot be edited.
Transd.sign. p.6		**Modbus: 41104 (46104)**
	Range: +/–9.99999 Unit: mV/V <2.03900>	In this parameter, the transducer signal in the sixth calibration point is displayed, but the value cannot be edited.
Shunt transd.sig		**Modbus: 41108 (46108)**
	Range: +/–9.99999 Unit: mV/V <2.03900>	The transducer signal offset when the shunt resistor is connected can be entered or automatically read from the module with a command.
Set zero		**Modbus: 41110 (46110)**
	Range: +/–999999 Unit: Measurem. unit <'Live'>	The actual weight value is displayed. Enter wanted value for the actual load, usually '0', i.e. unloaded scale. **NOTE! This parameter should be used for zeroing of the instrument.**
Zero offset		**Modbus: 41112 (46112)**
	Range: +/–999999 Unit: Measurem. unit <0>	This menu shows the offset value acquired by zeroing in 'Set zero'. If this parameter is edited, the zeroing will be influenced.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Table calibration

The scale is calibrated with recorded values from a previous calibration, normally a deadweight calibration.



Number of cal. p **Modbus: 41080 (46080)**

Range: 2 to 6 <2>

Number of calibration points.

Value cal. p.1 **Modbus: 41082 (46082)**

Range: +/–999999
Unit: Measurem. unit
<0>

In this parameter, enter the recorded value for the load on the scale in the first calibration point.

Value cal. p.2 **Modbus: 41084 (46084)**

Range: +/–999999
Unit: Measurem. unit
<500>

In this parameter, enter the recorded value for the load on the scale in the second calibration point.

Value cal. p.3 **Modbus: 41086 (46086)**

Range: +/–999999
Unit: Measurem. unit
<0>

In this parameter, enter the recorded value for the load on the scale in the third calibration point.

Value cal. p.4 **Modbus: 41088 (46088)**

Range: +/–999999
Unit: Measurem. unit
<0>

In this parameter, enter the recorded value for the load on the scale in the fourth calibration point.

Value cal. p.5 **Modbus: 41090 (46090)**

Range: +/–999999
Unit: Measurem. unit
<0>

In this parameter, enter the recorded value for the load on the scale in the fifth calibration point.

Value cal. p.6 **Modbus: 41092 (46092)**

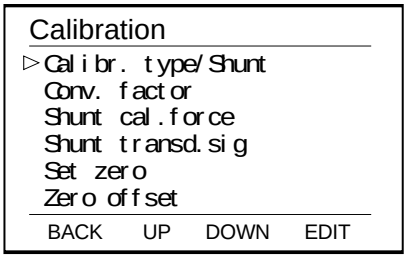
Range: +/–999999
Unit: Measurem. unit
<0>

In this parameter, enter the recorded value for the load on the scale in the sixth calibration point.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Transd.sign. p.1		**Modbus: 41094 (46094)**
	Range: +/–9.99999 Unit: mV/V <0.00000>	In this parameter, enter the recorded value of the transducer signal in the first calibration point.
Transd.sign. p.2		**Modbus: 41096 (46096)**
	Range: +/–9.99999 Unit: mV/V <1.66631>	In this parameter, enter the recorded value of the transducer signal in the second calibration point.
Transd.sign. p.3		**Modbus: 41098 (46098)**
	Range: +/–9.99999 Unit: mV/V <2.03900>	In this parameter, enter the recorded value of the transducer signal in the third calibration point.
Transd.sign. p.4		**Modbus: 41100 (46100)**
	Range: +/–9.99999 Unit: mV/V <2.03900>	In this parameter, enter the recorded value of the transducer signal in the fourth calibration point.
Transd.sign. p.5		**Modbus: 41102 (46102)**
	Range: +/–9.99999 Unit: mV/V <2.03900>	In this parameter, enter the recorded value of the transducer signal in the fifth calibration point.
Transd.sign. p.6		**Modbus: 41104 (46104)**
	Range: +/–9.99999 Unit: mV/V <2.03900>	In this parameter, enter the recorded value of the transducer signal in the sixth calibration point.
Shunt transd.sig		**Modbus: 41108 (46108)**
	Range: +/–9.99999 Unit: mV/V <2.03900>	The transducer signal offset when the shunt resistor is connected can be entered or automatically read from the module with a command.
Set zero		**Modbus: 41110 (46110)**
	Range: +/–999999 Unit: Measurem. unit <'Live'>	The actual weight value is displayed. If the scale is installed, a value for the actual load should be entered, usually '0' for an unloaded scale. **NOTE! This parameter should be used for zeroing of the instrument.**
Zero offset		**Modbus: 41112 (46112)**
	Range: +/–999999 Unit: Measurem. unit <0>	In this parameter, a recorded zero offset value can be entered. If zeroing has been performed with 'Set zero' above, the value of this parameter should not be changed.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Shunt calibration



Conv. factor **Modbus: 41066 (46066)**

Range:
0.01 to 100
<9.80665>

Defines the relationship between a measured value expressed in data sheet unit and expressed in the selected measurement unit.

Shunt cal. force **Modbus: 41106 (46106)**

Range: +/–999999
Unit:
Transducer data sheet unit.
<2138.0>

The force on the transducers giving the same signal offset as when the shunt calibration resistor is connected to the transducers.

Shunt transd.sig **Modbus: 41108 (46108)**

Range: +/–9.99999
Unit: mV/V
<2.03900>

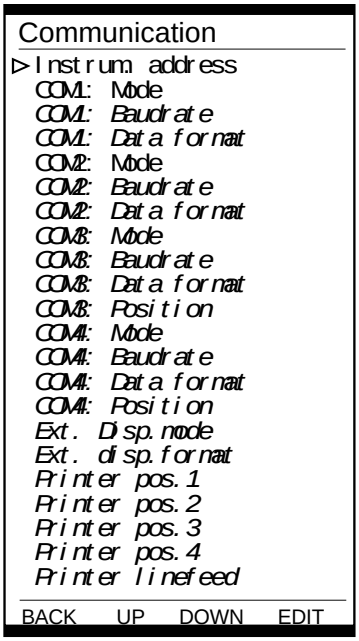
The transducer signal offset when the shunt resistor is connected can be entered or automatically read with a command.

Set zero **Modbus: 41110 (46110)** and
Zero offset **Modbus: 41112 (46112)**

See under ‘Deadweight calibration’.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Menu ‘Communication’



Instrum. address **Modbus: 41114 (46114)**

Range: 1 to 247
<1>

Defines the instrument address for the TAD 3-unit.

COM1:Mode **Modbus: 41116 (46116)**

[0] Not in use
[1] Modbus
[2] Modbus auto
[3] Ext. display
[4] Printer
[5] Printer 850
<Modbus auto>

Defines use of serial port Com 1.
Not in use: *The port is not used.*
Modbus: *The port is used for control unit communication.*
Modbus auto: *The control unit baudrate (from 9600) and bit configuration (8-none-1, 8-even-1 or 8-odd-1) is auto detected and used by TAD 3.*
Ext. display: *The port is used for transmission of the measurement value to an external display unit.*
Printer: *The port is used for a printer with 7-bit character set.*
Printer 850: *The port is used for a printer with 8-bit character set and 850 Multilingual translation.*

COM1:Baudrate **Modbus: 41118 (46118)**

[0] 300
[1] 600
[2] 1200
[3] 2400
[4] 4800
[5] 9600
[6] 19200
[7] 38400
[8] 57600
[9] 115200
<9600>

Defines the baudrate for the serial communication. The parameter must be set to the baudrate of the external equipment.

This parameter is not shown if ‘Not in use’ or ‘Modbus auto’ is selected in ‘COM1:Mode’.

COM1:Data format **Modbus: 41120 (46120)**

[0] 7-none-2
[1] 7-even-1
[2] 7-even-2
[3] 7-odd-1
[4] 7-odd-2
[5] 8-none-1
[6] 8-none-2
[7] 8-even-1
[8] 8-odd-1
< 8-none-1 >

Defines the bit configuration for the serial communication.
The parameter must be set to the same configuration as for the external equipment.

This parameter is not shown if ‘Not in use’ or ‘Modbus auto’ is selected in ‘COM1:Mode’.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
COM2:Mode		**Modbus: 41122 (46122)**
[0]	Not in use	Defines the use for serial port Com 2.
[1]	Modbus	***Not in use:*** *The serial port is not used.*
[2]	Modbus auto	***Modbus:*** *The serial port is used for communication with a control unit.*
[3]	Ext. display	***Modbus auto:*** *The control unit baudrate (from 9600) and bit configuration (8-none-1, 8-even-1 or 8-odd-1) is auto detected and used by TAD 3.*
[4]	Printer	***Ext. display:*** *The serial port is used for transmission of the measurement value to an external display unit.*
[5]	Printer 850	***Printer:*** *The serial port is used for a printer with 7-bit character set.*
[6]		***Printer 850:*** *The serial port is used for a printer with 8-bit character set and 850 Multilingual translation.*
[7]	I/O bus <I/O bus>	***I/O bus:*** *The serial port is used for the Nobel Weighing Systems I/O bus.*
COM2:Baudrate		**Modbus: 41124 (46124)**
[0]	300	Defines the baudrate for the serial communication. The parameter must be set to the baudrate of the external equipment.
[1]	600	
[2]	1200	
[3]	2400	If 'COM2:Mode' is set to 'I/O bus' and only DIO 3 units are used, we recommend baudrates from 115200 to 460800. If ANA 3 is included the baudrate may be max. 115200.
[4]	4800	
[5]	9600	
[6]	19200	
[7]	38400	This parameter is not shown if 'COM2:Mode' is set to 'Not in use' or 'Modbus auto'.
[8]	57600	
[9]	115200	
[10]	230400	
[11]	460800	
	<115200>	
COM2:Data format		**Modbus: 41126 (46126)**
[0]	7-none-2	Defines the bit configuration for the serial communication. The parameter must be set to the same configuration as for the external equipment.
[1]	7-even-1	
[2]	7-even-2	
[3]	7-odd-1	
[4]	7-odd-2	This parameter is not shown if 'COM2:Mode' is set to 'Not in use', 'Modbus auto' or 'I/O bus'.
[5]	8-none-1	
[6]	8-none-2	
[7]	8-even-1	
[8]	8-odd-1	
	< 8-none-1 >	

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Note: Parameters for 'COM3:' are shown only if 'COM2:Mode' is set to 'I/O bus'!

COM3:Mode **Modbus: 41128 (46128)**

[0] Not in use
[1] Modbus
[2] Modbus auto
[3] Ext. display
[4] Printer
[5] Printer 850
< Not in use >

Defines the use of serial port Com 3.
Not in use: *The serial port is not used.*
Modbus: *The serial port is used for communication with a control unit.*
Modbus auto: *The control unit baudrate (from 9600) and bit configuration (8-none-1, 8-even-1 or 8-odd-1) is auto detected and used by TAD 3.*
Ext. display: *The serial port is used for transmission of measurement values to an external display unit.*
Printer: *The serial port is used for a printer with 7-bit character set.*
Printer 850: *The serial port is used for a printer with 8-bit character set and 850 Multilingual translation.*

COM3:Baudrate **Modbus: 41130 (46130)**

[0] 300
[1] 600
[2] 1200
[3] 2400
[4] 4800
[5] 9600
[6] 19200
[7] 38400
[8] 57600
[9] 115200
< 9600 >

Defines the baudrate for the serial communication. The parameter must be set to the baudrate of the external equipment.

This parameter is not shown if 'Not in use' or 'Modbus auto' is selected in 'COM3:Mode'.

COM3:Data format **Modbus: 41132 (46132)**

[0] 7-none-2
[1] 7-even-1
[2] 7-even-2
[3] 7-odd-1
[4] 7-odd-2
[5] 8-none-1
[6] 8-none-2
[7] 8-even-1
[8] 8-odd-1
< 8-none-1 >

Defines the bit configuration for the serial communication.
This parameter must be set to the same configuration as for the external equipment.

This parameter is not shown if 'Not in use' or 'Modbus auto' is selected in 'COM3:Mode'.

COM3:Position **Modbus: 41134 (46134)**

[0] Analog.out.1
[1] Analog.out.2
[2] Dig.I/O 1
[3] Dig.I/O 2
< Dig.I/O 1 >

Defines in which additional unit serial port Com 3 is placed.

This parameter is not shown if 'Not in use' is selected in 'COM3:Mode'.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Note: Parameters for 'COM4:' are shown only if 'COM2:Mode' is set to 'I/O bus'!

COM4:Mode **Modbus: 41136 (46136)**

[0] Not in use
[1] Modbus
[2] Modbus auto
[3] Ext. display
[4] Printer
[5] Printer 850
< Not in use >

Defines the use of serial port Com 4.
Not in use: *The serial port is not used.*
Modbus: *The serial port is used for communication with a control unit.*
Modbus auto: *The control unit baudrate (from 9600) and bit configuration (8-none-1, 8-even-1 or 8-odd-1) is auto detected and used by TAD 3.*
Ext. display: *The serial port is used for transmission of measurement values to an external display unit.*
Printer: *The serial port is used for a printer with 7-bit character set.*
Printer 850: *The serial port is used for a printer with 8-bit character set and 850 Multilingual translation.*

COM4:Baudrate **Modbus: 41138 (46138)**

[0] 300
[1] 600
[2] 1200
[3] 2400
[4] 4800
[5] 9600
[6] 19200
[7] 38400
[8] 57600
[9] 115200
< 9600 >

Defines the baudrate for the serial communication. The parameter must be set to the baudrate of the external equipment.

This parameter is not shown if 'Not in use' or 'Modbus auto' is selected in 'COM4:Mode'.

COM4:Data format **Modbus: 41140 (46140)**

[0] 7-none-2
[1] 7-even-1
[2] 7-even-2
[3] 7-odd-1
[4] 7-odd-2
[5] 8-none-1
[6] 8-none-2
[7] 8-even-1
[8] 8-odd-1
< 8-none-1 >

Defines the bit configuration for the serial communication.
This parameter must be set to the same configuration as for the external equipment.

This parameter is not shown if 'Not in use' or 'Modbus auto' is selected in 'COM4:Mode'.

COM4:Position **Modbus: 41142 (46142)**

[0] Analog.out.1
[1] Analog.out.2
[2] Dig.I/O 1
[3] Dig.I/O 2
< Dig.I/O 2 >

Defines in which additional unit serial port Com 4 is placed.

This parameter is not shown if 'Not in use' is selected in 'COM4:Mode'.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Ext. disp.mode **Modbus: 41144 (46144)**

[0] Gross weight
[1] Net weight
[2] Disp. weight
[3] Flow rate
< Gross weight >

Defines the value to send to the external display unit, connected to TAD 3.

Gross weight: *The gross weight value is always sent.*
Net weight: *The net weight value is always sent.*
Disp. weight: *The gross or net weight value is sent, even if flow rate is displayed at TAD 3.*
Flow rate: *The flow rate value is always sent.*

The parameter is shown only if any serial port is set to 'Ext. display'. See section 6. Communication, for further information.

Ext. disp.format **Modbus: 41146 (46146)**

[0] 4
[1] 5
[2] 6
[3] 7
[4] 32
<6>

Defines the number of digits on the external display unit, connected to TAD 3.
Only shown if any serial port is set to 'Ext. display'
See section 6. Communication, for further information.

Printer pos.1 **Modbus: 41148 (46148)**

[0] Not in use
[1] Disp. weight
[2] Date/Time
[3] Instr.name
[4] Preset tare
< Disp. weight >

Defines the type of information to print in position 1 at the printer.

Not in use: *Position 1 not used.*
(If both 'Printer pos.1' and 'Printer pos.2' are set to 'Not in use' the printer line is removed.)
Disp. weight: *Displayed weight/flow rate including the text Gross/Net/Flow and unit.*
Date/Time: *Date and time for the printout.*
Instr.name: *Name of the instrument.*
Preset tare: *Value of the Preset tare.*

The parameter is shown only if 'Mode' for any serial port is set to 'Printer' or 'Printer 850'.

Printer pos.2 **Modbus: 41150 (46150)**

[0] Not in use
[1] Disp. weight
[2] Date/Time
[3] Instr.name
[4] Preset tare
< Not in use >

Defines the type of information to print in position 2 at the printer.

Not in use: *Position 2 not used.*
(If both 'Printer pos.1' and 'Printer pos.2' are set to 'Not in use' the printer line is removed.)
Disp. weight: *Displayed weight/flow rate including the text Gross/Net/Flow and unit.*
Date/Time: *Date and time for the printout.*
Instr.name: *Name of the instrument.*
Preset tare: *Value of the Preset tare.*

The parameter is shown only if 'Mode' for any serial port is set to 'Printer' or 'Printer 850'.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Printer pos.3 **Modbus: 41152 (46152)**

[0] Not in use
[1] Disp. weight
[2] Date/Time
[3] Instr.name
[4] Preset tare
< Not in use >

Defines the type of information to print in position 3 at the printer.

Not in use: *Position 3 not used.*
(If both 'Printer pos.3' and 'Printer pos.4' are set to 'Not in use' the printer line is removed.)
Disp. weight: *Displayed weight/flow rate including the text Gross/Net/Flow and unit.*
Date/Time: *Date and time for the printout.*
Instr.name: *Name of the instrument.*
Preset tare: *Value of the Preset tare.*

The parameter is shown only if 'Mode' for any serial port is set to 'Printer' or 'Printer 850'.

Printer pos.4 **Modbus: 41154 (46154)**

[0] Not in use
[1] Disp. weight
[2] Date/Time
[3] Instr.name
[4] Preset tare
< Not in use >

Defines the type of information to print in position 4 at the printer.

Not in use: *Position 4 not used.*
(If both 'Printer pos.3' and 'Printer pos.4' are set to 'Not in use' the printer line is removed.)
Disp. weight: *Displayed weight/flow rate including the text Gross/Net/Flow and unit.*
Date/Time: *Date and time for the printout.*
Instr.name: *Name of the instrument.*
Preset tare: *Value of the Preset tare.*

The parameter is shown only if 'Mode' for any serial port is set to 'Printer' or 'Printer 850'.

Printer linefeed **Modbus: 41156 (46156)**

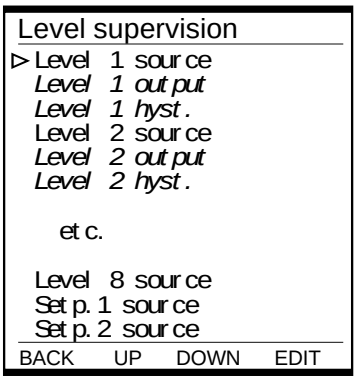
[0] 0
[1] 1
[2] 2
[3] 3
[4] 4
[5] 5
[6] 6
[7] 7
[8] 8
[9] 9
[10] 10
< 0 >

Defines the number of linefeeds after each printout. Each linefeed consist of CR LF.

The parameter is shown only if 'Mode' for any serial port is set to 'Printer'.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Menu ‘Level supervision’



Level 1 source **Modbus: 41158 (46158)**
Level 2 source **Modbus: 41164 (46164)**
Level 3 source **Modbus: 41170 (46170)**
Level 4 source **Modbus: 41176 (46176)**
Level 5 source **Modbus: 41182 (46182)**
Level 6 source **Modbus: 41188 (46188)**
Level 7 source **Modbus: 41194 (46194)**
Level 8 source **Modbus: 41200 (46200)**

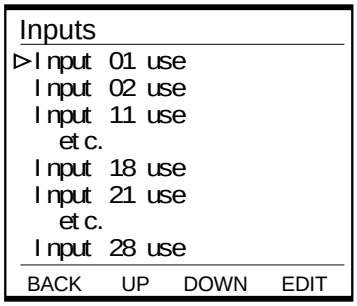
[0]	Not in use	Defines the signal to be supervised by the Level.
[1]	Net weight	***Net weight:*** *The Level operates on the net weight.*
[2]	Gross weight	***Gross weight:*** *The Level operates on the gross weight*
[3]	Disp. weight	***Disp. weight:*** *The Level operates on gross weight or net weight, even if the flow rate is displayed at TAD 3.*
[4]	Flow rate	***Flow rate:*** *The Level operates on the flow rate, so for function the flow option must be activated.*
[5]	Abs. net w.	***Abs.:*** *Stands for Absolute, the Level operates on the absolute value of net weight, gross weight, displayed weight, or flow rate.*
[6]	Abs. gross w.	***Offset lev.1:*** *Not available for ‘Level 1 source’.*
[7]	Abs. disp.w.	*Example:*
[8]	Abs. flow r.	*If this alternative is selected for ‘Level 2 source’, Level 2 will operate on the same signal as Level 1, but for a different level.*
[9]		*The level difference is set by Level 2*
[10]	Offset lev.1 <Not in use>	

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Level 1 outp.		**Modbus: 41160 (46160)**
Level 2 outp.		**Modbus: 41166 (46166)**
Level 3 outp.		**Modbus: 41172 (46172)**
Level 4 outp.		**Modbus: 41178 (46178)**
Level 5 outp.		**Modbus: 41184 (46184)**
Level 6 outp.		**Modbus: 41190 (46190)**
Level 7 outp.		**Modbus: 41196 (46196)**
Level 8 outp.		**Modbus: 41202 (46202)**
[0]	Active above	This parameter defines the conditions for control of a possible used output. ***Active above:*** *The used output is activated as the supervised signal level is above the set Level.* ***Active below:*** The *used output is activated as the supervised signal level is below the set Level.* Note: This parameter is not shown if corresponding 'Level (X) source' is set to 'Not in use'. Relay outputs can be defined for the Levels, see menu 'Outputs' on page 3-29.
[1]	Active below < Active above >	
Level 1 hyst.		**Modbus: 41162 (46162)**
Level 2 hyst.		**Modbus: 41168 (46168)**
Level 3 hyst.		**Modbus: 41174 (46174)**
Level 4 hyst.		**Modbus: 41180 (46180)**
Level 5 hyst.		**Modbus: 41186 (46186)**
Level 6 hyst.		**Modbus: 41192 (46192)**
Level 7 hyst.		**Modbus: 41198 (46198)**
Level 8 hyst.		**Modbus: 41204 (46204)**
	Range: +/-999999 Unit: Measurem. unit or flow unit. < 0.2 >	Defines the hysteresis range for the Level. Positive value gives a hysteresis range above the switch level, negative value gives a range below the switch level. Note: This parameter is not shown if corresponding 'Level (X) Source' is set to 'Not in use'.
Setp.1 source		**Modbus: 41206 (46206)**
Setp.2 source		**Modbus: 41208 (46208)**
[0]	Not in use	Defines the signal to be supervised by the setpoint. ***Net weight:*** *The Setpoint operates on the net weight.* ***Gross weight:*** *The Setpoint operates on the gross weight* ***Disp. weight:*** *The Setpoint operates on gross weight or net weight, even if the flow rate is displayed at TAD 3.* ***Flow rate:*** *The Setpoint operates on the flow rate, so for function the flow option must be activated.* ***Abs.:*** *Stands for Absolute, the Setpoint operates on the absolute value of net weight, gross weight, displayed weight, or flow rate.*
[1]	Net weight	
[2]	Gross weight	
[3]	Disp. weight	
[4]	Flow rate	
[5]	Abs. net w.	
[6]	Abs. gross w.	
[7]	Abs. disp.w.	
[8]	Abs. flow r. <Not in use>	

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Menu ‘Inputs’

Input 01 use **Modbus: 41210 (46210)**
Input 02 use **Modbus: 41212 (46212)**
Input 11 use **Modbus: 41214 (46214)**
Input 12 use **Modbus: 41216 (46216)**
Input 13 use **Modbus: 41218 (46218)**
Input 14 use **Modbus: 41220 (46220)**
Input 15 use **Modbus: 41222 (46222)**
Input 16 use **Modbus: 41224 (46224)**
Input 17 use **Modbus: 41226 (46226)**
Input 18 use **Modbus: 41228 (46228)**
Input 21 use **Modbus: 41230 (46230)**
Input 22 use **Modbus: 41232 (46232)**
Input 23 use **Modbus: 41234 (46234)**
Input 24 use **Modbus: 41236 (46236)**
Input 25 use **Modbus: 41238 (46238)**
Input 26 use **Modbus: 41240 (46240)**
Input 27 use **Modbus: 41242 (46242)** ►
Input 28 use **Modbus: 41244 (46244)**



[0]	Not in use
[1]	Tare
[2]	Gross/Net
[3]	Gross
[4]	Net
[5]	Print
[6]	Zero
[7]	Flow/Weight
[8]	Flow rate
[9]	Weight
[10]	Start batch.
[11]	Stop batch.
[12]	Reset batch.
[13]	RestartBatch
[14]	Res. b.alarm
[15]	Skip activ.
[16]	B. activity
[17]	
[18]	
[19]	Finish batch
	< Not in use >
	(For Input 01 and Input 02: < B. activity >)

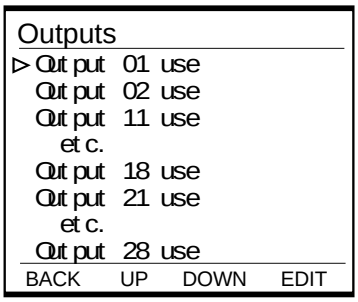
Defines the use of digital inputs to TAD 3. Two digital inputs, Input 01 and Input 02, are included in the TAD 3 unit.
The remaining inputs demand additional units DIO 3R, with 8 inputs and 8 outputs each, to be connected to TAD 3.
For inputs 31–38 and 41–48 the use need not be defined, it is always 'B. activity'.

Tare: *Input used for taring command.*
Gross/Net: *Input used for gross/net toggling.*
Gross: *Input used to switch TAD 3 to gross mode.*
Net: *Input used to switch TAD 3 to net mode.*
Print: *Input used for print command.*
Zero: *Input used for zero command.*
****/ Flow/Weight:*** *Input used for flow rate/weight toggling.*
****/ Flow rate:*** *Input used to switch TAD 3 to flow rate mode.*
****/ Weight:*** *Input used to switch TAD 3 to weight mode.*
*****/ Start batch.:*** *Input used for start of batching.*
*****/ Stop batch.:*** *Input used to halt the batching.*
*****/ Reset batch.:*** *Input used to terminate a halted batching.*
*****/ RestartBatch:*** *Input used to continue a halted batching.*
*****/ Res. b.alarm:*** *Input used to reset a batching alarm.*
*****/ Skip activ.:*** *Input used to skip the rest of a halted batching activity.*
*****/ B. activity:*** *Input used in batching activities for acknowledgement signal or for pulse batching.*
*****/ Finish batch:*** *Input used to continue batching until the actual batch is finished.*

NOTE:
****/*** *For function, the flow option must be activated.*
*****/*** *For function, the option Recipe batching must be activated.*

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Menu 'Outputs'



Output 01 use **Modbus: 41246 (46246)**
Output 02 use **Modbus: 41248 (46248)**
Output 11 use **Modbus: 41250 (46250)**
Output 12 use **Modbus: 41252 (46252)**
Output 13 use **Modbus: 41254 (46254)**
Output 14 use **Modbus: 41256 (46256)**
Output 15 use **Modbus: 41258 (46258)**
Output 16 use **Modbus: 41260 (46260)**
Output 17 use **Modbus: 41262 (46262)**
Output 18 use **Modbus: 41264 (46264)**
Output 21 use **Modbus: 41266 (46266)**
Output 22 use **Modbus: 41268 (46268)**
Output 23 use **Modbus: 41270 (46270)**
Output 24 use **Modbus: 41272 (46272)**
Output 25 use **Modbus: 41274 (46274)**
Output 26 use **Modbus: 41276 (46276)**
Output 27 use **Modbus: 41278 (46278)**
Output 28 use **Modbus: 41280 (46280)**

►

[0] Not in use
[1] In process
[2] Level 1
[3] Level 2
[4] Level 3
[5] Level 4
[6] Level 5
[7] Level 6
[8] Level 7
[9] Level 8
[10] Setpoint 1
[11] Setpoint 2
[12] Net mode
[13] Good zero
[14] StableWeight
[15] Flow r. disp
[16] B.inprogress
[17] B. stopped
[18] Batch. alarm
[19] B. activity
< Not in use >

(For Output 01 and Output 02: < B. activity >)

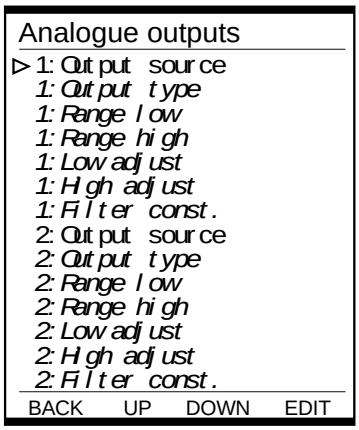
Defines the use for the digital outputs for TAD 3.
Two relay outputs, Output 01 and Output 02, are included in the TAD 3 unit. The remaining outputs demand additional units DIO 3R, with 8 inputs and 8 outputs each, to be connected to TAD 3.
For outputs 31–38 and 41–48 the use need not be defined, it is always 'B. activity'.

In process: *Active output means active 'In process'.*
Level 1 - 8: *Output activated by the Level.*
Setpoint 1, 2: *Output activated by the Setpoint.*
Net mode: *Output active in net mode.*
Good zero: *Output active by 'good zero'.*
StableWeight: *Output active by stable weight.*
****/ Flow r. disp:*** *Output active by flow rate display.*
*****/ B.inprogress:*** *Output active as batching is in progress (also when 'halted').*
*****/ B. stopped:*** *Output active as batching is halted.*
*****/ Batch. alarm:*** *Output active as a batching alarm is present and has not been reset.*
*****/ B. activity:*** *Output used in a batching activity.*

NOTE:
****/*** *For function, the flow option must be activated.*
*****/*** *For function, the option Recipe batching must be activated.*

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Menu ‘Analogue outputs’



1:Output source **Modbus: 41282 (46282)**

[0] Not in use
[1] Gross weight
[2] Net weight
[3] Disp. weight
[4] Flow rate
< Not in use >

Defines the value to represent on Analogue output 1.
Not in use: *The analogue output is not used.*
Gross weight: *The output represents gross weight.*
Net weight: *The output represents net weight.*
Disp. weight: *The output represents gross or net weight, even if flow rate is displayed.*
Flow rate: *The output represents flow rate (option).*

1:Output type **Modbus: 41284 (46284)**

[0] +/–20mA
[1] –12 - 20mA
[2] 0-20mA
[3] 4-20mA
[4] +/–10V
[5] 0-10V
<4-20mA>

Defines the type of signal, used to represent the weight/flow rate value at Analogue output 1.
+/–20mA, –12 - 20mA: *bipolar current output.*
0-20mA, 4-20mA: *monopolar current output.*
+/–10V: *bipolar voltage output.*
0-10V: *monopolar voltage output.*
This parameter is not shown if ‘1:Output source’ is set to ‘Not in use’.

1:Range low **Modbus: 41286 (46286)**

Range:
+/–999999
Unit:
Measurem. unit or flow unit
<0>

Defines the weight/flow rate value that should give the lowest output (0 V / 0 mA / 4 mA) at Analogue output 1.

This parameter is not shown if ‘1:Output source’ is set to ‘Not in use’.

1:Range high **Modbus: 41288 (46288)**

Range:
+/–999999
Unit:
Measurem. unit or flow unit
<500>

Defines the weight/flow rate value that should give the highest output (10 V / 20 mA) at Analogue output 1.

This parameter is not shown if ‘1:Output source’ is set to ‘Not in use’.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
1:Low adjust		**Modbus: 41290 (46290)**
	Range: +/–999 <0>	As this parameter is edited, Analogue output 1 will be activated with the lowest output signal (0 V / 0 mA / 4 mA). This parameter adds an offset to the output range and can be adjusted to give expected reading at lowest output for an instrument connected to Analogue output 1. Full adjustment range corresponds to about ±2 % of maximum analogue output. The parameter value will be set to zero each time '1:Output type' is changed. This parameter is not shown if '1:Output source' is set to 'Not in use'.
1:High adjust		**Modbus: 41292 (46292)**
	Range: +/–999 < 0 >	As this parameter is edited, Analogue output 1 will be activated with the highest output signal (10 V / 20 mA). This parameter controls the output gain and can be adjusted to give expected reading at highest output for an instrument connected to Analogue output 1. Full adjustment range corresponds to about ±2 % of maximum analogue output. The parameter value will be set to zero each time '1:Output type' is changed. This parameter is not shown if '1:Output source' is set to 'Not in use'.
1:Filter const.		**Modbus: 41294 (46294)**
[0] [1] [2] [3] [4] [5] [6] [7] [8] [9]	1 2 3 4 5 6 7 8 9 10 < 1 >	This parameter is used to get a slower update rate on Analogue output 1, which gives more stable readings. Example: 'Filter time' 200 ms, and this parameter set to 5 gives 1 second update on Analogue output 1. This parameter is not shown if '1:Output source' is set to 'Not in use'.
2:Output source		**Modbus: 41296 (46296)**
[0] [1] [2] [3] [4]	Not in use Gross weight Net weight Disp. weight Flow rate < Not in use >	Defines the value to represent on Analogue output 2. ***Not in use:*** *The analogue output is not used.* ***Gross weight:*** *The output represents gross weight.* ***Net weight:*** *The output represents net weight.* ***Disp. weight:*** *The output represents gross or net weight, even if flow rate is displayed.* ***Flow rate:*** *The output represents flow rate (option).*

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
2:Output type		**Modbus: 41298 (46298)**
[0]	+/–20mA	Defines the type of signal, used to represent the weight/flow rate value at Analogue output 2.
[1]	–12 - 20mA	***+/–20mA, –12 - 20mA:*** *bipolar current output.*
[2]	0-20mA	***0-20mA, 4-20mA:*** *monopolar current output.*
[3]	4-20mA	***+/–10V:*** *bipolar voltage output.*
[4]	+/–10V	***0-10V:*** *monopolar voltage output.*
[5]	0-10V	This parameter is not shown if '2:Output source' is set to 'Not in use'.
	<4-20mA>	
2:Range low		**Modbus: 41300 (46300)**
	Range: +/–999999 Unit: Measurem. unit or flow unit <0>	Defines the weight/flow rate value that should give the lowest output (0 V / 0 mA / 4 mA) at Analogue output 2. This parameter is not shown if '2:Output source' is set to 'Not in use'.
2:Range high		**Modbus: 41302 (46302)**
	Range: +/–999999 Unit: Measurem. unit or flow unit <500>	Defines the weight/flow rate value that should give the highest output (10 V / 20 mA) at Analogue output 2. This parameter is not shown if '2:Output source' is set to 'Not in use'.
2:Low adjust		**Modbus: 41304 (46304)**
	Range: +/–999 <0>	As this parameter is edited, Analogue output 2 will be activated with the lowest output signal (0 V / 0 mA / 4 mA). This parameter adds an offset to the output range and can be adjusted to give expected reading at lowest output for an instrument connected to Analogue output 2. Full adjustment range corresponds to about ±2 % of maximum analogue output. The parameter value will be set to zero each time '2:Output type' is changed. This parameter is not shown if '2:Output source' is set to 'Not in use'.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
2:High adjust		**Modbus: 41306 (46306)**
	Range: +/–999 <0>	As this parameter is edited, Analogue output 2 will be activated with the highest output signal (10 V / 20 mA). This parameter controls the output gain and can be adjusted to give expected reading at highest output for an instrument connected to Analogue output 2. Full adjustment range corresponds to about ±2 % of maximum analogue output. The parameter value will be set to zero each time '2:Output type' is changed. This parameter is not shown if '2:Output source' is set to 'Not in use'.
2:Filter const.		**Modbus: 41308 (46308)**
[0] [1] [2] [3] [4] [5] [6] [7] [8] [9]	1 2 3 4 5 6 7 8 9 10 <1>	This parameter is used to get a slower update rate on Analogue output 2, which gives more stable readings. Example: 'Filter time' 200 ms, and this parameter set to 5 gives 1 second update on Analogue output 2. This parameter is not shown if '2:Output source' is set to 'Not in use'.

Program options

In this sub menu, the name of each available program option is shown on one line. To activate a program option, a valid code must be entered on the option line. Individual codes, depending on the serial number of the instrument, can be ordered from Nobel Weighing Systems.

- Position the cursor at the program option you want to activate.
- Press function key EDIT, and the cursor moves to the right.
- Use the digit keys to enter the valid code for the option.
- Finish the code entry by pressing key ↵ .

When a program option has been activated it can be deactivated by entry of 0 (zero), replacing the valid code for the option.

Temporary program option code

For temporary activation of program options a demo code is available. This code can be used once, for service (to activate an option in a replacement instrument) or to try out a program option for a limited time.
The temporary demo code is 1 9 3 7 and it can be entered for any of the available program options to make it active for 7 days. After this time the activated program option will be automatically deactivated.
To activate the program option after this ”demo time” a valid code for the actual instrument must be ordered.

When a program option is running in ”demo mode” this is indicated by the text *DEMO* in the instrument display. An activated program option in ”demo mode” can be turned off by using ”0” as program option code.

NOTE!
Don’t forget to order a valid code immediately if you intend to use a program option for more than 7 days.

