

Weight Indicator TAD 3

From prog. name T002L240



Technical Manual

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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

Optional functions for batching are included in the Weight Indicator TAD 3 from programme T001(A)120 on.

Optional functions for batching and flow rate are included in the Weight Indicator TAD 3 from programme T002(A)200 on.

These functions are activated by entry of special codes that can be ordered from Nobel Weighing Systems.

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

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, that 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.

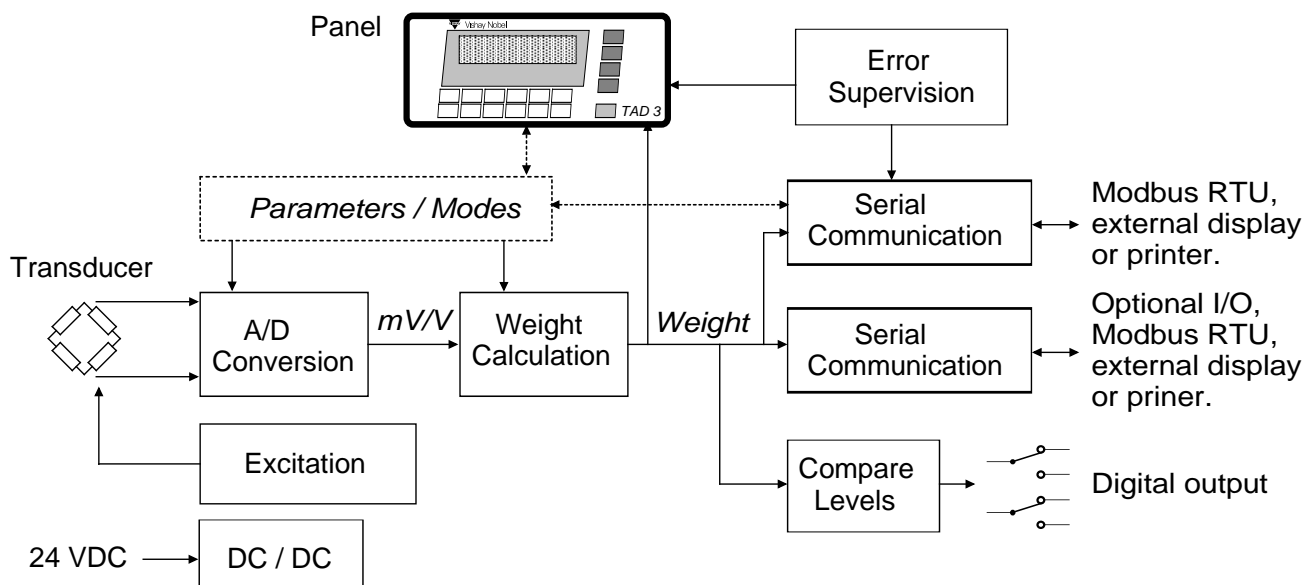


Figure 1. The Weight Indicator TAD 3 converts analogue transducer signals into precise measurement information, available by serial communication for use in industrial processes.

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. is 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.

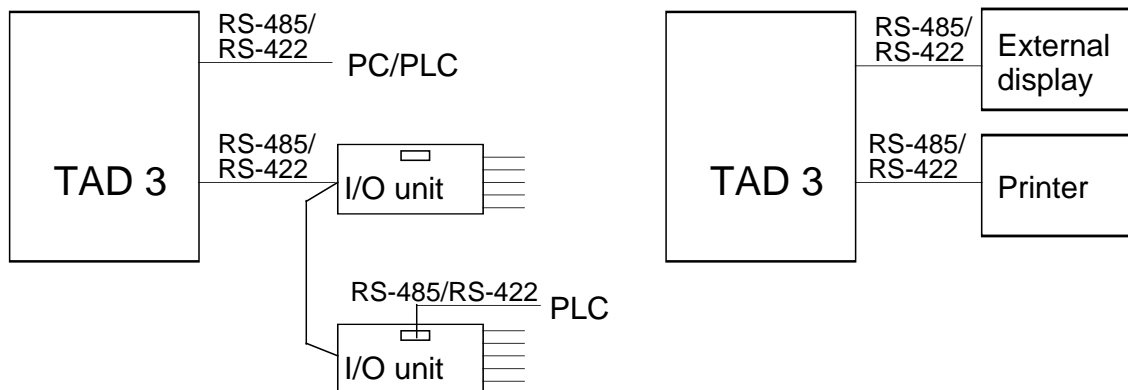


Figure 2. TAD 3 utilises serial communication to carry out different operational tasks.

Technical data

Transducer input

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

Conversion

A/D conversion	13 800 000 counts. Patented own design.
Temperature influence	
Gain	$< \pm 1.5 \text{ ppm}/^\circ\text{C}$ of shown weight.
Zero	$< \pm 0.01 \mu\text{V}/^\circ\text{C}$.
Noise	$< 0.15 \mu\text{V}$ p-p during 60 s.
Linearity	$< \pm 20 \text{ ppm}$ of range.
Repeatability	$< \pm 10 \text{ ppm}$ 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.
Linearisation	Can be calibrated in 6 points.

Serial communication, Com 1

Used for Modbus RTU communication, fieldbus communication (via GATE 3), 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 $> 3 \text{ ms}$ (Baud rate $> 38400 \Rightarrow > 1 \text{ ms}$). Modbus Auto $> 0.5 \text{ ms}$.

Serial communication, Com 2

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

Interface	RS-485/RS-422.
Baud rate	Up to 460 kbaud.
Response times:	Modbus $> 3 \text{ ms}$ (Baud rate $> 38400 \Rightarrow > 1 \text{ ms}$). Modbus Auto $> 0.5 \text{ ms}$.

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.
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Calendar clock

Internal real time clock with backup battery.

Power supply

Supply voltage	24 VDC $\pm 20\%$, 8 W.
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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.

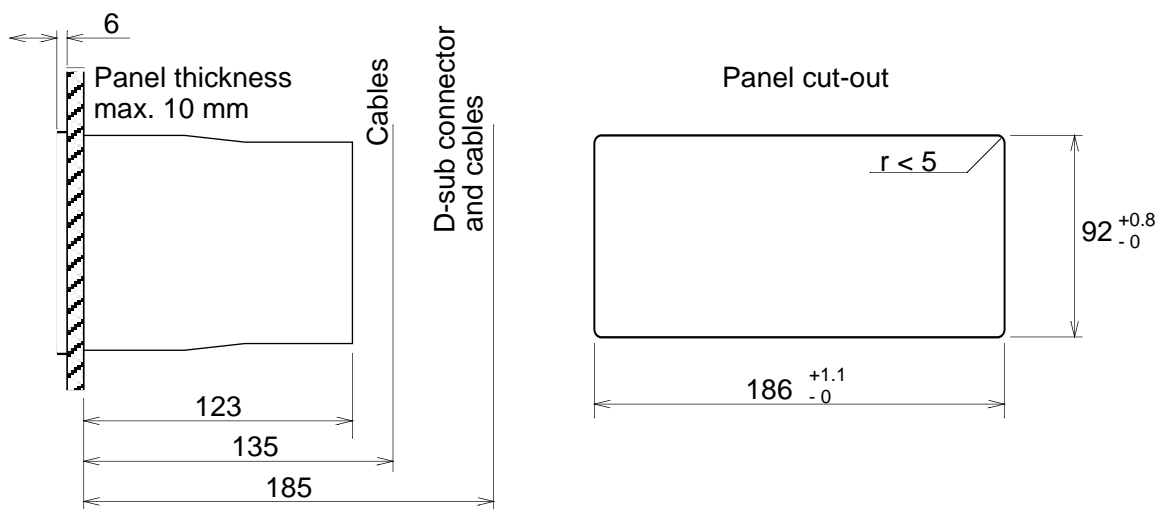


Figure 3. Mechanical dimensions and panel cut-out for TAD 3.

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

One or two units can be connected to Com 2 on TAD 3.

Switches to set the unit to 'Dig.I/O 1' or 'Dig.I/O 2'.

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)

Baud rate	Max. 115.2 kbaud.
Application	Modbus, remote display or printer.
Switches for line termination and fail safe.	

Power	24 VDC $\pm 20\%$, 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 $\pm 20\%$, 5 W.
Mechanical size	75 x 100 x 110 mm.

Accessories

GATE 3S Fieldbus unit

See separate data sheet.