Legal lock

In this sub menu the status of the legal lock function is displayed. As the lock is On, editing of certain parameters is disabled. These parameters are:

- All parameters in menu Calibration parameters.
- All parameters in menu Calibration, except ‘Set zero’ and ‘Zero offset’.
  For these parameters however the range is limited to ±10 % of the scale Capacity from calibrated zero value.
- Parameter ‘Display info’ in menu General.
- Parameters ‘Printer pos.1’ to ‘Printer pos.4’ in menu Communication.

Editing of the program option selection is also disabled.

Setting of the legal lock (On or Off) can be edited only after entry of a certain code.

Further information on legal weighing and on the use of legal lock is available in an additional manual.

4. Calibration

When measuring with TAD 3, the transducer output signal, corresponding to the transducer load, is converted to a weight value. The conversion is controlled by several parameters with values defined during calibration of the instrument.

Some calibration types for TAD 3 can be performed without any transducers connected, but the automatic filter time calculation will be correct only if all transducers of the weighing equipment are connected to the instrument.

Four calibration types are supported by TAD 3:

- **Data sheet calibration -** entry of values from transducer data sheet(s).
- **Shunt calibration** - connection of internal 80 kohm shunt resistor, entry of corresponding load value.
- **Table calibration -** entry of recorded values from a previous calibration.
- **Deadweight calibration -** storing of measured transducer signals for known weights.

Calibration can only be performed in menu 'Edit set-up'.
(A 'Set-up code' may be demanded, and normal weighing functions must be interrupted.)
Calibration starts as one calibration type is selected.

To ensure the best possible weighing results, the mechanical installation must be carried out with great care. Fixed mechanical connections to the scale should be avoided, or made as flexible as possible and perpendicular to the measuring direction. If the scale has several transducers connected in parallel, they must have the same rated load and impedance. If transducers and fixed supports are combined, the load must be evenly distributed on all supports.

It is recommended to start with a data sheet calibration, which is easy to perform and gives a fairly good accuracy so the installation can be tested.

Shunt calibration makes it possible to calibrate without loading the scale. Connection of the internal shunt resistor to the transducer, gives a specified weight reading.

DATA AND CALIBRATION SHEET ArtNo:1130480

LOAD CELL KIS-3 S/N 322471

RATED LOAD (R.L)	10	kN	EXCITATION VOLTAGE, RECOMMENDED	10 V AC OR DC
			EXCITATION VOLTAGE, MAXIMUM	18 V AC OR DC
OVERLOAD, SAFE	100	% R.L.		
OVERLOAD, ULTIMATE	200	% R.L.	INPUT RESISTANCE 350 +/- 3 OHMS INCL. STANDARD CABLE	
			OUTPUT RESISTANCE 350.1 OHMS INCL. STANDARD CABLE	
SIDE LOAD, SAFE	100	% R.L.		
SIDE LOAD, ULTIMATE	200	% R.L.	TEMPERATURE RANGE -40 TO +80 DEGREES C	
ELECTRICAL CONNECTION	SHIELDED 4-CONDUCTOR CABLE		TEMPERATURE EFFECT (-10 TO +50 DEGREES C)	
EXCITATION POSITIVE:	RED			
EXCITATION NEGATIVE:	BLACK		ON OUTPUT 0.001	% OF OUTPUT PER DEG. C
SIGNAL POSITIVE:	GREEN			
SIGNAL NEGATIVE:	WHITE		ON ZERO BALANCE 0.001	% OF R.O. PER DEG. C

RATED OUTPUT (R.O.) (TOLERANCE 0.1 %)		2.0394 mV/V
NONLINEARITY (BEST FIT THROUGH ZERO)	+/-	0.010 % R.O.
ZERO BALANCE		+0.0 % R.O.
CREEP 5 MINUTES		+0.001 % R.O.

CALIBRATION VALUES (TOLERANCE 0.1 %)SHUNT RESISTOR CONNECTED BETWEEN 'EXCITATION NEGATIVE 'AND 'SIGNAL NEGATIVE'
40 KOHMS CORRESPOND TO 9.9111 kN
80 KOHMS CORRESPOND TO 4.9683 kN
THE VALUES INDICATED FOR OUTPUT VOLTAGE AND CALIBRATION VALUES ARE APPLICABLE AT OPEN CIRCUIT WITHOUT EXTERNAL BALANCING RESISTORS AND WITH A CONNECTING CABLE OF STANDARD LENGTH.

Vishay Nobel AB
S-691 27 KARLSKOGA

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Figure 10. Each transducer from Nobel Weighing Systems is delivered with a detailed data and calibration sheet.

If the weight indicator must be replaced, a table calibration of the replacement unit can be performed, with recorded values from an earlier calibration.

To get the best accuracy, a deadweight calibration with known weights to at least 2/3 of the measuring capacity, should be performed.

All calibration parameters are found in the menus under ‘Calibration parameters’ and ‘Calibration’. The parameters are described in section 3. Set-up.

Common parameters

For all calibration types, measurement unit and resolution for the weight value, and the capacity for the scale must be specified. These parameters, among others, are found in menu ‘Calibration parameters’ and they are explained on pages 3-9 to 3-13. This section deals only with the calibration parameters.

Measurement unit
This parameter defines the engineering unit used for the weight value.
The same engineering unit will also be used for example in the parameter values ‘Resolution’, ‘Capacity’, ‘Level’, and ‘Setpoint’.

Resolution
This parameter defines decimal point position and resolution in weight display.
The decimal point position selected here will be used in setting up, in the displayed weight value and in the weight value sent to a printer or computer.
Resolution is understood to mean the smallest weight change presented.

Capacity
This parameter defines the nominal range of the scale. This is the capacity of the scale and should be set to the maximum weight with which the scale is to be loaded. Even if the scale (transducers) have larger capacity, this value should nevertheless be set so that the weighing vessel does not become over full if the scale is loaded up to this value. This parameter is used to calculate certain default values in the set-up, in checking the maximum zero value (with ZERO key and zero-tracking) and in checking the maximum permissible setpoint value in batching (option Recipe batching).

Number of scale divisions

The number of scale divisions (div.) for a scale = ‘Capacity’ / ‘Resolution’.
To get correct and stable weight display, parameter ‘Resolution’ should be set so that the number of scale divisions with the selected ‘Capacity’ is less than 6 000 (10 000).
The number of scale divisions is also limited by the performance of the transducers and by how large a portion of the transducer capacity that is actually utilised.
To ensure a stable weight display, the input signal to the instrument should exceed 0.3 μV/scale division.

Example:

- Three transducers, each of 20 000 N (approx. 2 000 kg), are to support a tank which, without contents, weighs 3 500 kg. The amount of material in the tank varies from 0 – 1 000 kg.
- Transducer capacity = 6 118 kg
  (3 x 20 000 N / 9.80665).
- Transducer sensitivity = 2.039 mV/V.
- Supply voltage to transducers = 8.4 V (+/-5%).
- Signal from transducers at full load (6 118 kg) = 17 mV
  (2.039 mV/V x 8.4 V).
- Signal change in response to an applied load of 1 000 kg = 2.8 mV
  (17 mV x 1 000 / 6 118).
- Set 'Capacity' to 1 000 kg.

  1. Set 'Resolution' to 0.1.
     Number of scale divisions = 1 000 / 0.1 = 10 000
     Signal/scale division = 2.8 mV / 10 000 div. = 0.28 μV/div.
  2. Set 'Resolution' to 0.2.
     Number of scale divisions = 1 000 / 0.2 = 5 000
     Signal/scale division = 2.8 mV / 5 000 div. = 0.56 μV/div.

  It is best to select Case 2, since both the number of scale divisions and signal/div. are on the borderline in Case 1. In some special cases the resolution may obviously be driven higher, but the transducer characteristics must always be observed.

Data sheet calibration

Data sheet calibration is recommended as first-time calibration for a new installation. In data sheet calibration, values from the transducer data sheets are entered as parameter values, the scale need not be loaded and an accuracy of 0.1 % can be obtained. The accuracy of TAD 3 itself is 0.005 %. It is essential that no external forces influence the scale installation. If fixed support points are included in the scale, the load must be evenly distributed on transducers and fixed supports.

Conv. factor
In transducer data sheets, loads are normally not expressed in the measurement unit, selected for the scale. This parameter defines a constant by which a weight value, expressed in the measurement unit, should be multiplied to be expressed in the data sheet unit.
When using a transducer, calibrated in Newton, in a scale displaying weight values in kg, the 'Conv. factor' shall be the local gravitation constant in m/s^2.
The default value, 9.80665, is an international mean value for the gravitation constant (world-wide range 9.78 – 9.83).
If the data sheet unit is the same as the measurement unit, the conversion factor parameter should be set to 1.0000.

Number of transd
In weighing applications the load on the scale may be supported by several transducers or fixed supports. This parameter defines the total number of transducers and fixed supports in the scale, up to maximum 4.
If the scale has more than 4 support points, this parameter should be set to '1' and the parameter value for 'Rated load' and 'Rated output' must be calculated.

Rated load
Rated load for a transducer is indicated in the data sheet and should be entered as a parameter value, expressed in the unit of the data sheet.
NOTE! If the data sheet value is 5 kN, this parameter should be set to 5000 (N).
If several transducers are used in a scale, they must all have the same rated load.
If the scale has more than 4 support points, 'Number of transd' should be set to '1' and the value of this parameter should be calculated as:
rated load for one transducer, multiplied by the total number of support points.

Rated output 1 (2, 3, 4)
Rated output is given in the data sheet for every transducer. Parameters will be available for the number of support points specified in 'Number of transd'.
For fixed support points the rated output value is 0.00000 (mV/V).
If the scale has more than 4 support points, 'Number of transd' should be set to '1' and the parameter value for 'Rated output 1' should be calculated as:
the mean value of rated output for all active transducers.

Shunt transd.sig
This parameter shows the stored shunt transducer signal value from last calibration.
If the scale is not installed, skip this parameter or enter a known value.
Press function key EDIT. The function keys change to: <– , CANCEL, SH. ON.
Make sure the scale is unloaded.
Press key SH. ON. An internal 80 kohm shunt resistor is connected to the transducer.
After a while the measured shunt transducer signal will be displayed, and can be stored by pressing function key STORE.
Alternatively a new value can be entered by the digit keys.
The stored shunt transducer signal value will be used for calibration check in menu 'Diagnostics'.

Set zero
Set zero is useful only when the scale installation is finished.
After all data sheet values have been entered as parameter values, TAD 3 performs necessary calculations and then displays the actual gross weight on the scale as a live weight in this parameter. By the digit keys this value can be set to zero, for unloaded scale, or to the weight of the known load, for a scale that is loaded.

Zero offset
For an installed scale this parameter shows the zero offset after zeroing, a value that should not be edited, but recorded in the Set-up list.
For a scale that is not installed it is possible to enter the known weight of fixed equipment on the scale.

Make a record of the parameter values in the 'Set-up list', appendix 2.
To terminate Data sheet calibration, function key BACK, and then EXIT, should be pressed. In menu 'Exit set-up' the values can be saved (or not saved) and that terminates the calibrating operation.

Shunt calibration

In this method, calibration is performed by connection of a well-defined internal shunt calibration resistor (80 kohm) to the transducer input. This causes a transducer signal change, corresponding to a known transducer load.
A shunt calibration is based on values from the transducer data sheet and assumes that no external forces affect the installation. If the installation includes fixed support points, the load must be evenly distributed on transducers and fixed support points. With shunt calibration an accuracy of 0.2 % can be obtained, so the data sheet calibration, described above , is recommended. The accuracy of TAD 3 itself is 0.005 %.

Conv. factor
In transducer data sheets, loads are normally not expressed in the measurement unit, selected for the scale. This parameter defines a constant by which a weight value, expressed in the measurement unit, should be multiplied to be expressed in the data sheet unit.
When using a transducer, calibrated in Newton, in a scale displaying weight values in kg, the 'Conv. factor' shall be the local gravitation constant in m/s^2.
The default value, 9.80665, is an international mean value for the gravitation constant (world-wide range 9.78 – 9.83).
If the data sheet unit is the same as the measurement unit, the conversion factor parameter should be set to 1.0000.

Shunt cal. force
In this parameter, the shunt calibration force for the connected shunt resistor, a value from the transducer data sheet, should be entered. The value is expressed in the data sheet unit. If several transducers are used in parallel, the mean value of all the shunt calibration force values should be entered.
If fixed support points are included in the installation, the entered parameter value must be adjusted for this. For one transducer and two fixed support points, only one third of the total load is measured, so the data sheet value must be multiplied by a factor three.

Shunt transd.sig
This parameter shows the stored shunt transducer signal value from last calibration.
If the scale is not installed, skip this parameter or enter a known value.
Press function key EDIT. The function keys change to: <– , CANCEL, SH. ON.
Make sure the scale is unloaded.
Press key SH. ON. An internal 80 kohm shunt resistor is connected to the transducer.
After a while the measured shunt transducer signal will be displayed, and can be stored by pressing function key STORE.
Alternatively a new value can be entered by the digit keys.
The stored shunt transducer signal value will be used to calculate the weight value during normal weighing and for calibration check in menu 'Diagnostics'.

Set zero
Set zero is useful only when the scale installation is finished.
After all parameter values have been entered, TAD 3 performs necessary calculations and then displays the actual gross weight on the scale as a live weight in this parameter.
By the digit keys this value can be set to zero for unloaded scale, or to the weight of the known load if the scale is loaded.

Zero offset
For an installed scale this parameter shows the zero offset after zeroing, a value that should not be edited, but recorded in the Set-up list.
For a scale that is not installed it is possible to enter the known weight of fixed equipment on the scale.

Make a record of the parameter values in the 'Set-up list', appendix 2.
To terminate Shunt calibration, function key BACK, and then EXIT, should be pressed.
In menu 'Exit set-up' the values can be saved (or not saved) and that terminates the calibrating operation.

Table calibration

Table calibration can be used to copy recorded values from a previous deadweight calibration of the weighing equipment into a replacement instrument. This is performed by entry of recorded weight values and corresponding transducer signal values into the instrument. Calibration can be performed for up to 6 points.
The accuracy of the copying procedure is 0.005 %.

Number of cal.p.
Only parameters for the selected number of calibration points will be displayed in the menu. The number of calibration points can be changed during the calibration.

Value cal. p.1, Value cal. p.2 etc.
These parameters are used for entry of recorded weight values, expressed in the measurement unit, from a previous deadweight calibration with TAD 3.

Transd.sign. p.1, Transd.sign. p.2 etc.
These parameters are used for entry of recorded transducer signal values for corresponding calibration points.

Shunt transd.sig
This parameter shows the stored shunt transducer signal value from last calibration.
Press function key EDIT. The function keys change to: <– , CANCEL, SH. ON.
A recorded shunt transducer signal value can be entered by the digit keys.
Alternatively, if the scale is installed and unloaded, press function key SH. ON.
An internal 80 kohm shunt resistor is connected to the transducer. After a while the measured shunt transducer signal will be displayed, and can be stored by pressing function key STORE.
The stored shunt transducer value is used for calibration check in menu 'Diagnostics'.

Set zero
Set zero is useful only when the scale installation is finished.
Make sure the scale is unloaded. The actual weight value will be displayed in this parameter. The value can be set to zero (or any other value) by the digit keys.

Zero offset
This parameter is used for entry of the recorded zero offset value from a previous deadweight calibration.
If a zeroing has been performed with parameter 'Set zero' above, the value of parameter 'Zero offset' need not be changed.

To terminate Table calibration, function key BACK, and then EXIT, should be pressed. In menu 'Exit set-up' the values can be saved (or not saved) and that terminates the calibrating operation.

Deadweight calibration

This is normally the most accurate calibration type. The transducer signals are measured and automatically stored when the scale is loaded with known weights. Calibration can be performed in up to six calibration points, starting with the lowest, the highest point, or any other order.
Calibration of the lowest point is normally performed with the scale unloaded.
If calibration in two points is used, the second point should be placed as high as possible, the scale should be loaded with at least 2/3 of the 'Capacity'.
By calibration in more than two points, the highest calibration point should be placed at, or higher than, the highest load for which the scale is to be used, and the calibration points should be evenly distributed in the measuring range.

Number of cal. p
This parameter defines the number of calibration points. Up to six points can be selected, and parameters for load value and transducer signal will be displayed only for the selected number of points.
It is possible to change the number of points during the calibration.

Value cal. p.1,
This parameter defines the load for the lowest calibration point. Normally the scale should be unloaded and the parameter value set to 0 (zero). This weight value and the corresponding transducer signal value are automatically stored in TAD 3.

Value cal. p.2, Value cal. p.3 etc.
The scale should be loaded with known weights. These parameters show the load according to the previous calibration and the parameter values should be changed to the value of the known weights. As a parameter value is stored, TAD 3 will also store the corresponding transducer signal value for that calibration point.

Transd. sign. p.1, Transd. sign. p.2 etc.
These parameters contain the automatically stored transducer signal values for the calibration points. The values cannot be edited.

Shunt transd.sig
This parameter shows the stored shunt transducer signal value from last calibration.
Press function key EDIT. The function keys change to: <– , CANCEL, SH. ON.
Make sure the scale is unloaded. Press key SH. ON. An internal 80 kohm shunt resistor is connected to the transducer. After a while the measured shunt transducer signal will be displayed, and can be stored by pressing function key STORE.
Alternatively a new value can be entered by the digit keys.
The stored shunt transducer signal is used for calibration check in menu ‘Diagnostics’.

Set zero
Set zero is useful only when the scale installation is finished.
After all parameter values have been entered, TAD 3 performs necessary calculations and then displays the actual gross weight on the scale as a live weight in this parameter. By the digit keys this value can be set to zero, for an unloaded scale, or to the weight of the known load, for a scale that is loaded.

Zero offset
For an installed scale this parameter shows the zero offset after zeroing, a value that should not be edited, but recorded in the Set-up list. For a scale that is not installed it is possible to enter the known weight of fixed equipment on the scale.

Make a record of the parameter values in the ‘Set-up list’, appendix 2.
To terminate Dead weight calibration, function key BACK, and then EXIT, should be pressed. In menu ‘Exit set-up’ the values can be saved (or not saved) and that terminates the calibrating operation.

5. Operation

General

Weight Indicator TAD 3 with strain gauge transducers is designed mainly for weighing purposes. The measurement value is displayed at the front panel, and can also be transmitted to a master computer/PLC, display units, or printers. The measurement value can also be presented as the output signal from an analogue output module, connected as additional unit.
Some functions in TAD 3 can be controlled by digital input signals, and several digital outputs from the instrument can be provided. The number of inputs and outputs may be expanded by connection of additional I/O units, controlled by parameters in TAD 3.

Power supply

The weight indicator is powered by 24 VDC and should not be turned off during week-ends and over-night. Continuous power supply to electronics and transducers prevents moisture condensation in the units.

Power-up sequence

As TAD 3 is started it enters the Starting up state, displaying programme name and serial number for some seconds.

If any error is detected during power-up, the sequence stops and an error code will be displayed. See section 10. Troubleshooting for further information.

If no errors are detected, TAD 3 can enter normal operation (automatic start-up), displaying actual weight value, possibly together with other instrument information.
If ‘Manual start-up’ is selected, TAD 3 enters the ‘Wait for start’ state, displaying the text ‘Press ENTER to start operation!’.
If a warm up time has been set, the text ‘Warming up Please wait!’ will be displayed until the warm up time has expired. Then the instrument will switch over to normal operation by ‘automatic start-up’ or ‘manual start-up’.

Figure 11. TAD 3 front panel by normal weighing operation.

Display alternatives by normal operation

When TAD 3 is in normal operation, the measurement value can always be transmitted to connected external units. Normally the value is also displayed at the TAD 3 front panel, but display of other information can also be selected.
See under ‘Main menu’ at page 5-8.

At the TAD 3 front panel the measurement value is displayed in numerical form, with the selected measurement unit and decimal point position.
A graphic bar, representing the actual gross weight, may also be displayed. Maximum length of the bar corresponds to the instrument capacity.

Additional information about the measurement value may be displayed to the right:

Net Net weight is displayed (Net weight = gross weight -tare value).
Zero The measurement value is within the range of ‘good zero’.
Motion The measurement value is not stable, according to TAD 3 settings. When it becomes stable ‘Motion’ disappears after a set delay time.
Print Printing is performed. If ‘Print’ is flashing TAD 3 is waiting for stable weight to start the commanded printing.

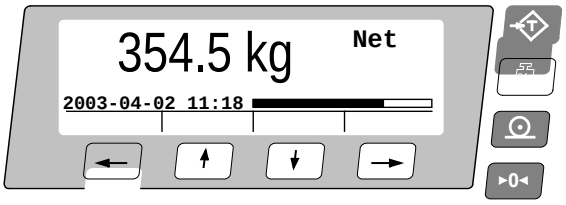
Information line

More additional information can be displayed on a separate line, together with the measurement value:

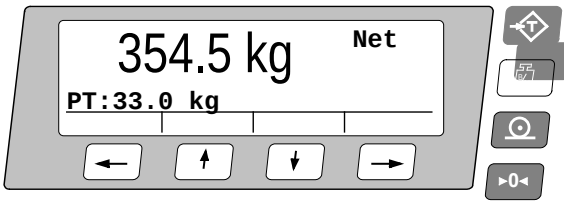
- actual date and time, or
- value of the Preset tare, or
- status for the level supervision, or
- status for the two internal digital inputs and outputs.

One of these alternatives may be selected by set-up parameter ‘Display info’ in menu ‘Edit set-up/General’.

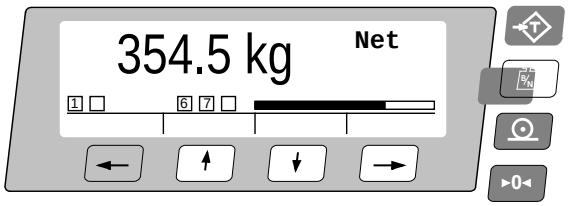
Actual date and time
In the example below ‘Date/Time’ has been selected.
Date and time can be set in menu ‘Clock set-up’, a sub menu to the instrument Main menu.



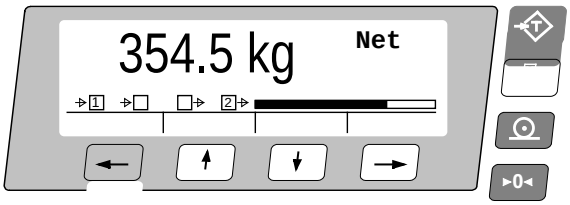
Value of Preset tare
When ‘Preset tare’ has been selected, the graphic representation of the gross weight is not displayed.
The displayed value of Preset tare (PT) can be edited in menu ‘Preset tare’, a sub menu to the instrument Main menu.



Status for the level supervision
When ‘Level status’ has been selected, up to eight boxes will be displayed below the weight value, one for each Level in use. The boxes have fixed positions, starting with Level 1 to the left.
When the level of the supervised signal, including influence from the hysteresis, is above the set ‘Level’, the Level number will be displayed in the box.
In the example Levels 1, 2, 6, 7, and 8 are in use.
For Levels 1, 6, and 7 the level of the supervised signal is above the set ‘Level’.



Status of internal digital inputs and outputs
In the example below ‘I/O status’ has been selected.
Status of the internal digital inputs and outputs is displayed in four boxes.
To the left, two boxes for input 01 and 02 are displayed, and
to the right two boxes for output 01 and 02.
When a digit (1 or 2) is displayed in a box, that input or output is active.
The example below shows that input 01 and output 02 are active.



Security locks

In TAD 3 two security locks are included to prevent unauthorised editing via the panel keys. The locks can be activated by parameters in menu ‘Edit set-up/General’.

‘Operator lock’ prevents opening of the instrument Main menu and the Batching menu, thus protecting all set-up parameters and values in the instrument from editing.

‘Set-up lock’ prevents entry in the menus ‘Edit set-up’, 'Recipes', and ‘Batching parameters’, thus protecting all set-up parameters in TAD 3 from being edited. But other menus in the instrument Main menu are still available. For example Instrument name, Edit levels, and Clock set-up.

Codes for the security locks

When a security lock is activated the operator must enter a four digit code to get access to the protected area. By default the valid code for both locks is ‘1 9 3 7’ , but the locks are not activated.
In menu ‘Edit set-up’, sub menu ‘General’, parameters are available to activate the locks and to change the default code to any four digit code.

The code for the Operator lock can only open the Operator lock.

The code for the Set-up lock will open both Set-up lock and Operator lock.

Taring

Taring means storing of a tare value and that TAD 3 switches over to display of net weight. The net weight being the gross weight minus the tare value.
In TAD 3 two tare values can be stored, Auto tare and Preset tare.

'Auto' tare value is the actual gross weight, stored as tare value when the TARE key is pressed.

'Preset' tare is a tare value that can be entered only if TAD 3 is set to use Preset tare. The value of Preset tare can be entered by the digit keys in sub menu 'Preset tare' under the instrument Main menu. See below. 'Preset tare' can also be entered from a master unit by serial communication.

Calibration parameter 'Tare corr.mode' defines the use of 'Auto', 'Preset', or the sum 'Auto+preset' by taring.

Auto Only 'Auto tare' is used. 'Preset tare' value can not be entered or edited.

Preset Only 'Preset tare' is used.

Auto+preset The sum of the 'Auto tare' and 'Preset tare' values is used. When the TARE key is pressed, the actual gross weight is stored as Auto tare value and the instrument will display net weight = '– Preset tare'.

With default setting, taring of TAD 3 can be performed, even if the weight is not stable. But if parameter 'Motion check' in 'Edit set-up/Calibration parameters' is set to 'On', taring will be allowed only when the weight value is stable.

If Calibration parameter 'Over load check' is set to Unipolar, taring is not allowed at negative gross weight.

Taring example:
A combination of Preset tare and Auto tare is useful in weighing operations when it is inconvenient or impossible to separate a packing and its contents.

- The packing must be weighed to establish a 'known weight' for it.
- Go to 'Edit set-up' (see page 3-3), menu 'Calibration parameters' and set parameter 'Tare corr.mode' to Auto+preset. Save the new setting.
- Go to menu 'Preset tare' in the instrument Main menu and enter the packing weight as parameter value.
- Press the TARE key when the scale is not loaded, or loaded with permanent help equipment only. The Preset tare value will be displayed as negative net weight.
- Put the packing with contents on the scale.
  The weight of the contents will be displayed as net weight.

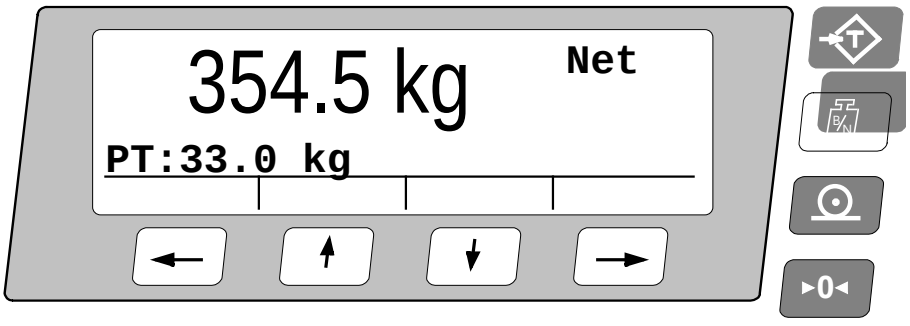


Figure 12. To the right on the panel four keys are provided with symbols for taring, toggling between gross and net weight, printing, and zero adjustment.

Gross/Net operation

At normal operation TAD 3 presents a numerical weight value at the display, either gross weight or net weight. When net weight is displayed the text ‘Net’ is added to the right of the value.
Toggling between display of gross weight and net weight can be performed by pressing the GROSS/NET key.

Gross weight is continuously shown in form of a graphic bar at the display, except if the value of Preset tare is shown. Maximum length of the bar corresponds to the set Capacity of the instrument.

Net weight is the difference between gross weight and a tare value. For calculation of net weight, TAD 3 can use either ‘Preset’ tare, ‘Auto’ tare, or the sum of them.

Net weight can not be displayed if the tare value in use is zero (0).

Zero setting

A basic zero setting of the gross weight is performed as part of the calibration for the scale. If changes to the weighing equipment are made later a renewed calibration, or at least the zero setting of a calibration, should be performed.

Minor correction of the zero value may be needed and can rapidly be performed:
When a gross weight close to zero is displayed, pressing the ZERO key will make the gross weight zero.

Pressing the ZERO key will also set the value of ‘Auto tare’ to zero.

Zero setting with the ZERO key is permitted only if:
- the weight is stable (the text ‘Motion’ not shown), and
- the accumulated zero correction since last calibration is between -1 % and +3 % of the ‘Capacity’, over and above the zero offset obtained when the instrument was calibrated last time.

The text ‘Zero’ will be shown to the right on the display when the displayed weight is a ’good zero’, meaning that the weight deviates from zero with less than one quarter of the set ‘Resolution’.

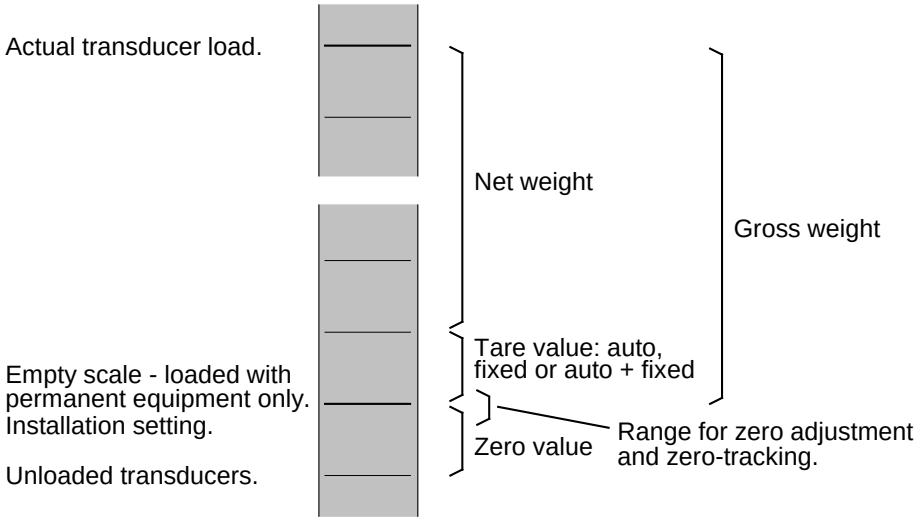


Figure 13. Correlation between gross weight, net weight, and tare value for a scale.

Zero-tracking/Automatic zero setting

In TAD 3 the functions zero-tracking and automatic zero setting can be enabled. Zero-tracking gives a continuous zero setting by slow changes in zero weight. The automatic zero setting performs zeroing of small negative gross weights. For both functions the following requirements should be met:

- The zero point stays within the permissible range, deviation from calibrated zero less than -1 % to +3 % of Capacity.
- No setpoint function is activated (armed).
- Batching is not in progress (program option).

Zero-tracking

Zero-tracking is active when, in addition to the common requirements above, the following requirements are met:

- Calibration parameter ‘Zero-tracking’ is set to On or On+AutoZero.
- The gross weight is ‘good zero’ (deviation from zero less than one quarter of Resolution).
- The weight is stable (the text Motion not shown).
- The rate of weight change is lower than the ‘zero-track.rate’, see below.

The set-up parameter ‘Zero-track.rate’ determines the maximum permissible weight change per minute for the zero-tracking. If parameter ‘Resolution’ is changed, the value of ‘Zero-track rate’ will change correspondingly.

Automatic zero setting

Automatic zero setting is active when, in addition to the common requirements above, the following requirements are met:

- Calibration parameter ‘Zero-tracking’ is set to On+AutoZero.
- The gross weight is negative.
- TAD 3 is in gross mode.
- The weight has been stable (the text Motion not shown) for 5 seconds.

Motion

The text ‘Motion’ may be shown to the right in the display. This will happen for an unstable weight value if it has changed by more than the set ‘Motion detect w.’ between two internal weight calculations (one-tenth of the filter time).
After the weight becomes stable, the text ‘Motion’ will still be shown for a short time, specified in parameter ‘No-motion delay’. TAD 3 will regard the weight as unstable until the text ‘Motion’ has disappeared.

When the text ‘Motion’ is shown, the following activities are affected:

- Zero setting can not be performed.
- Zero-tracking can not be performed.
- Taring can not be obtained (applies if ‘Motion check’ is ‘On’).
- Printout of weights is delayed until stable weight is obtained (applies if ‘Motion check’ is ‘On’).

Print function

General

A printer must be connected to one of the TAD 3 serial communication ports and the communication parameters must be correctly set.
See section 6. Communication, page 6-22 and section 3. Set-up, pages 3-20 to 3-25.

Printing of displayed weight

The displayed weight value in TAD 3 can be printed out on a connected printer, but on certain conditions:

- The displayed weight must be higher than the value of ‘Min.weight print’ in sub menu ‘Edit set-up/Calibration parameters’ (page 3-11). If the weight is too low, an error message will be shown.
- If parameter ‘Motion check’ in menu ‘Edit set-up/Calibration parameters’ is set to ‘On’, the displayed value must be stable (‘Motion’ not shown). Parameter ‘Motion detect w.’ in the same sub menu defines ”stable weight”. If the weight is not stable (‘Motion’ shown), printing will be delayed and the text ‘Print’ will be flashing. When the weight has become stable (‘Motion’ not shown) printing will be performed.

When a displayed weight value is printed, it will also be added to the value ‘Printed’ in Accumulated weight, a sub menu to the instrument Main menu.

Printing of displayed flow rate (program option)

The displayed flow rate value in TAD 3 can always be printed out on a connected printer.

Other printouts

A printer, connected to TAD 3, can also be used for printing of other data for the instrument.

Printing of Accumulated weight values
If PRINT is pressed, when any of the sub menues ‘Accumulated weight, printed’, 'Accumulated weight, activities' or 'Accumulated weight, recipes' is open, and editing is not performed, the accumulated weight values of the menu will be printed out, together with actual date/time and Instrument name for the TAD 3.
See example on page 6-24.

Printing of Level and Setpoint values
If PRINT is pressed when sub menu ‘Edit levels’ is open, and editing is not performed, the actual values for the Levels and Setpoints in use will be printed out, together with actual date/time and Instrument name for the TAD 3.
See example on page 6-24.

Printing of set-up parameter values
If PRINT is pressed when sub menu ‘Show set-up’ or ‘Edit set-up’ is open, printing of a complete list of all set-up parameter values, except for batching and recipe parameters, will be performed. The printout will take several minutes to conclude.
See example on page 6-24.

Printing of recipe parameters
If PRINT is pressed when menu ‘Recipe XX (+ poss. recipe name)’ is open, and editing is not performed, a list of all recipe lines for the selected recipe will be printed out.

Printing of batching parameters
If PRINT is pressed when menu ‘Batching parameters’ is open, and editing is not performed, of a list of all batching parameters will be printed out.

Main menu

Figure 14.
When TAD 3 performs normal weighing, the instrument Main menu can be opened without interrupting the weighing operation.

Press digit key 0, also marked i, to open the instrument Main menu.
If the 'Operator lock' is activated, TAD 3 will request the four digit 'Operator code' to allow entry in the instrument Main menu.

In the instrument Main menu, several sub menus are available for display of other information or for entry of new values.
The sub menus are described in this manual and in manual 'Operating instructions, Quick installation' for Weight Indicator TAD 3.

Batching: See section 7. Recipe batching.

Accumulated weights: Display and edit of accumulated weight values.
See page 5-10 and 'Operating instructions, Quick installation'.

Recipes: See section 7. Recipe batching.

Batching parameters: See section 7. Recipe batching.

Instrument name: A name to identify the instrument in printed reports etc.
See page 5-10 and 'Operating instructions, Quick installation'.

Preset tare: A fixed tare value for the scale.
See page 5-10 and 'Operating instructions, Quick installation'.

Edit levels: Edit Level values and show Setpoint values.
See page 5-10 and 'Operating instructions, Quick installation'.

Show set-up: Display of all used set-up parameter values.
See section 3. Set-up.

Edit set-up: Edit of set-up parameter values.
See section 3. Set-up.

Clock set-up: Setting of actual date and time.
See page 5-11 and 'Operating instructions, Quick installation'.

Information: Display of some important instrument data.
See page 5-11.

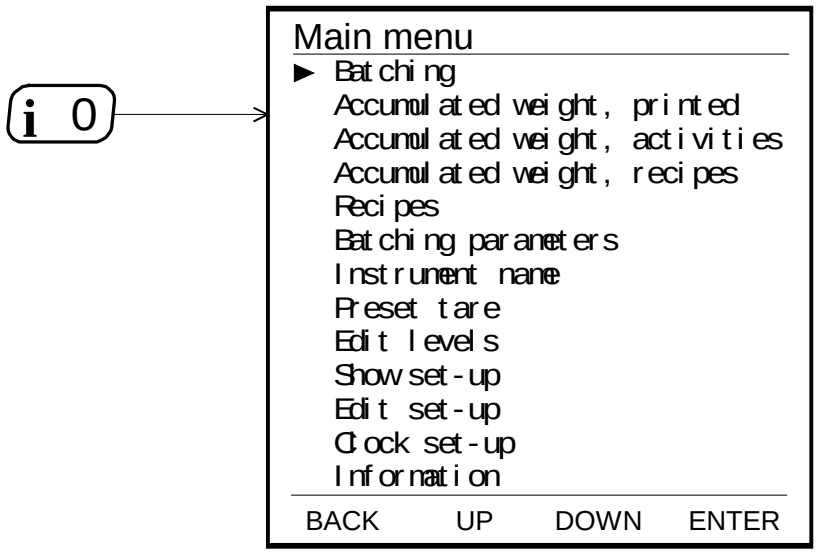


Figure 14. In the instrument Main menu a sub menu can be selected by the cursor and then opened by function key ENTER.