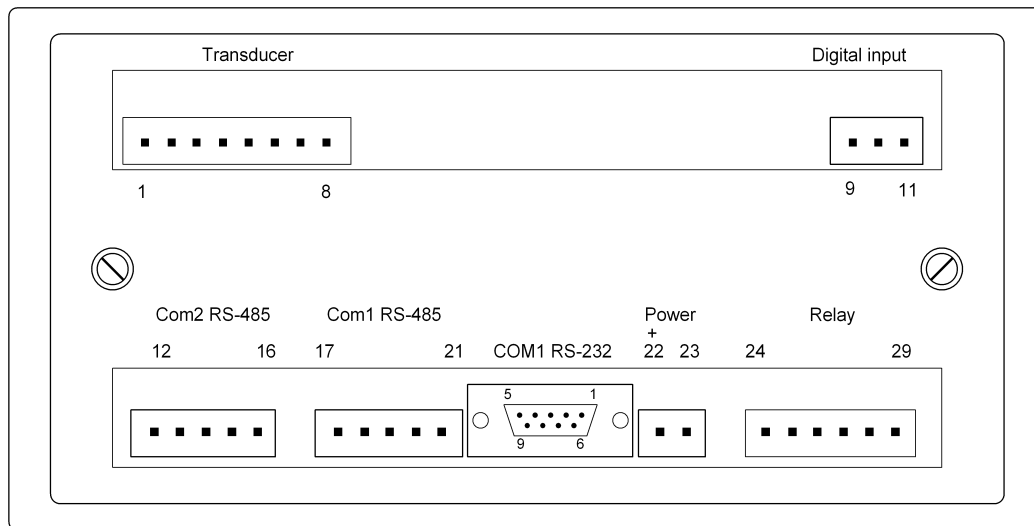


Figure 5. Connectors at the rear of TAD 3.

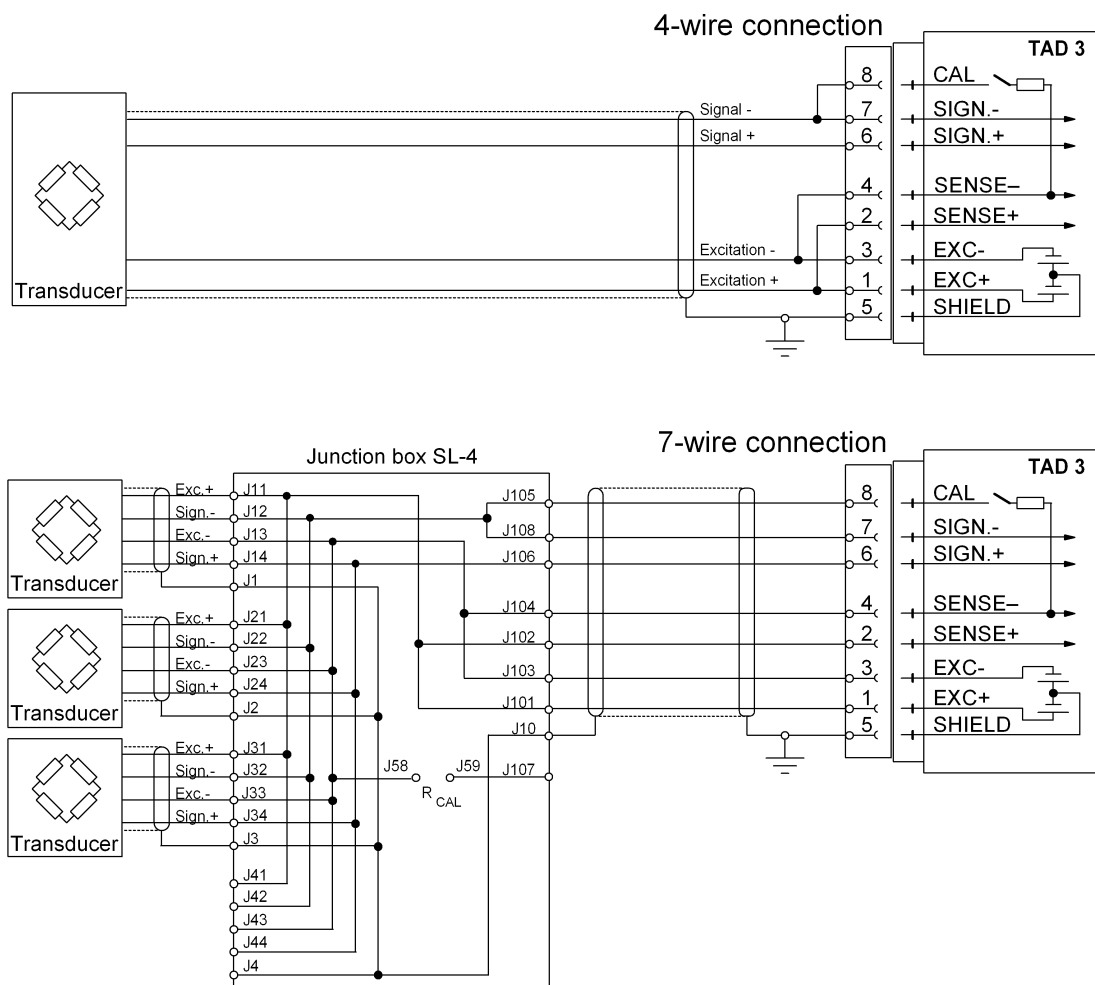


Figure 6. A transducer may be connected directly to terminals at TAD 3.
For several transducers or long distance, a junction box
and lengthening cable is needed.

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.

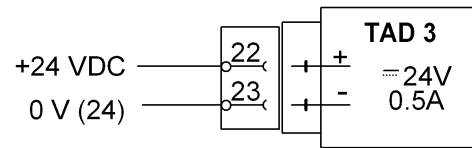
In the junction box SL-4 from Nobel Weighing Systems, see figure 6, all necessary terminals and interconnections are provided.

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.

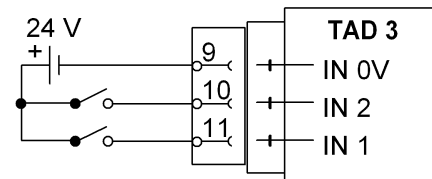
Nobel Weighing Systems provides a range of mains operated power supplies, intended for various numbers of TAD 3 units.



Digital inputs

Terminals 9 – 11.

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

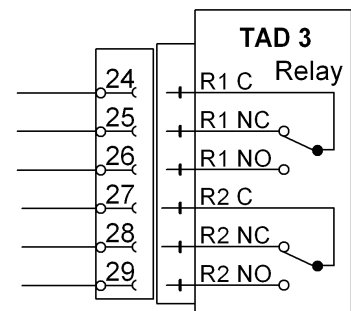


Relay outputs

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.

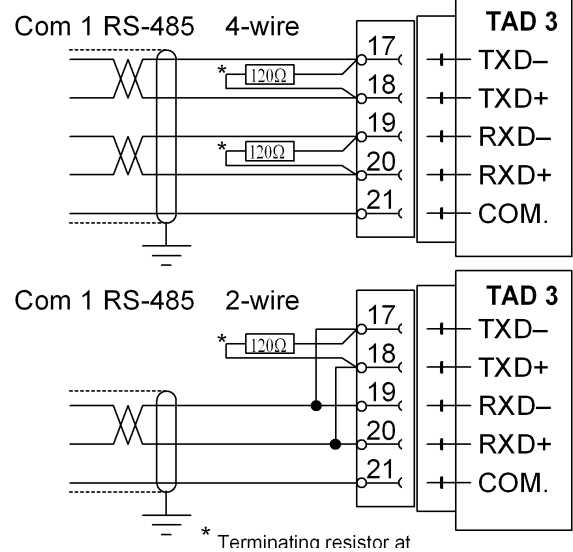
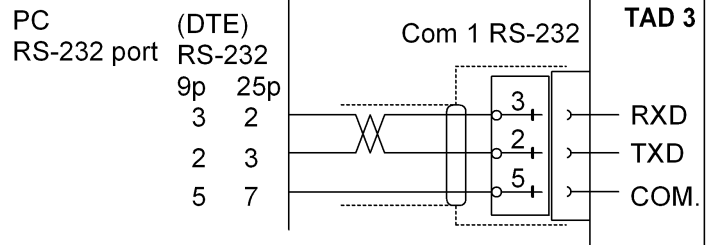
Serial communication interface:
RS-485/RS-422 for 2-wire or 4-wire with common earth (COM).

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.



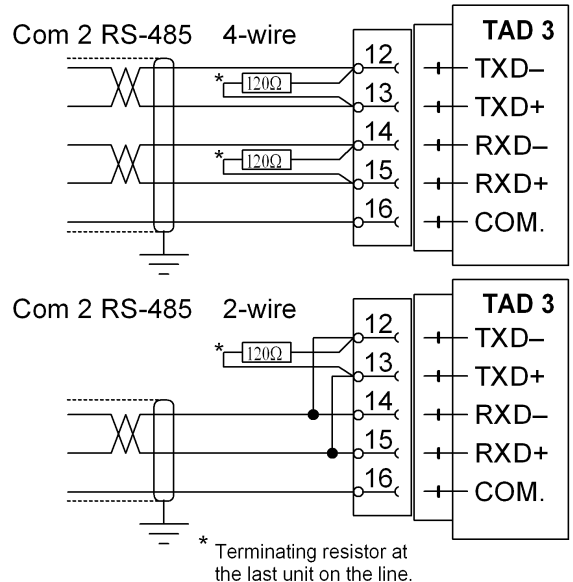
Serial communication Com 2

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 backlighted 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.

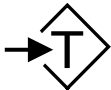


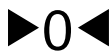
Function keys

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 can not 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 **1** to open the instrument Main menu.

Then press function key DOWN several times to position the cursor 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.