Batching
In this sub menu you can select any of the created recipes, select the number of batches to perform, and select the size of these batches.

Accumulated weight, printed
TAD 3 is capable of storing accumulated weight values up to 10 000 000 000,000. When this limit is passed, 10 000 000 000 will be subtracted from the value.

One accumulated weight value is called ‘printed’. Every time the PRINT key is pressed, and the text ‘Print’ is shown, the actual displayed weight will be added to 'Accumulated weight, printed’ (even if no printer is connected to TAD 3).

The value can be edited (set to zero) according to instructions for numerical parameters on pages 3-4 and 3-5.

Accumulated weight, activities and recipes
If the programme option Recipe batching is activated, accumulated values for the recipes and the batched components will also be shown.
TAD 3 is capable of storing accumulated weight values up to 10 000 000 000,000. When this limit is passed, 10 000 000 000 will be subtracted from the value.

Single accumulated weight values can be edited (set to zero) according to instructions for numerical parameters on pages 3-4 and 3-5.

As menu 'Accumulated weight, activities' or 'Accumulated weight, recipes' is displayed, all values of the displayed menu can be set to zero by key F1.
A warning will precede the zeroing.

Recipes
Up to 30 recipes can be created and stored in TAD 3. By this sub menu you can study and, when needed, edit the recipe parameters.

Batching parameters
This sub menu contains parameters that control display and print-out during the batching operation. It also contains all parameters of the activities (max. 24) that can be created in the instrument.

Instrument name
In this sub menu an instrument name can be entered. This name can serve to identify the instrument in printouts. The instrument name can be made up of digits, upper case letters, and lower case letters.

Preset tare
Sub menu ‘Preset tare’ in the instrument Main menu can be opened only if parameter Tare corr.mode in menu ‘Calibration parameters’ is set to ‘Preset’ or ‘Auto+preset’.

When sub menu ‘Preset tare’ is open, the numeric Preset tare value can be edited after function key EDIT has been pressed.

Edit levels
In this menu actual supervision levels for the used Level are shown and can be edited. Used Setpoint values are also shown, but can only be edited from a master computer/PLC.

Editing of a Level value is performed like for ”numerical” set-up parameters, see pages 3-4 and 3-5.
The Level value can be set positive or negative up to 99999, using the measurement unit that is set for the instrument.

Show set-up

All set-up parameters in TAD 3 are arranged in menus, as shown in figure 8 on page 3-2. In this sub menu the setting of all set-up parameters can be shown, but the values can not be edited.

Edit set-up

All set-up parameters in TAD 3 are arranged in menus, as shown in figure 8 on page 3-2. In this sub menu the setting of all set-up parameters can be shown. Parameter values can also be edited, see editing procedure on pages 3-4 and 3-5.

Clock set-up

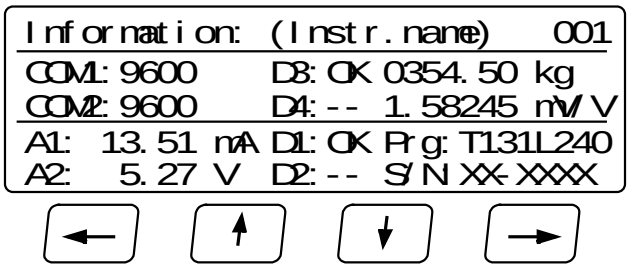
Date and time information can be presented at the TAD 3 display and in printouts from the instrument. Setting of correct date and time is performed in 'Clock set-up', a sub menu to the instrument Main menu.

Editing of data in 'Clock set-up' is performed like for other "numerical" parameters, see pages 3-4 and 3-5.

Settings are available for:
Year (up to 2095), Month (1 – 12), Day (1 – 31), Hour (0 – 24), and Minute (0 – 60).

Information

In sub menu Information some important data and measured live values for TAD 3 are displayed. No values can be edited in this menu.



On the first line the instrument name and instrument address are shown.

On the second and third lines are shown:

to the left,
: baud rates for the serial communication ports Com 1 and Com 2. When a correct message is received on Com 1 or Com 2, the text COM1: and COM2: respectively flashes.

in the middle,
: status for DIO 3R number 3 and 4 (if used) as 'OK' or '– –' (error).

to the right,
: actual gross weight value and transducer signal in mV/V.

On the bottom lines are shown:

to the left,
: actual output signals from the analogue output units in use. If a used analogue output unit is out of order, a broken line is displayed.

in the middle,
: status for DIO 3R number 1 and 2 (if used) as 'OK' or '– –' (error).

to the right,
: the instrument's programme name and serial number.

Press the function key marked ← or the key ↵ to switch TAD 3 back to the instrument 'Main menu'.

Level supervision

TAD 3 contains eight supervision Levels that can be used to supervise defined signals in the instrument. Both internal and external digital outputs can be connected as outputs for the Levels. For each Level, hysteresis and operation mode for the digital output is controlled by set-up parameters.

Functions for Level supervision are defined in menu ‘Edit set-up’ by parameters in the sub menus ‘Level supervision’ and ‘Outputs’.

‘Level X source’
In sub menu ‘Level supervision’, parameters are available to set each Level to ‘Not in use’, or to define the input signal for the Level. See pages 3-26 and 3-27.

Select ‘Net weight’ or ‘Gross weight’ to supervise these weight values, independent of which weight that is actually displayed.
Select ‘Disp. weight’ to supervise either gross weight or net weight, depending on which weight that is actually displayed.

‘Flow rate’ can only be used if the Flow option is activated in TAD 3.

Select ‘Abs. net.w.’, ‘Abs. gross.w.’, ‘Abs. disp.w.’ or ‘Abs. flow r.’ to act on the absolute value of these signals, i.e. the value independent of polarity.

The ‘source’ parameter for Level 2 – Level 8 can also be set to ‘Offset lev.1’. Then that Level will use the same input signal as Level 1. The supervised level will be at a fixed offset from Level 1, defined by ‘value’ for the Level.

If a value other than ‘Not in use’ is selected for a Level, more parameters for that Level will be shown.

‘Level X outp.’:
Defines how a digital output, if connected to the Level, should operate.
The parameter can be set to make an output active when the signal is above the Level, or when it is below the Level.

‘Level X hyst.’:
Defines the width of a hysteresis range for the Level. The definition of a negative hysteresis range starts with a minus sign(-).
Hysteresis is an intentional difference between the switch levels for increasing and decreasing signal level. One switch level is always at the defined Level. The other switch level is at a higher level by positive hysteresis, at a lower level by negative hysteresis. See figure 15.

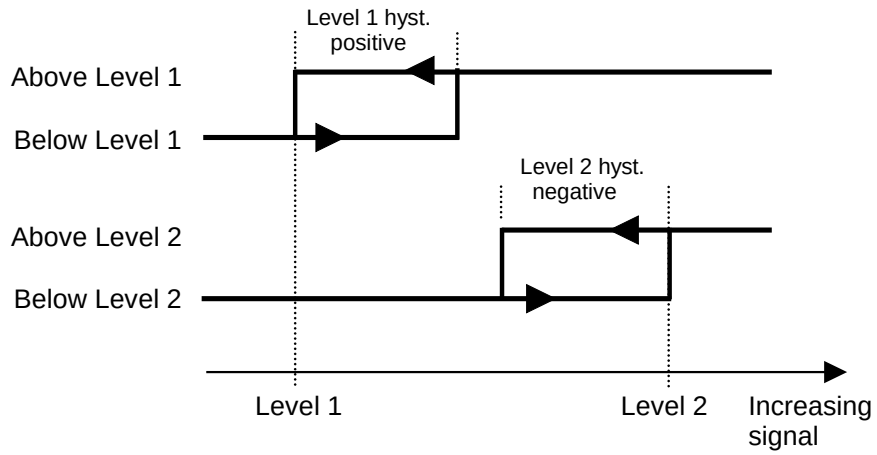


Figure 15. Influence on the level supervision from positive hysteresis, for Level 1, and negative hysteresis, for Level 2.

Level status
Actual status of the Levels (input signal above or below Level) can be read via the serial communication and shown at the TAD 3 display. See pages 5-2 and 5-3 about the Information line ‘Status for the level supervision’.
That information line includes the influence from hysteresis, but it does not show the status of any digital outputs, connected to the Levels.

Setpoint function

General

The two Setpoints can be used for fast, accurate and reliable supervision of weight values. The Setpoint function is of a one shot type, the function is activated by a command from the master computer/PLC and deactivated when the weight has reached the Setpoint value.

The Setpoints can be connected to any digital output in the TAD 3 system for flexibility. The status of the Setpoints can be found in modbus register ”Status 2”.

The Setpoints can only be controlled by a master computer/PLC via serial communication. The Setpoint is loaded into the modbus registers using modbus function 06 or 16. Commands can be sent to the instrument by loading the command number in the modbus ”Command register” or by setting corresponding ”Coil”, using modbus function 15.

NOTE: To ensure good operation during the time when a setpoint is activated, the zero-tracking function is not working.

Set-up

The selection of the setpoint functions are made in set-up parameter ”Setpoint 1 source” and ”Setpoint 2 source”. In these set-ups you can select which signal (weight value) the setpoint shall act on.

Connection of a setpoint to an output is made in set-up menu ”Outputs”.

Operation

The wanted setpoints (weight levels) must be loaded into the modbus registers called ‘Setpoint 1 value’ and ‘Setpoint 2 value’.

The setpoint(s) are activated by sending command ”Activate setpoint 1”, ”Activate setpoint 2 ” or ”Activate setpoint 1 and 2” to the instrument (command 1, 3 and 5). If a setpoint is connected to an output, then corresponding digital output is activated.

When the selected weight becomes higher than the setpoint the setpoint function is deactivated and the corresponding ”Setpoint X cycle done” bit is set. A possible connected digital output is also deactivated at the same time.

The setpoint function, and possible connected digital outputs, can also be deactivated by sending command ”Deactivate setpoint 1”, ”Deactivate setpoint 2” or ”Deactivate setpoint 1 and 2” (command 2, 4 and 6).

NOTE The ”Setpoint X cycle done” bit for a setpoint is reset when the setpoint value is loaded and when the setpoint is activated.

Use of inputs and outputs

Internal I/O's are included in TAD 3, two digital inputs and two digital outputs. Additional digital I/O units and analogue output units can be connected, communicating with TAD 3 by 'I/O bus' through serial port Com 2.
Each unit can be set to DIO 3R number 1, 2, 3 or 4 and ANA 3 number 1 or 2 respectively. See section 9. Additional units.

All input and output functions are controlled by set-up parameters in TAD 3. Parameter editing can only be performed in sub menus to 'Edit set-up', when normal measuring functions are interrupted.

Digital inputs

Inputs 01 and 02 are the internal digital inputs in TAD 3.
Inputs 11 – 18, 21 – 28, 31 – 38 and 41 – 48 are the digital inputs to TAD 3 via additional units DIO 3R number 1, 2, 3, and 4 respectively.

The digital inputs can be used for remote operation of the instrument.
If programme option flow rate or recipe batching is activated, the digital inputs can also be set to perform flow rate or batching operations.

Digital input functions for 11 – 18 and 21 – 28 are defined by parameters in sub menu 'Inputs', see page 3-28.
The digital inputs 31 – 38 and 41 – 48 can only be used for recipe batching.
Parameter editing is described on pages 3-4 and 3-5.

Digital outputs

Outputs 01 and 02 are the internal digital outputs from TAD 3.
Outputs 11 – 18, 21 – 28, 31 – 38, and 41 – 48 are the digital outputs from TAD 3 via additional units DIO 3R number 1, 2, 3, and 4 respectively.

The digital outputs can be used for control of external equipment and for indication of instrument status.
If programme option flow rate or recipe batching is activated, the digital outputs can also be connected for control and indication of flow rate and batching functions.

Digital output functions for 11 – 18 and 21 – 28 are defined by parameters in sub menu 'Outputs', see page 3-29.
The digital outputs 31 – 38 and 41 – 48 can only be used for recipe batching.
Parameter editing is described on pages 3-4 and 3-5.

Analogue outputs

To produce analogue outputs from TAD 3, one or two additional units ANA 3 must be connected to serial communication port Com 2.

The analogue output signal will represent a selected signal in TAD 3 in form of an analogue current or voltage signal.
All analogue output functions are defined by parameters in sub menu 'Analog outputs', see pages 3-30 to 3-33.
Parameter editing is described on pages 3-4 and 3-5.

Filter function

In TAD 3 the weight value is produced in two forms, unfiltered and filtered.
The unfiltered weight value represents the transducer load with the smallest delay. This means that the instrument will respond rapidly to changing load, but the weight display will be unstable if the load is fluctuating.
The filtered weight value will give a smoother weight display, but the response on changing load will be delayed.

Filter window (filtered weight – unfiltered weight).
The instrument can automatically switch between unfiltered and filtered weight in order to make the weight display fast when the load on the scale changes, but stable for constant load. The difference between the two latest filtered weight values is checked and parameter 'Filter window' defines at which difference the switch over should take place.
If the difference is smaller than 'Filter window', the filtered weight will be used.

Filter function (filtered weight).
The parameter 'Filter type' can be used to make the filtered weight value respond more slowly or more rapidly to changing load on the scale. The filtered weight is a true mean value of the weight value during one filter time period. If the load on the scale is fluctuating, for instance on account of a stirrer, a prolonged filter time can be set in order to get a more stable weight display.

The instrument calculates a filter time (standard), based on the actual calibration, as a reference value for the other fixed filter times.

- If 'Filter type' is set to Standard (default) the instrument will select the calculated filter time.
- If 'Filter type' is set to Long the instrument will select a filter time, four times the calculated filter time.
- If 'Filter type' is set to Short the instrument will select a filter time, one fourth of the calculated filter time.
- If 'Filter type' is set to Special a filter time value can be entered for parameter 'Filter time'.

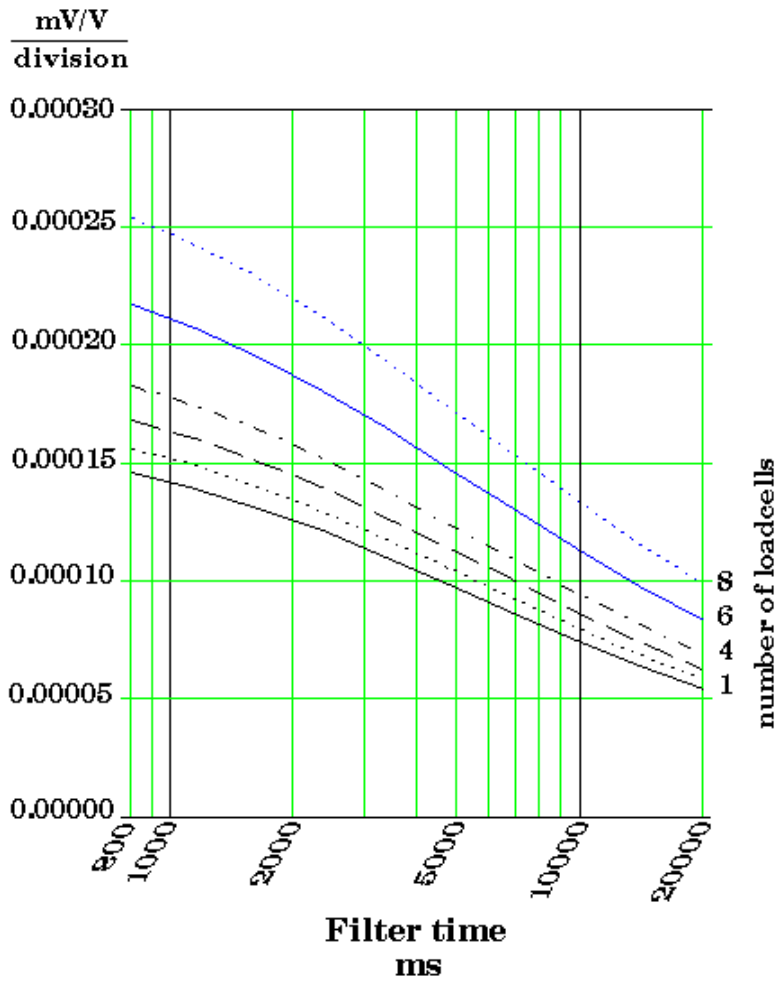
In all these cases 'Filter time' will be automatically set to the nearest higher value that is a multiple of 200 ms (50 Hz) or 166.67 ms (60 Hz).

The range for 'Filter time' is 167 – 20 000 ms.

The instrument updates the internal weight 10 times per Filter Time Period, implying that: Weight Conversion Time = 'Filter time' / 10.

Settling time for unfiltered weight is 2 – 3 times 'Filter time' / 10.

At calibration TAD 3 will calculate and set the filter time automatically. The instrument measures the sense voltage as a parameter for this calculation, so table or data sheet calibration without actual transducers connected will produce a random result.
To set a filter time value under these conditions, use filter type special and enter the wanted value.
With data from the installation entered in the formula below and the result applied in the diagram on next page, the expected standard filter time will be found. The variation in sense voltage caused by the number of transducers is shown in the diagram for low cable resistance. High cable resistance has the same influence direction as more transducers. Higher sense voltage caused by the use of external excitation will give lower filter time.



Formula to get '*mV/V to division*':

$$\frac{resolution \cdot transducer\ rated\ output \cdot conversion\ factor}{number\ of\ transducers \cdot rated\ load} = \frac{mV\ /\ V}{division}$$

'transducer rated output' is the mean value of Rated output at rated load for all connected load cells.

Example:

The figures used in the example on page 4-3 will give:

$$\frac{0.2\ kg\ /\ div \cdot 2.039\ mV\ /\ V \cdot 9.80665\ N\ /\ kg}{3 \cdot 20\ 000\ N} = 0.000067 \frac{mV\ /\ V}{division}$$

With 3 transducers this will make the filter time 20 000 ms.
To make the scale faster, select filter type 'Short' (5 000 ms) or
filter type 'Special' and then a suitable filter time.
Another way is to set Resolution to 0.5 kg, which will make the filter time 800 ms.

I/O bus connection

Additional units with input and output functions can be used together with TAD 3. These units, described in section 9, communicate through serial port Com 2 by the ”I/O bus”, a Modbus protocol on RS-485.

Up to six additional units can be connected to Com 2:

- four units type DIO 3R with 8 inputs and 8 outputs each.
  DIO 3R number 1 and 2 also has one serial communication port each.
- two units type ANA 3 with one analogue output each.

When Com 2 shall communicate with additional units over the I/O bus, parameter ‘COM2:Mode’ in menu ‘Edit set-up/Communication’ must be set to ‘I/O bus’. This setting will make parameters for two more communication ports, COM3 and COM4, available. By parameter setting COM3 and COM4 can be located at the serial ports of the connected DIO 3R units number 1 and 2.

DIO 3R number 3 and 4 can only be used as input/output units for recipe batching and communication port 'Com 3/4' has no function at these units.

6. Communication

TAD 3 has two serial communication ports, primarily used for communication with a control unit. Alternatively they can be used for data transmission to an external display, printer or I/O modules (Com 2 only).

Communication interface

TAD 3 is equipped with 2 serial communication ports: Com 1, Com 2.
Com 1 has both RS-232 communication, using a 9-pole D-sub socket at TAD 3, and RS-485 communication (can't be used simultaneously).
Com 2 communicates by RS-485 only.

The serial communication utilises RS-485 for 2-wire or 4-wire. RS-485 is an interface working with differential voltages, giving a noise resistant transmission in a network with several units and long distances. The host computer (master) must have an asynchronous communication port for RS-485, or use a converter, e.g. Westermo MA-42 for RS-232 to RS-485 conversion.
If 2-wire transmission is used, the control unit must be capable of data flow direction control or utilise a converter for automatic data flow direction control e.g. Westermo MA-44.
When 4-wire transmission is used, no data flow direction control is needed.

When the RS-232 port is used it's possible to communicate with one TAD 3 directly from a PC without using a converter.

Transmission principles

All the TAD 3 units connected to the network can listen to what is transmitted in the network, but only one unit at a time may transmit. A time-sharing principle is needed to allow communication in both directions (half duplex).

All communication in the network must be initiated by the control unit (master). When TAD 3 is working together with a master the TAD 3 units are all slaves, only allowed to reply to master commands. As the master has addressed a command message to a specific slave unit, it listens for the reply during a specified time, before sending next command message.
If the reply from a slave unit fails it may be due to:

– Mismatch in communication parameters. (baud rate, address, . .)
– More than one slave unit has been transmitting at the same time. This can distort the reply message and make it impossible to decode.

I/O bus

When more in/out functions are needed (digital I/O, analogue outputs or serial communication ports), additional I/O units can be connected to TAD 3.

When additional I/O units are used, Com 2 is occupied for this purpose.
See section 9. Additional units.

Modbus

General

For communication with a master computer (PLC) the Modbus protocol is used in the TAD 3. The Modbus protocol is a standard protocol, used for master/slave communication in the industry. The TAD 3 implementation works with the Modbus RTU format (the ASCII format is not supported).

Information is transmitted in blocks of data to minimise polling and response time delays. For example the error register, status register and weight register could be read with one command to the TAD 3.

When a command that cannot be performed is sent, the TAD 3 responds with an exception code. For a better explanation of the error, a special error register could be read.

Depending on the type of the communicating equipment (the master), the commands in the application programme (PLC programme, or pc programme) may be different from type to type. However, if the master is not a Modicon PLC system, then the Modbus implementation in the master must have some cross-reference function to transfer the Modbus register and I/O bit numbering to the masters own register and I/O bit numbering. All registers and coils described in this manual use the standard Modbus (Modicon) register and I/O numbering.
See the master's own Modbus driver documentation for how the commands should be activated in the master's application programme.

Most manufacturers of PLC systems and HMI and SCADA software can provide Modbus drivers. Various Modbus drivers for development of Windows programs are also available on the market.

For detailed information about the Modbus protocol see:

Modicon Modbus Protocol Reference Guide PI-MBUS-300 Rev.D.

Setup of Modbus communication

- Set parameter ‘COMx:Mode’ (in ‘Edit set-up’, menu ‘Communication’) to ‘Modbus auto’. The baud rate and bit settings will be autodetected.
- The TAD 3 will as default be given the address 1. If more than one TAD 3 is used in a network, each TAD 3 must be given a unique address in parameter ‘Instrum. address’.
- When longer response times are needed, set ‘COMx:Mode’ to ‘Modbus’ and select the correct ‘Baudrate’ and ‘Data format’. See Technical data.

Register description

TAD 3 has a number of Modicon 'Holding Registers' (registers 4XXXX ...).
The Modbus function 03 'Read Holding Registers' should be used to read these registers and the Modbus function 05 'Preset Single Register' or 16 'Preset Multiple Registers' should be used to write to the registers.
See section **‘Data representation’** for a description of the different data formats used.

Hint: To find out which of the float formats that should be used, read the ‘Instrument type’ register (40200/45200), which equals ‘2003’ for TAD 3.

General registers

Data type: Integer	Data type: Float (2 reg./value)	Data type: Modicon float (2 reg./value)	Explanation	R/W
40001 (1 reg)	40200	45200	Instrument type	R
40002 (1 reg)	40202	45202	Program number	R
40003 (1 reg)	40204	45204	Program version	R
40004 (3 reg)	40208	45208	Serial number	R
40007 (1 reg)	40210	45210	Command error	R
40008 (1 reg)	40212	45212	Instrument state	R
40009 (1 reg)	40214	45214	Instrument error	R
40010 (1 reg)	40216	45216	Status 1	R
40011 (1 reg)	40218	45218	Status 2	R
40012 (3 reg)	40220	45220	Gross weight	R
40015 (3 reg)	40222	45222	Net weight	R
40018 (3 reg)	40224	45224	Flow rate (Option)	R
40021 (3 reg)	40226	45226	Analogue outp. value 1	R
40024 (3 reg)	40228	45228	Analogue outp. value 2	R
40027 (3 reg)	40230	45230	Input signal (mV/V)	R
40030 (1 reg)	40232	45232	Command register	R/W *
40031 (3 reg)	40234	45234	Setpoint 1 value	R/W
40034 (3 reg)	40236	45236	Setpoint 2 value	R/W
40043 (1 reg)	40242	45242	Status of ext. input 11-28	R/W**
40044 (1 reg)	40244	45244	Status of ext. output 11-28	R/W**
40045 (1 reg)	40246	45246	Level status	R/W**
40046 (1 reg)	40248	45248	Status of ext. input 31-48	R/W**
40047 (1 reg)	40250	45250	Status of ext. output 31-48	R/W**
47600 to -612	44200 to -213	49200 to -213	Last act. reg. See 7-40.	R
47620 to -809	44220 to -351	49220 to -351	Last b. reg. See 7-41 to 42.	R
47820 to -834	44360 to -377	49360 to -377	Curr. b. reg. See 7-43.	R

*/ The read value is always ‘zero’.

**/ Write to these registers is allowed, but has no effect!

Important:

‘Net weight’, ‘Gross weight’ and ‘Flow rate’ registers are only valid when ‘Instrument error’ register equals 0. Therefore it’s recommended to read the ‘Instrument error’ register together with these registers.

General registers cont.

Data type: Integer	Data type: Float (2 reg./value)	Data type: Modicon float (2 reg./value)	Explanation	R/W
44003 (3 reg)	41802	46802	Clock: Year	R/W
44006 (3 reg)	41804	46804	Clock: Month	R/W
44009 (3 reg)	41806	46806	Clock: Day	R/W
44012 (3 reg)	41808	46808	Clock: Hour	R/W
44015 (3 reg)	41810	46810	Clock: Minute	R/W
44039 (3 reg)	41826	46826	Level 1 value	R/W
44042 (3 reg)	41828	46828	Level 2 value	R/W
44045 (3 reg)	41830	46830	Level 3 value	R/W
44048 (3 reg)	41832	46832	Level 4 value	R/W
44051 (3 reg)	41834	46834	Level 5 value	R/W
44054 (3 reg)	41836	46836	Level 6 value	R/W
44057 (3 reg)	41838	46838	Level 7 value	R/W
44060 (3 reg)	41840	46840	Level 8 value	R/W
44063 (3 reg)	41842	46842	Preset tare value	R/W
44066 (3 reg)	41844	46844	Setpoint 1	R/W
44069 (3 reg)	41846	46846	Setpoint 2	R/W
44072 to -080	41848 to -853	46848 to -853	Batch data reg. See 7-43.	R/W

Accumulated weight registers

Data type: Integer	Data type: Float (2 reg./value)	Data type: Modicon float (2 reg./value)	Explanation	R/W
40760 (3 reg)	40600	45600	Printed acc. weight LOW	R/W
40763 (3 reg)	40602	45602	Printed acc. weight HIGH	R/W
47000 to -323	41584 to -799	46584 to -799	Batching reg. See 7-44 to 47.	R/W

Accumulated weight is represented by two values (HIGH, LOW). To get the resulting value multiply value HIGH by 10000 and add value LOW. LOW is a value between ±9999.999 with 3 decimals. HIGH is a value without decimals between ±999999. To zero accumulated weight send 0 to both HIGH and LOW.

String registers

Data type: string	Explanation	R/W
44696 (6 reg)	Instrument name	R/W

Instrument type

This register holds the type of the instrument. For TAD 3 this value is 2003.

Program number

This register holds the program number of the TAD 3. Normal programs has a value below 100 and special programs a value above 100.

Program version

This register holds the program version of the TAD 3. The value 100 means 1.00.

Serial number

This register holds the serial number of the instrument. The value 991000 means 99-1000. This can be used by the master to be sure that an instrument with a specific serial number is used for a special process.

Command error

This register holds the error code when a command has been sent to the TAD 3. A command that gives a 03 or 07 as exception will have an error code with a better description of the problem in this register. For an explanation of the error codes see section 10 Troubleshooting. Normally this register should contain ‘00’ which means no error. Error codes 100 to 65535 are valid in this register.

Instrument state

This register contains the state of the TAD 3 unit.

Code	Description
00	**'Starting up' state.** The instrument is starting up after a reset or power on.
01	**'Wait for start' state.** The TAD 3 is waiting for a start command to go in process.
02	**'Normal' state.** There are no parameter errors in the system. **Note:** Weight errors still indicates normal state.
03	**'Local Set-up' state.** Someone is modifying the set-up parameters from the front of the TAD 3. It's not possible to enter Remote Set-up or Remote Restore state from here.
04	**'Remote Set-up' state.** A master computer is modifying the set-up parameters in the TAD 3. It's not possible to enter Local Set-up state from here.
05	**'Remote Restore' state.** A master computer is restoring set-up data to TAD 3. It's not possible to enter Local Set-up state from here.
06	**'Error' state.** An error has been detected during start up of the instrument.
07	**'Fatal error' state.** An error has been detected during start up of the instrument. It's not possible to enter any other state from here.
08	**'Test' state.** TAD 3 is running in a special mode used for service and production test.
09	**'Warming up state'** The parameter 'Warm up time' is set to a value other than zero, and TAD 3 is waiting for the warming up time to pass.
99	**'Boot' state.** The TAD 3 is ready to receive a new program.

Instrument error

This register holds the error code in the TAD 3, for example weight, RAM, Flash, EEPROM errors.
For an explanation of the error codes see section 10. Troubleshooting.
Normally this register should contain '00' which means no error.
Error codes 000 to 099 are valid in this register.

Status 1

Bits set to 1 in this register have the following meaning:

Bit no	Function	Comment
0	Net weight > INT size	The net weight in ‘scaled integer’ format does not fit in one register. (See description of data representation.)
1	Gross weight > INT size	The gross weight in ‘scaled integer’ format does not fit in one register. (See description of data representation.)
2	Flow rate > INT size	The flow rate in ‘scaled integer’ format does not fit in one register. (See description of data representation.)
3	Good zero (disp. weight)	
4	Good zero Gross	
5	Good zero Net	
6	Net Mode	'1' = Net mode ‘0' = Gross mode
7	Motion	Unstable weight
8	Calibration resistor on	Internal shunt resistor connected.
9		
10		
11	Flow rate display	Flow rate is shown in the display.
12	Net weight > 6 digits	The net weight value is out of precision and should normally not be used.
13	Gross weight > 6 digits	The gross weight value is out of precision and should normally not be used.
14	Remote operation	‘1’ = On ‘0’ = Off
15	Calibration edits allowed	

Note: If this register (bits) is read as float value,
see description of Data representation.

Status 2

Bits set to 1 in this register have the following meaning:

Bit no	Function	Comment
0	Output 01 activated	Internal relay 1 active.
1	Output 02 activated	Internal relay 2 active.
2	I/O bus error	An error on the I/O bus is present.
3	Analogue output 2 voltage/current	'0' = current ‘1' = voltage.
4	Power failure	The 'power failure' bit is cleared when a 'Read Holding Reg.' (function 03) command reads this register Status 2 (however, the reply contains the set bit, if it was set).
5		
6	RESERVED	Always 0.
7	Digital input 01 activated	24V signal active on digital input 01.
8	Digital input 02 activated	24V signal active on digital input 02.
9	Above Level 1	The weight is above Level 1.
10	Above Level 2	The weight is above Level 2.
11	Analogue output 1 voltage/current	'0' = current ‘1' = voltage.
12	Setpoint 1 activated	See description of setpoint function.
13	Setpoint 2 activated	See description of setpoint function.
14	Setpoint 1 cycle done	See description of setpoint function.
15	Setpoint 2 cycle done	See description of setpoint function.

Note: If this register (bits) is read as float value,
see description of Data representation.

Gross weight

This register holds the gross weight. The weight should **not** be read alone because the status and error codes are stored in other registers. The weight is only valid when the register ‘Instrument error’ equals 00.

A good choice is to read at least the registers 40009 – 40014 (integer)
or the registers 40214 – 40221 (45214 – 45221) (float).

Note: When shunt relay is connected, this is the shunt test value.

Net weight

This register holds the net weight. The weight should **not** be read alone because the status and error codes are stored in other registers. The weight is only valid when the register ‘Instrument error’ equals 00.

A good choice is to read at least the registers 40009 – 40017 (integer)
or the registers 40214 – 40223 (45214 – 45223) (float).

Note: When shunt relay is connected, this is the shunt test value.

Flow rate (option)

This register holds the flow rate. The flow rate should **not** be read alone because the status and error codes are stored in other registers. The flow rate is only valid when the register ‘Instrument error’ equals 00.

A good choice is to read at least the registers 40009 – 40020 (integer)
or the registers 40214 – 40225 (45214 – 45225) (float).

Analogue output value 1, 2

These registers holds the values sent to the analogue outputs. The registers can be used for fault finding in the system.
Note: The value is rounded to two decimals.

Input signal (mV/V)

This register holds the current input signal in mV/V. This register could be used for fault finding in the system.

When shunt relay is connected, the mV/V change is placed here.

Command register

As this register is read, the answer will always contain only zero's.

There are a number of actions that can be activated in the TAD 3. The value of this register (when different from zero) will activate one of these actions, as described in ‘Command description’ on next page.

When an action can not be performed for some reason (wrong state etc.) an exception is given as reply. When an exception with code 03 or 07 is received the command error register could be read to get a better error explanation.

Command description

Cmd	Action activated in TAD 3	Description
0	No action	
1	Activate setpoint 1	See description of setpoint function.
2	Deactivate setpoint 1	See description of setpoint function.
3	Activate setpoint 2	See description of setpoint function.
4	Deactivate setpoint 2	See description of setpoint function.
5	Activate setpoint 1 and 2	See description of setpoint function.
6	Deactivate setpoint 1 and 2	See description of setpoint function.
7	Auto tare	
8	Set to zero	Used to set the gross weight to zero.
9	Select gross mode	
10	Select net mode	
11	Select normal weight	Disconnect shunt resistor.
12	Select calibration value	Connect shunt resistor.
13	Weight display	Show weight on the display.
14	Flow rate display	Show flow rate on the display (option).
16	Start operation	When the TAD 3 is in 'Wait for start state', this command can be used to start up the instrument.
17	Enter Remote operation	This command disables the keys on the TAD 3 unit. This means that an external computer is controlling the instrument. This command is only valid when TAD 3 is displaying weight or a Batching screen (batching running, halted or ready).
18	Exit Remote operation	This command enables the keys and leaves the remote operation.
19	Print command	This command initiates a printout on a possible connected computer.
50 - 60	Batching commands	See section 7. Recipe batching (program option).

Continued on next page.

Command description. (continued)

100	* Enter Remote Set-up	This command is used to be able to change the set-up of the TAD 3 from remote.
101	* Enter Remote Restore	This command is used to be able to restore a saved set-up to the TAD 3 from remote.
102	* Exit Remote Set-up/ Restore and save changes	This is used when the parameters are changed from remote and should be saved in the TAD 3.
103	* Exit Set-up without saving changes	This can be used to discard edits made to the set-up parameters, before the set-up is left.
104	* Do Reset	This command is used to reset the instrument from remote location.
105	Check set-up data	This command checks that the set-up is correct.

*** WARNING! This command will interrupt the normal weighing function.**

Setpoint 1, setpoint 2

The registers are used to read and write setpoints. See description of setpoint function.

Status of external inputs 11-28

Bits set to 1 in this register have the following meaning:

Bit no	Function	Bit no	Function
0	Digital input 11 activated.	**8**	Digital input 21 activated.
1	Digital input 12 activated.	**9**	Digital input 22 activated.
2	Digital input 13 activated.	**10**	Digital input 23 activated.
3	Digital input 14 activated.	**11**	Digital input 24 activated.
4	Digital input 15 activated.	**12**	Digital input 25 activated.
5	Digital input 16 activated.	**13**	Digital input 26 activated.
6	Digital input 17 activated.	**14**	Digital input 27 activated.
7	Digital input 18 activated.	**15**	Digital input 28 activated.

Note: If this register (bits) is read as float value,
see description of Data representation.

Status of external outputs 11-28

Bits set to 1 in this register have the following meaning:

Bit no	Function	Bit no	Function
0	Digital output 11 activated.	**8**	Digital output 21 activated.
1	Digital output 12 activated.	**9**	Digital output 22 activated.
2	Digital output 13 activated.	**10**	Digital output 23 activated.
3	Digital output 14 activated.	**11**	Digital output 24 activated.
4	Digital output 15 activated.	**12**	Digital output 25 activated.
5	Digital output 16 activated.	**13**	Digital output 26 activated.
6	Digital output 17 activated.	**14**	Digital output 27 activated.
7	Digital output 18 activated.	**15**	Digital output 28 activated

Note: If this register (bits) is read as float value,
see description of Data representation.

Level status

Bits set to 1 in this register have the following meaning:

Bit no	Function	Comment
0	Above level 1	The weight is above Level 1.
1	Above level 2	The weight is above Level 2.
2	Above level 3	The weight is above Level 3.
3	Above level 4	The weight is above Level 4.
4	Above level 5	The weight is above Level 5.
5	Above level 6	The weight is above Level 6.
6	Above level 7	The weight is above Level 7.
7	Above level 8	The weight is above Level 8.