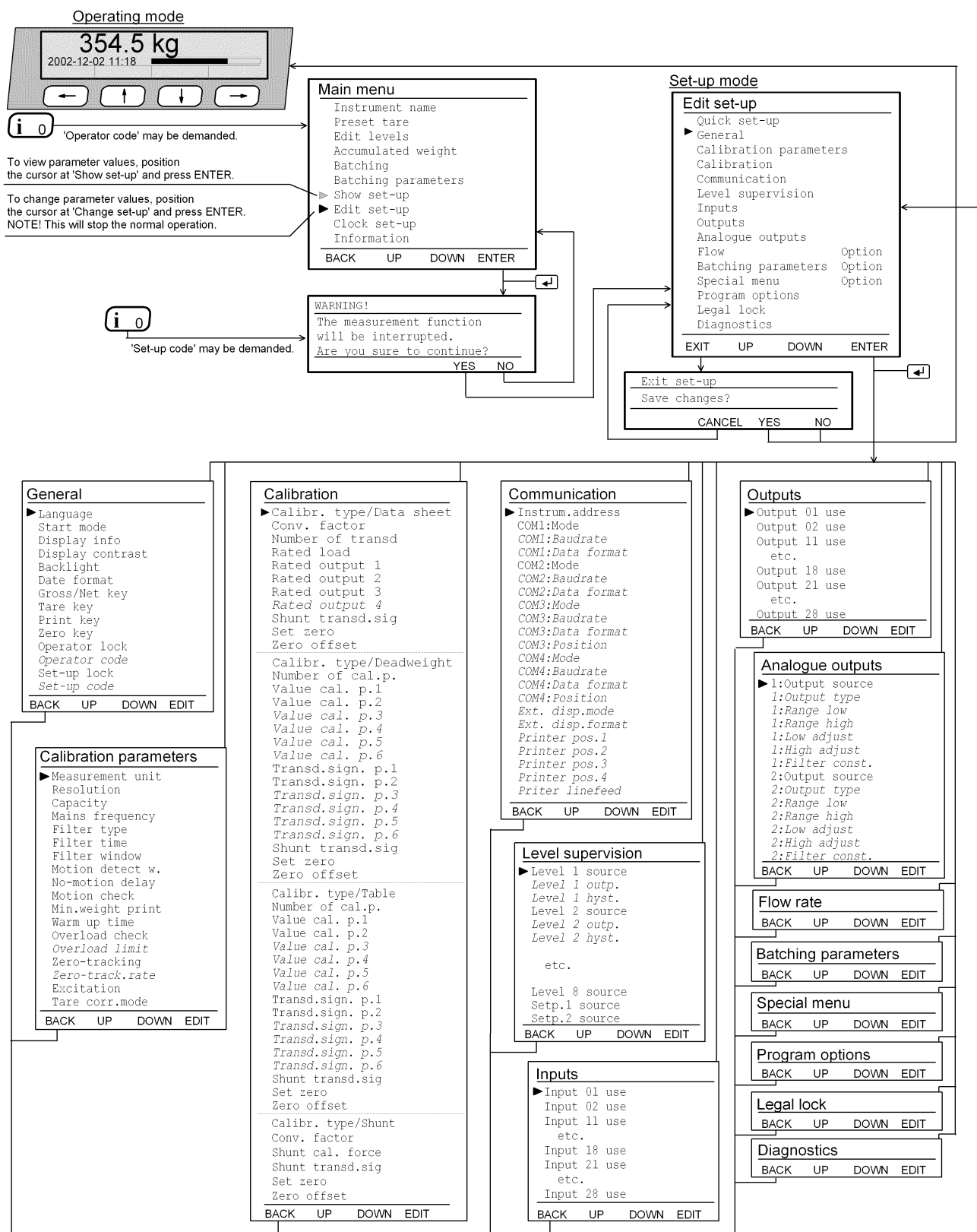


Figure 8. The parameters are arranged in a number of menus. For some parameters, viewing is conditional. Parameter editing can only be performed when the normal measuring operation is interrupted. Consequently, the selection of 'Edit set-up' must be acknowledged, and a valid code for a security lock 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 $\dot{1}$, should be used to open the menus.

When TAD 3 is in normal operation, and the key $\dot{1}$ 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 $\dot{1}$ 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 \downarrow 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.

Set-up mode

<div> <div>Edit set-up</div> <div> <div>Quick set-up</div> <div>► General</div> <div>Calibration parameters</div> <div>Calibration</div> <div>Communication</div> <div>Level supervision</div> <div>Inputs</div> <div>Outputs</div> <div>Analogue outputs</div> <div>Flow rate</div> <div>Batching parameters</div> <div>Special menu</div> <div>Program options</div> <div>Legal lock</div> <div>Diagnoses</div> </div> <div> <div>EXIT</div> <div>UP</div> <div>DOWN</div> <div>ENTER</div> </div> </div>	<div> <div>See 'Operating instructions, Quick installation</div> <div>See pages 3-7, 3-8</div> <div>See pages 3-9 to 3-13</div> <div>See pages 3-13 to 3-19</div> <div>See pages 3-20 to 3-25</div> <div>See pages 3-26, 3-27</div> <div>See page 3-28</div> <div>See page 3-29</div> <div>See pages 3-30 to 3-33</div> <div>See pages 8-2, 8-3</div> <div>See pages 7-11 to 7-24</div> <div>See page 3-34</div> <div>See page 3-34</div> <div>See pages 10-1 to 10-4</div> </div>
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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.

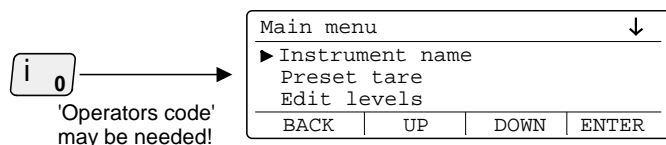
In menu 'Edit set-up' a sub menu can be selected by positioning of the cursor and pressing the key ENTER.

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

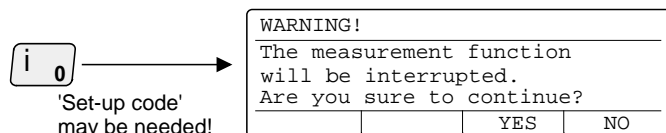
When the indicated parameter has been selected, by function key EDIT, the cursor moves to the parameter value and the function keys will get editing functions.

Selecting a parameter in 'Edit set-up':

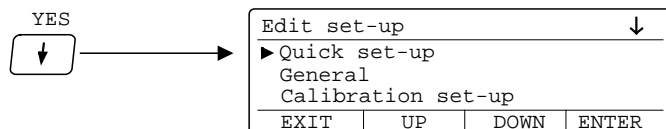
Press the key marked **i** (digit key 0).
(The Operator code may be demanded.)
The instrument Main menu will be shown.



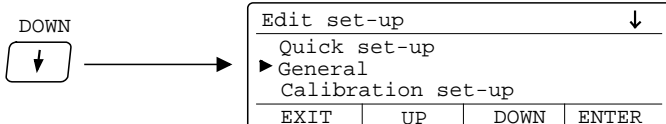
Press **i** (digit key 0) again to enter in menu 'Edit set-up'.
(The Set-up code may be demanded.)
A warning menu will be shown.



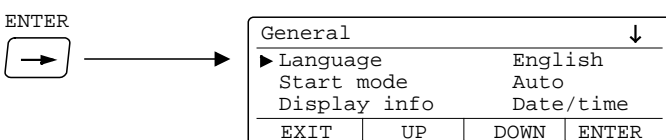
Press YES to enter in 'Edit set-up'.
Normal measuring will be interrupted and editing will be possible.



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

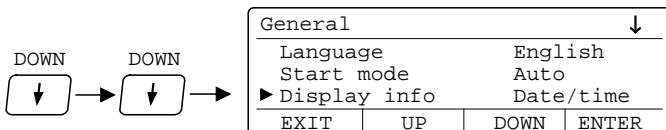


Press ENTER (or ↵) to open the indicated sub menu.

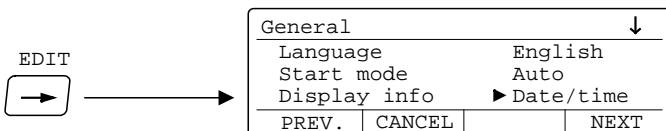


A list of the parameters in the sub menu will be shown.

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.

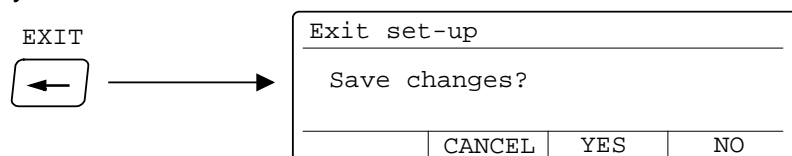
Leaving menu 'Edit set-up':

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 for the optional batching function that can be activated.