Note: If this register (bits) is read as float value,
see description of Data representation.

Status of external inputs 31-48

Bits set to 1 in this register have the following meaning:

Bit no	Function	Bit no	Function
0	Digital input 31 activated.	**8**	Digital input 41 activated.
1	Digital input 32 activated.	**9**	Digital input 42 activated.
2	Digital input 33 activated.	**10**	Digital input 43 activated.
3	Digital input 34 activated.	**11**	Digital input 44 activated.
4	Digital input 35 activated.	**12**	Digital input 45 activated.
5	Digital input 36 activated.	**13**	Digital input 46 activated.
6	Digital input 37 activated.	**14**	Digital input 47 activated.
7	Digital input 38 activated.	**15**	Digital input 48 activated.

Note: If this register (bits) is read as float value,
see description of Data representation.

Status of external outputs 31-48

Bits set to 1 in this register have the following meaning:

Bit no	Function	Bit no	Function
0	Digital output 31 activated.	**8**	Digital output 41 activated.
1	Digital output 32 activated.	**9**	Digital output 42 activated.
2	Digital output 33 activated.	**10**	Digital output 43 activated.
3	Digital output 34 activated.	**11**	Digital output 44 activated.
4	Digital output 35 activated.	**12**	Digital output 45 activated.
5	Digital output 36 activated.	**13**	Digital output 46 activated.
6	Digital output 37 activated.	**14**	Digital output 47 activated.
7	Digital output 38 activated.	**15**	Digital output 48 activated

Note: If this register (bits) is read as float value,
see description of Data representation.

Clock

These registers are used to read and write the time and date in TAD 3.

Level 1 ... Level 8

These registers are used to read and write levels that are supervised by TAD 3.

Preset tare

This register is used to read and write a new preset tare.

Setpoint 1, setpoint 2

The registers are used to read and write setpoints. See description of setpoint function.

Set-up register description

Note: Normally the Windows programme batchCOM, supplied by Nobel Weighing Systems, is used to edit parameters using a remote computer, and therefore this information is only useful if you are writing your own set-up program.

Data type: Float (2 reg./value)	Data type: Modicon float (2 reg./value)	Description	R/W
40368	45368	Not stored calibration points during dead-weight calibration. Bit 0 indicates point 1 not stored, bit 1 point 2 and so on...	R
40370	45370	Program options enabled Bit 0 - Batching, Bit 1 - Flow rate, Bit 2 - Option 3 ..... Bit 8 - Option 9.	R
40372	45372	Always 0.	R
40374	45374	Total number of batching and recipe parameters.	R
40376	45376	Location of first string set-up register. All strings occupies 6 Modbus registers.	R
40378	45378	Number of string set-ups.	R
40380	45380	Location of first normal set-up register. (normally 41000). If 'Modicon float' is used, add 5000 to this value.	R
40382	45382	Number of normal set-ups.	R
40384	45384	Location of first application programme specific set-up register. If 'Modicon float' is used, add 5000 to this value.	R
40386	45386	Number of application specific set-ups (normally 0).	R
40394	45394	Set-up version.	R
40396	45396	Set-up data version.	R
41000 – 41399	46000 – 46399	Set-up registers. Registers containing the set-up parameters. See section 3 and 8.	R/W *
41400 - 41461	46400 - 46461	Registers containing batching parameters. See section 7.	R/W
41462 - 41583	46462 - 46583	Registers containing recipe parameters. See section 7.	R/W

*/ Only possible to write in 'Remote set-up' state!

Data type: Strings	Description	R/W
44702 - 45025	String set-ups (54 strings with 6 registers each).	R/W

How to edit set-up registers

Example: Change resolution to 0.2.

- Start by setting coil 100 (or command 100) ‘Enter Remote Set-up’.
- Locate the resolution parameter in section 3. This gives modbus register 41030.
- Set resolution ‘0.2’ by sending ‘7’ to modbus register 41030.
- Proceed with changes of all the parameters that are to be changed.
- Finish by setting coil 102 (or command 102) ‘Exit Remote Set-up/Restore and save changes’.

TAD 3 makes a reset and the changes goes in action.

See section 3 and other parts describing the set-up for more information.

I/O bits (Coils)

TAD 3 has a number of I/O bits that the master can write to using Modbus function 05 or 15.

Each of these I/O bits are linked to a command in TAD 3, which is described previously in this manual.

Set the I/O bit with the same number as the command that should be executed.

The action is activated if the master sets the I/O bit to 'ON'.

If the master sets the I/O bit to 'OFF', this is accepted, but no action is activated.

All I/O bits are WRITE ONLY. This means the master cannot read the I/O bits but only write to them.

Note: If the master tries to write to more than one I/O bit (Modbus function 15) the TAD 3 will act on the lowest I/O bit number only.

Data representation

Data sent to and from the TAD 3 uses 16 bit holding registers (40XXX) and can use different formats for flexibility.

Integer

Unsigned integer (1 modbus register)

Values stored in one modbus register as an unsigned integer
(16 bit number without decimals).

Scaled integer (2 modbus registers + 1 modbus register = 3 modbus registers)

Values stored in a special 3 register format. The first two registers are used as a 32 bit long integer value (with sign) and the third register is holding the number of decimals in the value.

Example: 12345678 (32 bit number) in the two first registers and 3 in the third register gives the value: 12345.678.

Register	Hex	Decimal	Description
1	00BC	188	The 16 most significant bits in the value.
2	614E	24910	The 16 least significant bits in the value.
3	0003	3	The number of decimals.

Calculations in decimal numbers:

First multiply the most significant register with 2^{16} (65536) and add the least significant register to the value.

$188 * 2^{16} + 24910 = 12345678$

Now divide the number to get the right number of decimals. The decimal register was set to 3 in this example, which gives the value $10^3 = 1000$ to divide with.

12345678 / 1000 = 12345.678

Note: If your PLC system can't handle 32 bit values, the second register can be used as a 16 bit register with the number of decimals that is indicated in the third register. This will limit the value range to -32768 to +32767. This must be regarded in the calibration of the instrument. Flags in Status register 1 indicates when the weights are bigger than a 16 bit integer. These flags can be checked to be sure that the weight fits in just one register.

Float, Modicon float

Values stored as standard IEEE 32 bit float values. Each value has two registers assigned to it. To read/write a float value an even number of Modbus registers, starting at an even address, must be read/written each time.

The float values are stored in two different register orders. Some devices may transfer the values with the high order bits in the first register and the low order bits in the second register. Other devices may invert the register order.

Modicon float: For true Modicon PLC's, use these registers.

Float: Many third party controllers that support Modicon protocol use the float format where all bytes are written out in order to one 32 bit register, as opposed to Modicon float which uses 2 consecutive 16 bit registers. Use these registers for these types of controllers.

When float registers representing bits are read, the bits set are returned as a float value.

For example if bit 4 is set the value 16.0 is returned as a float value, and if both bit 0 and bit 4 are set the value 17.0 is returned as a float value. To use the value it's a good choice to convert it to an unsigned integer where the bits can be compared.

Strings

Each modbus register holds two 8 bit ASCII characters.
Each string consists of 12 characters.

Writing strings:

- Must start writing on a valid string start address.
- All data in the string (1 - 6 registers) must be written in one command.
- Unused characters up to position 12 will automatically be filled with spaces.

Reading strings:

- Start reading at any position in the string.
- No null character is added at the end.
- Not used characters are returned as spaces.

Example: Instrument name (NOBEL): 44696

Register	Hex	Decimal	Description
44696	4E 4F	20047	NO
44697	42 45	16965	BE
44698	4C 20	19488	L

Exception responses

When the master sends a query to a slave it expects a normal response (as described earlier). One of the following three events occur after a query from the master.

1. Normal response.
The slave has received the query without communication error and can handle the query normally. The slave returns a normal response.

2. Communication error.
If the slave does not receive the query due to a communication error, or detects some communication error (parity error or checksum error), **no** response is returned. The master should process a time-out for the query.

3. Command error.
If the slave receives the query without any communication error, but cannot handle the query, e.g. if the command was not valid, the requested register number not valid or TAD 3 in a mode where the command was not allowed, then the slave will return an exception response informing the master of the nature of the error.

The following exception codes are possible.

Code	Name	Description
01	Illegal function	Not a valid function code. Valid function codes are 01, 02, 03, 05, 06, 08, 15, 16.
02	Illegal data address	Not a valid data address. See ‘Register description’ for a list of allowed registers.
03	Illegal data value	Value in data query field not valid. To get a better explanation of the error, the ‘command error’ register could be read.
07	Negative acknowledgement	TAD 3 has received the query but cannot perform it. To get a better explanation of the error, the ‘command error’ register could be read.

Supported Modbus functions

Function	Description
01 Read Coil Status	Reads the state of discrete outputs (0X references, coils). Only implemented because some 'masters' use this function to initiate communication. Coil range: 1 – 16 (Max number of points to read: 16). Response: Zero (OFF) for all requested points.
02 Read Input Status	Reads the state of discrete inputs (1X references). This function is implemented only because some 'masters' use this function to initiate communication. Input range: 1 – 16 (Max number of points to read: 16). Response: Zero (OFF) for all requested points.
03 Read Holding Reg.	Reads the binary contents of holding registers (4X references). Max number of registers to read: 100
05 Force Single Coil	Forces a single coil (0X references) to either ON or OFF. This function is used to activate commands in TAD 3.
06 Preset Single Reg.	Presets a value into a single holding register (4X references).
08 Diagnostics	This function can provide a series of different communication tests, depending on a sub function code. TAD 3 supports only sub function code 00, which is a 'loop-back' test. The same data as received will be sent back to the master. Max number of data bytes: 64
15 Force Multiple Coils	Forces each coil (0X references) in a sequence of coils to either ON or OFF. This function is used to activate commands in TAD 3. Max. number of points: 16 (only the first is used).
16 Preset Multiple reg.	Presets values into a sequence of holding registers (4X references). Max number of registers to preset: 100

Note: No broadcast messages are allowed.

It is possible to send or fetch any number of registers (max 100) or I/O bits (max. 16). If the master tries to read more registers than there are available, the TAD 3 module will send dummy values for those registers not available.

External display

General

The transmitted value is adapted for Newport/London external displays with 4, 5, 6 or 7 digits and the Intrinsic safety indicator MTL 643 with 32 characters.

Setup of external display

COMx: Mode: Ext. display.

COMx:Baudrate: As selected on external display.

COMx:Data format: As selected on external display.

Ext. disp.mode: The wanted presentation on the external display. (Gross weight, Net weight, Displayed weight or Flow rate.)

Ext. disp.format: Depending on type of external display as described in the following tables.

Type	Description
4 (digits)	Four digit indicator. Display: -999 – 9999 (plus decimal point).
5 (digits)	Five digit indicator. Display: -9999 – 99999 (plus decimal point).
6 (digits)	Six digit indicator. Display: -99999 – 999999 (plus decimal point). Possible gross/net indicators will be activated.
7 (digits)	Seven digit indicator. Display: -999999 – 9999999 (plus decimal point).
32 (char.)	MTL 643 indicator. Display: -999999 – 9999999 (plus decimal point).

External display with 4 to 7 digits

The external display normally shows the current weight/flow, but under the following conditions only 'dashes' (-----) are displayed:

- the number of digits in the transmitted weight/flow value is outside the display range.
- the instrument is not in normal state or there is a weight error.

Definition of weight/flow value to external display with 4, 5, 7 digits:

Character No.	Value alphanumeric.	Value Hex	Function
1		02	Start character (STX).
2 to 5 – 9	0 – 9, . , -	30 – 39,2E,2D	*/ Weight/flow value: 4, 5 or 7 digits and a possible decimal point. (The first digit may be a minus sign).
Last		0D	End character (CR).

Definition of weight/flow value to external display with 6 digits:

Character No.	**Value alphanumeric.**	**Value Hex**	**Function**
1		02	Start character (STX).
2	H, M, blank	48, 4D, 20	This character is present only if 6 digits is selected in 'Ext. disp.format'. H = gross weight is transmitted. M = net weight is transmitted. blank = flow, or no valid weight is transmitted.
3 to 8 or 9	0 – 9, . , -	30 – 39,2E,2D	*/ Weight/flow value: 6 digits and a possible decimal point. (The first digit may be a minus sign).
Last		0D	End character (CR).

Note: */ The number of digits in the value (including a minus sign, if present) will equal the number of digits selected in 'Ext. disp.format'.
Leading zeros will be added to fill up to the selected number of digits.
The decimal point does not occupy any digit position.

External display MTL 643

This external display can handle both digits and characters and has therefore some special extra features. The value is always shown with the chosen unit and when there is an error, the display indicates ‘error’ instead of just ‘----’. The error message is shown when there is an internal error in the TAD 3 or the number of digits in the transmitted value is outside the indicators range.

A time-out is set to 10 seconds in the MTL 643, which means that if there is a communication error etc. ‘TIMEOUT’ will flash on the MTL 643 when the time-out has passed.

Example of the weight shown on MTL 643.

‘Gross’ and ‘Net’ will replace each other.

‘Motion’ and ‘Good zero’ will replace each other.

When a flow value is shown, these texts are replaced by ‘Flow rate‘.

Button 1 on MTL is dedicated to: TARE

Button 2 on MTL is dedicated to: G/N

Button 3 on MTL is dedicated to: PRINT

Printing

The print function is designed to work best with a 40 characters printer.

Printout types

The following types of printout can be obtained:

- Printout of displayed weight (flow rate).
- Printout of accumulated weight.
- Printout of preset tare.
- Printout of level and setpoint values.
- Printout of set-up list.
- Batch printouts.

Setup of printer

COMx: Mode: Printer or Printer 850

Printer: ASCII characters (1-127 dec.). with international character codes described in the table below.

Printer 850: Multilingual character set known as Code Page 850 (1-255 dec.)

Printers are using different character codes for the international characters found in the Swedish, German and French language. Depending on if 'Printer' or 'Printer 850' is chosen and depending on the chosen language in the instrument, different character codes are used.

When 'Printer' is chosen, the printer should be set to the same language as the language used in TAD 3 if possible.

Table showing character codes used for different settings of 'COMX Mode' and 'Language' in TAD 3.

All numbers stated in decimal representation

Character in TAD 3	**Mode: Printer** **Language: Sve./Eng./Suo.**	**Mode: Printer** **Language: Deut./Ned.**	**Mode: Printer** **Language: Fra./Esp.**	**Mode: Printer 850**
å	125 (})	97 (a)	97 (a)	134
ä	123 ({)	123 ({)	97 (a)	132
ö	124 (|)	124 (|)	111 (o)	148
ü	126 (~)	125 (})	117 (u)	129
Å	93 (])	65 (A)	65 (A)	143
Ä	91 ([)	91 ([)	65 (A)	142
Ö	92 (\)	92 (\)	79 (O)	153
Ü	85 (U)	93 (])	85 (U)	154

(continued)

(continued)

Character in TAD 3	Mode: Printer Language: Sve./Eng./Suo.	Mode: Printer Language: Deut./Ned.	Mode: Printer Language: Fra./Esp.	Mode: Printer 850
ô	111 (o)	111 (o)	111 (o)	147
ç	99 (c)	99 (c)	92 (\)	135
Ç	99 (c)	99 (c)	92 (\)	128
à	97 (a)	97 (a)	97 (a)	133
è	101 (e)	101 (e)	125 (})	138
é	96 (`)	101 (e)	123 ({)	130
ê	101 (e)	101 (e)	96 (`)	136
ß	115 (s)	126 (~)	115 (s)	225

COMx:Baudrate: As selected on the printer.

COMx:Data format: As selected on the printer.

Printer pos 1 – 4: For flexibility it's possible to select the use of four different printer fields with the size of 20 characters each. The fields can be either: 'Not in use' , 'Disp.weight', 'Date/Time', 'Instr.name' or 'Preset tare'. This layout is only used when the displayed weight is printed, using the 'PRINT' button.

Printer pos.1	Printer pos.2
Printer pos.3	Printer pos.4

The layout of the printer fields.

If both positions on a row are set to 'Not in use' that row is omitted.

Printer linefeed: After each printout of displayed weight, ordered with the 'PRINT' button, the amount of linefeeds defined in this parameter is added.

Print examples

Printout of displayed weight/flow rate (Print button pressed)

Printer pos.1 = Date/Time Printer pos.2 = Instr. name
Printer pos.3 = Not in use Printer pos.4 = Disp. weight
Printer linefeed = 0 Instrument name = Ice cream

```
  2003-04-02 02:45    Ice cream
                      N   078.3 kg
  2003-04-02 02:46    Ice cream
                      G   088.7 kg
  2003-04-02 02:47    Ice cream
                          286.0 kg/min
```

(net weight is displayed)

(gross weight is displayed)

(flow rate is displayed)

Printout of accumulated weights for recipe

```
- - - - - - - - - - - - - - - - - - - -
  2003-04-02 02:49    Ice cream
  Accumulated weight, recipe
  R01:Vanilla         324.500kg
  R02:Strawberry      209.000kg
  R04:Chocolate       68.200kg
  . . . . .
- - - - - - - - - - - - - - - - - - - -
```

Printout of preset tare

```
- - - - - - - - - - - - - - - - - - - -
  2003-04-02 02:49    Ice cream
  Preset tare         23.0   kg
- - - - - - - - - - - - - - - - - - - -
```

Printout of used levels and setpoints

```
- - - - - - - - - - - - - - - - - - - -
  2003-04-02 02:49    Ice cream
  Level 1             100.0  kg
  Level 2             150.0  kg
  Level 3             168.0  kg
  Setpoint 1          198.5  kg
- - - - - - - - - - - - - - - - - - - -
```

Printout of set-up list

```
- - - - - - - - - - - - - - - - - - - -
  2003-04-02 02:47    Ice cream
  TAD 3 (T131L240)    12-2183

  Language            English
  Start mode          Auto
  Display info        Date/Time
  Display contrast    4
  Backlight           5
  Date format         YYYY-MM-DD
  Gross/Net key       On
  Tare key            On
  Print key           On
  Zero key            On
   .....
```

Printout of RECIPE

```
- - - - - - - - - - - - - - - - - - - - -
  2003-04-02 10:09    Ice cream
  TAD 3 (T131L240)    12-2183

  01:Recipe name      Vanilla
  L01,act             01:Cream
  L01,setp            60.0   kg
  L02,act             02:Stirrer
  L02,setp            3.0    s
  L03,act             03:Vanilla
  L03,setp            20.0   kg
  L04,act             00:---
  L05,act             00:---
  L06,act             00:---
  L07,act             00:---
  L08,act             00:---
  L09,act             00:---
  L10,act             00:---
  L11,act             00:---
  L12,act             00:---
  L13,act             00:---
  L14,act             00:---
  L15,act             00:---
  L16,act             00:---
  L17,act             00:---
  L18,act             00:---
  L19,act             00:---
  L20,act             00:---
  L22,act             00:---
  L23,act             00:---
  L24,act             00:---
  L25,act             00:---
  L26,act             00:---
  L27,act             00:---
  L28,act             00:---
  L29,act             00:---
  L30,act             00:---
- - - - - - - - - - - - - - - - - - - - -
```

Printout of BATCH DATA

```
- - - - - - - - - - - - - - - - - - - - -
  2003-04-02 10:09    Ice cream
  Batching
  Recipe              01:Vanilla
  Num. of batches     2
  Batch size          100    %
- - - - - - - - - - - - - - - - - - - - -
```

Printout of ONLY ALARMS REPORT

```
- - - - - - - - - - - - - - - - - - - - -
  2003-04-02 Ice cream   BATCH:000001
  10:10 R01,A01:*SETPOINT ALARM*
- - - - - - - - - - - - - - - - - - - - -
```

Printout of FULL REPORT

```
- - - - - - - - - - - - - - - - - - - - -
  2003-04-02 10:10    Ice cream
  Batching report
  Recipe              01:Vanilla
  Num. of batches     2
  Batch size          100    %
- - - - BATCH NUMBER: 000001 - - -
  10:10 A01:Cream
        SP:   60.0 kg  W:   60.1 kg
  10:10 A02:Stirrer
        SP:    3.0 s   Timer finished
  10:11 A03: Vanilla
        SP:   20.0 kg  W:   20.1 kg
  10:11 SUBTOTAL: 80.200 kg
- - - - BATCH NUMBER: 000002 - - -
  10:11 A01:Cream
        SP:   60.0 kg  W:   60.1 kg
  10:11 A02:Stirrer
        SP:    3.0 s   Timer finished
  10:12 A03:Vanilla
        SP:   20.0 kg  W:   20.0 kg
  10:12 SUBTOTAL: 80.100 kg
  10:12 BATCHING FINISHED
- - - - - - - - - - - - - - - - - - - - -
```

Printout of LIMITED REPORT

```
- - - - - - - - - - - - - - - - - - - - -
  2003-04-02 10:10    Ice cream
  Batching report
  Recipe              01:Vanilla
  Num. of batches     2
  Batch size          100    %
- - - - BATCH NUMBER: 000001 - - -
  10:10 A01:Cream
        SP:   60.0 kg  W:   60.1 kg
  10:11 A03: Vanilla
        SP:   20.0 kg  W:   20.1 kg
  10:11 SUBTOTAL: 80.200 kg
- - - - BATCH NUMBER: 000002 - - -
  10:11 A01:Cream
        SP:   60.0 kg  W:   60.1 kg
  10:12 A03:Vanilla
        SP:   20.0 kg  W:   20.0 kg
  10:12 SUBTOTAL: 80.100 kg
  10:12 BATCHING FINISHED
- - - - - - - - - - - - - - - - - - - - -
```

7. Recipe batching (program option)

Contents:

General

Weight Indicator TAD 3 with programme name T131L240 includes a program option for ‘Recipe batching’. The option can be activated by an individual code for each instrument. The code can be ordered from Nobel Weighing Systems and should be entered in menu ‘Program options’ in ‘Edit set-up’ under the instrument Main menu. See page 3-34 in this manual for instructions.

By batching, more digital inputs and outputs may be needed. Connection of one to four additional units DIO 3R will give the instrument TAD 3 maximum 34 digital inputs and 34 digital outputs. See section 9.

Front panel

When TAD 3 is in normal operation and ‘Recipe batching’ is activated, the texts ‘BATCH’ and 'RECIPE' are displayed at the two function keys to the left.
Two front panel keys get specific batching functions:

the key **-** (minus, with a green start symbol) will get the start batch function,

the key **.** (point, with a red stop symbol) will get the stop batch function.

Batching principles

In the instrument TAD 3 with recipe batching, 30 recipes are available; each of them including 30 lines where defined activities and setpoint values can be entered.
Up to 24 activities can be defined, and by connection of external units DIO 3R the instrument can get up to 32 added inputs and outputs.
By batching TAD 3 performs the activities of the selected recipe as one sequence. The batching sequence can be repeated a defined number of times.
As batching is performed, the instrument function is supervised and possible alarms will be given. Printing of alarms and batched weights can be performed on a connected printer.
Activation of 'Recipe check' will make the instrument start the batching by performing a simulation of the recipe.

During batching sequences, the signals ‘B.inprogress’ (batching in progress), ‘B. stopped’ (batching stopped), and ‘Batch. alarm’ (batching alarm) will be indicated on digital outputs from TAD 3, according to the configuration in menu ‘Edit set-up’ / ‘Outputs’.
Output ‘B.inprogress’ will be active during the entire batching.

Batching activities

Up to 24 activities can be defined and edited without restrictions.
Each activity is defined, starting from a selected type of activity which has a number of parameters that can be edited.
The following types of activities are available for the recipe batching sequences:

Weigh in	used to batch a component into the weighed vessel (batch in).
Weigh out	used to batch from a previously filled, weighed vessel (batch out). Displayed weight during **Weigh out** is always negative.
Dump	used to empty a vessel into which components have been batched.
Fill	used to fill up a vessel to a certain level.
Timer	used to pause the batching sequence for a defined time.
Timer w.outp	used to activate an output for a defined time.
Latch on	used to activate an output signal.
Latch off	used to deactivate an output signal.
Manual	used to halt the batching, making it possible to manually add special material. Then batching must be manually restarted.
Pulse batch	used for batching with the aid of pulses from a flow meter.

Recipes

Up to 30 recipes can be created and edited without restrictions. Each recipe can have up to 30 lines of instructions that will be performed in numerical order.
On each used recipe line one of the defined batching activities is selected.
Activities of the types **Weigh in, Weigh out, Timer, Timer w.outp, Manual,** and **Pulse batch** also require Setpoint values. If the Setpoint is set to 0 the batching sequence will jump that activity.

Parameters of the recipe that is being batched cannot be edited. But the parameters of all other recipes can be edited during the batching.

All Setpoint values are included in the recipe data and can be shown and edited in menu ‘Recipe’. To open the 'Recipe' menu, press the function key 'RECIPE' in the normal weight display of the instrument.
The menu 'Recipe' can be protected by a password.

Weigh in and **Weigh out**	The Setpoint value determines the component quantity, expressed in the measurement unit.
Timer and **Timer w.outp**	The Setpoint value determines the duration of the activity, expressed in seconds with max. one decimal. The range is 0.0 to 999999.0 seconds.
Manual	The Setpoint value normally determines a small component quantity to be added manually.
Pulse batch	The Setpoint value determines the component quantity, expressed in the pulse batching unit.

The activity types **Dump**, **Fill**, **Latch on** and **Latch off** do not require Setpoint values.

Recipe check

In program option Recipe batching the function Recipe check is included. When that function is activated the instrument will start each batching by a simulation of the recipe. TAD 3 will give an alarm if the batch cannot be performed due to for example lack of material or insufficient weighing capacity.
Activate the function in the instrument 'Main menu' / 'Batching parameters' by setting parameter 'Recipe check' to 'Yes'.

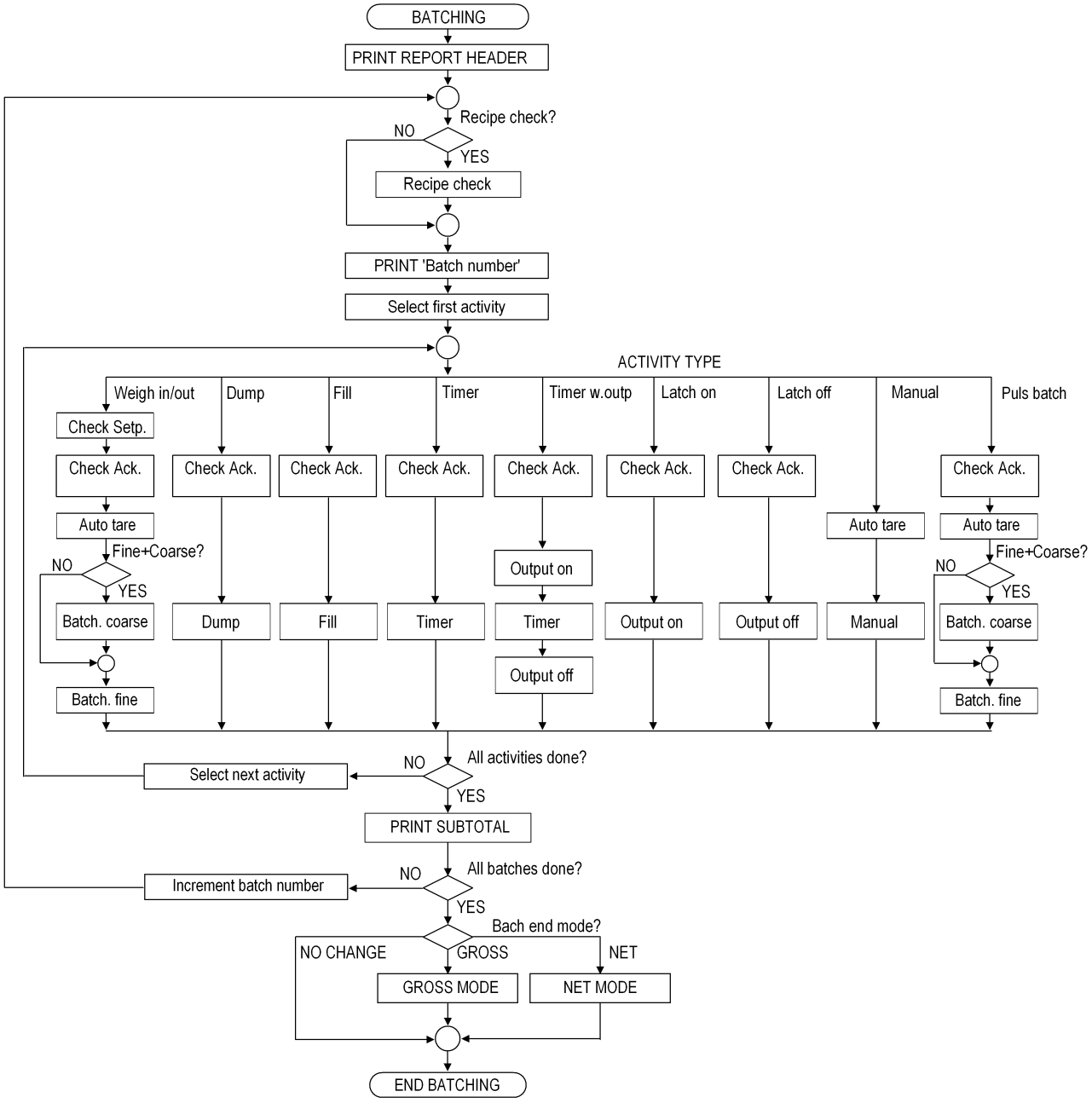


Figure 16. Principles for how batching is carried out. The batching sequence is a recipe that can include up to 30 activities. 30 such recipes can be stored in TAD 3.

Description of activity types

Weigh in

When a Weigh in activity is started, the Setpoint value is checked to determine if the receiving container has sufficient capacity for the set quantity of material. The implication of this Setpoint check is that actual Gross weight + Setpoint value must be less than **`Capacity`** for the scale.

If the remaining scale capacity is not sufficient an alarm message will be displayed and printed, the batching sequence will be halted and all batching outputs broken. When the alarm cause has been cured the alarm can be reset and the batching restarted.

When the Setpoint value has been checked and accepted, the acknowledgement input signal is checked (not if **`Ack.type`** is **`No test`**).
An unsatisfactory signal will initiate an alarm (if **`Ack.type`** is **`At start`** or **`Continuous`**), and if **`Ack.type`** is **`Wait`** or **`Wait+contin.`** the instrument will wait (without alarm) until the acknowledgement input signal is received.
When the acknowledgement signal is correct the batching sequence continues.

The instrument waits for the weight to become stable before Auto taring is performed (if **`Motion check`** is **`On`**). Alarm is never initiated by an unstable weight in conjunction with start of batching. After the instrument is tared it switches to net weight and displays zero weight.

If **`Batching mode`** is **`Fine+Coarse`** the Coarse output (and also the Fine output if **`F.on during C.`** is **`Yes`**) is now activated. The instrument shows increasing weight. When the weight reaches 'coarse level' the Coarse output is deactivated ('coarse level' = Setpoint – **`Fine value`** – **`Inflight value`**).

The Fine output (or if **`Batching mode`** is **`One phase`**, the output defined in parameter **`Output no`**) is then activated (if not activated earlier).
When the increasing weight reaches 'inflight level' the output is deactivated ('inflight level' = Setpoint – **`Inflight value`**). The **`Inflight value`** is adjusted automatically after each batching if the activity parameter **`Inflight factor`** is set to a value higher than zero.

The instrument waits equivalent to **`Wait time`**, a time that must be set so that all material is really stable on the scale before the waiting time has expired.

The following operations are also performed:

- Stability and tolerance check.
- Printout of batched weight.
- Adding of batched weight to the accumulated weight register.

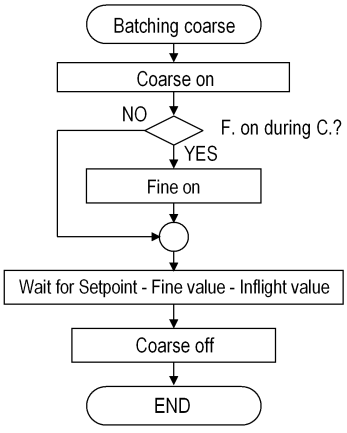


Figure 17. Flow chart for batching step "Batching coarse".

The total batching time for the activity is monitored and if the time exceeds the set **`Timeout value`**, an alarm will be initiated. Timeout count will start when the acknowledgement signal is received and stop during possible batching halts. Timeout count starts all over again when a Timeout alarm has been reset and batching has been restarted.

Stability and tolerance check
After the complete batching of a Weigh in (or Weigh out) activity (and Wait time), a stability check is performed if **`Motion check`** is **`On`** (stability check is never performed for a Pulse batching activity).

Unstable weight initiates an alarm. A second weight stability check is performed at restart, implying that the weight MUST be stable for the instrument to continue the batching sequence. If stable weight cannot be obtained, batching must be reset or the ongoing activity skipped.

The batched weight is always checked against the set tolerance limits.
One parameter defines the **`Minus tolerance`** (weight below the Setpoint value) and the other defines the **`Plus tolerance`** (weight above the Setpoint value).
The tolerance setting range is 0.00 - 100.00 %.
100.00 % means that tolerance check is not performed (all weights are approved).
5.00 % means that the batched weight is permitted to deviate from the Setpoint value by 5 % thereof.

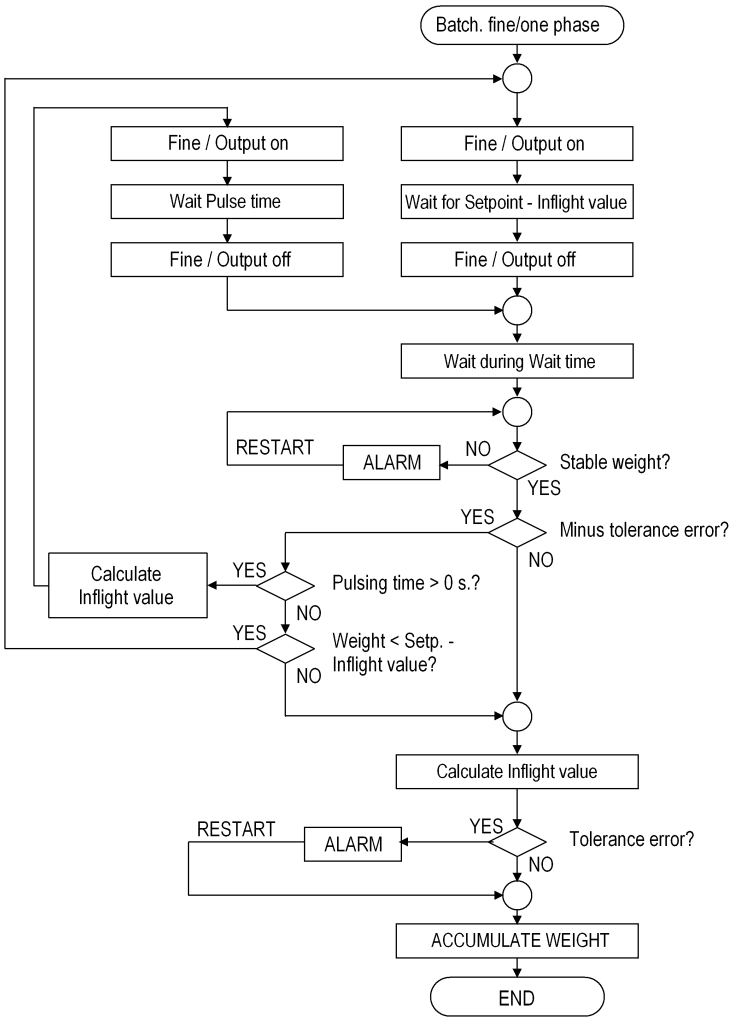


Figure 18. Flow chart for batching steps "Batching fine" and "Batching one phase".

If the weight is below the **Minus tolerance** limit, and a **Pulsing time** other than zero is selected, the fine output will be activated again for the time defined by the parameter **Pulsing time**. After the **Wait time** a renewed tolerance check will be performed.
If the weight value is still below the **Minus tolerance** limit, pulsing of the fine output will be performed repeatedly until the weight value is above the **Minus tolerance** limit. Selection of a **Pulsing time** other than zero makes it possible to ensure that the obtained batch weights will never be below the **Minus tolerance** limit.

If **Pulsing time** is zero and the weight value is below the **Minus tolerance** limit, batching will recommence in the fine phase if the remaining weight up to the Setpoint value is greater than the **Inflight value**.

In other cases an alarm will be obtained. An alarm is always obtained if the weight value exceeds the **Plus tolerance** limit.

The operator can bypass these tolerance alarms by resetting the alarm and restarting the batching sequence. Either the erroneous weight can be accepted or other manual adjustments can be made before batching is restarted. When restarting after a tolerance alarm a second tolerance check will *not* be performed but the actual weight will be used for accumulation and printing.

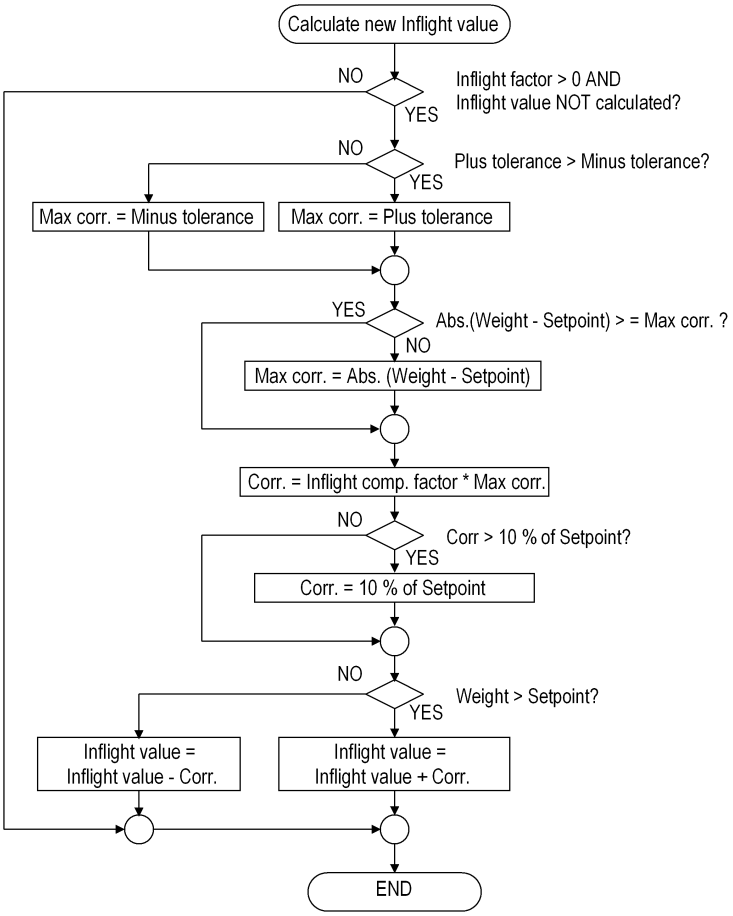


Figure 19. Automatic adjustment of Inflight value.

Automatic inflight compensation
Automatic inflight compensation is operative when the **Inflight factor** has a value higher than zero. It is used to adjust the **Inflight value** after each activity to bring the batched weight value as close to the Setpoint as possible.

Automatic inflight compensation for any activity is performed by:
New **Inflight value** = preceding **Inflight value** +
(batched weight - Setpoint value) x **Inflight factor**.

The range of the **Inflight factor** is 0 - 100 % (0 % means no compensation). A 50 % **Inflight factor** adjusts the **Inflight value** by 50 % of the difference between batched weight and Setpoint value.

Figure 18 shows where in the sequence the **Inflight value** is calculated. (Note that the calculation is performed prior to possible pulsing).

Figure 19 describes the Inflight value adjustment. Usually, the difference between batched weight and Setpoint value is the starting point for the changes.

The difference between batched weight and Setpoint value is limited to the largest value of Setpoint value × **Plus tolerance** or Setpoint value × **Minus tolerance**. This limitation ensures that the correction (for example, by a possible tolerance error) will not be completely unreasonable. The correction of the **Inflight value** is always limited to 10 % of the Setpoint value.

Weigh out

Weigh out is very similar to Weigh in, but batching is done from an already filled vessel. The only difference being that the Setpoint value is checked to determine that a sufficient material quantity is available in the container. The requirement is for the gross weight to be larger than the Setpoint value + 20 × **Resolution**. If this requirement is not satisfied an alarm is initiated.

The weight display during this type of batching is always negative.

Pulse batching

The **Pulse batching** activity is very similar to the activities Weigh in and Weigh out, but the **Pulse batching** activity does not use the measured weight value for the batching. Instead it counts pulses (normally from a flow meter) that are scaled to a weight, volume or any other unit. Another difference is that there are no stability and setpoint checks included in the **Pulse batching** sequence.

There are four more parameters in this activity, defining the input for pulses (**Pulse input no**), the number of decimals for pulse batching (**No of decimals**), the pulse batching unit (**Unit**), and the number of pulses/unit (**Scale factor**).

NOTE! For a pulse batching activity the **weight** in this manual should be read as ‘No of counted pulses × Scale factor’.

Dump

Only emptying of the vessel into which the components have been batched is performed by this activity.

The acknowledgement signal will be checked (except when **Ack.type** is **No test**). An unsatisfactory signal will initiate an alarm (if **Ack.type** is **At start** or **Continuous**). And if **Ack.test** is **Wait** or **Wait+contin.**, the instrument waits (without alarm) until the acknowledgement signal is received. Whenever an alarm has been obtained Reset alarm and Restart are required. When the acknowledgement signal is correct the instrument switches to display of gross weight.

The dump output (defined in parameter **Output no**) is activated. When the gross weight has come down to the **Low level** a timer is started. This is a low-weight value, which is used to obtain a detectable weight value close to zero.

After a time equivalent to **Wait time**, the dump output is deactivated. **Wait time** must be selected long enough to allow all material left at the dump low level to leave the vessel during this time.

The total dumping time is monitored and if it exceeds the set **Timeout value**, an alarm will be obtained. Timeout count will start when the acknowledgement signal is received and stop during possible batching halts.

Timeout count starts all over again if a Timeout alarm has been reset and dumping has been restarted.

Fill

This activity type is used to fill a vessel with material.

The acknowledgement signal will be checked (except when **Ack.type** is **No test**). An unsatisfactory signal will initiate an alarm (if **Ack.type** is **At start** or **Continuous**). And if **Ack.test** is **Wait** or **Wait+contin.**, the instrument waits (without alarm) until the signal is received. Whenever an alarm has been obtained Reset alarm and Restart are required. When the acknowledgement signal is correct the gross weight is checked.

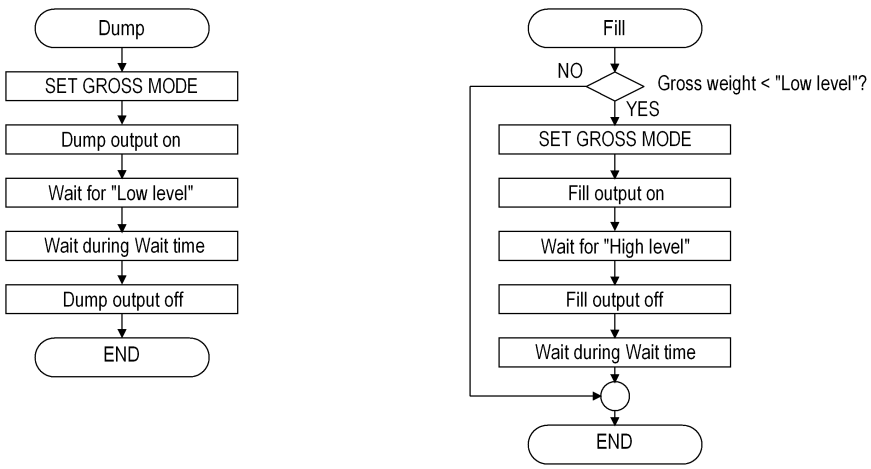


Figure 20. Flow charts for the Dump and Fill activities.

If the gross weight is below **Low level** the instrument switches to display of gross weight and activates the Fill output (defined in parameter **Output no**), else nothing more is done in the activity.

When the gross weight has come up to the **High level** the output is deactivated.

The instrument waits equivalent to **Wait time**. It must be set so that all material is really on the scale before the waiting time has expired.

The total filling time is monitored and if the time exceeds the set **Timeout value** an alarm will be obtained. Timeout count will start when the acknowledgement signal is received and stop during possible batching halts.

Timeout count starts all over again if a Timeout alarm has been reset and filling has been restarted.

Timer and Timer with output

Timer activities are used to switch on an output signal for the set time or to give a 'pause' (without any output signal).

The acknowledgement signal will be checked (except when **Ack.type** is **No test**). An unsatisfactory signal will initiate an alarm (if **Ack.type** is **At start** or **Continuous**). And if **Ack.test** is **Wait** or **Wait+contin.**, the instrument waits (without alarm) until the acknowledgement input signal is received. Whenever an alarm has been obtained Reset alarm and Restart are required.

When the acknowledgement signal is correct the Timer output (defined in parameter **Output no**) is activated if **Activity type** is **Timer w. outp**.

The instrument counts down the time corresponding to Setpoint value (the count-down can be watched on the display). If batching is restarted after a temporary halt (due to, for example, an alarm) the time count starts from where it was stopped.

When the time has expired the output is deactivated (if it was active).

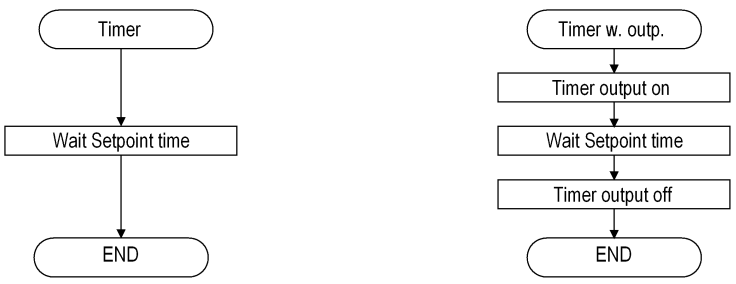


Figure 21. Flow charts for activities Timer and Timer with output.

Latch on

Latch on activities are used to switch on an output signal.

The acknowledgement signal will be checked (except when **Ack.type** is **No test**). An unsatisfactory signal will initiate an alarm (if **Ack.type** is **At start** or **Continuous**). And if **Ack.test** is **Wait** or **Wait+contin.**, the instrument waits (without alarm) until the signal is received. Whenever an alarm has been obtained Reset alarm and Restart are required.

When the acknowledgement signal is correct the output is activated.

The **On during halt** parameter determines if the output should be switched off or not during temporary halts.

Latch off

Latch off activities are used to switch off an output signal.

The acknowledgement signal will be checked (except when **Ack.type** is **No test**). An unsatisfactory signal will initiate an alarm (if **Ack.type** is **At start** or **Continuous**). And if **Ack.test** is **Wait** or **Wait+contin.**, the instrument waits (without alarm) until the signal is received. Whenever an alarm has been obtained reset alarm and restart are required.

When the acknowledgement signal is correct the output is deactivated.

Manual

Activity Manual halts the batching to allow special operations, which must be carried out manually. (For example, to add small quantities of material manually.) Before batching is halted autotaring is performed, which means that the net weight zero is displayed when the manual operation starts.
Batching must be manually restarted by the RESTART function key.

If **`Print weight`** is **`Yes`** then the weight value (weighed by the scale or entered manually) will be added to the accumulating registers and printed.
Parameter **`Enter weight`** defines whether the operator shall have the opportunity to enter the weight value for the added material manually, or not.
If parameter **`Enter weight`** is **`Yes`** but the operator does not enter a weight value manually, then the weight value from the scale will be used.

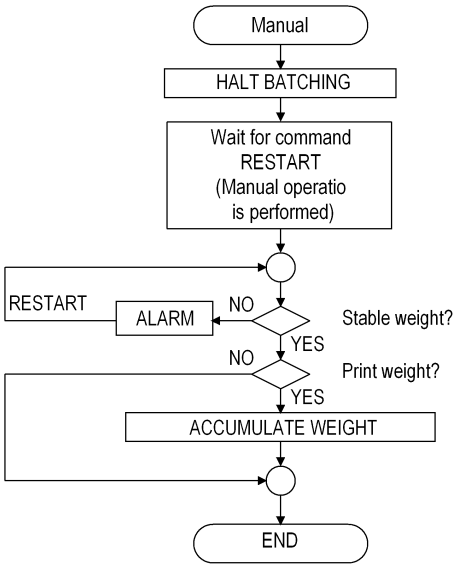
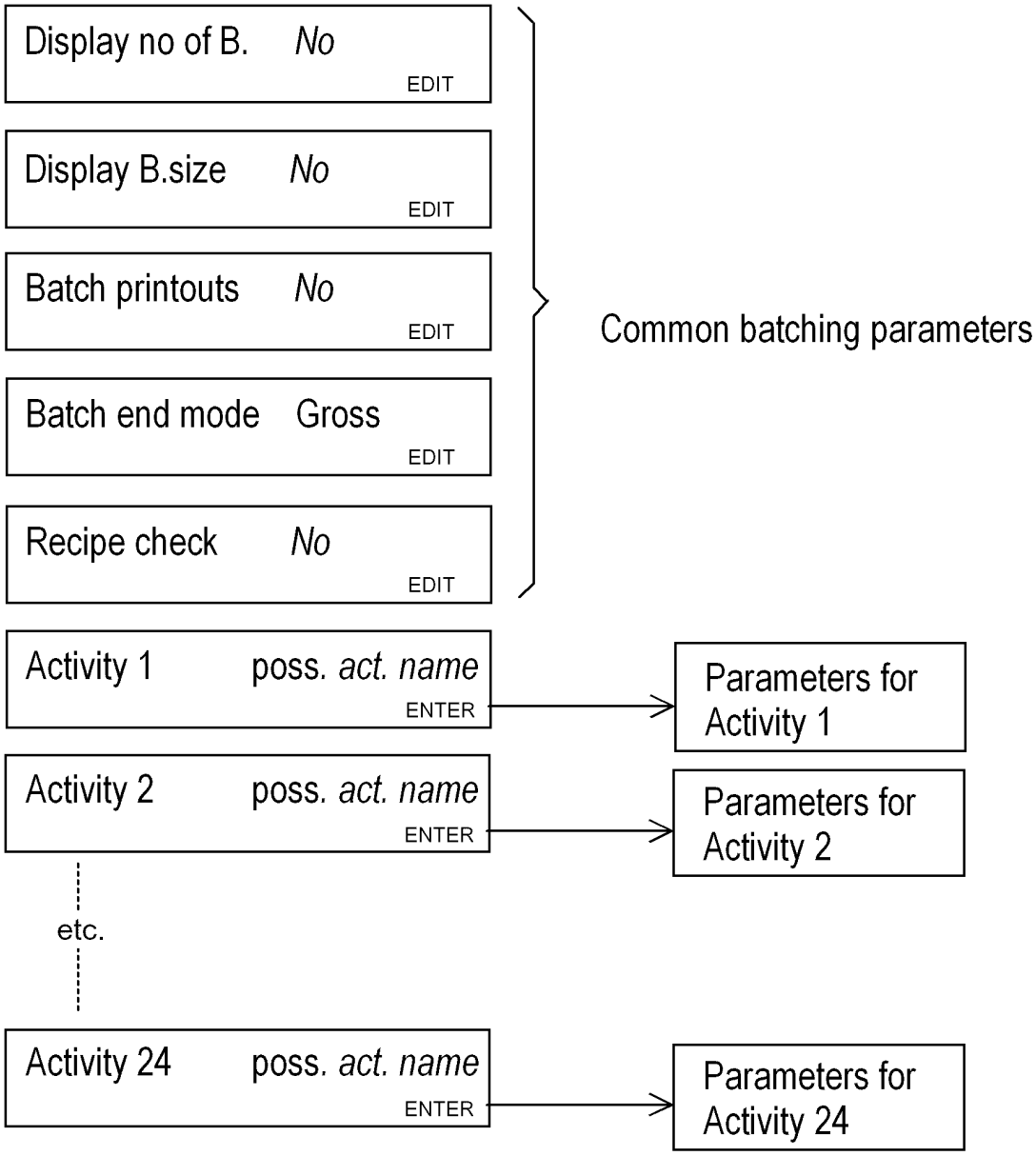


Figure 22. Flow chart for activity Manual.

Batching parameters survey



Batching parameters

Changing and storing

Data entered to define batching parameters are stored in power safe memory. Stored information will not be lost if the instrument is switched off.

Certain activity parameters are of a conditional type, implying that they do not appear unless another parameter has a certain value. These conditions are given in the explanation text for the parameters.

Parameter editing can be performed in menu ‘Batching parameters’, by the front panel keys or by serial communication. During normal measuring operation the menu ‘Batching parameters’ is available in the instrument Main menu, accessible by activation of the key marked '$\dot{\text{i}}$'.
If the normal measuring operation has been stopped the menu ‘Batching parameters’ is also available as a sub menu to ”Edit set-up”.

Parameters marked with * can also be edited during a batching in progress.

Printout (or manual recording) of all parameter settings is recommended after editing. These recordings will be extremely valuable if an instrument has to be replaced.

Printout of parameters can be ordered if a printer is connected.

A better way to make a backup file of all instrument settings is to use the PC-programme batchCOM from Nobel Weighing Systems.
You need the "Full Product" version of the programme.

Parameters

On the following pages a survey of all batching parameters is presented.
The batching parameters for activities are divided in groups following which activity type they belong to.

The first line shows the parameter name and the Modbus addresses, used for set-up by serial communication. The parameters are saved in two different float value formats, and consequently also in two different memory registers.

For choice parameters a list of available alternatives is displayed. At each alternative an index within [ ] is given, to be used by serial communication set-up.

For numerical parameters, a value range is given.

At the end of the table, the default value is given within < >.

To the right in the table there is a short parameter explanation and, *in italic,* the result for the different alternatives.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Menu ‘Batching parameters’

Display no of B. **Modbus: 41400 (46400)**

[0] No
[1] Yes
<No>

Defines if it should be possible to select several batches.
No: *Not possible to select a number of batches (always one batch).*
Yes: *Possible to select a number of batches.*

Display B-size **Modbus: 41402 (46402)**

[0] No
[1] Percent
[2] Weight
<No>

Defines if it should be possible to select a batch size.
No: *Not possible to select batch size (always 100% batch size).*
Percent: *Possible to enter a batch size in percent.*
Weight: *Possible to enter a batch size in weight units.*

Batch printouts **Modbus: 41404 (46404)**

[0] No
[1] Full report
[2] Limited rep.
[3] Only alarms
<No>

Defines the type of batch report.
No: *No batch report is printed.*
Full report: *Batched weights, alarms and other information are printed.*
Limited rep.: *Only batched weights and alarms are printed.*
Only alarms: *Only batch alarms are printed.*

Batch end mode **Modbus: 41406 (46406)**

[0] No change
[1] Gross
[2] Net
<Gross>

Selection of weight display mode after finished batching operation.
No change: *No change of mode.*
Gross: *Sets gross mode.*
Net: *Sets net mode.*

Recipe check **Modbus: 41408 (46408)**

[0] No
[1] Yes
<No>

Defines if a recipe check should be performed before the batching operation starts. See page 7-3.
No: *No recipe checks.*
Yes: *Every batch should be checked.*

Activity number **Modbus: 41410 (46410)**

1 to 24
<0>

This "parameter" is only used by writing and reading of activity parameters over serial communication (Modbus).

When writing or reading parameter values for an activity by Modbus you must start by writing the activity number into this "parameter" (Modbus register). Then the following parameters are valid for that activity number (except 'Activity name' that is handled separately).

By setup from the instrument front panel the display will show a list with 'Activity 1' to 'Activity 24'. Using the function keys you can select an activity and set or edit the parameter values for that activity.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

The instrument can store 24 sets of the following parameters (one set for each activity).

Activity type

Modbus: 41412 (46412)

[0]	Not used
[1]	Weigh in
[2]	Weigh out
[3]	Dump
[4]	Fill
[5]	Timer
[6]	Timer w. outp
[7]	Latch on
[8]	Latch off
[9]	Manual
[10]	Pulse batch
	<Not used>

Defines the type of activity.
Not used: *The activity is not used.*
Weigh in: *Weigh in activity.*
Weigh out: *Weigh out activity.*
Dump: *Dumping activity.*
Fill: *Filling activity.*
Timer: *Timer activity.*
Timer w. outp: *Timer activity with output.*
Latch on: *Latch on activity.*
Latch off: *Latch off activity.*
Manual: *Manual activity.*
Pulse batch: *Pulse batching activity.*

Activity name

Modbus: See table below

Activity name (12-character string) for each one of the 24 activities. The string data format is explained under Data representation in section Communication. Modbus-addresses are given in the table below. The activity name is used to identify the activity in the instrument and on printouts.

Activity	Modbus register	Activity	Modbus register	Activity	Modbus register
01	44702 – 44707	09	44750 – 44755	17	44798 – 44803
02	44708 – 44713	10	44756 – 44761	18	44804 – 44809
03	44714 – 44719	11	44762 – 44767	19	44810 – 44815
04	44720 – 44725	12	44768 – 44773	20	44816 – 44821
05	44726 – 44731	13	44774 – 44779	21	44822 – 44827
06	44732 – 44737	14	44780 – 44785	22	44828 – 44833
07	44738 – 44743	15	44786 – 44791	23	44834 – 44839
08	44744 – 44749	16	44792 – 44797	24	44840 – 44845

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Weighing In or Out (Activity type = Weigh in or Weigh out)

Batching mode

[0]	One phase
[1]	Fine+Coarse
	< Fine+Coarse >

Modbus: 41414 (46414)

Defines if it is a one phase batching or a Coarse/Fine batching.

One phase: *One phase batching (only one output).*
Fine+Coarse: *Coarse-fine batching (two outputs used).*

Output no

[0]	01
[1]	02
[2]	11
[3]	12
[4]	13
[5]	14
[6]	15
[7]	16
[8]	17
[9]	18
[10]	21
[11]	22
[12]	23
[13]	24
[14]	25
[15]	26
[16]	27
[17]	28
[18]	31
[19]	32
[20]	33
[21]	34
[22]	35
[23]	36
[24]	37
[25]	38
[26]	41
[27]	42
[28]	43
[29]	44
[30]	45
[31]	46
[32]	47
[33]	48
	<01>

Modbus: 41416 (46416)

Defines the output used for one phase batching.

For use of the outputs, see page 5-14.

If any of the outputs 01 – 28 should be used, it must be defined as **`B.activity`** in the set-up menu ‘Outputs’ (the other outputs are always defined as **`B.activity`**).

Note: This parameter is only shown if **`Batching mode`** is set to **`One phase`**.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Coarse outp. no		**Modbus: 41418 (46418)**
[0]	01	Defines the output used for coarse batching.
[1]	02	For use of the outputs, see page 5-14.
[2]	11	If any of the outputs 01 – 28 should be used, it must be defined as **`B.activity`** in the set-up menu 'Outputs' (the other outputs are always defined as **`B.activity`**).
[3]	12	
[4]	13	
[5]	14	
[6]	15	Note: This parameter is only shown if **`Batching mode`** is set to **`Fine+Coarse`**.
[7]	16	
[8]	17	
[9]	18	
[10]	21	
[11]	22	
[12]	23	
[13]	24	
[14]	25	
[15]	26	
[16]	27	
[17]	28	
[18]	31	
[19]	32	
[20]	33	
[21]	34	
[22]	35	
[23]	36	
[24]	37	
[25]	38	
[26]	41	
[27]	42	
[28]	43	
[29]	44	
[30]	45	
[31]	46	
[32]	47	
[33]	48	
	<01>	

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Fine output no		**Modbus: 41420 (46420)** Defines the output used for fine batching. For use of the outputs, see page 5-14. If any of the outputs 01 – 28 should be used, it must be defined as **`B.activity`** in the set-up menu 'Outputs' (the other outputs are always defined as **`B.activity`**). Note: This parameter is only shown if **`Batching mode`** is set to **`Fine+Coarse`**.
[0]	01	
[1]	02	
[2]	11	
[3]	12	
[4]	13	
[5]	14	
[6]	15	
[7]	16	
[8]	17	
[9]	18	
[10]	21	
[11]	22	
[12]	23	
[13]	24	
[14]	25	
[15]	26	
[16]	27	
[17]	28	
[18]	31	
[19]	32	
[20]	33	
[21]	34	
[22]	35	
[23]	36	
[24]	37	
[25]	38	
[26]	41	
[27]	42	
[28]	43	
[29]	44	
[30]	45	
[31]	46	
[32]	47	
[33]	48	
	<01>	

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
F. on during C.		**Modbus: 41422 (46422)**
[0]	No	Defines if the fine output shall be active during the coarse batching phase.
[1]	Yes	
	<No>	Note: This parameter is only shown if **`Batching mode`** is set to **`Fine+Coarse`**.
		No: *Only the coarse output is active during the coarse batching phase.* ***Yes:*** *Both coarse and fine outputs are activated during the coarse batching phase.*
Fine value *		**Modbus: 41424 (46424)**
	Range: +/-999999 Unit: Measurem. unit. <0.0>	The amount of material batched in the fine batching phase.
		Note: This parameter is only shown if **`Batching mode`** is set to **`Fine+Coarse`**.
Minus tolerance *		**Modbus: 41426 (46426)**
	Range: 0.00 - 100.00 Unit: %. <100.00>	Minus tolerance value. 100 % = No tolerance check.
Plus tolerance *		**Modbus: 41428 (46428)**
	Range: 0.00 - 100.00 Unit: %. <100.00>	Plus tolerance value. 100 % = No tolerance check.
Inflight factor *		**Modbus: 41430 (46430)**
	Range: 0 - 100 Unit: %. <0>	Automatic inflight compensation is performed with this factor. The ”Inflight value” is corrected with the resulting batching error multiplied by this factor.
		0 = No automatic inflight compensation.
Inflight value *		**Modbus: 41432 (46432)**
	Range: 0 - 999999 Unit: Measurem. unit. <0.0>	Batching will be completed (output deactivated) when this value remains to batch.
		If automatic inflight compensation is used, this value is adjusted after each batch.
Wait time *		**Modbus: 41434 (46434)**
	Range: 0.1 - 999.9 Unit: s. <5.0>	Time from completed batching (outputs off) to stability check and tolerance check.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Pulsing time *		**Modbus: 41436 (46436)**
	Range: 0.1 - 999.9 Unit: s. <0.0>	Time for one pulse on the output Fine/Output when the setpoint value is not reached after ordinary batching (minus tolerance error). 0 = No pulsing
Timeout value *		**Modbus: 41438 (46438)**
	Range: 0 - 9999 Unit: s. <0>	Max. allowed time for complete batching of the component (activity). 0 = No timeout control.
Ack. type		**Modbus: 41440 (46440)**
[0]	No test	Defines the type of acknowledgement control to be used for the activity. ***No test:*** *No acknowledgement control is performed.* ***At start:*** *Acknowledgement control is performed at start of the activity.* ***Wait:*** *The instrument waits for the acknowledgement signal before it starts the activity.* ***Continuous:*** *The acknowledgement control is performed continuously.* ***Wait+contin.:*** *The instrument waits for the acknowledgement signal before it starts the activity and then the acknowledgement control is performed continuously.*
[1]	At start	
[2]	Wait	
[3]	Continuous	
[4]	Wait+contin.	
	<No test>	

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Ack. input no		**Modbus: 41442 (46442)**
[0]	01	Defines the input used for acknowledgement control.
[1]	02	For use of the inputs, see page 5-14.
[2]	11	
[3]	12	If any of the inputs 01 – 28 should be used, it must be defined as **B.activity** in the set-up menu ‘Inputs’ (the other inputs are always defined as **B.activity**).
[4]	13	
[5]	14	
[6]	15	Note: This parameter is NOT shown if **Ack.type** is set to **No test**.
[7]	16	
[8]	17	
[9]	18	
[10]	21	
[11]	22	
[12]	23	
[13]	24	
[14]	25	
[15]	26	
[16]	27	
[17]	28	
[18]	31	
[19]	32	
[20]	33	
[21]	34	
[22]	35	
[23]	36	
[24]	37	
[25]	38	
[26]	41	
[27]	42	
[28]	43	
[29]	44	
[30]	45	
[31]	46	
[32]	47	
[33]	48	
	<01>	

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Dumping (Activity type = Dump)

Output no
See page 7-16

Modbus: 41416 (46416)
Defines the output used for dumping.
For use of the outputs, see page 5-14.
If any of the outputs 01 – 28 should be used, it must be defined as **`B.activity`** in the set-up menu 'Outputs' (the other outputs are always defined as **`B.activity`**).

Low level *
Range: +/-999999
Unit:
Measurem. unit.
<1.0>

Modbus: 41444 (46444)
Defines the gross weight level at which "Wait time" starts.

Wait time *
Range: 0.1 - 999.9
Unit: s.
<5.0>

Modbus: 41434 (46434)
Defines the time from that "Low level" is reached until the (dump) output is deactivated.

Timeout value *
Range: 0 - 9999
Unit: s.
<0>

Modbus: 41438 (46438)
Defines the max. allowed time for complete dumping.
0 = No timeout control.

Ack. type

Modbus: 41440 (46440)
See under "Weighing In or Out".

Ack. input no

Modbus: 41442 (46442)
See under " Weighing In or Out".

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Filling (Activity type = Fill)

Output no
See page 7-16

Modbus: 41416 (46416)
Defines the output used for filling.
For use of the outputs, see page 5-14.
If any of the outputs 01 – 28 should be used, it must be defined as **`B.activity`** in the set-up menu 'Outputs' (the other outputs are always defined as **`B.activity`**).

Low level *
Range: +/-999999
Unit:
Measurem. unit.
<0.0>

Modbus: 41444 (46444)
The filling starts if the gross weight is below this level, else no filling is performed.

High level *
Range: +/-999999
Unit:
Measurem. unit.
<0.0>

Modbus: 41446 (46446)
Defines the gross weight level at which the(fill) output is deactivated.

Wait time *
Range: 0.1 - 999.9
Unit: s.
<5.0>

Modbus: 41434 (46434)
Defines the time from that "High level" is reached until the filling is regarded as finished.

Timeout value *
Range: 0 - 9999
Unit: s.
<0>

Modbus: 41438 (46438)
Defines the max. allowed time for complete filling.
0 = No timeout control.

Ack. type

Modbus: 41440 (46440)
See under " Weighing In or Out".

Ack. input no

Modbus: 41442 (46442)
See under " Weighing In or Out".

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Timer or Timer with output (Activity type = Timer or Timer w. outp)

Output no
See page 7-16

Modbus: 41416 (46416)

Defines the output used for the timer.

For use of the outputs, see page 5-14.

If any of the outputs 01 – 28 should be used, it must be defined as **`B.activity`** in the set-up menu 'Outputs' (the other outputs are always defined as **`B.activity`**).

Note: This parameter is only shown if **`Activity type`** is set to **`Timer w.outp.`**

Ack. type

Modbus: 41440 (46440)
See under " Weighing In or Out"

Ack. input no

Modbus: 41442 (46442)
See under " Weighing In or Out"

Latch on or Latch off (Activity type = Latch on or Latch off)

Output no
See page 7-16

Modbus: 41416 (46416)

Defines the output used for the latch.

For use of the outputs, see page 5-14.

If any of the outputs 01 – 28 should be used, it must be defined as **`B.activity`** in the set-up menu 'Outputs' (the other outputs are always defined as **`B.activity`**).

On during halt
[0] No
[1] Yes
<No>

Modbus: 41448 (46448)
Defines if the (latch) output will remain activated during halts in batching sequence.

Note: This parameter is only shown if **`Activity type`** is set to **`Latch on`**.

No: *Output is deactivated during halt.*
Yes: *Output will remain activated during halt.*

Ack. type

Modbus: 41440 (46440)
See under " Weighing In or Out"

Ack. input no

Modbus: 41442 (46442)
See under " Weighing In or Out"

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Manual (Activity type = Manual)

Print weight
[0] No
[1] Yes
<No>

Modbus: 41450 (46450)
Defines if the weight value (from the scale or manually entered) is printed and accumulated.
No: *No printing or accumulation.*
Yes: *The weight value is printed and accumulated.*

Enter weight
[0] No
[1] Yes
<No>

Modbus: 41452 (46452)
Defines if the operator shall have the opportunity to manually enter a weight value.
No: *Not possible to enter a weight value manually.*
Yes: *Possible to enter a weight value manually.*

Pulse batching (Activity type = Pulse batch)

Batching mode
[0] One phase
[1] Fine+Coarse
< Fine+Coarse >

Modbus: 41414 (46414)
Defines if it is a one phase batching or a Coarse/Fine batching.
One phase: *One phase batching (only one output).*
Fine+Coarse: *Coarse-fine batching (two outputs used).*

Output no
See page 7-16

Modbus: 41416 (46416)
Defines the output used for one phase batching.
For use of the outputs, see page 5-14.
If any of the outputs 01 – 28 should be used, it must be defined as **`B.activity`** in the set-up menu 'Outputs' (the other outputs are always defined as **`B.activity`**).
Note: This parameter is only shown if **`Batching mode`** is set to **`One phase`**.

Coarse outp. no
See page 7-17

Modbus: 41418 (46418)
Defines the output used for coarse batching.
For use of the outputs, see page 5-14.
If any of the outputs 01 – 28 should be used, it must be defined as **`B.activity`** in the set-up menu 'Outputs' (the other outputs are always defined as **`B.activity`**).
Note: This parameter is only shown if **`Batching mode`** is set to **`Fine+Coarse`**.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Fine output no	See page 7-18	**Modbus: 41420 (46420)** Defines the output used for fine batching. For use of the outputs, see page 5-14. If any of the outputs 01 – 28 should be used, it must be defined as **B.activity** in the set-up menu 'Outputs' (the other outputs are always defined as **B.activity**). Note: This parameter is only shown if **Batching mode** is set to **Fine+Coarse**.
F. on during C.	[0] No [1] Yes <No>	**Modbus: 41422 (46422)** Defines if the fine output shall be active during the coarse batching phase. Note: This parameter is only shown if **Batching mode** is set to **Fine+Coarse**. ***No:*** *Only the coarse output is active during the coarse batching phase.* ***Yes:*** *Both coarse and fine outputs are activated during the coarse batching phase.*
Fine value *	Range: +/-999999 Unit: Pulse batch. unit. <0.0>	**Modbus: 41424 (46424)** The amount of material batched in the fine batching phase. Note: This parameter is only shown if **Batching mode** is set to **Fine+Coarse**.
Minus tolerance *	Range: 0.00 - 100.00 Unit: %. <100.00>	**Modbus: 41426 (46426)** Minus tolerance value. 100 % = No tolerance check.
Plus tolerance *	Range: 0.00 - 100.00 Unit: %. <100.00>	**Modbus: 41428 (46428)** Plus tolerance value. 100 % = No tolerance check.
Inflight factor *	Range: 0 - 100 Unit: %. <0>	**Modbus: 41430 (46430)** Automatic inflight compensation is performed with this factor. The "Inflight value" is corrected with the resulting batching error multiplied by this factor. 0 % = No automatic inflight compensation.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Inflight value *	Range: 0 - 999999 Unit: Pulse batch. unit. <0.0>	**Modbus: 41432 (46432)** Batching will be completed (output deactivated) when this value remains to batch. If automatic inflight compensation is used, this value is adjusted after each batch.
Wait time *	Range: 0.1 - 999.9 Unit: s. <5.0>	**Modbus: 41434 (46434)** Time from completed batching (outputs off) to tolerance check.
Pulsing time *	Range: 0.1 - 999.9 Unit: s. <0.0>	**Modbus: 41436 (46436)** Time for one pulse on the output Fine/Output when setpoint value is not reached after the ordinary batching (minus tolerance error). 0 = No pulsing
Timeout value *	Range: 0 - 9999 Unit: s. <0>	**Modbus: 41438 (46438)** Max. allowed time for complete batching of the component (activity). 0 = No timeout control.
Ack. type		**Modbus: 41440 (46440)** See under ” Weighing In or Out”
Ack. input no		**Modbus: 41442 (46442)** See under ” Weighing In or Out”
Pulse input no [0] 01 [1] 02	<01>	**Modbus: 41454 (46454)** Defines the input used for pulse counting. The input must be defined as **`B. activity`** in the set-up menu ‘Inputs’.
No of decimals [0] 0 [1] 1 [2] 2 [3] 3	<0>	**Modbus: 41456 (46456)** Defines if the number of decimals used for the pulse batching value.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Unit		**Modbus: 41458 (46458)**
[0]	NONE	Defines the engineering unit that should be used for pulse batching.
[1]	g	
[2]	kg	
[3]	t	
[4]	lb	
[5]	N	
[6]	kN	
[7]	oz	
[8]	psi	
[9]	kPa	
[10]	MPa	
[11]	bar	
[12]	l	
[13]	lbf	
[14]	kgf	
[15]	PLI	
[16]	N/m	
[17]	kN/m	
[18]	Nm	
[19]	daN	
[20]	mV/V	
[21]	pls	
	<kg>	
Scale factor		**Modbus: 41460 (46460)**
	Range: 0.001 – 999999.0 Unit: – <1.000>	Number of counted pulses/Unit.

Recipe parameters

When a recipe number has been selected, 30 lines for the recipe activities are available.

For each used line, select one of the defined activities.
See page 7-14 to 7-28 about defining activities.

If the activity, selected for the line, is of the type Weigh in, Weigh out, Timer, Timer with output, Manual or Pulse batch a setpoint value must also be entered.

If the activity, selected for the line, is of the type Dump, Fill, Latch on or Latch off no setpoint value is used, and the parameter 'Line XX, setpoint' will not be displayed.

Modbus addresses for all recipe lines are shown in the table at page 7-32.

Changing and storing

Data entered for the recipe parameters are stored in a power safe memory.
Stored information will not be lost if the instrument is switched off.

Certain recipe parameters are of a conditional type, implying that they do not appear unless another parameter has a certain value. These conditions are given in the explanation text for the parameters.

Parameter editing can be performed in menu 'Recipe', either by the front panel keys or by serial communication.
The menu 'Recipe' is available also during the batching.