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.
---------	---------------------------------------	--------------------------------------------

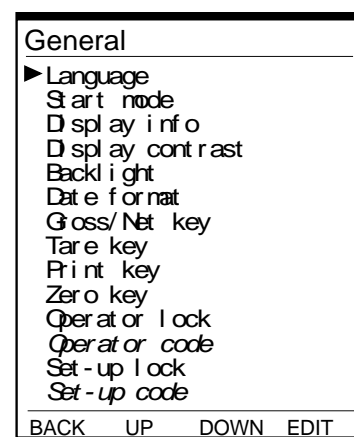
Menu 'General'

Language

[0]	Svenska
[1]	English
[2]	Deutsch
[3]	Français
[4]	Suomi
[5]	Espanol
[6]	Nederlands
	<English>

Modbus: 41000 (46000)

Defines the language to be used in menus and messages.



Start mode

[0]	Command
[1]	Auto
	<Auto>

Modbus: 41002 (46002)

Defines the start mode after power-on or reset.

Command: A 'start operation' command from control computer or panel key is required for start up.

Auto: Automatic start up.

Display info

[0]	Off
[1]	Level status
[2]	Preset tare
[3]	Date/Time
[4]	I/O status
	<Date/Time>

Modbus: 41004 (46004)

Defines the additional information displayed by Operating mode.

Off: Normally no additional information, but if option 'Flow rate' is activated, a line with the actual weight value (alt. flow rate) is displayed.

Level status: A line of boxes for Level indication.

Preset tare: A line with the actual 'Preset Tare' (PT) value.

Date/Time: A line with date and 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 readability at slanted display.
[2]	2	High values giving sharper characters but reduced readability at slanted display.
[3]	3	
[4]	4	
[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	<i>Off: Operator lock is not activated.</i>
[1]	On	<i>On: Operator lock is activated, preventing unauthorised display and editing of settings in TAD 3.</i>
	<Off>	
Operator code		Modbus: 41022 (46022)
	Range:	Defines the valid code for Operator lock.
	1 - 9999	Only shown if Operator lock is 'On'.
	<1937>	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	<i>Off: Set-up lock is not activated.</i>
[1]	On	<i>On: Set-up lock is activated, preventing parameter editing in Edit set-up.</i>
	<Off>	
Set-up code		Modbus: 41026 (46026)
	Range:	Defines the valid code for Set-up lock.
	1 - 9999	Only shown if Set-up lock is 'On'.
	<1937>	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

- [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>

Modbus: 41028 (46028)

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

Calibration parameters	
► Measurement unit	
Resolution	
Capacity	
Main frequency	
Filter type	
Filter time	
Filter window	
Motion detect w	
No-motion delay	
Motion check	
Min. weight print	
Warmup time	
Overload check	
Overload limit	
Zero-tracking	
Zero-track. rate	
Excitation	
Tare corr. mode	
BACK	UP DOWN EDIT

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Resolution		Modbus: 41030 (46030)
[0]	0.001	<p>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.</p> <p>If the last digits of the weight value are not stable, a more coarse resolution can be selected to get a stable reading.</p>
[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:	Nominal range of scale.
	0.5 to 999999	Capacity / Resolution = Number of divisions.
	Unit:	
	Measurem. unit	
	<500>	
Mains frequency		Modbus: 41034 (46034)
[0]	50 Hz	<p>Defines a filter for suppression of mains frequency noise.</p> <p>50 Hz: 50 Hz filter activated.</p> <p>60 Hz: 60 Hz filter activated.</p>
[1]	60 Hz	
	<50 Hz>	
Filter type		Modbus: 41036 (46036)
[0]	Short	<p>Used to filter transducer signal for optimum stability.</p> <p>Short: Decreases weighing accuracy. (Fast response to a transducer signal change.)</p> <p>Standard: Normal setting.</p> <p>Long: Improves the suppression of unstable force on the transducers. (Delays response to a transducer signal change.)</p> <p>Special: Filter time set in parameter 'Filter Time'.</p>
[1]	Standard	
[2]	Long	
[3]	Special	
	<Standard>	
Filter time		Modbus: 41038 (46038)
	Range:	<p>When 'Filter type' is set to Short, Standard or Long the filter time is automatically calculated by TAD 3 and can be read here.</p> <p>When 'Filter type' is set to 'Special' the filter time can be defined here, giving more flexibility.</p> <p>For more information, see Filter function in section 5 Operation.</p>
	200 to 20000	
	for 50 Hz,	
	167 to 20000	
	for 60 Hz.	
	Unit: ms	
	<800>	

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Filter window		
	Range: 0 to 999999 Unit: Measurem. unit <10 * Resolution>	Modbus: 41040 (46040) 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.		
	Range: 0 to 999999 Unit: Measurem. unit <1 * Resolution>	Modbus: 41042 (46042) 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		
	Range: 0 to 10.0 Unit: s <1.0>	Modbus: 41044 (46044) Delay in seconds from detection of stable weight until the Motion status goes off.
Motion check		
[0]	Off	Modbus: 41046 (46046) <i>Off: Only zero adjustment is inhibited during motion.</i> <i>On: Inhibits zero adjustment, taring, and printing during motion.</i>
[1]	On <Off>	
Min.weight print		
	Range: 0 to 999999 Unit: Measurem. unit <0>	Modbus: 41048 (46048) The smallest weight value that is allowed to be printed. 0 gives no restrictions.
Warm up time		
	Range: 0 - 200 Unit: min <0>	Modbus: 41050 (46050) 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		
[0]	Off	Modbus: 41052 (46052) Check of overload is performed according to this set-up. Off: No check is performed. Weight will be reported up to the limits of the AD converter. 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. 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.
[1]	Unipolar	
[2]	Bipolar	
	<Off>	
Overload limit		
	Range: 0.5 to 999999	Modbus: 41054 (46054) 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.
	Unit:	
	Measurem. unit	
	<Capacity + 9 * Resolution>	
Zero-tracking		
[0]	Off	Modbus: 41056 (46056) With this parameter automatic zero-tracking can be selected, or a combination of automatic zero-tracking and automatic zerosetting. The functions are described on page 5-6.
[1]	On	
[2]	On+AutoZero	
	<Off>	
Zero-track.rate		
	Range: 0 to 1500	Modbus: 41058 (46058) 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.
	Unit: /min	
	<1>	
Excitation		
[0]	DC	Modbus: 41060 (46060) Selection of excitation for the transducers connected to the TAD 3. DC: Transducer excitation is taken from the internal DC power supply. 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.
[1]	AC	
[2]	External	
	<DC>	

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Tare corr.mode		Modbus: 41062 (46062)
[0]	Auto	<p>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.</p>
[1]	Preset	
[2]	Auto+preset	
	<Auto>	

Menu 'Calibration'

Calibration type		Modbus: 41064 (46064)
[0]	Data sheet	<p>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 loadcells.</p>
[1]	Deadweight	
[2]	Table	
[3]	Shunt	
	<Data sheet>	

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!

Calibration	
► Cal i br . t y p e / D a t a s h e e t	
Conv. f a c t o r	
N u m b e r o f t r a n s d	
R a t e d l o a d	
R a t e d o u t p u t 1	
R a t e d o u t p u t 2	
R a t e d o u t p u t 3	
R a t e d o u t p u t 4	
S h u n t t r a n s d. s i g	
S e t z e r o	
Z e r o o f f s e t	
BACK	UP DOWN EDIT

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Rated load		Modbus: 41070 (46070)
	Range: 1 to 999999	Defines the rated load for one transducer, expressed in the data sheet unit. The value is specified in the transducer data sheet.
	Unit: Data sheet unit <2000.0>	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	Defines the rated output signal for transducer 1. The value is specified in the transducer data sheet for transducer 1.
	Unit: mV/V <2.03900>	If the total number of transducers and fixed supports is over 4: add up all rated output values, divide by the <u>number of transducers</u> , and enter the result here!
Rated output 2		Modbus: 41074 (46074)
	Range: 0 to 9.99999	Defines the rated output signal for transducer 2. The value is specified in the transducer data sheet for transducer 2.
	Unit: mV/V <2.03900>	
Rated output 3		Modbus: 41076 (46076)
	Range: 0 to 9.99999	Defines the rated output signal for transducer 3. The value is specified in the transducer data sheet for transducer 3.
	Unit: mV/V <2.03900>	
Rated output 4		Modbus: 41078 (46078)
	Range: 0 to 9.99999	Defines the rated output signal for transducer 4. The value is specified in the transducer data sheet for transducer 4.
	Unit: mV/V <2.03900>	
Shunt transd.sig		Modbus: 41108 (46108)
	Range: +/-9.99999	The transducer signal offset when the shunt resistor is connected can be entered or automatically read with a command.
	Unit: mV/V <2.03900>	
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 can not be edited.	

Calibration
► Calibr. type/Deadweight
Number of cal. p.
Value cal. p. 1
Value cal. p. 2
Value cal. p. 3
Value cal. p. 4
Value cal. p. 5
Value cal. p. 6
Transd. sign. p. 1
Transd. sign. p. 2
Transd. sign. p. 3
Transd. sign. p. 4
Transd. sign. p. 5
Transd. sign. p. 6
Shunt transd. sign
Set zero
Zero offset
BACK UP DOWN EDIT

[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 can not 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 can not 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 can not 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 can not 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 can not 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

Range:
2 to 6
<2>

Modbus: 41080 (46080)

Number of
calibration points.

Value cal. p.1

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

Modbus: 41082 (46082)

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

Value cal. p.2

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

Modbus: 41084 (46084)

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

Value cal. p.3

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

Modbus: 41086 (46086)

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

Value cal. p.4

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

Modbus: 41088 (46088)

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

Value cal. p.5

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

Modbus: 41090 (46090)

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

Value cal. p.6

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

Modbus: 41092 (46092)

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

Calibration

```

► Cal i br . t y p e / T a b l e
N u m b e r o f c a l . p .
V a l u e c a l . p . 1
V a l u e c a l . p . 2
V a l u e c a l . p . 3
V a l u e c a l . p . 4
V a l u e c a l . p . 5
V a l u e c a l . p . 6
T r a n s d . s i g n . p . 1
T r a n s d . s i g n . p . 2
T r a n s d . s i g n . p . 3
T r a n s d . s i g n . p . 4
T r a n s d . s i g n . p . 5
T r a n s d . s i g n . p . 6
S h u n t t r a n s d . s i g
S e t z e r o
Z e r o o f f s e t

```

BACK UP DOWN EDIT

[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

Range:
0.01 to 100
<9.80665>

Modbus: 41066 (46066)

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

Calibration

► Cal i br . t y p e / Shunt
Conv. f a c t o r
Shunt c a l . f o r c e
Shunt t r a n s d . s i g
S e t z e r o
Z e r o o f f s e t

BACK UP DOWN EDIT

Shunt cal. force

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

Modbus: 41106 (46106)

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

Shunt transd.sig

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

Modbus: 41108 (46108)

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

Range: 1 to 247
<1>

Modbus: 41114 (46114)

Defines the instrument address for the TAD 3-unit.

COM1:Mode

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

Modbus: 41116 (46116)

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 autodetected 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

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

Modbus: 41118 (46118)

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

- [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 >

Modbus: 41120 (46120)

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'.

Communication
► Instrum address
COM1: Mode
COM1: Baudrate
COM1: Data format
COM2: Mode
COM2: Baudrate
COM2: Data format
COM3: Mode
COM3: Baudrate
COM3: Data format
COM3: Position
COM4: Mode
COM4: Baudrate
COM4: Data format
COM4: Position
Ext. disp. mode
Ext. disp. format
Printer pos. 1
Printer pos. 2
Printer pos. 3
Printer pos. 4
Printer linefeed
BACK UP DOWN EDIT

[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 autodetected 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.
[1]	600	The parameter must be set to the baudrate of the external equipment.
[2]	1200	
[3]	2400	
[4]	4800	
[5]	9600	
[6]	19200	
[7]	38400	
[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.
[1]	7-even-1	
[2]	7-even-2	The parameter must be set to the same configuration as for the external equipment.
[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 >	

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
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Note: Parameters for 'COM3:' are shown only if 'COM2:Mode' is set to 'I/O bus'!

COM3:Mode

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

Modbus: 41128 (46128)

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 autodetected 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

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

Modbus: 41130 (46130)

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

- [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 >

Modbus: 41132 (46132)

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

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

Modbus: 41134 (46134)

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.
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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 autodetected 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		
[0]	Gross weight	Modbus: 41144 (46144) Defines the value to send to the external display unit, connected to TAD 3. Gross weight: <i>The gross weight value is always sent.</i> Net weight: <i>The net weight value is always sent.</i> Disp. weight: <i>The gross or net weight value is sent, even if flow rate is displayed at TAD 3.</i> Flow rate: <i>The flow rate value is always sent.</i> The parameter is shown only if any serial port is set to 'Ext. display'. See section 6. Communication, for further information.
[1]	Net weight	
[2]	Disp. weight	
[3]	Flow rate	
	< Gross weight >	
Ext. disp.format		
[0]	4	Modbus: 41146 (46146) 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.
[1]	5	
[2]	6	
[3]	7	
[4]	32 <6>	
Printer pos.1		
[0]	Not in use	Modbus: 41148 (46148) Defines the type of information to print in position 1 at the printer. Not in use: <i>Position 1 not used.</i> <i>(If both 'Printer pos.1' and 'Printer pos.2' are set to 'Not in use' the printer line is removed.)</i> Disp. weight: <i>Displayed weight/flow rate including the text Gross/Net/Flow and unit.</i> Date/Time: <i>Date and time for the printout.</i> Instr.name: <i>Name of the instrument.</i> Preset tare: <i>Value of the Preset tare.</i> The parameter is shown only if 'Mode' for any serial port is set to 'Printer' or 'Printer 850'.
[1]	Disp. weight	
[2]	Date/Time	
[3]	Instr.name	
[4]	Preset tare < Disp weight >	
Printer pos.2		
[0]	Not in use	Modbus: 41150 (46150) Defines the type of information to print in position 2 at the printer. Not in use: <i>Position 2 not used.</i> <i>(If both 'Printer pos.1' and 'Printer pos.2' are set to 'Not in use' the printer line is removed.)</i> Disp. weight: <i>Displayed weight/flow rate including the text Gross/Net/Flow and unit.</i> Date/Time: <i>Date and time for the printout.</i> Instr.name: <i>Name of the instrument.</i> Preset tare: <i>Value of the Preset tare.</i> The parameter is shown only if 'Mode' for any serial port is set to 'Printer' or 'Printer 850'.
[1]	Disp. weight	
[2]	Date/Time	
[3]	Instr.name	
[4]	Preset tare < Not in use >	

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Printer pos.3		
[0]	Not in use	Modbus: 41152 (46152) Defines the type of information to print in position 3 at the printer. <i>Not in use: Position 3 not used.</i> <i>(If both 'Printer pos.3' and 'Printer pos.4' are set to 'Not in use' the printer line is removed.)</i> <i>Disp. weight: Displayed weight/flow rate including the text Gross/Net/Flow and unit.</i> <i>Date/Time: Date and time for the printout.</i> <i>Instr.name: Name of the instrument.</i> <i>Preset tare: Value of the Preset tare.</i> The parameter is shown only if 'Mode' for any serial port is set to 'Printer' or 'Printer 850'.
[1]	Disp. weight	
[2]	Date/Time	
[3]	Instr.name	
[4]	Preset tare	
	< Not in use >	
Printer pos.4		
[0]	Not in use	Modbus: 41154 (46154) Defines the type of information to print in position 4 at the printer. <i>Not in use: Position 4 not used.</i> <i>(If both 'Printer pos.3' and 'Printer pos.4' are set to 'Not in use' the printer line is removed.)</i> <i>Disp. weight: Displayed weight/flow rate including the text Gross/Net/Flow and unit.</i> <i>Date/Time: Date and time for the printout.</i> <i>Instr.name: Name of the instrument.</i> <i>Preset tare: Value of the Preset tare.</i> The parameter is shown only if 'Mode' for any serial port is set to 'Printer' or 'Printer 850'.
[1]	Disp. weight	
[2]	Date/Time	
[3]	Instr.name	
[4]	Preset tare	
	< Not in use >	
Printer linefeed		
[0]	0	Modbus: 41156 (46156) 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'.
[1]	1	
[2]	2	
[3]	3	
[4]	4	
[5]	5	
[6]	6	
[7]	7	
[8]	8	
[9]	9	
[10]	10	
	< 0 >	

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

Level 1 source

Level 2 source

Level 3 source

Level 4 source

Level 5 source

Level 6 source

Level 7 source

Level 8 source

- [0] Not in use
- [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.
- [9]
- [10] Offset lev.1
<Not in use>

Modbus: 41158 (46158)

Modbus: 41164 (46164)

Modbus: 41170 (46170)

Modbus: 41176 (46176)

Modbus: 41182 (46182)

Modbus: 41188 (46188)

Modbus: 41194 (46194)

Modbus: 41200 (46200)

Defines the signal to be supervised by the Level.

Net weight: The Level operates on the net weight.

Gross weight: The Level operates on the gross weight

Disp. weight: The Level operates on gross weight or net weight, even if the flow rate is displayed at TAD 3.

Flow rate: The Level operates on the flow rate, so for function the flow option must be activated.

Abs.: Stands for Absolute, the Level operates on the absolute value of net weight, gross weight, displayed weight, or flow rate.

Offset lev.1: Not available for 'Level 1 source'.

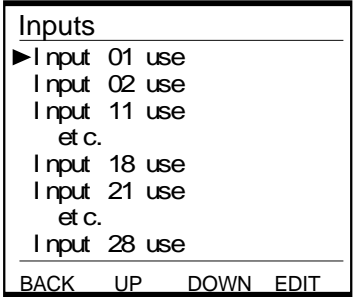
Example:

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.