Printout (or manual recording) of all parameter settings is recommended after editing. These recordings will be extremely valuable if an instrument has to be replaced.

Printout of parameters can be ordered if a printer is connected.

A better way to make a backup file of all instrument settings is to use the PC-programme batchCOM from Nobel Weighing Systems.
You need the "Full Product" version of the programme.

Parameters

On the following pages a survey of all recipe parameters is presented.

The first line shows the parameter name and the Modbus addresses, used for set-up by serial communication. The parameters are saved in two different float value formats, and consequently also in two different memory registers.

For choice parameters a list of available alternatives is displayed. At each alternative an index within [ ] is given, to be used by serial communication set-up.

For numerical parameters, a value range is given.

At the end of the table, the default value is given within < >.

To the right in the table there is a short parameter explanation and, *in italic,* the result for the different alternatives.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Menu 'Recipe'

Recipe number

01 to 30
<0>

Modbus: 41462 (46462)

This "parameter" is only used by writing and reading of recipe parameters over serial communication (Modbus).

When writing or reading parameter values for a recipe by Modbus you must start by writing the recipe number into this "parameter" (Modbus register). Then the following parameters are valid for that recipe (except 'Recipe name' that is handled separately).

By setup from the instrument front panel the display will show a list with 'Recipe 01' to 'Recipe 30'. Using the function keys you can select a recipe and set or edit the parameter values for that recipe.

In the instrument there is room for 30 sets of the following parameters (one set for each recipe).

Recipe name

Modbus: See table below

The recipe name, a 12-character string, is used to identify the recipe at the instrument display and in printouts. Modbus addresses for the 30 recipe names are shown in the table below.
For string data format, refer to:
Communication / Data representation.

Recipe	Modbus-register	Recipe	Modbus-register	Recipe	Modbus-register
01	44846 – 44851	11	44906 – 44911	21	44966 – 44971
02	44852 – 44857	12	44912 – 44917	22	44972 – 44977
03	44858 – 44863	13	44918 – 44923	23	44978 – 44983
04	44864 – 44869	14	44924 – 44929	24	44984 – 44989
05	44870 – 44875	15	44930 – 44935	25	44990 – 44995
06	44876 – 44881	16	44936 – 44941	26	44996 – 45001
07	44882 – 44887	17	44942 – 44947	27	45002 – 45007
08	44888 – 44893	18	44948 – 44953	28	45008 – 45013
09	44894 – 44899	19	44954 – 44959	29	45014 – 45019
10	44900 – 44905	20	44960 – 44965	30	45020 – 45025

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Line XX, activity number		**Modbus: See next page**
[0]	00:- - -	Defines the activity number for recipe line XX. If the activity has been given a name, this will also be presented here. Activity '00:- - -' means the recipe line is not used. NOTE: Unused activities (Activity type = Not used) cannot be selected from the front panel.
[1]	01:'poss. act. name'	
[2]	02: -"-	
[3]	03: -"-	
[4]	04: -"-	
[5]	05: -"-	
[6]	06: -"-	
[7]	07: -"-	
[8]	08: -"-	
[9]	09: -"-	
[10]	10: -"-	
[11]	11: -"-	
[12]	12: -"-	
[13]	13: -"-	
[14]	14: -"-	
[15]	15: -"-	
[16]	16: -"-	
[17]	17: -"-	
[18]	18: -"-	
[19]	19: -"-	
[20]	20: -"-	
[21]	21: -"-	
[22]	22: -"-	
[23]	23: -"-	
[24]	24: -"-	
	<00:- - ->	
Line XX, setpoint		**Modbus: See next page**
	0 – 999999 Unit: Depends on the activity type <0>	This parameter is shown only if the activity on the recipe line needs a setpoint value.

Modbus-registers for recipe line information

Recipe line	Modbus	Recipe line	Modbus
R01, act	41464 (46464)	R16, act	41524 (46524)
R01, setp	41466 (46466)	R16, setp	41526 (46526)
R02, act	41468 (46468)	R17, act	41528 (46528)
R02, setp	41470 (46470)	R17, setp	41530 (46530)
R03, act	41472 (46472)	R18, act	41532 (46532)
R03, setp	41474 (46474)	R18, setp	41534 (46534)
R04, act	41476 (46476)	R19, act	41536 (46536)
R04, setp	41478 (46478)	R19, setp	41538 (46538)
R05, act	41480 (46480)	R20, act	41540 (46540)
R05, setp	41482 (46482)	R20, setp	41542 (46542)
R06, act	41484 (46484)	R21, act	41544 (46544)
R06, setp	41486 (46486)	R21, setp	41546 (46546)
R07, act	41488 (46488)	R22, act	41548 (46548)
R07, setp	41490 (46490)	R22, setp	41550 (46550)
R08, act	41492 (46492)	R23, act	41552 (46552)
R08, setp	41494 (46494)	R23, setp	41554 (46554)
R09, act	41496 (46496)	R24, act	41556 (46556)
R09, setp	41498 (46498)	R24, setp	41558 (46558)
R10, act	41500 (46500)	R25, act	41560 (46560)
R10, setp	41502 (46502)	R25, setp	41562 (46562)
R11, act	41504 (46504)	R26, act	41564 (46564)
R11, setp	41506 (46506)	R26, setp	41566 (46566)
R12, act	41508 (46508)	R27, act	41568 (46568)
R12, setp	41510 (46510)	R27, setp	41570 (46570)
R13, act	41512 (46512)	R28, act	41572 (46572)
R13, setp	41514 (46514)	R28, setp	41574 (46574)
R14, act	41516 (46516)	R29, act	41760 (46760)
R14, setp	41518 (46518)	R29, setp	41578 (46578)
R15, act	41520 (46520)	R30, act	41580 (46580)
R15, setp	41522 (46522)	R30, setp	41582 (46582)

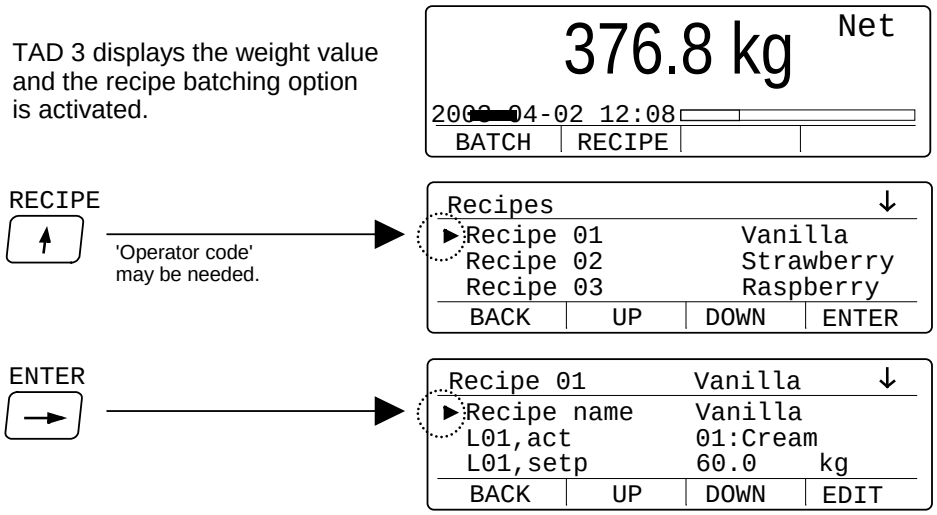
Batching

Operation

When TAD 3 is in normal operation, displaying the weight value and having the recipe batching option is activated, this is indicated by the texts BATCH and RECIPE at the function key to the left.

Menu Recipe

Pressing the key below RECIPE will open the Recipe menu.



The Recipe menu displays a list of the 30 possible recipes. To the left is a cursor that can be positioned by function keys UP and DOWN.

As the key below ENTER is pressed, a list for the actual recipe will be shown with the recipe name and the recipe lines L01 to L30.
Recipe lines in use show an activity and, when necessary, a valid setpoint value.
Recipe lines not in use show the text '00: - - -'.

The activities are shown with activity number and activity name according to set-up.

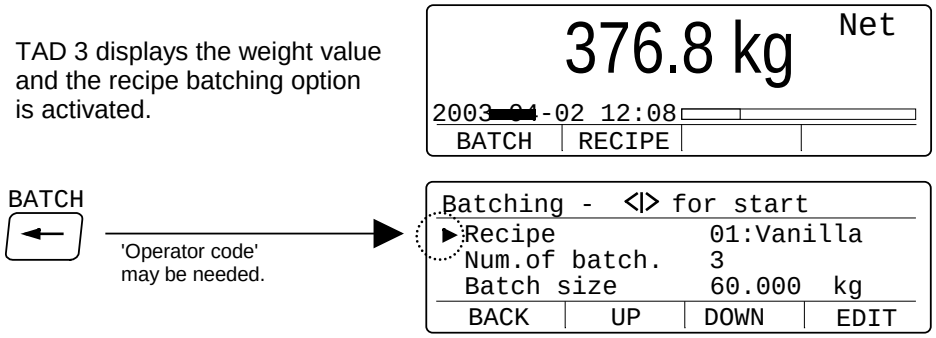
By positioning the cursor at a desired recipe line and pressing the key below EDIT you will get the possibility to:
select any of the defined activities with the keys below PREV. and NEXT
or
edit the setpoint value by the numerical keys.

If the setpoint value for an activity is set to 0, that activity will not be performed in the batching sequence.

Finish every editing by pressing the enter-key ( ).

Menu Batching

Pressing the key below BATCH will open the Batching menu.



The Batching menu shows the selected recipe and actual batch data.
To the left a cursor can be positioned by the keys below UP and DOWN.

As the key below EDIT is pressed you will get the possibility to:
select among the available recipes (recipes with at least one valid activity) with the keys below PREV. and NEXT
or:
edit the number of batches or the batch size by the numerical keys.

Finish every editing by pressing the enter-key ( ).

Recipe shows the recipe selected for batching.

Num. of batch. (if activated) shows the number of batches to perform.
If this line is not activated, only one batch at a time can be performed.
(Number of batches can be edited in the range 1 to 999999.)

Batch size (if activated) shows the size of one batch, in percent or in weight.
If this line is not activated, the batch size is the sum of all Setpoint values without scaling, for the activity types 'Weigh in', 'Weigh out', 'Manual', and 'Puls batch'.

If percentage is shown, the Setpoint values (except for Timer) will be scaled by that percentage.
(Batch percentage can be edited in the range 1 to 999999 %).

If a weight value is shown, the Setpoint values (except for Timer) will be scaled to produce the shown batch size.
(Batch weight can be edited in the range 0.001 to 999999 units.)
NOTE! Strange effects may appear if 'Unit' for a Pulse batch activity differs from 'Measurement unit' for the instrument, or if Weigh in and Weigh out activities are used in the same batching sequence.

Start the batching
After checking the data shown in menu Batching, the batch sequence can be started by pressing the key with a green start symbol.

Batching commands

Below a description is given for how batching commands are given from the front panel of Weight Indicator TAD 3.
These batching commands can also be given from a control computer by serial communication or from external keys, defined in menu 'Edit set-up' / 'Inputs'.

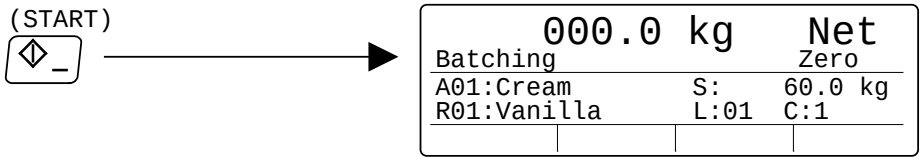
Start batching
Batching can be started as the menu 'Batching – <I> to start' is displayed.

Press the start key, i.e. key - (minus), also marked with a green start symbol.

The batching view will open with the actual weight value in the upper field.
The line below the weight value shows actual batching step, or alarm text.

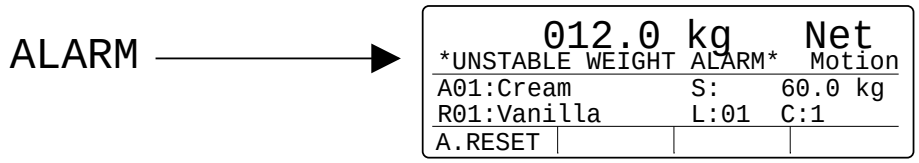
Next line shows the activity number and name (if defined), and the setpoint value (S), possibly scaled for the commanded batch size.

The bottom line shows the actual recipe number and name (if defined), followed by the recipe line number (L:) and batch number (C:) in process.



Batching can also be started from a digital input or via serial communication when normal weight is displayed, when menu Batching is open, and when the view Batching finished is displayed.

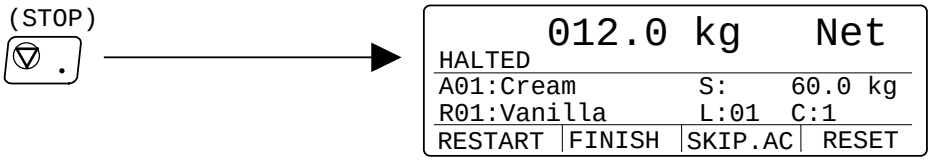
Reset alarm
If an alarm is obtained the batching will be halted and the cause of the alarm will be displayed.
The alarm can be reset from the front panel by function key A.RESET.



After the alarm has been reset, batching can be restarted, or it can be ended in different ways. See next page.

Stop batching
At any time, batching can be halted from the instrument panel.

Press the stop key, i.e. key . (point), also marked with a red stop symbol.



When batching is halted it can be restarted, or it can be ended in different ways. See next page.

Restart batching
As batching is halted (and a possible alarm has been reset) the batching operation can be restarted from where it was stopped by function key RESTART at the instrument front panel.

Finish batch
Function key FINISH is shown only if a batching operation with several batches is halted (and a possible alarm has been reset).
If FINISH is pressed the remaining activities of the actual batch will be performed. After that the batching operation will be ended.

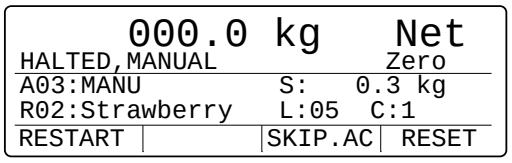
Skip activity
As batching is halted (and a possible alarm has been reset) the current activity can be skipped by function key SKIP.AC. This means that the weight of the material that may have been batched will be accumulated and printed. After that batching will continue with next activity in the sequence.

Terminate batching
As batching is halted (and a possible alarm has been reset) the batching operation can be terminated by function key RESET. The weight of the material that may have been batched will be accumulated and printed. After that the batching operation will be ended.

Manual operation
Activity type Manual halts the batching sequence to allow manual operation, for example adding of a small quantity of material.
Auto taring is performed so net weight zero will be displayed.

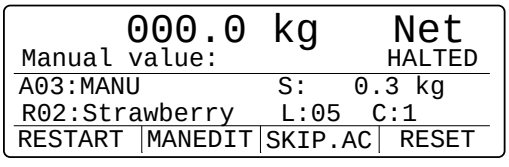
The instrument can be set for weighing of the manually added material.
Add material to make the weight value equal to the shown Setpoint value.
Then function key RESTART should be pressed to continue the batching.

Manual →



Alternatively the instrument can be set to allow manual entry by the digit keys of the added material weight value.
Manually add the amount of material, given as Setpoint value.
Press function key MANEDIT to edit the 'Manual value: '
Use the digit keys to enter the added material weight value at 'Manual value: ' and finish the entry by key ↵ .
Then function key RESTART should be pressed to continue the batching.
(If no weight value is entered, the weight value from the scale will be used.)

Manual →



Accumulated weights

One accumulated weight will be created for each batching activity of the types Weigh in, Weigh out, Manual (if **`Print weight`** is **`Yes`**), and Pulse batching.

One accumulated weight will also be created for each recipe.
(Pulse batching values will be added to the accumulated recipe weight only if the 'Unit' for Pulse batching is equal to 'Measurement unit'.)

For more information about accumulated weights, see page 5-10.

Printing

Printout of batching reports will be performed automatically according to the setting of parameter 'Batch printout' in menu 'Batching parameters':

`No`	no reports will be printed.
`Full report`	reports will be printed containing a report header, the batch number, batched weight values, alarms that have occurred and other information (like Latch ON, HALTED etc.).
`Limited rep.`	reports will be printed containing a report header, the batch number, batched weight values, and the alarms that have occurred during the batching.
`Only alarms`	reports will be printed containing date and time for all alarms that have occurred during the batching.

Printout of all Batch data (recipe number and name, number of batches, batch size), used in the batching operation, can be started by pressing the PRINT key when menu 'Batching' is displayed.

Printout of the batching parameters in use can be started from menu 'Main menu' / 'Batching parameters' by pressing the PRINT key.

Batching alarms

General

When a batching alarm is initiated, the following events take place:
Batching is halted and all batching outputs are deactivated.
The outputs for ‘Batch. alarm’ and ‘B. stopped’ will be activated.
An alarm message is displayed.
An alarm report is printed.

Whenever an alarm has been obtained, alarm reset and restart of batching are required (pressing of function keys A.RESET and RESTART). If restart of batching is not possible, batching must be terminated (by RESET) or the activity must be skipped (by SKIP.AC). After a restart the instrument will continue the batching sequence.

Batching alarms

RECIPE ALARM

Can be obtained only if Recipe check has been selected (Batching parameters / Recipe check = Yes). The instrument will perform a recipe simulation at the start of each batch and this alarm is obtained if the batching cannot be performed because of for example lack of material or insufficient weighing capacity.

SETPOINT ALARM

Weigh in: The vessel, being batched to, does not have sufficient volume to contain the desired quantity of material (the gross weight will exceed Capacity).
Weigh out: The contents of the vessel (gross weight) is not sufficient to batch out the desired quantity of material.

ACKNOWLEDGE ALARM

The alarm is caused by absence of acknowledgement signal.
Instrument behaviour depends on the selected acknowledgement type (**Ack.type**):
No test: An alarm is never obtained in this case.
At start: An acknowledgement signal was not present at start of activity.
Wait: An alarm is never obtained in this case.

> **NOTE!** If an acknowledgement signal is not present, the instrument waits for an acknowledgement signal for any length of time, displaying the text ‘Checking ack.’.

Continuous: The acknowledgement signal was cancelled during the activity or was not present at starting.
Wait+contin.: Identical to **Wait** until start of activity, after that identical to **Continuous**.

TIMEOUT ALARM

The activity was not completed within the specified maximum time, set by parameter (**Timeout value**).

MINUS TOLERANCE ALARM
Batched weight below minus tolerance limit.

PLUS TOLERANCE ALARM
Batched weight exceeds plus tolerance limit.

UNSTABLE WEIGHT ALARM
Weight not stable after Wait time (obtained only if **Motion check** is **On**).

WEIGHT ALARM
Incorrect weight (e.g. transducer or weight converter fault).

POWER FAIL ALARM
A power failure has occurred during the batching.

Serial communication

General

For a detailed description of communication interface and transmission principles, see section 6. Communication in this manual.

Everything that can be performed from the front panel, except controlling a Manual activity, can also be performed from a control computer via serial communication.

Modbus registers

This section only deals with the registers used in batching.

The registers are presented in tables, and some information in detail is also given.

Last activity registers

Data type: Integer	**Data type: Float (2 reg./value)**	**Data type: Modicon float (2 reg./value)**	**Explanation**	**R/W**
47600 (1 reg)	44200	49200	Counter (free running)	R
47601 (3 reg)	44202	49202	Batch number	R
47604 (1 reg)	44204	49204	Recipe number	R
47605 (1 reg)	44206	49206	Recipe line	R
47606 (1 reg)	44208	49208	Activity number	R
47607 (3 reg)	44210	49210	Setpoint	R
47610 (3 reg)	44212	49212	Batched quantity	R

All these registers are updated each time an activity of the types ‘Weigh in’, ‘Weigh out’, ‘Manual’, and ‘Pulse batch’ is ended.

Register ‘Counter’ will increment one step for each update and can be used to indicate when the activity is ended.

Last batch registers

Data type: Integer	Data type: Float (2 reg./value)	Data type: Modicon float (2 reg./value)	Explanation	R/W
47620 (1 reg)	44220	49220	Counter (free running)	R
47621 (1 reg)	44222	49222	Creation time, hour	R
47622 (1 reg)	44224	49224	Creation time, minutes	R
47623 (3 reg)	44226	49226	Batch number	R
47626 (1 reg)	44228	49228	Recipe number	R
47627 (3 reg)	44230	49230	Subtotal	R
47630 (3 reg)	44232	49232	Recipe line 1, setpoint	R
47633 (3 reg)	44234	49234	Recipe line 1, batched qty.	R
47636 (3 reg)	44236	49236	Recipe line 2, setpoint	R
47639 (3 reg)	44238	49238	Recipe line 2, batched qty.	R
47642 (3 reg)	44240	49240	Recipe line 3, setpoint	R
47645 (3 reg)	44242	49242	Recipe line 3, batched qty.	R
47648 (3 reg)	44244	49244	Recipe line 4, setpoint	R
47651 (3 reg)	44246	49246	Recipe line 4, batched qty.	R
47654 (3 reg)	44248	49248	Recipe line 5, setpoint	R
47657 (3 reg)	44250	49250	Recipe line 5, batched qty.	R
47660 (3 reg)	44252	49252	Recipe line 6, setpoint	R
47663 (3 reg)	44254	49254	Recipe line 6, batched qty.	R
47666 (3 reg)	44256	49256	Recipe line 7, setpoint	R
47669 (3 reg)	44258	49258	Recipe line 7, batched qty.	R
47672 (3 reg)	44260	49260	Recipe line 8, setpoint	R
47675 (3 reg)	44262	49262	Recipe line 8, batched qty.	R
47678 (3 reg)	44264	49264	Recipe line 9, setpoint	R
47681 (3 reg)	44266	49266	Recipe line 9, batched qty.	R
47684 (3 reg)	44268	49268	Recipe line 10, setpoint	R
47687 (3 reg)	44270	49270	Recipe line 10, batched qty.	R
47690 (3 reg)	44272	49272	Recipe line 11, setpoint	R
47693 (3 reg)	44274	49274	Recipe line 11, batched qty.	R
47696 (3 reg)	44276	49276	Recipe line 12, setpoint	R
47699 (3 reg)	44278	49278	Recipe line 12, batched qty.	R
47702 (3 reg)	44280	49280	Recipe line 13, setpoint	R
47705 (3 reg)	44282	49282	Recipe line 13, batched qty.	R
47708 (3 reg)	44284	49284	Recipe line 14, setpoint	R
47711 (3 reg)	44286	49286	Recipe line 14, batched qty.	R

Continued on next page.

Last batch registers (cont.)

Data type: Integer	Data type: Float (2 reg./value)	Data type: Modicon float (2 reg./value)	Explanation	R/W
47714 (3 reg)	44288	49288	Recipe line 15, setpoint	R
47717 (3 reg)	44290	49290	Recipe line 15, batched qty.	R
47720 (3 reg)	44292	49292	Recipe line 16, setpoint	R
47723 (3 reg)	44294	49294	Recipe line 16, batched qty.	R
47726 (3 reg)	44296	49296	Recipe line 17, setpoint	R
47729 (3 reg)	44298	49298	Recipe line 17, batched qty.	R
47732 (3 reg)	44300	49300	Recipe line 18, setpoint	R
47735 (3 reg)	44302	49302	Recipe line 18, batched qty.	R
47738 (3 reg)	44304	49304	Recipe line 19, setpoint	R
47741 (3 reg)	44306	49306	Recipe line 19, batched qty.	R
47744 (3 reg)	44308	49308	Recipe line 20, setpoint	R
47747 (3 reg)	44310	49310	Recipe line 20, batched qty.	R
47750 (3 reg)	44312	49312	Recipe line 21, setpoint	R
47753 (3 reg)	44314	49314	Recipe line 21, batched qty.	R
47756 (3 reg)	44316	49316	Recipe line 22, setpoint	R
47759 (3 reg)	44318	49318	Recipe line 22, batched qty.	R
47762 (3 reg)	44320	49320	Recipe line 23, setpoint	R
47765 (3 reg)	44322	49322	Recipe line 23, batched qty.	R
47768 (3 reg)	44324	49324	Recipe line 24, setpoint	R
47771 (3 reg)	44326	49326	Recipe line 24, batched qty.	R
47774 (3 reg)	44328	49328	Recipe line 25, setpoint	R
47777 (3 reg)	44330	49330	Recipe line 25, batched qty.	R
47780 (3 reg)	44332	49332	Recipe line 26, setpoint	R
47783 (3 reg)	44334	49334	Recipe line 26, batched qty.	R
47786 (3 reg)	44336	49336	Recipe line 27, setpoint	R
47789 (3 reg)	44338	49338	Recipe line 27, batched qty.	R
47792 (3 reg)	44340	49340	Recipe line 28, setpoint	R
47795 (3 reg)	44342	49342	Recipe line 28, batched qty.	R
47798 (3 reg)	44344	49344	Recipe line 29, setpoint	R
47801 (3 reg)	44346	49346	Recipe line 29, batched qty.	R
47804 (3 reg)	44348	49348	Recipe line 30, setpoint	R
47807 (3 reg)	44350	49350	Recipe line 30, batched qty.	R

All these registers are updated each time a batching sequence is ended.

Register ‘Counter’ will increment one step for each update and can be used to indicate when the sequence is ended.

Current batching status registers

Data type: Integer	Data type: Float (2 reg./value)	Data type: Modicon float (2 reg./value)	Explanation	R/W
47820 (1 reg)	44360	49360	Batching Status	R
47821 (1 reg)	44362	49362	Batching Step	R
47822 (1 reg)	44364	49364	Batching Alarm	R
47823 (3 reg)	44366	49366	Batch number	R
47826 (1 reg)	44368	49368	Recipe number	R
47827 (1 reg)	44370	49370	Recipe line	R
47828 (1 reg)	44372	49372	Current Activity	R
47829 (3 reg)	44374	49374	Current setpoint	R
47832 (3 reg)	44376	49376	Current quantity *	R

In registers Batching Status, Batching Step and Batching Alarm the status is shown as codes, explained on pages 7-47 to 7-49.

* – Displayed net weight for a Weigh in or Weigh out activity.
– Displayed gross weight for a Fill or Dump activity.
– Calculated weight (no of pulses/scale factor) for a Pulse batching activity.
– Remaining time for a Timer or Timer with output activity.
– Zero for all other activities (Latch on, Latch off).

Batch data registers

Data type: Integer	Data type: Float (2 reg./value)	Data type: Modicon float (2 reg./value)	Explanation	R/W
44072 (3 reg)	41848	46848	Recipe number (1-30)	R/W
44075 (3 reg)	41850	46850	Number of batches	R/W
44078 (3 reg)	41852	46852	Batch size	R/W

Accumulated weight registers for batching

Data type: Integer (3 reg./value)	Data type: Float (2 reg./value)	Data type: Modicon float (2 reg./value)	Explanation	R/W
			ACTIVITIES	
47000	41584	46584	Activity 1, acc. weight LOW	R/W
47003	41586	46586	Activity 1, acc. weight HIGH	R/W
47006	41588	46588	Activity 2, acc. weight LOW	R/W
47009	41590	46590	Activity 2, acc. weight HIGH	R/W
47012	41592	46592	Activity 3, acc. weight LOW	R/W
47015	41594	46594	Activity 3, acc. weight HIGH	R/W
47018	41596	46596	Activity 4, acc. weight LOW	R/W
47021	41598	46598	Activity 4, acc. weight HIGH	R/W
47024	41600	46600	Activity 5, acc. weight LOW	R/W
47027	41602	46602	Activity 5, acc. weight HIGH	R/W
47030	41604	46604	Activity 6, acc. weight LOW	R/W
47033	41606	46606	Activity 6, acc. weight HIGH	R/W
47036	41608	46608	Activity 7, acc. weight LOW	R/W
47039	41610	46610	Activity 7, acc. weight HIGH	R/W
47042	41612	46612	Activity 8, acc. weight LOW	R/W
47045	41614	46614	Activity 8, acc. weight HIGH	R/W
47048	41616	46616	Activity 9, acc. weight LOW	R/W
47051	41618	46618	Activity 9, acc. weight HIGH	R/W
47054	41620	46620	Activity 10, acc. weight LOW	R/W
47057	41622	46622	Activity 10, acc. weight HIGH	R/W
47060	41624	46624	Activity 11, acc. weight LOW	R/W
47063	41626	46626	Activity 11, acc. weight HIGH	R/W
47066	41628	46628	Activity 12, acc. weight LOW	R/W
47069	41630	46630	Activity 12, acc. weight HIGH	R/W
47072	41632	46632	Activity 13, acc. weight LOW	R/W
47075	41634	46634	Activity 13, acc. weight HIGH	R/W
47078	41636	46636	Activity 14, acc. weight LOW	R/W
47081	41638	46638	Activity 14, acc. weight HIGH	R/W
47084	41640	46640	Activity 15, acc. weight LOW	R/W
47087	41642	46642	Activity 15, acc. weight HIGH	R/W

Continued on next page.

Accumulated weight registers for batching (cont.)

Data type: Integer (3 reg./value)	Data type: Float (2 reg./value)	Data type: Modicon float (2 reg./value)	Explanation	R/W
47090	41644	46644	Activity 16, acc. weight LOW	R/W
47093	41646	46646	Activity 16, acc. weight HIGH	R/W
47096	41648	46648	Activity 17, acc. weight LOW	R/W
47099	41650	46650	Activity 17, acc. weight HIGH	R/W
47102	41652	46652	Activity 18, acc. weight LOW	R/W
47105	41654	46654	Activity 18, acc. weight HIGH	R/W
47108	41656	46656	Activity 19, acc. weight LOW	R/W
47111	41658	46658	Activity 19, acc. weight HIGH	R/W
47114	41660	46660	Activity 20, acc. weight LOW	R/W
47117	41662	46662	Activity 20, acc. weight HIGH	R/W
47120	41664	46664	Activity 21, acc. weight LOW	R/W
47123	41666	46666	Activity 21, acc. weight HIGH	R/W
47126	41668	46668	Activity 22, acc. weight LOW	R/W
47129	41670	46670	Activity 22, acc. weight HIGH	R/W
47132	41672	46672	Activity 23, acc. weight LOW	R/W
47135	41674	46674	Activity 23, acc. weight HIGH	R/W
47138	41676	46676	Activity 24, acc. weight LOW	R/W
47141	41678	46678	Activity 24, acc. weight HIGH	R/W
			RECIPES	
47144	41680	46680	Recipe 1, acc. weight LOW	R/W
47147	41682	46682	Recipe 1, acc. weight HIGH	R/W
47150	41684	46684	Recipe 2, acc. weight LOW	R/W
47153	41686	46686	Recipe 2, acc. weight HIGH	R/W
47156	41688	46688	Recipe 3, acc. weight LOW	R/W
47159	41690	46690	Recipe 3, acc. weight HIGH	R/W
47162	41692	46692	Recipe 4, acc. weight LOW	R/W
47165	41694	46694	Recipe 4, acc. weight HIGH	R/W
47168	41696	46696	Recipe 5, acc. weight LOW	R/W
47171	41698	46698	Recipe 5, acc. weight HIGH	R/W
47174	41700	46700	Recipe 6, acc. weight LOW	R/W
47177	41702	46702	Recipe 6, acc. weight HIGH	R/W

Continued on next page.

Accumulated weight registers for batching (cont.)

47180	41704	46704	Recipe 7, acc. weight LOW	R/W
47183	41706	46706	Recipe 7, acc. weight HIGH	R/W
47186	41708	46708	Recipe 8, acc. weight LOW	R/W
47189	41710	46710	Recipe 8, acc. weight HIGH	R/W
47192	41712	46712	Recipe 9, acc. weight LOW	R/W
47195	41714	46714	Recipe 9, acc. weight HIGH	R/W
47198	41716	46716	Recipe 10, acc. weight LOW	R/W
47201	41718	46718	Recipe 10, acc. weight HIGH	R/W
47204	41720	46720	Recipe 11, acc. weight LOW	R/W
47207	41722	46722	Recipe 11, acc. weight HIGH	R/W
47210	41724	46724	Recipe 12, acc. weight LOW	R/W
47213	41726	46726	Recipe 12, acc. weight HIGH	R/W
47216	41728	46728	Recipe 13, acc. weight LOW	R/W
47219	41730	46730	Recipe 13, acc. weight HIGH	R/W
47222	41732	46732	Recipe 14, acc. weight LOW	R/W
47225	41734	46734	Recipe 14, acc. weight HIGH	R/W
47228	41736	46736	Recipe 15, acc. weight LOW	R/W
47231	41738	46738	Recipe 15, acc. weight HIGH	R/W
47234	41740	46740	Recipe 16, acc. weight LOW	R/W
47237	41742	46742	Recipe 16, acc. weight HIGH	R/W
47240	41744	46744	Recipe 17, acc. weight LOW	R/W
47243	41746	46746	Recipe 17, acc. weight HIGH	R/W
47246	41748	46748	Recipe 18, acc. weight LOW	R/W
47249	41750	46750	Recipe 18, acc. weight HIGH	R/W
47252	41752	46752	Recipe 19, acc. weight LOW	R/W
47255	41754	46754	Recipe 19, acc. weight HIGH	R/W
47258	41756	46756	Recipe 20, acc. weight LOW	R/W
47261	41758	46758	Recipe 20, acc. weight HIGH	R/W
47264	41760	46760	Recipe 21, acc. weight LOW	R/W
47267	41762	46762	Recipe 21, acc. weight HIGH	R/W
47270	41764	46764	Recipe 22, acc. weight LOW	R/W
47273	41766	46766	Recipe 22, acc. weight HIGH	R/W
47276	41768	46768	Recipe 23, acc. weight LOW	R/W
47279	41770	46770	Recipe 23, acc. weight HIGH	R/W

Continued on next page.

Accumulated weight registers for batching (cont.)

47282	41772	46772	Recipe 24, acc. weight LOW	R/W
47285	41774	46774	Recipe 24, acc. weight HIGH	R/W
47288	41776	46776	Recipe 25, acc. weight LOW	R/W
47291	41778	46778	Recipe 25, acc. weight HIGH	R/W
47294	41780	46780	Recipe 26, acc. weight LOW	R/W
47297	41782	46782	Recipe 26, acc. weight HIGH	R/W
47300	41784	46784	Recipe 27, acc. weight LOW	R/W
47303	41786	46786	Recipe 27, acc. weight HIGH	R/W
47306	41788	46788	Recipe 28, acc. weight LOW	R/W
47309	41790	46790	Recipe 28, acc. weight HIGH	R/W
47312	41792	46792	Recipe 29, acc. weight LOW	R/W
47315	41794	46794	Recipe 29, acc. weight HIGH	R/W
47318	41796	46796	Recipe 30, acc. weight LOW	R/W
47321	41798	46798	Recipe 30, acc. weight HIGH	R/W

Accumulated weight is represented by two values (HIGH, LOW).
To calculate the resulting value multiply value HIGH by 10000 and add value LOW.
LOW is a value between ±9999.999 with 3 decimals.
HIGH is a value without decimals between ±999999.
To zero accumulated weight, send 0 to both HIGH and LOW.

Batching status

This register contains the batching status.

Code	Description
00	Batching not active
01	Batching running
02	Batching halted
03	Batching alarm
04	Batching halted for manual operation

Batching step

This register contains the batching step.

Code	Description
00	Batching not active
01	Initialise batching
02	Starting batching
03	Initialising activity
04	Checking acknowledge
05	Checking setpoint
06	Autotaring
07	Batching coarse
08	Batching fine
09	Batching one phase
10	Pulse batching coarse
11	Pulse batching fine
12	Pulse batching one phase
13	Delay after batching
14	Checking tolerance
15	Pulsing
16	Dumping
17	Delay after dumping
18	Filling material
19	Delay after filling
20	Timing
21	Timing with output
22	Activating latch
23	Deactivating latch
24	Manual operation
25	Finishing manual operation
26	Finishing activity
27	Finishing batching
28	Resetting batching
29	Skipping activity
30	Checking recipe

Batching alarm

This register contains the batching alarms present.

Code	Description
00	No alarm
01	Setpoint alarm
02	Acknowledge alarm
03	Timeout alarm
04	Minus tolerance alarm
05	Plus tolerance alarm
06	Unstable weight alarm
07	Weight error alarm
08	Power failure alarm
09	Recipe alarm

Batching commands

Only the commands used by batching are shown in the table below.

Command description

Cmd	Action activated in TAD 3
50	Start batching
51	Stop batching
52	Reset batching
53	Restart batching
54	Reset batching alarm
55	Skip batching activity (move to next activity)
56	Finish batching
57	Show weight after batching

8. Flow rate (program option)

General

This programme (T131L240) includes a program option for flow measurement, that can be activated by an individual code for each instrument. The code can be ordered from Nobel Weighing Systems and should be entered in menu ‘Program options’ in ‘Edit set-up’ under the instrument Main menu.
See page 3-34 in this manual for instructions.

As option ‘Flow’ is activated the text ‘F/W’ is displayed during normal operation at the function key to the right on the instrument panel.