The level difference is set by Level 2

Level supervision	
► Level 1 source	
Level 1 out p.	
Level 1 hyst.	
Level 2 source	
Level 2 out p.	
Level 2 hyst.	
et c.	
Level 8 source	
Set p. 1 source	
Set p. 2 source	
BACK	UP DOWN EDIT

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
<hr/>		
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	<p>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 external I/O units, with 8 inputs and 8 outputs each, to be connected to TAD 3.</p> <p>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.</p> <hr/> <p>NOTE: */ For function, the flow option must be activated. **/ For function, the batching option must be activated.</p>
[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 >)	

[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)

Outputs	
► Out put	01 use
Out put	02 use
Out put	11 use
et c.	
Out put	18 use
Out put	21 use
et c.	
Out put	28 use
BACK	UP DOWN EDIT

[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.
Two relay outputs, Output 01 and Output 02,
are included in the TAD 3 unit. The remaining outputs
demand external I/O units, with 8 inputs
and 8 outputs each, to be connected to TAD 3.

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 batching option must be activated.***

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

Menu 'Analogue outputs'

1:Output source

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

Modbus: 41282 (46282)

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).

Analogue outputs

- 1: Out put source
- 1: Out put type
- 1: Range low
- 1: Range high
- 1: Low adjust
- 1: High adjust
- 1: Filter const.
- 2: Out put source
- 2: Out put type
- 2: Range low
- 2: Range high
- 2: Low adjust
- 2: High adjust
- 2: Filter const.

BACK UP DOWN EDIT

1:Output type

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

Modbus: 41284 (46284)

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

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

Modbus: 41286 (46286)

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

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

Modbus: 41288 (46288)

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		
	Range: +/-999 <0>	<p>Modbus: 41290 (46290)</p> <p>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.</p> <p>Full adjustment range corresponds to about ± 2 % of maximum analogue output.</p> <p>The parameter value will be set to zero each time '1:Output type' is changed.</p> <p>This parameter is not shown if '1:Output source' is set to 'Not in use'.</p>
1:High adjust		
	Range: +/-999 < 0 >	<p>Modbus: 41292 (46292)</p> <p>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.</p> <p>Full adjustment range corresponds to about ± 2 % of maximum analogue output.</p> <p>The parameter value will be set to zero each time '1:Output type' is changed.</p> <p>This parameter is not shown if '1:Output source' is set to 'Not in use'.</p>
1:Filter const.		
[0]	1	<p>Modbus: 41294 (46294)</p> <p>This parameter is used to get a slower update rate on Analogue output 1, which gives more stable readings.</p> <p>Example: 'Filter time' 200 ms, and this parameter set to 5 gives 1 second update on Analogue output 1.</p> <p>This parameter is not shown if '1:Output source' is set to 'Not in use'.</p>
[1]	2	
[2]	3	
[3]	4	
[4]	5	
[5]	6	
[6]	7	
[7]	8	
[8]	9	
[9]	10	
	< 1 >	
2:Output source		
[0]	Not in use	<p>Modbus: 41296 (46296)</p> <p>Defines the value to represent on Analogue output 2.</p> <p>Not in use: The analogue output is not used.</p> <p>Gross weight: The output represents gross weight.</p> <p>Net weight: The output represents net weight.</p> <p>Disp. weight: The output represents gross or net weight, even if flow rate is displayed.</p> <p>Flow rate: The output represents flow rate (option).</p>
[1]	Gross weight	
[2]	Net weight	
[3]	Disp. weight	
[4]	Flow rate	
	< Not in use >	

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
2:Output type		
[0]	+/-20mA	Modbus: 41298 (46298) Defines the type of signal, used to represent the weight/flow rate value at Analogue output 2. +/-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 '2:Output source' is set to 'Not in use'.
[1]	-12 - 20mA	
[2]	0-20mA	
[3]	4-20mA	
[4]	+/-10V	
[5]	0-10V	
	<4-20mA>	
2:Range low		
	Range: +/-999999	Modbus: 41300 (46300) Defines the weight/flow rate value that should give the lowest output (0 V / 0 mA / 4 mA) at Analogue output 2.
	Unit: Measurem. unit or flow unit <0>	
		This parameter is not shown if '2:Output source' is set to 'Not in use'.
2:Range high		
	Range: +/-999999	Modbus: 41302 (46302) Defines the weight/flow rate value that should give the highest output (10 V / 20 mA) at Analogue output 2.
	Unit: Measurem. unit or flow unit <500>	
		This parameter is not shown if '2:Output source' is set to 'Not in use'.
2:Low adjust		
	Range: +/-999	Modbus: 41304 (46304) 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.
	<0>	
		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		
	Range: +/-999 <0>	<p>Modbus: 41306 (46306)</p> <p>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.</p> <p>This parameter is not shown if '2:Output source' is set to 'Not in use'.</p>
2:Filter const.		
[0]	1	<p>Modbus: 41308 (46308)</p> <p>This parameter is used to get a slower update rate on Analogue output 2, which gives more stable readings.</p> <p>Example: 'Filter time' 200 ms, and this parameter set to 5 gives 1 second update on Analogue output 2.</p> <p>This parameter is not shown if '2:Output source' is set to 'Not in use'.</p>
[1]	2	
[2]	3	
[3]	4	
[4]	5	
[5]	6	
[6]	7	
[7]	8	
[8]	9	
[9]	10	
	<1>	

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 $\pm 10\%$ 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.	!	INPUT RESISTANCE 350 +/- 3 OHMS INCL. STANDARD CABLE	
OVERLOAD, ULTIMATE	200 % R.L.	!		
		!	OUTPUT RESISTANCE 350.1 OHMS INCL. STANDARD CABLE	
SIDE LOAD, SAFE	100 % R.L.	!	TEMPERATURE RANGE -40 TO +80 DEGREES C	
SIDE LOAD, ULTIMATE	200 % R.L.	!		
ELECTRICAL CONNECTION	SHIELDED 4-CONDUCTOR CABLE		TEMPERATURE EFFECT (-10 TO +50 DEGREES C)	
EXCITATION POSITIVE:	RED	!	ON OUTPUT 0.001 % OF OUTPUT PER DEG. C	
EXCITATION NEGATIVE:	BLACK	!		
SIGNAL POSITIVE:	GREEN	!	ON ZERO BALANCE 0.001 % OF R.O. PER DEG. C	
SIGNAL NEGATIVE:	WHITE	!		
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				KARLSKOGA 03-04-30

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 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 $0.3 \mu\text{V}/\text{scale division}$.

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
($3 \times 20\,000 \text{ N} / 9.80665$).
- 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
($2.039 \text{ mV/V} \times 8.4 \text{ V}$).
- Signal change in response to an applied load of 1 000 kg = 2.8 mV
($17 \text{ mV} \times 1\,000 / 6\,118$).
- 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 = $2.8 \text{ mV} / 10\,000 \text{ div.} = 0.28 \mu\text{V}/\text{div.}$
 2. Set 'Resolution' to 0.2.
 Number of scale divisions = $1\,000 / 0.2 = 5\,000$
 Signal/scale division = $2.8 \text{ mV} / 5\,000 \text{ div.} = 0.56 \mu\text{V}/\text{div.}$

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 can not 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'.

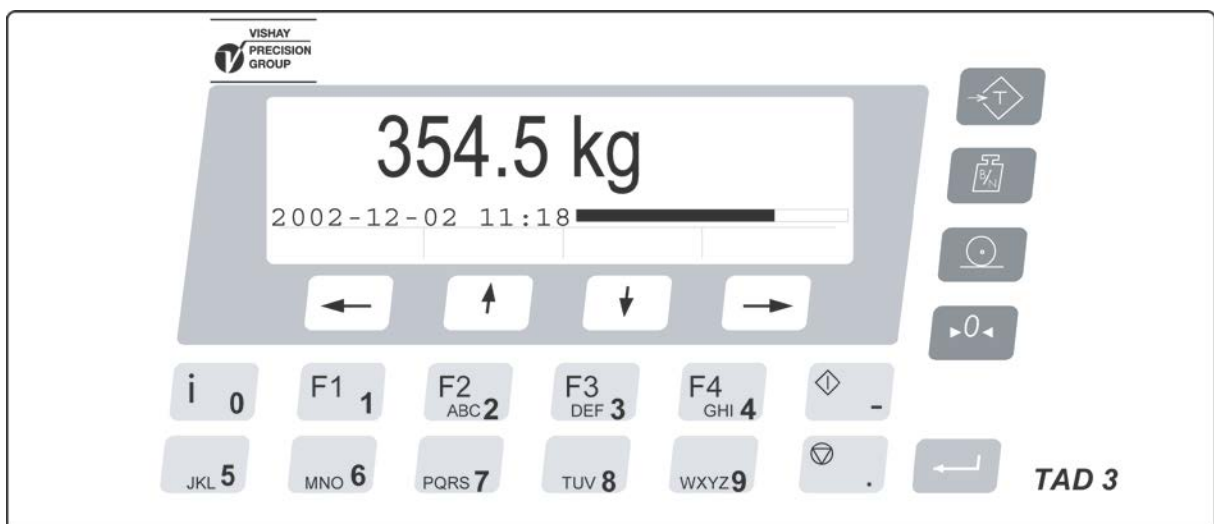


Figure 11. TAD 3 front panel by normal weighing operation.