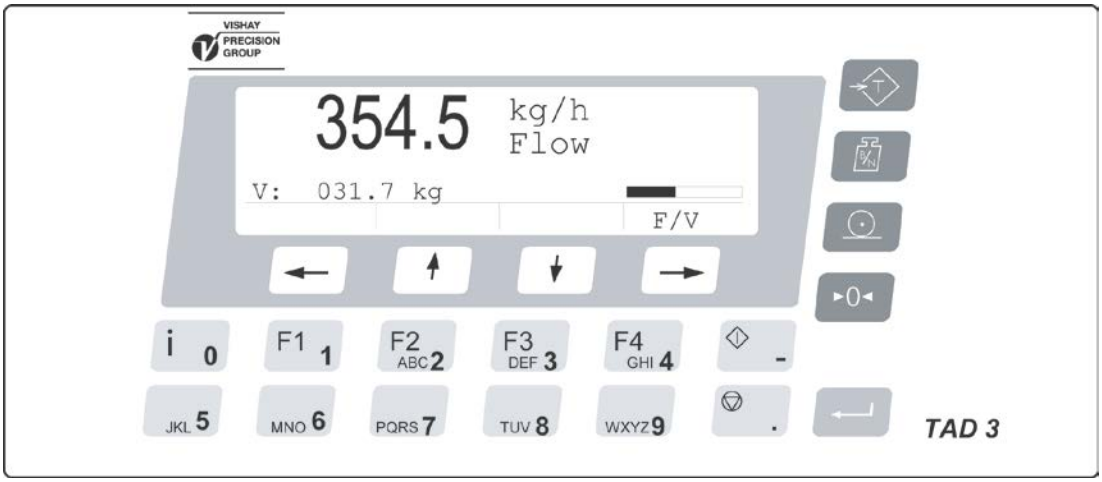
The flow rate value can be shown on the display, checked by the level supervision, sent to an analogue output or to a remote display, and it can also be fetched by serial communication.

Operation

As option ‘Flow’ is activated TAD 3 calculates the flow by measuring the weight change during a selected integration time and dividing by the time.
The flow rate can be displayed as weight change per second, per minute or per hour.

TAD 3 will display weight or flow value, and switch over between weight and flow is accomplished with the function key 'W/F' or the digit key 4, also marked ‘F4’. Switch over can also be accomplished by a digital input.

While the flow value is shown at the normal display position, the weight value can be displayed at the information line, and vice versa, provided the set-up parameter ‘Display info’ in Edit set-up/General is set to ‘Off’.



Flow rate parameters

Changing and storing

Data entered to define flow rate parameters are stored in power safe memory. Stored information will not be lost if the instrument is switched off.

Parameter editing can be performed in menu ‘Flow rate’, by the front panel keys or by serial communication. The menu is available under ‘Edit set-up’, provided normal measuring operation has been stopped.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.

Menu ‘Flow rate’ (Program option)

Flow rate res

Modbus: 41312 (46312)

[0]	0.001
[1]	0.002
[2]	0.005
[3]	0.01
[4]	0.02
[5]	0.05
[6]	0.1
[7]	0.2
[8]	0.5
[9]	1
[10]	2
[11]	5
[12]	10
[13]	20
[14]	50
	<0.02>

Defines the decimal point position and resolution format for the flow rate value.
All set-up parameters using the flow rate unit will be written with the decimal point position selected in this menu.
If the last digits of the flow rate value are not stable, a more coarse resolution can be selected to get a stable reading.

Flow rate unit

Modbus: 41314 (46314)

[0]	Unit/s
[1]	Unit/min
[2]	Unit/h
[3]	Unit*1000/m
[4]	Unit*1000/h
	<Unit/s>

Defines the engineering unit that should be used for the flow rate value and for related set-up parameters.

Unit/s: Measurement unit per second.
Unit/min: Measurement unit per minute.
Unit/h: Measurement unit per hour.
Unit*1000/m: Measurement unit * 1000 per minute.
Unit*1000/h: Measurement unit * 1000 per hour.

If the flow rate unit exceeds 4 characters then it will be represented as ”/s”, ”/min”,”/h”, ”*/mi” or ”*/h” in the set-up menus.
In the case of ”Unit*1000/m” or ”Unit*1000/h” then some flow rate units will be preceded by a ”k” and some will be converted, for example ”kg” to ”t”.

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Auto deriv. time		**Modbus: 41310 (46310)**
[0] [1]	Off On <On>	The derivation time can be entered manually or calculated automatically by the instrument. **Off:** Manual entering of derivation time. **On:** Automatic calculation of derivation time.
Derivation time		**Modbus: 41316 (46316)**
	Range: 0.20 – 3600.00 Unit: s <0.64>	The flow rate is the weight change over the latest elapsed ”Derivation time” divided by this time. At calibration the derivation time is always adjusted by the instrument to the nearest possible value (depending on the filter time).

Setting of ‘Flow Rate Resolution’

Parameter ‘Flow rate res’ defines the decimal point position and resolution for the flow rate value. All set-up parameters using the flow rate unit will be written with the decimal point position selected in this menu. If the last digits of the flow rate value are not stable, a more coarse resolution can be selected to get a stable reading. A more coarse resolution will also result in a shorter derivation time (if ‘Automatic derivation time’ is set to ‘On’).

Setting of ‘Flow Rate Unit’

Parameter ‘Flow rate unit’ defines the engineering unit that should be used for the flow rate value and for related set-up parameters.

If the flow rate unit exceeds 4 characters then it will be represented as ”/s”, ”/min”,”/h”, ”*/mi” or ”*/h” in the set-up menus.

In the case of ”Unit*1000/m” or ”Unit*1000/h” then some flow rate units will be preceded by a ”k”.
Other flow rate units will be converted, according to the table below.

Measurement unit	**Flow rate unit * 1000**
kg	t
kN	MN
kPa	Mpa
MPa	GPa
l	m3
kgf	Mgf
kN/m	MN/m
mV/V	V/V

Setting of ‘Flow Rate Derivation Time’

To enable the instrument to make a correct measurement of flow rates, a derivation time must be selected in accordance with the desired accuracy.

If ‘Auto deriv. time’ is set to ‘On’ then the instrument will calculate a derivation time based on the current calibration (including filter parameters), the ‘Flow rate res’ and the ‘Flow rate unit’. The instrument tries to calculate a derivation time that will give a stable and accurate flow rate value at the current settings (provided that the weight is stable).
A longer filter time and/or a more coarse ‘Flow rate res’ will give shorter derivation times. The automatically calculated derivation is limited to its defined max. and min. values.

If ‘Auto deriv. time’ is set to ‘Off’, then the derivation time must be entered manually. The instrument will accept any derivation (within its min. and max. limits) and it is up to the user to select a suitable derivation time for the application.
At calibration the derivation time is always adjusted by the instrument to the nearest possible value (depending on the filter time).

Flow rate update time

The flow rate value is updated every weight conversion if the number of weight conversions is < = 64 per derivation time period. In other cases it is updated 64 times per derivation time period. At start-up the accuracy of the flow rate will not gain full precision until after a full derivation time period.

Flow rate value to analogue output

The flow rate value can be obtained on a connected analogue output.
The settings for analogue outputs are found in the menu 'Analog outputs' (section 3 in this manual).

Level supervision of the flow rate value

It is possible to level supervise the flow rate value and use it in the setpoint function.
The settings for level supervision and setpoint function are found in the menu 'Level supervision' (chapter 3 in the manual).

Serial communication

The flow rate value can be read from a register by using serial communication.
It’s also possible to control if flow rate or weight should be shown on the display.

Hints and examples

First of all it is important to have a good weighing application where you use the loadcells in a good way to get high resolution and accuracy. It is possible to use long filter time in TAD 3 to get a higher resolution and accuracy.
To get rid of noise it's important to have as high signal from the loadcells as possible.

Example:

We assume that you can calibrate the scale to get a stable weight reading with resolution 0.2 kg (use longer filter time if necessary).

The flow rate function measures the weight difference during one derivation time and we assume that we can get a weight error less than one weight division.

- A derivation time of 10 seconds gives a flow rate error of:
  0.2 / 10 = 0.02 kg/s (72 kg/h)
- A derivation time of 100 seconds gives a flow rate error of:
  0.2 / 100 = 0.002 kg/s (7.2 kg/h)

In an application where you have a nominal flow rate of 1500 kg/h
you will get an error of:
72 / 1500 = 4.8 % for a derivation time of 10 seconds and
7.2 / 1500 = 0.48 % for a derivation time of 100 seconds in this example.

If it is possible to calibrate the scale with a better resolution (you still need to have a stable weight) then you can achieve a better flow rate accuracy and/or a shorter derivation time.

NOTE!
The flow rate calculation is not depending on the final selected weight resolution.

9. Additional units

General

By the I/O bus for TAD 3, additional units can be connected via serial port Com 2. Two types of additional units are available, DIO 3R and ANA 3. Maximum four DIO 3R units and two ANA 3 units can be connected at the same time.

The I/O bus is a Modbus protocol on RS-485 that can be transmitted on 2-wires or 4-wires in a shielded cable with twisted pairs. The total length of the I/O bus cable must not exceed 50 m.
If ANA 3 is connected to the I/O bus, the baud rate may be max. 115200 and 'pull down' resistor(s) must be mounted in accordance with the diagrams below. Terminating resitors for the I/O bus cable impedance should NOT be used.

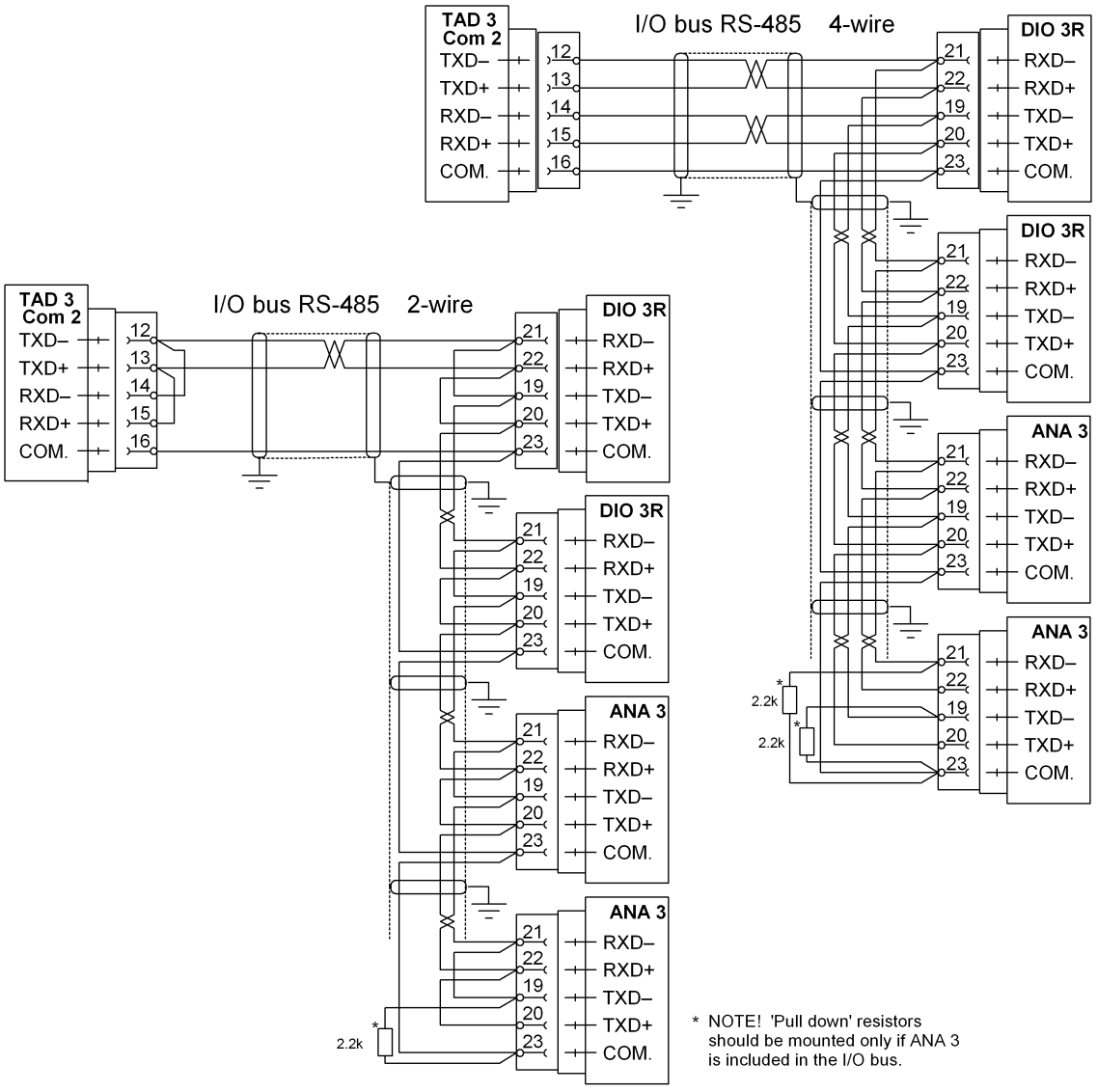


Figure 23. Examples on connection of two DIO 3R and two ANA 3 units to TAD 3 by 4-wire and 2-wire I/O bus cable.

DIO 3R Digital input/output unit

DIO 3R is used to increase the number of inputs and outputs for TAD 3. It features eight digital inputs in two separate groups and eight separate relay outputs, each with an indictor on the front panel, and one serial port for connection of external units. The unit communicates with TAD 3 via a serial port for the I/O bus.

For technical data, refer to section 1. Introduction in this manual.

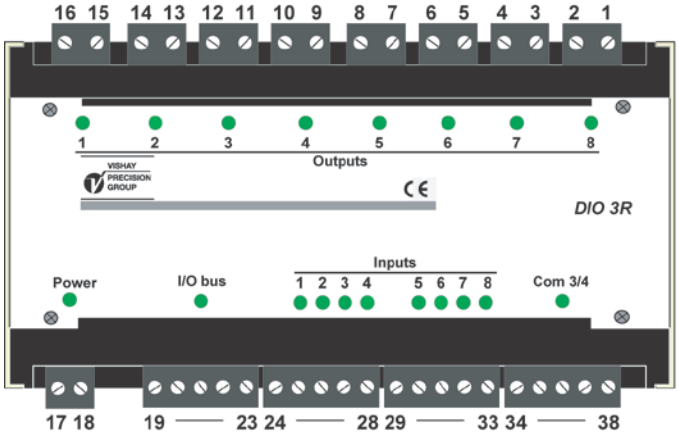


Figure 24. DIO 3R front panel and terminal blocks.

Mechanical installation

DIO 3R is built into a protective plastic housing that can be snap-mounted on 35 mm wide DIN rail or screw attached on a flat surface.

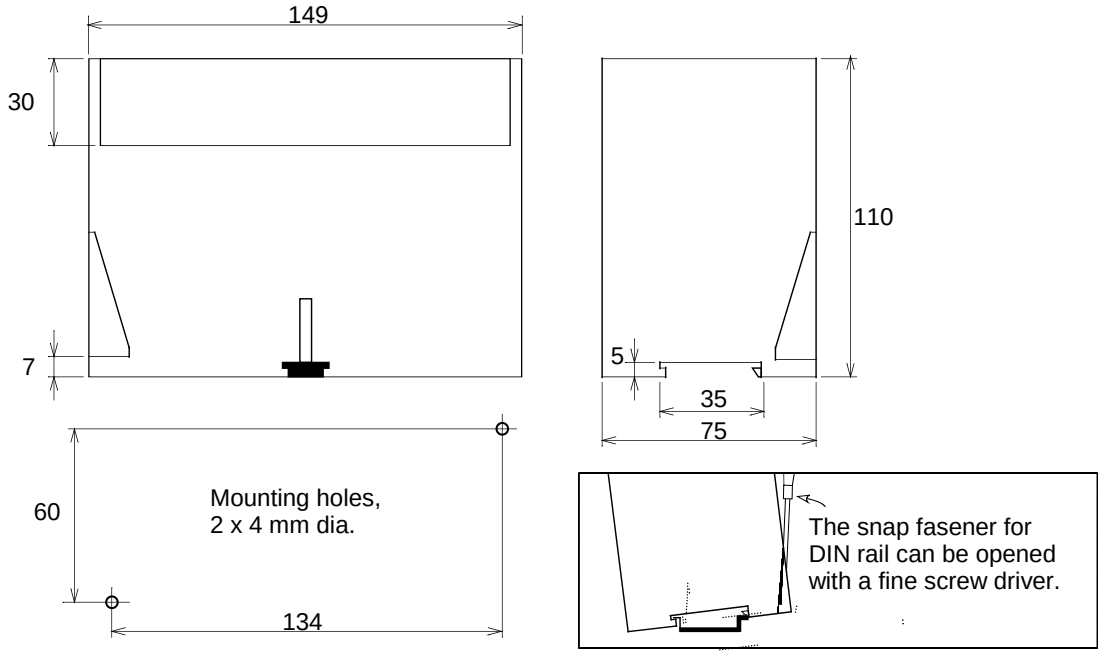
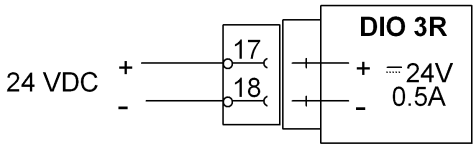


Figure 25. Mechanical dimensions for DIO 3R.

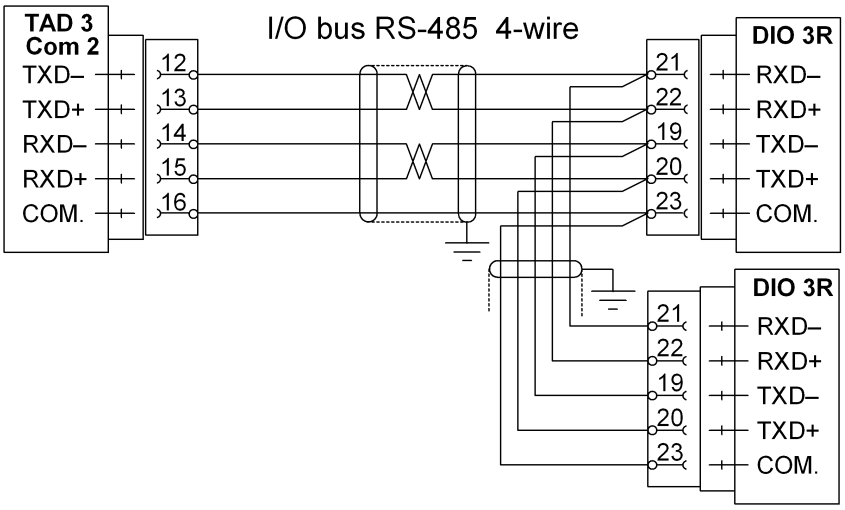
Electrical installation

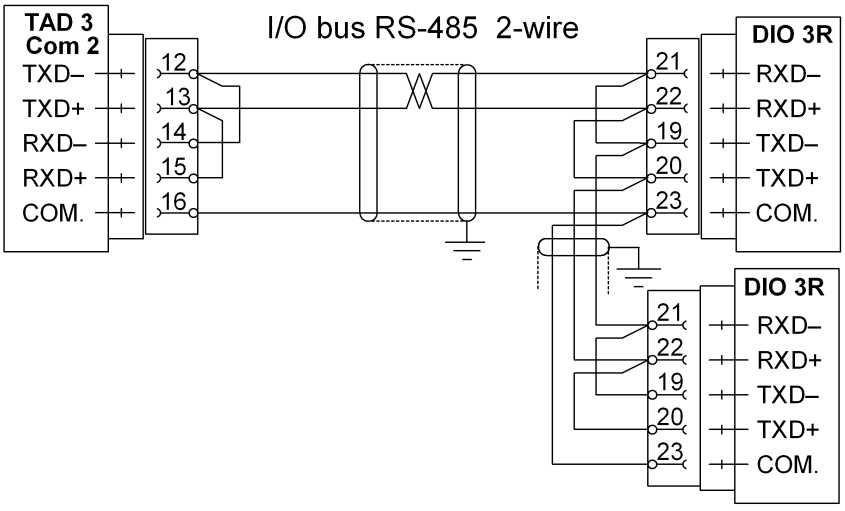
All electrical connections to DIO 3R are made through plug-in terminal blocks. Shielded cables are needed, except for the power supply. All cables should be routed at least 200 mm from power cables to avoid electromagnetical interference. Cable connection is shown below.

Power supply
Terminals 17, 18.
DIO 3R should be powered by 20 – 28 V DC, see Technical data, connected according to the diagram. Nobel Weighing Systems provides a range of mains operated power supplies.



Serial communication, I/O bus to TAD 3
Terminals 19 – 23.
Unit DIO 3R should be connected to Com 2 at TAD 3 via the I/O bus.
Use shielded cable with twisted pairs, the total cable length must not exceed 50 m.
Terminating resistors for the cable impedance must NOT be mounted.
Connect the cable shield to ground close to DIO 3R.
Parameter COM2:Mode in menu ‘Edit set-up / Communication’ must be set to ‘I/O bus’.

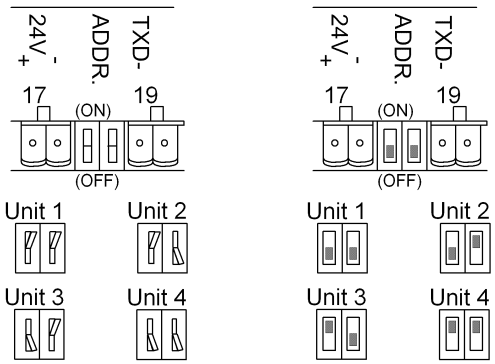




DIO 3R unit number

Two switches between terminals 18 and 19 define the DIO 3R unit number.
Two types of switches can occur.

DIO 3R unit	Switch left	Switch right
1	OFF	OFF
2	OFF	ON
3	ON	OFF
4	ON	ON



DIO 3R unit 1 has digital in/outputs no. 11 to 18.

DIO 3R unit 2 has digital in/outputs no. 21 to 28.

DIO 3R unit 3 has digital in/outputs no. 31 to 38.

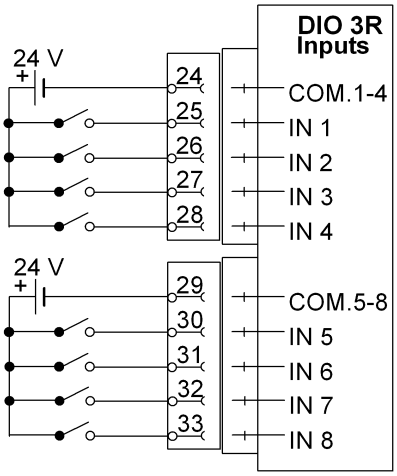
DIO 3R unit 4 has digital in/outputs no. 41 to 48.

Digital inputs

Terminals 24 – 28.
and 29 – 33.
Eight digital inputs in two groups, each group with a common reference point.
The two groups are galvanically isolated from each other.

An input will be active when +24 V is connected to the terminal.

Function for the inputs must be defined in menu Edit set-up / Inputs.

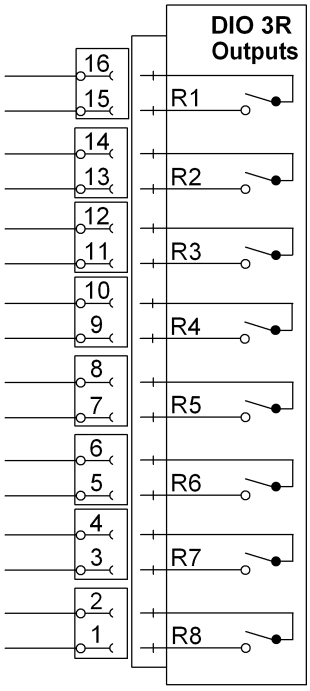


Digital outputs

Terminals 1 to 16.
Eight digital outputs (closing relay contacts) galvanically isolated from each other.

An activated output is a closed contact.

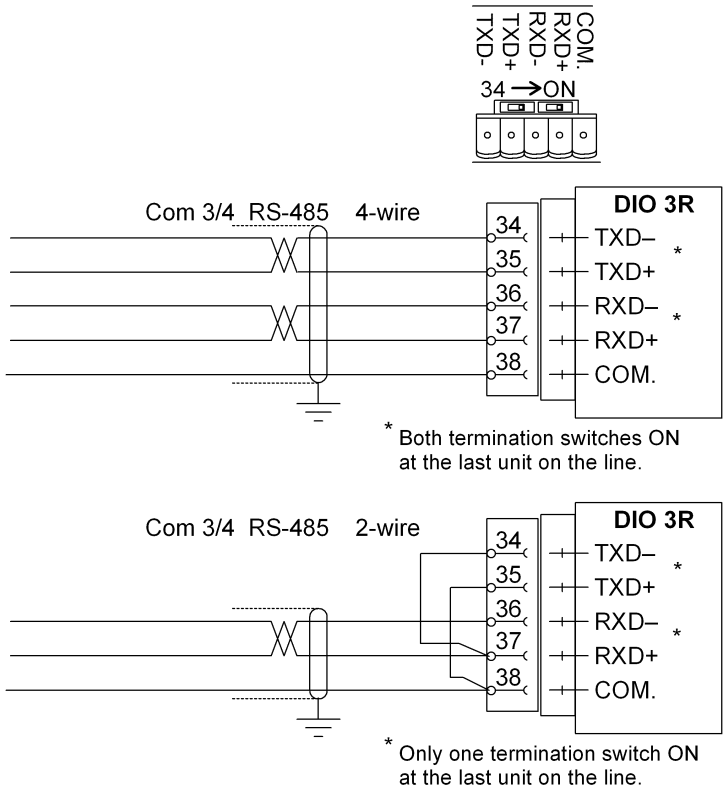
Function for the outputs must be defined in menu Edit set-up / Outputs.



Serial communication via Com 3 or Com 4.
Terminals 34 – 38.
For DIO 3R number 1 and 2, serial port Com 3/4 can be defined as Com 3 or Com 4 for TAD 3 in menu ‘Edit set-up’ / ‘Communication’.
This serial port, intended for RS-485 on 2-wires or 4-wires with common signal ground (COM.), should be used for connection of external units to TAD 3.

Shielded cable with twisted pairs should be used, and the cable shield should be connected to ground, preferably via the mounting rail.

The transmission line must be terminated at both ends.
When DIO 3R is at the end of the line, one of the termination switches should be in ON position by 2-wire communication, both termination switches should be in ON position by 4-wire communication.
(When DIO 3R is not at the end of the line, both switches should be in OFF position.)



ANA 3. Analogue output unit

ANA 3 is a high performance unit, providing an analogue output for Weight Indicator TAD 3. All characteristics for the output are set by parameters in TAD 3. One or two ANA 3 units can be connected to TAD 3, communicating via the I/O bus at serial port Com 2.

The module is easily installed on a DIN rail or a flat surface.

For technical data, refer to section 1. Introduction in this manual.

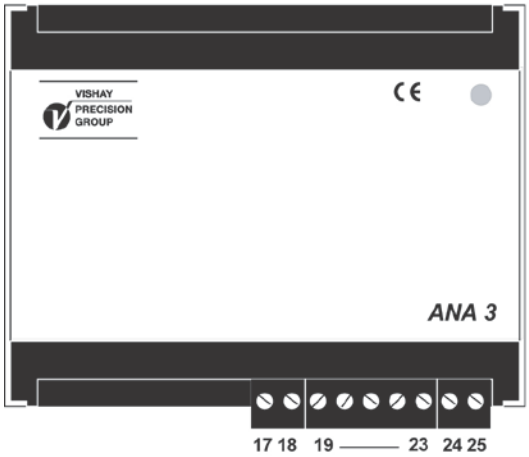


Figure 26. ANA 3 front panel and terminal blocks.

Mechanical installation

ANA 3 is built into a protective plastic housing that can be snap-mounted on a 35 mm wide DIN rail, or screw attached on a flat surface.
Mounted modules should have at least 10 mm free space on each side.

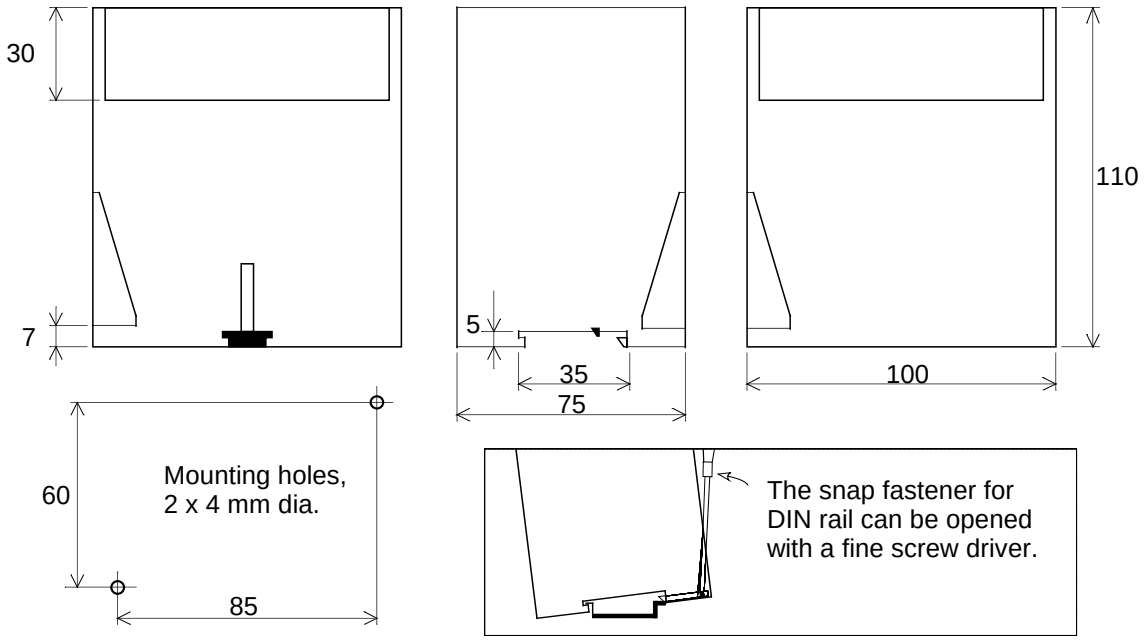
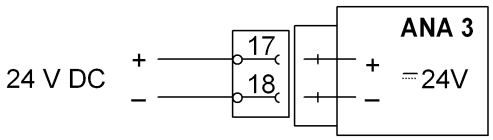


Figure 27. Mechanical dimensions for ANA 3.

Electrical installation

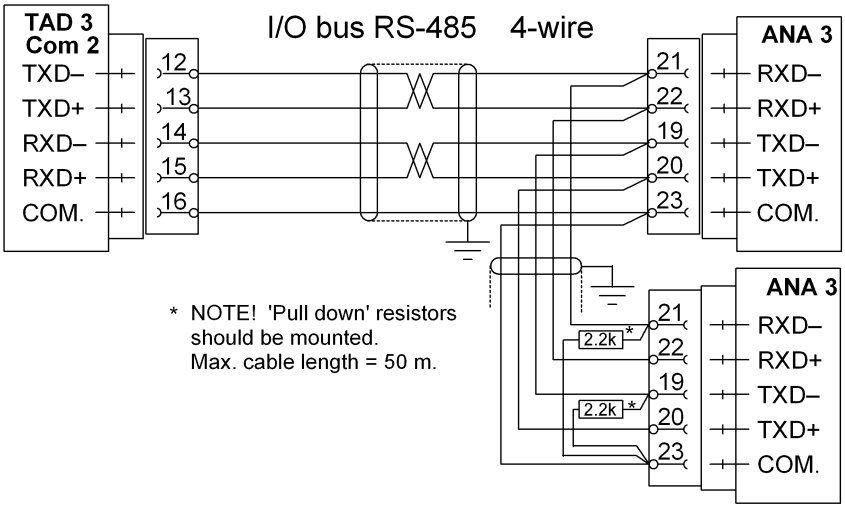
All electrical connections to ANA 3 are made through plug-in terminal blocks. Shielded cables are needed, except for the power supply. All cables should be routed at least 200 mm from power cables to avoid electromagnetical interference. Cable connection is shown below.

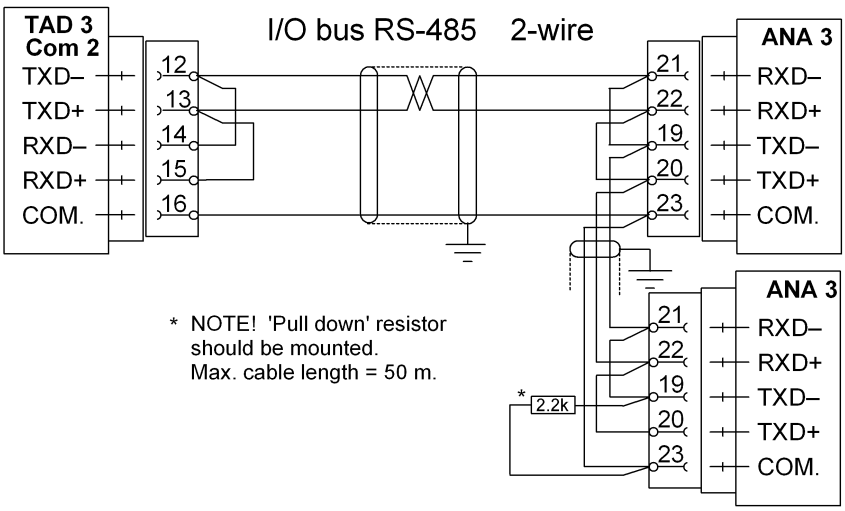
Power supply
Terminals 17, 18.
ANA 3 should be powered by 20 – 28 V DC, see Technical data, connected according to the diagram. Nobel Weighing Systems provides a range of mains operated power supplies.



Serial communication, I/O bus to TAD 3
Terminals 19 – 23.
ANA 3 should be connected to Com 2 at TAD 3 via the I/O bus. In the I/O bus, the negative lines (RXD- , TXD-) must be connected to COM via 2.2 kohm resistors, mounted on separate terminals at the last unit according to diagrams below.
Use shielded cable with twisted pairs, the total cable length must not exceed 50 m.
Terminating resistors for the cable impedance must NOT be mounted.
Connect the cable shield to ground close to ANA 3.

Parameter COM2:Mode in menu ‘Edit set-up / Communication’ must be set to ‘I/O bus’.





ANA 3 unit number

A jumper inside the ANA 3 unit is used to define the unit number.

‘Analogue output 1’ the jumper connected in the position shown below. (factory default)

‘Analogue output 2’ the jumper not connected.

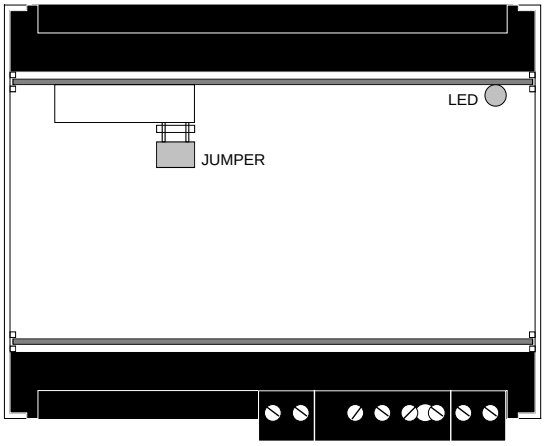
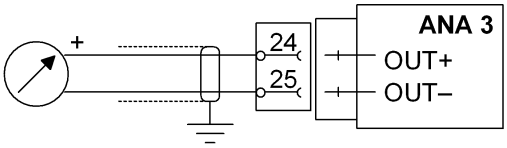


Figure 28. ANA 3 with the jumper in this position is ‘Analogue output 1’ for TAD 3.

Analogue output



Terminals 24, 25.
A measured value will be presented as a current or voltage signal, as selected in menu ‘Analogue outputs’ in TAD 3.
Connect the cable shield to ground close to ANA 3.

Function for the analogue output must be defined in menu ‘Edit set-up / Analogue outputs’.

10. Troubleshooting

General

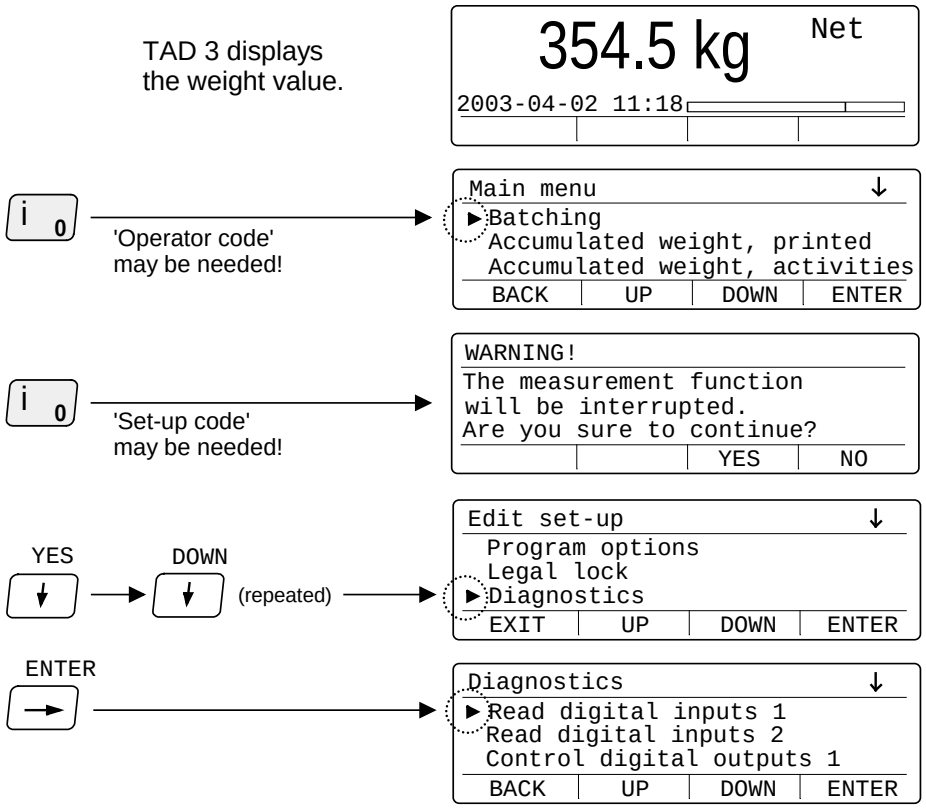
During installation or maintenance of the TAD 3 instrument, sub menu Diagnostics in menu ‘Edit set-up’ may be useful for solving possible problems, especially when external units are involved.