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:

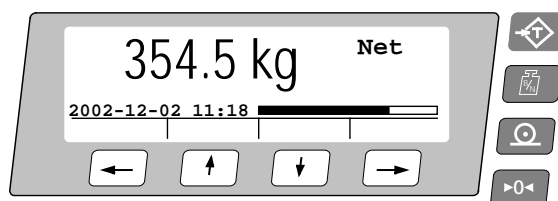
- actual date and time, or
- value of the Preset tare, or
- status for the level supervision, or
- status for the two internal digital inputs and outputs.

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.

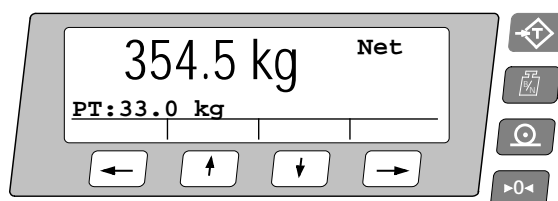
Date and time can be set in menu 'Clock set-up', a sub menu to the instrument Main menu.



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.



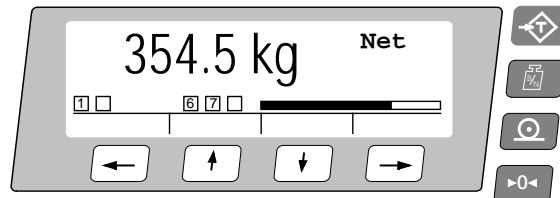
Status for the level supervision

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 menu 'Edit set-up' and 'Batching parameters', thus protecting all set-up parameters in TAD 3 from editing.

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.

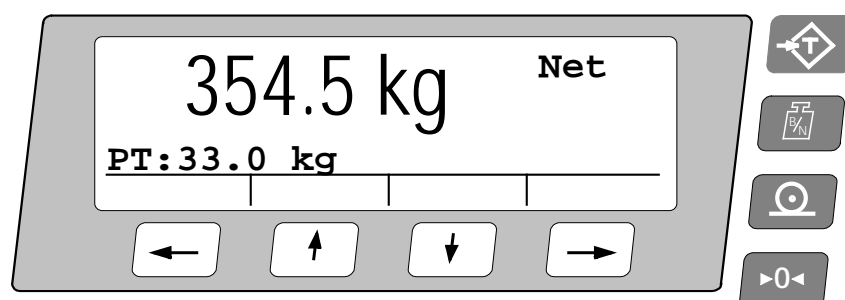


Figure 12. To the right on the panel four keys are provided with symbols for taring, toggling between gross and net weight, printing, and zero adjustment.

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.

Toggleing 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'.

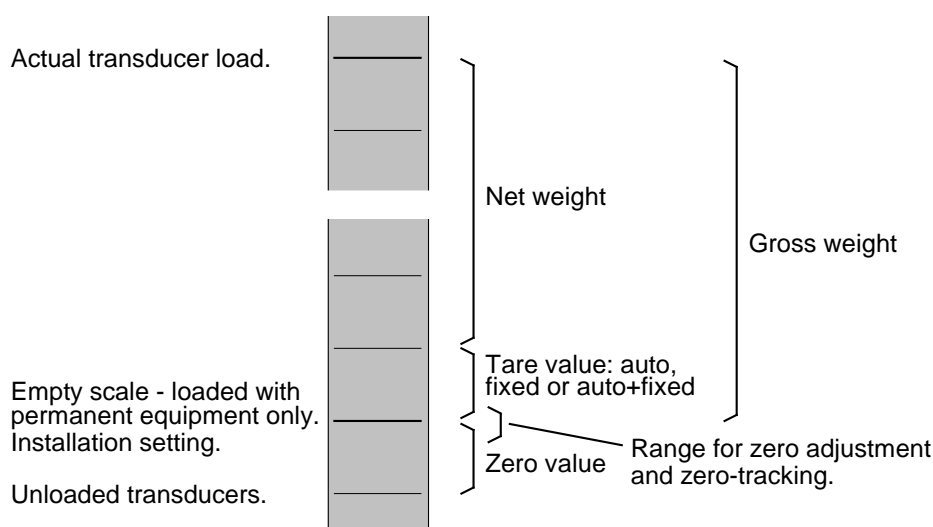


Figure 13. Correlation between gross weight, net weight, and tare value for a scale.

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 (programme option) is not performed.

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 6-21 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 sub menu 'Accumulated weight' is open, and editing is not performed, the accumulated weight values will be printed out, together with actual date/time and Instrument name for the TAD 3.
See example on page 6-23.

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 6-23.

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 can be performed.
The printout will take several minutes to conclude.
See example on page 6-23.

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.

Instrument name:	A name to identify the instrument in printed reports etc. See page 5-9 and 'Operating instructions, Quick installation'.
Preset tare:	A fixed tare value for the scale. See page 5-9 and 'Operating instructions, Quick installation'.
Edit levels:	Edit Level values and show Setpoint values. See page 5-9 and 'Operating instructions, Quick installation'.
Accumulated weight:	Show and edit accumulated weight values. See page 5-9 and 'Operating instructions, Quick installation'.
Batching:	See section 7. Batching.
Batching parameters:	See section 7. Batching.
Show set-up:	Show all used set-up parameter values. See section 3. Set-up.
Edit set-up:	Edit set-up parameter values. See section 3. Set-up.
Clock set-up:	Setting of actual date and time. See page 5-10 and 'Operating instructions, Quick installation'.
Information:	Show some important instrument data. See page 5-10.

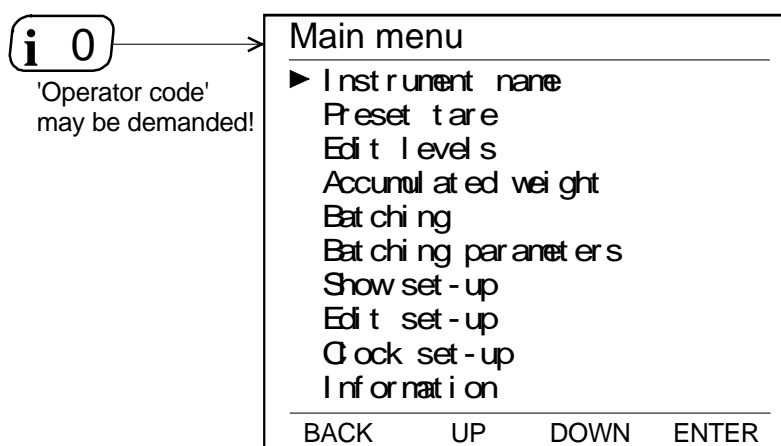


Figure 14. In the instrument Main menu a sub menu can be selected by the cursor and then opened by function key ENTER.

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.

Accumulated weight

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 the value 'Printed' (even if no printer is connected to TAD 3).

By default the value 'Printed' is shown. If the Batching function is activated, accumulated values for the batched components will also be shown.

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

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.

Information: (Inst r. name) 001	
COM: 9600	0354. 50 kg
COM2: 9600	1. 58245 mV/ V
A1: 13. 51 mA	D1: OK Pr g: T002A240
A2: 5. 27 V	D2: -- S N 0

←
↑
↓
→

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

On the second and third lines, to the left,

baud rates are shown 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.

On the second and third lines, to the right,

actual gross weight value and transducer signal in mV/V is shown.

On the bottom lines, to the left,

actual output signals from the analogue output units in use are shown.

If a used analogue output unit is out of order, this is indicated by a broken line.

On the bottom lines, in the middle,

status for the DIO 3-units in use is shown as 'OK' or '--' (error).

On the bottom lines, to the right,

the instrument's programme name and serial number are shown.

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.

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.

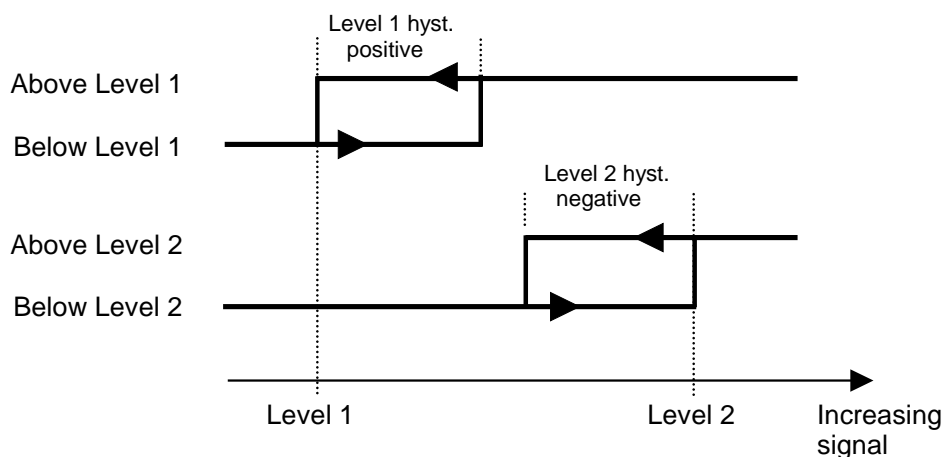


Figure 15. Influence on the level supervision from positive hysteresis, for Level 1, and negative hysteresis, for Level 2.