TAD 3 has an automatic error checking facility. This serves to facilitate troubleshooting and to ensure that the instrument will function in the best possible manner.
When an error is detected, the measuring functions are interrupted, all outputs are set passive, the analogue outputs are set to 0 V or 0 mA, and an error code will be displayed.

Diagnostics

Menu ‘Diagnostics’ is useful by troubleshooting, to check instrument functions and connections between TAD 3 and external units.
Digital input status can be read, digital and analogue output status can be set, and the instrument calibration can be checked.

As ‘Diagnostics’ is used, menu ‘Edit set-up’ is open so normal measuring functions are interrupted.

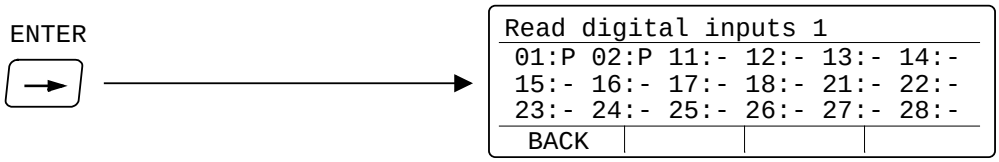


In menu ‘Diagnostics’ the cursor can be positioned at a sub menu name.

When ENTER is pressed that sub menu will be opened.

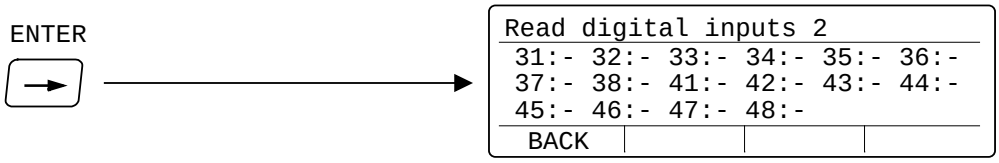
Read digital inputs, menu 1 and 2.
In these menus the status of all digital inputs to TAD 3, internally or by additional units, can be monitored.
Status for the digital inputs can not be changed in these menus.

Position the cursor at sub menu name ‘Read digital inputs 1’ and press ENTER.



01 and 02 are internal inputs to TAD 3,
11 - 18 are inputs through additional unit DIO 3R, number1,
21 - 28 are inputs through additional unit DIO 3R, number2.

Or position the cursor at sub menu name ‘Read digital inputs 2’ and press ENTER.

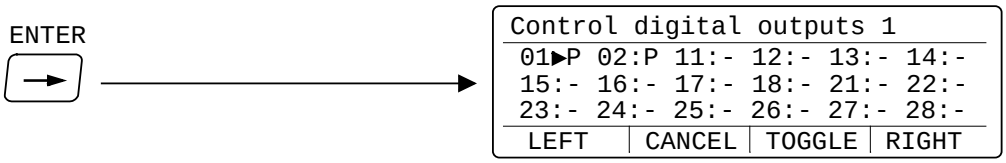


31 - 38 are inputs through additional unit DIO 3R, number 3,
41 - 48 are inputs through additional unit DIO 3R, number 4.

Inputs that are not available (or not existing) are marked minus (–).
Available inputs are marked ‘A’ when active, marked ‘P’ when passive.

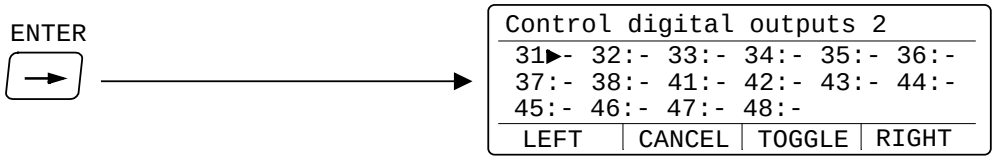
Control digital outputs, menu 1 and 2.
In these menus the status of all digital (relay) outputs from TAD 3, internally or by additional units, can be monitored and edited.

Position the cursor at sub menu name ‘Control digital outputs 1’ and press ENTER.



01 and 02 are internal outputs from TAD 3,
11 - 18 are outputs through additional unit DIO 3R, number 1,
21 - 28 are outputs through additional unit DIO 3R, number 2.

Or position the cursor at sub menu name 'Control digital outputs 2' and press ENTER.



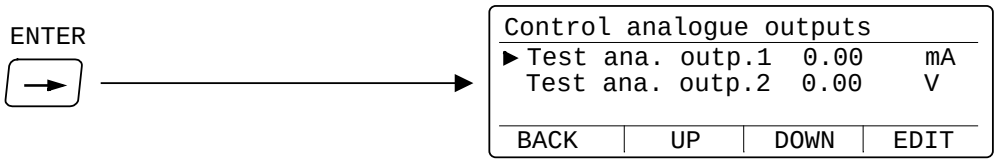
31 - 38 are outputs through additional unit DIO 3R, number 3,
41 - 48 are outputs through additional unit DIO 3R, number 4.

Outputs that are not available (or not existing) are marked minus (–).
Available outputs are marked ‘A’ (active) or ‘P’ (passive).

Initially all outputs are marked ‘–’ or ‘P’ because all available outputs are set passive when ‘Edit set-up’ is opened and the normal measuring functions are interrupted.

Position the cursor at an available output, marked A or P.
When TOGGLE is pressed, the output will change status.

Control analogue outputs.
Position the cursor at Diagnostics sub menu ‘Control analogue outputs’ and then press ENTER.



This menu can be opened, provided at least one of the parameters ‘Output source’ in menu Analogue outputs is set to something else than ‘Not in use’.

If the ‘Test ana.’ value for an output is replaced by ‘– – – – – – –’, it means that the analogue output unit is not available and the value can not be edited.

When ‘Diagnostics’ is used normal measuring functions for TAD 3 are interrupted and the analogue outputs are set to zero, so initially the value for the available outputs will be 0.00 (mA or V).

To change the output signal, position the cursor at the wanted line, and press EDIT. The cursor moves to the signal value for the analogue output, replaced by an underscore line where a new value can be entered by the digit keys.

Calibration check

By calibration check an internal calibration resistor is connected to the transducers, provided that terminals 7 and 8 are interconnected. A calibration value will be shown that should be equal to the set capacity of the scale.

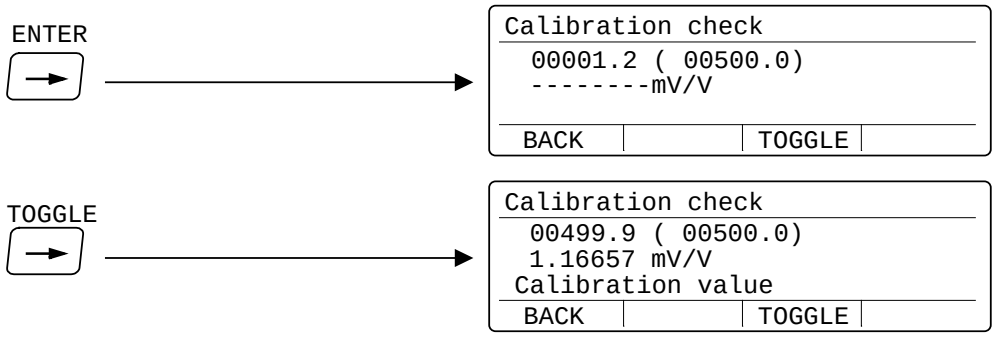
The following requirements must be fulfilled if the calibration value should be regarded as correct:

- The installation must be completely and correctly carried out according to separate instructions.
- A value for ‘Shunt transd.sig’ must be stored during calibration.
- The calibration value should be read with the same load on the scale as when the value of ‘Shunt transd.sig’ was stored (usually unloaded scale).

Operation

Calibration check should be done whenever you suspect a malfunction or at least once a year. It is a check of the complete weighing circuit (weight transmitter, cables and transducers).

Position the cursor at Diagnostics sub menu ‘Calibration check’, and then press ENTER.



The menu ‘Calibration check’ is opened, showing actual gross weight and, in brackets, the scale capacity.

Press TOGGLE to perform a calibration check, i.e. the internal shunt resistor is connected to the transducer (provided that terminals 7 and 8 are interconnected).

When the calibration check is finished the first line, outside the brackets, will show a calibration value (the scale ‘Capacity’).

Any percentage deviation for the calibration value from the value in brackets may be regarded as a possible error contribution in the weight value.

The deviation for the calibration value should be less than 0.02 % of the capacity. Nevertheless, a deviation of +/-1 unit of the resolution should always be accepted.

The second line will indicate the transducer signal change in consequence of that the calibration resistor is connected to the transducer.

Error codes

When an error is detected, or when menu ‘Edit set-up’ is opened, all digital outputs are set passive and the analogue outputs are set to 0 V or 0 mA.

This part provides a guidance on how to deal with the fault or error.

Some errors are displayed on TAD 3, containing a description of the error and the error code.

The error codes can also be fetched by Modbus communication in the registers ‘Instrument error’ and ‘Command error’ (see section 6. Communication).

The error codes are divided in four groups, depending on their origin:

- **Weight errors**, occur when transducer signals or weight values go out of given ranges.
- **Start-up errors**, occur only during start-up.
- **General errors**, usually occur due to faulty entries from the front panel, alternatively invalid data or unallowed commands from the control unit.
- **Set-up errors**, can only occur during instrument set-up (from the front panel or by serial communication).

On the following pages a summary of all error codes is given
(note that code 000 always means 'no error').

Weight errors

The indication is either temporary or stays on until the cause is cured.

Error code	Explanation
000	**No error.** The instrument in ‘normal state’ and no error is detected.
001	**Instrument in Remote set-up state.** Weight is not valid.
003	**Instrument not in normal state.** Weight is not valid.
004	**Overload** Overload means that the weight exceeds the highest allowed limit that is specified in the set-up parameters ‘Overload check’ and ‘Overload limit’.
005	**Over range** Overrange means that the input signal from the transducer exceeds the operating range.
006	**Underload** Underload means that the weight is below the lowest allowed limit that is specified in the set-up parameters ‘Overload check’ and ‘Overload limit’.

Error code	Explanation
007	**Under range** Underrange means that the input signal from the transducer is below the operation range.
010	**Excitation short-circuit. ” Check transducer connections ”** Either a short-circuit in the excitation circuit or too many transducers connected. (A fault in a transducer or inside the instrument is also possible.) Check transducer connections. See section, 2 Installation.
011	**Sense voltage error. ” Check transducer connections ”** The sense voltage is too low, unbalanced or has a reversed polarity. (A fault in a transducer or inside the instrument, is also possible.) Check transducer connections. See section, 2 Installation.
012	**Transducer signal error** The input signal is too high, for example due to a faulty or missing transducer connection. (A fault in a transducer or inside the instrument is also possible.) Check transducer connections. See section, 2 Installation.
013	**Transducer signal out of range** The input signal is too high. (A fault in accordance with Error 012 above is also possible.)
014	**Invalid AD signal** Invalid AD signal is reported whilst the instrument is waiting for sufficient conversion data to calculate a valid weight value. This indication is reported during power-up and while switching the shunt calibration resistor to and from, since the conversion will be momentarily unreliable.
015	**Transducer sign. out of range** The input signal is too low. (A fault in accordance with Error 012 above is also possible.)
019	**Calibration resistor connected** Calibration resistor connected. The gross and net weight registers contain the calibration value, see page 10-4, Calibration check.

Start-up errors

These error codes can only appear during start-up.

Error code	Explanation
080	**Invalid set-up version.** This error usually occurs at first start-up after a program upgrade. The actual settings have been replaced by default values. Enter set-up mode, perform the necessary editing and save the new parameter settings.
081	**Invalid set-up data.** Indicates faulty set-up checksum. The actual settings have been replaced by default values. Enter set-up mode, perform the necessary editing and save the new parameter settings.
082	**Invalid weight data.** This error code can occur at restart after a power failure, etc. It indicates one or several faults among the stored data for auto tare, preset tare, zero setting and gross/net mode. It also indicates that the instrument is using default values (0 for auto tare, preset tare and zero setting and gross/net is set to gross). The operator must send a reset command from the control computer or power off and on the instrument to achieve normal operation.
083-085	**Invalid factory calibration.** Invalid factory calibration is a fatal error. It indicates that the range constant stored in the EEPROM during manufacture has been corrupted. Specially trained service personnel is required. The distributor must be contacted.
086	**Batching parameters error.** Indicates faulty batching parameter checksum. The actual settings have been replaced by default values. Enter set-up mode, perform the necessary editing and save the new parameter settings.
096	**FRAM error.** FRAM memory error is a fatal error. It indicates equipment failure which requires trained service personnel. The distributor must be contacted.
097	**RAM error.** RAM memory error is a fatal error. It indicates equipment failure which requires trained service personnel. The distributor must be contacted.
098	**FLASH error.** Flash memory error is a fatal error. It indicates equipment failure which requires trained service personnel. The distributor must be contacted.
099	**Watchdog error.** If a watchdog error appears the system will be reinitialised. The operator must then send a reset command from the control computer, or power the instrument off and on, to achieve normal operation. The program regularly sends impulses to a special watchdog circuit to ensure that the circuits and the program operate correctly. However, if these impulses for any reason are omitted the watchdog error indication will result.
230	**Recipe parameters error.** Indicates faulty recipe parameter checksum. The actual settings have been replaced by default values. Enter set-up mode, perform the necessary editing and save the new parameter settings.

General errors

These errors generally occur due to faulty entries from the front panel, alternatively invalid data or unallowed commands from the control unit.

Error code	Explanation
100	**Instrument in wrong state.** The transmitted command is not applicable to the present TAD 3 mode.
101	**Overrange entry.** Value over allowed range. Compare with restrictions for the parameter.
102	**Underrange entry.** Value under allowed range. Compare with restrictions for the parameter.
103	**Illegal start address.** Illegal modbus start address, when writing data to TAD 3.
104	**Illegal number of registers.** Illegal number of modbus registers, when writing data to TAD 3.
105	**Illegal value error.** Illegal data in modbus registers, when writing data to TAD 3.
106	**Choice not available.** The choice is not valid in this program release of the TAD 3 software.
120	**Unstable weight.** Zero setting always requires a stable weight on the scale. If motion check is set to ON, also taring and printing of weight values require a stable weight on the scale. Consequently, if you try to transmit a command for zero setting, taring, or printing of weight value without awaiting a stable weight you will receive this error code.
121	**Taring not allowed (negative gross weight).** Taring is not allowed at negative gross weight if parameter 'Overload check' is set to Unipolar.
122	**Instrument in net mode.** Zero setting requires that the instrument is in gross mode. However, if you try to transmit a zero setting command while the scale is in net mode you'll receive this error code.
123	**Outside zero setting limits.** Adjustment of the zero setting during operation is only possible if the accumulated correction required is within 1% and +3% of the capacity set-up. Consequently, if you transmit a zero setting command while the required adjustment is outside allowed range you will receive this error code.
124	**Setpoint(s) not in use.** Activation/Deactivation of setpoint(s) can not be done, as at least one of the setpoint sources is/are set to 'not in use'.

(contined)

(continued)

Error code	Explanation
125	**Below min. weight for printing!** This error message is displayed if an attempt is made to print out a weight that is less than the 'minimum weight for printing'.
126	**Net mode not allowed.** Net weight can not be shown when the tare value equals 0.
127	**Remote operation not allowed.** The enter remote operation command is only allowed when TAD 3 is displaying weight.
130	**Enter set-up/restore not allowed.** The transmitted command is not applicable to the present TAD 3 mode.
131	**Exit set-up/restore not allowed.** The exit set-up command is only allowed when the instrument state is ”Remote set-up state” or ”Remote restore state”.
132	**Wrong port for software upgrade.** Software upgrade is only possible via Com 1.
133	**Function not allowed when legal lock is on.** Software upgrade, default set-up and restore set-up is not allowed when the legal lock is set to On.
134	**Option not enabled.** The command can not be executed as the needed Program option is not enabled.
135	**Wrong batching state.** The command can not be executed in this batching state.
136	**Change not allowed during batching.** It's not allowed to change the value during batching.
137	**Command not allowed during batching.** The command is not allowed when batching is in progress.
138	**Printer not ready.** The printer can not be handled as the buffer is full.
139	**No printer configured.** Printout can not be performed as no printer is configured on any of the serial ports.
140	**Command not allowed at the moment.** The requested command is not allowed at the moment.

Set-up errors

These errors occur only during instrument set-up, from the front panel or by serial communication.

Certain errors depends on more than one set-up parameter and it is the operator's responsibility to locate and correct all faulty set-up parameters.

Error code	Explanation
160	**Calibration weight error.** Weight error during calibration.
161	**Parameter locked by legal lock.** The instrument is sealed by a legal lock, and the parameter you have tried to change is locked.
162	**Timeout when storing cal.point!** Transducer signal is not stable within 10 seconds by storing of the calibration point.
163	**Saving of set-up value not allowed.** Certain set-up parameters are dependent on other parameters and saved automatically when you save a new value for the related set-up. Thereafter, certain automatically saved parameters can only be browsed. If you try to save a new value in one of these set-ups this indication will result.
164	**Illegal set-up register.** Requested set-up parameter does not exist or is not defined.
165	**Capacity/Resolution > 6 digits!** The Capacity value has more than the permitted 6 digits. Select a combination of Resolution and Capacity that will result in max. 6 digits plus decimal point.
166	**Some parameters set to default.** Some parameters that were restored uses special choices that are not allowed in this instrument. These parameters will be set to default.
167	**Illegal calibration direction!** All weights with corresponding mV/V values must be increasing for increasing calibration point number.
168	**Warning - Calibration not finished! (All cal. points not stored).** A deadweight calibration was started, but all calibration points are not stored.
169	**Zero offset can not be changed.** When a deadweight calibration is started, all calibration points must be stored before it's possible to edit the parameters 'set zero' and 'zero offset'.
170	**Zero setting out of range (legal weighing limits) !** Limits for zeroing by legal weighing is ±10 % of Capacity.
177	**Warning - The flow rate derivation time is changed by the instrument.** As the flow rate derivation time is dependent on the calibration this warning will occur when the derivation time is automatically changed by more than 10 %.

(continued)

(continued)

Error code	Explanation
187	**Zero-track.rate too high!** Exit set-up/restore not allowed. The zero-track rate is too high. Select a lower zero track rate.
188	**Capacity/Resolution > 6 digits!** Exit set-up/restore not allowed. The Capacity value has more than the permitted 6 digits. Select a combination of Resolution and Capacity that will result in max. 6 digits plus decimal point.
189	**Too high transd. signal in cal. point 2.** Exit set-up/restore not allowed, the mV/V signal in calibration point 2 is too high (often due to a previous, strange data sheet calibration).
190	**Too high transd. signal in cal. point 2.** Exit set-up/restore not allowed, the mV/V signal in calibration point 2 is too high, due to strange data sheet calibration. The conversion factor, rated load etc. does not correspond to each other.
191	**Illegal calibration direction.** All weights with corresponding mV/V values must be increasing for increasing calibration point number.
199	**COM3 and COM4 on the same unit.** COM3 and COM4 must be on separate I/O units.
211-214	**DIO 3R number [1 to 4] faulty.** One of the used DIO 3R units is faulty. This error can occurr at start of batching operation.
215	**No activities in the recipe.** The selected recipe contains no activities. This error can occurr at start of batching operation.
216	**No operational activities in the recipe.** The selected recipe contains no operational activities. This error can occurr at start of batching operation.
217	**Activities in the recipe are not configured.** The selected recipe contains activities that are not configured. This error can occurr at start of batching operation.
225	**Illegal activity number.** **I**llegal activity number when writing Modbus data.
226	**Illegal recipe number.** **I**llegal recipe number when writing Modbus data.
230	**Faulty recipe parameters.** See page 10-7!

(continued)

(continued)

Error code	Explanation
245	**Exit set-up/restore not allowed.** Some batching parameter is erroneous. Parameter value is outside allowed range.
246	**Exit set-up/restore not allowed.** Some recipe parameter is erroneous. Parameter value is out of range.
1001 – 1024	**Input/Output used in activity [1–24] not defined as B. activity.** An input/output used in the batching activity 1–24 is not set to B. activity in the input/output menu.
1101 – 1124	**Input/Output used in activity [1–24] not defined as B. activity.** Exit set-up/restore not allowed, an input/output used in the batching activity 1–24 is not set to B. activity in the input/output menu.
41000 - 41798	**Exit set-up/restore not allowed.** There is an error in the parameter pointed out by this error code. The parameter value is out of range.

Set-up list for TAD 3 Address: .....

Location/Notes: .....

Progr. name: ..... Ser. no.: ..... Date: .....

Modbus number	Parameter name	Default value	Set-up value	
41000 (46000)	Language	English [1]	.....	.....
41002 (46002)	Start mode	Auto [1]	.....	.....
41004 (46004)	Display info	Date/Time [3]	.....	.....
41006 (46006)	Display contrast	4 [4]	.....	.....
41008 (46008)	Backlight	5 [5]	.....	.....
41010 (46010)	Date format	YYYY-MM-DD [0]	.....	
41012 (46012)	Gross/Net key	On [1]	.....	.....
41014 (46014)	Tare key	On [1]	.....	.....
41016 (46016)	Print key	On [1]	.....	.....
41018 (46018)	Zero key	On [1]	.....	.....
41020 (46020)	Operator lock	Off [0]	.....	.....
41022 (46022)	Operator code	1937	.....	.....
41024 (46024)	Set-up lock	Off [0]	.....	.....
41026 (46026)	Set-up code	1937	.....	.....
41028 (46028)	Measurement unit	kg [2]	.....	.....
41030 (46030)	Resolution	0.1 [6]	.....	.....
41032 (46032)	Capacity	500	.....	.....
41034 (46034)	Mains frequency	50 Hz [0]	.....	.....
41036 (46036)	Filter type	Standard [1]	.....	.....
41038 (46038)	Filter time	800	.....	.....
41040 (46040)	Filter window	10 * Resolution	.....	.....
41042 (46042)	Motion detect w.	1 * Resolution	.....	.....
41044 (46044)	No-motion delay	1.0	.....	.....
41046 (46046)	Motion check	Off [0]	.....	.....
41048 (46048)	Min.weight print	0	.....	.....
41050 (46050)	Warm up time	0	.....	.....
41052 (46052)	Overload check	Off [0]	.....	.....
41054 (46054)	Overload limit	Cap. + 9 * Res.	.....	.....
41056 (46056)	Zero-tracking	Off [0]	.....	.....
41058 (46058)	Zero-track.rate	1	.....	.....
41060 (46060)	Excitation	DC [0]	.....	.....
41062 (46062)	Tare corr.mode	Auto [0]	.....	.....
41064 (46064)	Calibration type	Data sheet [0]	.....	.....
41066 (46066)	Conv. factor	9.80665	.....	.....
41068 (46068)	Number of transd	3	.....	.....
41070 (46070)	Rated load	2000.0	.....	.....
41072 (46072)	Rated output 1	2.03900	.....	.....
41074 (46074)	Rated output 2	2.03900	.....	.....
41076 (46076)	Rated output 3	2.03900	.....	.....
41078 (46078)	Rated output 4	2.03900	.....	.....

Set-up list for TAD 3 Address: .....

Location/Notes: .....

Progr. name: ..... Ser. no.: ..... Date: .....

Modbus number	Parameter name	Default value	Set-up value	
41080 (46080)	Number of cal.p	2	.....	.....
41082 (46082)	Value cal. p.1	0	.....	.....
41084 (46084)	Value cal. p.2	500	.....	.....
41086 (46086)	Value cal. p.3	0	.....	.....
41088 (46088)	Value cal. p.4	0	.....	.....
41090 (46090)	Value cal. p.5	0	.....	.....
41092 (46092)	Value cal. p.6	0	.....	.....
41094 (46094)	Transd.sign. p.1	0.00000	.....	.....
41096 (46096)	Transd.sign. p.2	1.66631	.....	.....
41098 (46098)	Transd.sign. p.3	2.03900	.....	.....
41100 (46100)	Transd.sign. p.4	2.03900	.....	.....
41102 (46102)	Transd.sign. p.5	2.03900	.....	.....
41104 (46104)	Transd.sign. p.6	2.03900	.....	.....
41106 (46106)	Shunt cal. force	2138.0	.....	.....
41108 (46108)	Shunt transd.sig	2.03900	.....	.....
41110 (46110)	Set zero		.....	.....
41112 (46112)	Zero offset	0	.....	.....
41114 (46114)	Instrum. address	1	.....	.....
41116 (46116)	COM1:Mode	Modbus auto [2]	.....	.....
41118 (46118)	COM1:Baudrate	9600 [5]	.....	.....
41120 (46120)	COM1:Data format	8-none-1 [5]	.....	.....
41122 (46122)	COM2:Mode	I/O bus [7]	.....	.....
41124 (46124)	COM2:Baudrate	115200 [9]	.....	.....
41126 (46126)	COM2:Data format	8-none-1 [5]	.....	.....
41128 (46128)	COM3:Mode	Not in use [0]	.....	.....
41130 (46130)	COM3:Baudrate	9600 [5]	.....	.....
41132 (46132)	COM3:Data format	8-none-1 [5]	.....	.....
41134 (46134)	COM3:Position	Dig.I/O 1 [2]	.....	.....
41136 (46136)	COM4:Mode	Not in use [0]	.....	.....
41138 (46138)	COM4:Baudrate	9600 [5]	.....	.....
41140 (46140)	COM4:Data format	8-none-1 [5]	.....	.....
41142 (46142)	COM4:Position	Dig.I/O 2 [3]	.....	.....
41144 (46144)	Ext. disp.mode	Gross weight [0]	.....	.....
41146 (46146)	Ext. disp.format	6 [2]	.....	.....
41148 (46148)	Printer pos.1	Disp weight [1]	.....	.....
41150 (46150)	Printer pos.2	Not in use [0]	.....	.....
41152 (46152)	Printer pos.3	Not in use [0]	.....	.....
41154 (46154)	Printer pos.4	Not in use [0]	.....	.....
41156 (46156)	Printer linefeed	0 [0]	.....	.....
41158 (46158)	Level 1 source	Not in use [0]	.....	.....
41160 (46160)	Level 1 outp.	Active above [0]	.....	.....
41162 (46162)	Level 1 hyst.	0.2	.....	.....

Appendix 1.

Set-up list, page 2.

Set-up list for TAD 3 Address: .....

Location/Notes: .....

Progr. name: ..... Ser. no.: ..... Date: .....

Modbus number	Parameter name	Default value	Set-up value	
41164 (46164)	Level 2 source	Not in use [0]	.....	.....
41166 (46166)	Level 2 outp.	Active above [0]	.....	.....
41168 (46168)	Level 2 hyst.	0.2	.....	.....
41170 (46170)	Level 3 source	Not in use [0]	.....	.....
41172 (46172)	Level 3 outp.	Active above [0]	.....	.....
41174 (46174)	Level 3 hyst.	0.2	.....	.....
41176 (46176)	Level 4 source	Not in use [0]	.....	.....
41178 (46178)	Level 4 outp.	Active above [0]	.....	.....
41180 (46180)	Level 4 hyst.	0.2	.....	.....
41182 (46182)	Level 5 source	Not in use [0]	.....	.....
41184 (46184)	Level 5 outp.	Active above [0]	.....	.....
41186 (46186)	Level 5 hyst.	0.2	.....	.....
41188 (46188)	Level 6 source	Not in use [0]	.....	.....
41190 (46190)	Level 6 outp.	Active above [0]	.....	.....
41192 (46192)	Level 6 hyst.	0.2	.....	.....
41194 (46194)	Level 7 source	Not in use [0]	.....	.....
41196 (46196)	Level 7 outp.	Active above [0]	.....	.....
41198 (46198)	Level 7 hyst.	0.2	.....	.....
41200 (46200)	Level 8 source	Not in use [0]	.....	.....
41202 (46202)	Level 8 outp.	Active above [0]	.....	.....
41204 (46204)	Level 8 hyst.	0.2	.....	.....
41206 (46206)	Setp.1 source	Not in use [0]	.....	.....
41208 (46208)	Setp.2 source	Not in use [0]	.....	.....
41210 (46210)	Input 01 use	Not in use [0]	.....	.....
41212 (46212)	Input 02 use	Not in use [0]	.....	.....
41214 (46214)	Input 11 use	Not in use [0]	.....	.....
41216 (46216)	Input 12 use	Not in use [0]	.....	.....
41218 (46218)	Input 13 use	Not in use [0]	.....	.....
41220 (46220)	Input 14 use	Not in use [0]	.....	.....
41222 (46222)	Input 15 use	Not in use [0]	.....	.....
41224 (46224)	Input 16 use	Not in use [0]	.....	.....
41226 (46226)	Input 17 use	Not in use [0]	.....	.....
41228 (46228)	Input 18 use	Not in use [0]	.....	.....
41230 (46230)	Input 21 use	Not in use [0]	.....	.....
41232 (46232)	Input 22 use	Not in use [0]	.....	.....
41234 (46234)	Input 23 use	Not in use [0]	.....	.....
41236 (46236)	Input 24 use	Not in use [0]	.....	.....
41238 (46238)	Input 25 use	Not in use [0]	.....	.....
41240 (46240)	Input 26 use	Not in use [0]	.....	.....
41242 (46242)	Input 27 use	Not in use [0]	.....	.....
41244 (46244)	Input 28 use	Not in use [0]	.....	.....

Set-up list for TAD 3 Address: .....

Location/Notes: .....

Progr. name: ..... Ser. no.: ..... Date: .....

Modbus number	Parameter name	Default value	Set-up value	
41246 (46246)	Output 01 use	Not in use [0]	.....	.....
41248 (46248)	Output 02 use	Not in use [0]	.....	.....
41250 (46250)	Output 11 use	Not in use [0]	.....	.....
41252 (46252)	Output 12 use	Not in use [0]	.....	.....
41254 (46254)	Output 13 use	Not in use [0]	.....	.....
41256 (46256)	Output 14 use	Not in use [0]	.....	.....
41258 (46258)	Output 15 use	Not in use [0]	.....	.....
41260 (46260)	Output 16 use	Not in use [0]	.....	.....
41262 (46262)	Output 17 use	Not in use [0]	.....	.....
41264 (46264)	Output 18 use	Not in use [0]	.....	.....
41266 (46266)	Output 21 use	Not in use [0]	.....	.....
41268 (46268)	Output 22 use	Not in use [0]	.....	.....
41270 (46270)	Output 23 use	Not in use [0]	.....	.....
41272 (46272)	Output 24 use	Not in use [0]	.....	.....
41274 (46274)	Output 25 use	Not in use [0]	.....	.....
41276 (46276)	Output 26 use	Not in use [0]	.....	.....
41278 (46278)	Output 27 use	Not in use [0]	.....	.....
41280 (46280)	Output 28 use	Not in use [0]	.....	.....
41282 (46282)	1:Output source	Not in use [0]	.....	.....
41284 (46284)	1:Output type	4-20mA [3]	.....	.....
41286 (46286)	1:Range low	0	.....	.....
41288 (46288)	1:Range high	500	.....	.....
41290 (46290)	1:Low adjust	0	.....	.....
41292 (46292)	1:High adjust	0	.....	.....
41294 (46294)	1:Filter const.	1 [0]	.....	.....
41296 (46296)	2:Output source	Not in use [0]	.....	.....
41298 (46298)	2:Output type	4-20mA [3]	.....	.....
41300 (46300)	2:Range low	0	.....	.....
41302 (46302)	2:Range high	500	.....	.....
41304 (46304)	2:Low adjust	0	.....	.....
41306 (46306)	2:High adjust	0	.....	.....
41308 (46308)	2:Filter const.	1 [0]	.....	.....
41312 (46312)	Flow rate res	0.02 [4]	.....	.....
41314 (46314)	Flow rate unit	Unit/s [0]	.....	.....
41310 (46310)	Auto deriv. time	On [1]	.....	.....
41316 (46316)	Derivation time	0.64	.....	.....
Common batching parameters				
41400 (46400)	Display no of B	No [0]	.....	.....
41402 (46402)	Display B-size	No [0]	.....	.....
41404 (46404)	Batch printouts	No [0]	.....	.....
41406 (46406)	Batch end mode	Gross [1]	.....	.....
41408 (46408)	Recipe check	No [0]	.....	.....

Appendix 1.

Set-up list, page 4.

Batch parameters for TAD 3 Address: .....

Location/Notes: .....

Progr. name: ..... Ser. no.: ..... Date: .....

Activity number.: A .... Activity name: .....

Activity type:
[0] Not used [3] Dump [6] Timer w. outp [9] Manual
[1] Weigh in [4] Fill [7] Latch on [10] Pulse batch
[2] Weigh out [5] Timer [8] Latch off

Weigh in / Weigh out (7-12 – 7-15)

Batching mode .....
Output no .....
Coarse outp. no .....
Fine outp. no .....
F. on during C. .....
Fine value .....
Minus tolerance .....
Plus tolerance .....
Inflight factor .....
Inflight value .....
Wait time .....
Pulsing time .....
Timeout value .....
Ack. type .....
Ack. input no .....

Dump (7-16)

Output no .....
Low level .....
Wait time .....
Timeout value .....
Ack. type .....
Ack. input no .....

Fill (7-17)

Output no .....
Low level .....
High level .....
Wait time .....
Timeout value .....
Ack. type .....
Ack. input no .....

Timer / Timer w. output (7-18)

Output no .....
Ack. type .....
Ack. input no .....

Latch on / Latch off (7-19)

Output no .....
On during halt .....
Ack. type .....
Ack. input no .....

Manual (7-19)

Print weight .....
Enter weight .....

Pulse batch (7-20 – 7-23)

Batching mode .....
Output no .....
Coarse outp. no .....
Fine output no .....
F. on during C. .....
Fine value .....
Minus tolerance .....
Plus tolerance .....
Inflight factor .....
Inflight value .....
Wait time .....
Pulsing time .....
Timeout value .....
Ack. type .....
Ack. input no .....
Pulse input no .....
No of decimals .....
Unit .....
Scale factor .....

Appendix 2.

Batch parameters
Manuscript form

Recipe parameters for TAD 3 Address: .....

Location/Notes: .....

Progr. name: ..... Ser. no.: ..... Date: .....

Recipe number.: R ..... Recipe name: .....

Recipe line	Activity	Setpoint
L01	.....	.....
L02	.....	.....
L03	.....	.....
L04	.....	.....
L05	.....	.....
L06	.....	.....
L07	.....	.....
L08	.....	.....
L09	.....	.....
L10	.....	.....
L11	.....	.....
L12	.....	.....
L13	.....	.....
L14	.....	.....
L15	.....	.....
L16	.....	.....
L17	.....	.....
L18	.....	.....
L19	.....	.....
L20	.....	.....
L21	.....	.....
L22	.....	.....
L23	.....	.....
L24	.....	.....
L25	.....	.....
L26	.....	.....
L27	.....	.....
L28	.....	.....
L29	.....	.....
L30	.....	.....

Appendix 3

Recipe parameters.
Manuscript form.

Declaration of Conformity

We Nobel Elektronik AB
Box 423, S-691 27 KARLSKOGA
SWEDEN

declare under our sole responsibility that the product

Weight Processor TAD 3

to which this declaration relates is in conformity with the following standards or other normative documents

EMC:

SS-EN 55011 (1991)	/ SS EN 50081-2 (1993):	Class A, Group 1
SS-ENV 50140 (1993)	/ SS-EN 50082-2 (1995):	10 V/m
ENV 50141 (1993)	/ SS-EN 50082-2 (1995):	10V
SS-EN 61000-4-2 (1995)	/ SS-EN 50082-2 (1995):	4 kV Contact discharge 8 kV Air discharge
SS-EN 61 000-4-4 (1995)	/ SS-EN 50082-2 (1995):	2 kV AC Mains 2 kV Control 1 kV Signal

The product to which this declaration relates is in conformity with the essential requirements in the EMC Directive 89/336/EEC with amend. 92/31/EEC and 93/68/EEC

KARLSKOGA April 13 1999

.....

Bengt-Åke Sjögren, Managing Director

Document no. 35214
Article no. 600 684 R4

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