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 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 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 I/O unit 1 or 2, Analogue output 1 or 2 respectively.

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 and 21 – 28 are the digital inputs to TAD 3 via additional I/O unit 1 and I/O unit 2 respectively.

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

Digital input functions are defined by parameters in sub menu 'Inputs', see page 3-28. 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 and 21 – 28 are the digital outputs from TAD 3 via additional I/O unit 1 and I/O unit 2 respectively.

The digital outputs can be used for control of external equipment and for indication of instrument status.

If the flow rate option or batching option is activated, the digital outputs can also be connected for control and indication of flow rate and batching functions.

Digital output functions are defined by parameters in sub menu 'Outputs', see page 3-29. 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 load changes, 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 load changes 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.

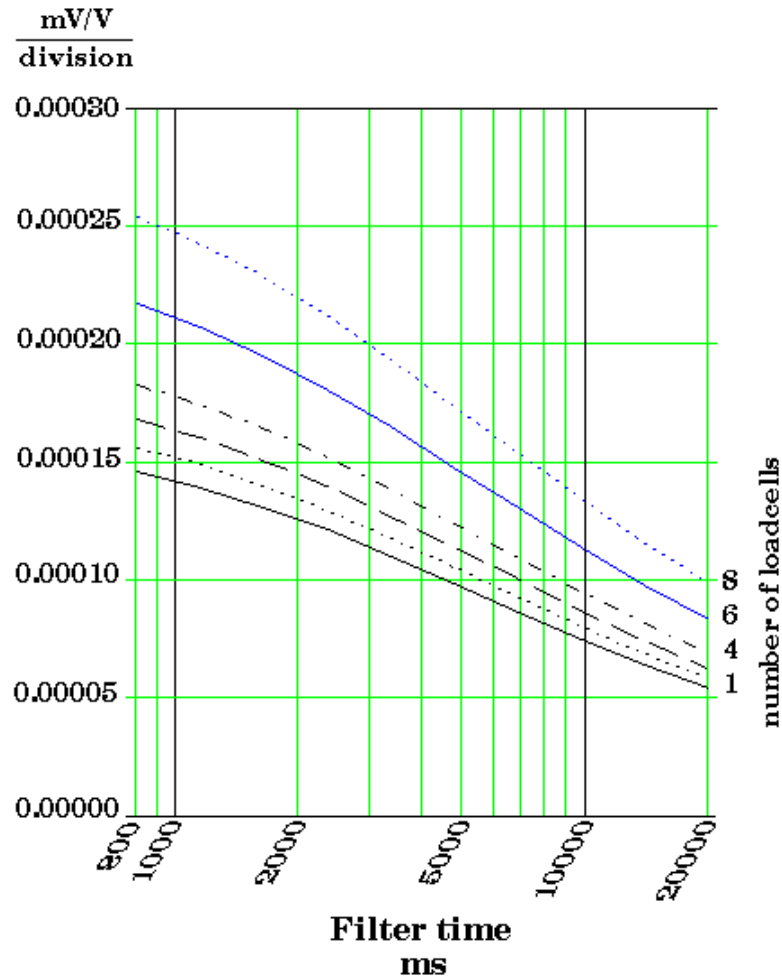
The instrument updates the internal weight 10 times per Filter Time Period, implying that: $\text{Weight Conversion Time} = \text{'Filter time'} / 10$.

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':

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

'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:

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

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 four additional units can be connected to Com 2. Two DIO 3 units with eight inputs/outputs each and two ANA 3 units with one analogue output each. Each DIO 3 unit also has one serial communication port.

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 two connected DIO 3 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 both the error register, status register and weight register could be read with one command to the TAD 3.

When a command that can not 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 uses the standard Modbus (Modicon) register and I/O numbering. See the masters own Modbus driver documentation for how the commands should be activated in the masters 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 baudrate 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	External input status	R/W**
40044 (1 reg)	40244	45244	External output status	R/W**
40045 (1 reg)	40246	45246	Level status	R/W**
40100 to -110	40300 to -309	45300 to -309	Last act. reg. See 7-30.	R
40114 to -158	40314 to -347	45314 to -347	Last b. reg. See 7-31.	R
40162 to -174	40350 to -363	45350 to -363	Curr. b. reg. See 7-32.	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 -095	41848 to -863	46848 to -863	Batch data reg. See 7-32.	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
40766 to -807	40604 to -631	45604 to -631	Batching reg. See 7-33.	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 hold 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. 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.

Additional input status

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.

Additional output status

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.

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 deltaCOM, 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	Location of first batching parameter register. If 'Modicon float' is used, add 5000 to this value.	R
40374	45374	Number of batching 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 - 41799	46400 - 46799	Batching parameter registers. Registers containing the batching parameters. See section 7.	R/W

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

Data type: Strings	Description	R/W
44600 - 44690	String set-ups (12 characters / 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).

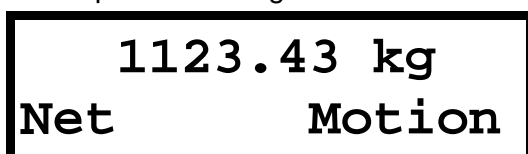
Note: */ The number of digits in the value (including a minus sign, if present) will equal the number of digits selected in 'Ext. disp.format'.
Leading zeros will be added to fill up to the selected number of digits.
The decimal point does not occupy any digit position.

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 (j)	97 (a)	97 (a)	134
ä	123 (i)	123 (i)	97 (a)	132
ö	124 (l)	124 (l)	111 (o)	148
ü	126 (~)	125 (j)	117 (u)	129
Å	93 (I)	65 (A)	65 (A)	143
Ä	91 (I)	91 (I)	65 (A)	142
Ö	92 (l)	92 (l)	79 (O)	153
Ü	85 (U)	93 (I)	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 (j)	138
é	96 (')	101 (e)	123 (l)	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

```

2002-12-02 02:45      Ice cream
                      N   078.3 kg
2002-12-02 02:46      Ice cream
                      G   088.7 kg
2002-12-02 02:47      Ice cream
                      286.0 kg/min

```

(net weight is displayed)

(gross weight is displayed)

(flow rate is displayed)

Printout of accumulated weight

```

- - - - -
2002-12-02 02:49      Ice cream
Accumulated weight
Printed               90.3 kg
....
- - - - -

```

Printout of preset tare

```

- - - - -
2002-12-02 02:49      Ice cream
Preset tare          23.0   kg
- - - - -

```

Printout of used levels and setpoints

```

- - - - -
2002-12-02 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

```

- - - - -
2002-12-02 02:47      Ice cream
TAD 3 (T002A240)      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 BATCH DATA

```

- - - - -
2002-12-02 10:09      Icecream
Batching
Num. of batches      2
Batch size           100      %
A1: Cream            60.0     kg
A2: Stirrer          3.0      s
A3: Vanilla          20.0     kg
- - - - -

```

Printout of FULL REPORT

```

- - - - -
2002-12-02 10:10      Icecream
Batching report
Num. of batches      2
Batch size           100      %
- - - BATCH NUMBER: 000001 - - -
10:10 A1:** SETPOINT ALARM **
10:10 A1:RESTART
10:10 A1: Cream
      SP: 60.0 kg  W: 60.5 kg
10:10 A2: Stirrer
      SP: 3.0 s   Timer finished
10:11 A3: Vanilla
      SP: 20.0 kg W: 21.0 kg
10:11 SUBTOTAL: 81.500 kg
- - - BATCH NUMBER: 000002 - - -
10:11 A1: Cream
      SP: 60.0 kg W: 61.0 kg
10:11 A2: Stirrer
      SP: 3.0 s   Timer finished
10:11 A3: HALTED
10:11 A3: RESTART
10:12 A3: Vanilla
      SP: 20.0 kg W: 20.0 kg
10:12 SUBTOTAL: 81.000 kg
10:12 BATCHING FINISHED
- - - - -

```

Printout of LIMITED REPORT

```

- - - - -
2002-12-02 10:10      Icecream
Batching report
Num. of batches      2
Batch size           100      %
- - - BATCH NUMBER: 000001 - - -
10:10 A1:** SETPOINT ALARM **
10:10 A1: Cream
      SP: 60.0 kg  W: 60.5 kg
10:11 A3: Vanilla
      SP: 20.0 kg W: 21.0 kg
10:11 SUBTOTAL: 81.500 kg
- - - BATCH NUMBER: 000002 - - -
10:11 A1: Cream
      SP: 60.0 kg W: 61.0 kg
10:12 A3: Vanilla
      SP: 20.0 kg W: 20.0 kg
10:12 SUBTOTAL: 81.000 kg
10:12 BATCHING FINISHED
- - - - -

```

Printout of ONLY ALARMS REPORT

```

- - - - -
2002-12-02 Icecream    BATCH:000001
10:10 A1:** SETPOINT ALARM **
- - - - -

```

7. Batching (program option)

Contents:	Batching principles	page 7-1
	Activity descriptions	page 7-4
	Batching parameters	page 7-11
	Operation	page 7-25
	Batching alarms	page 7-29
	Serial communication	page 7-30

General

From programme name T001A120, the Weight Indicator TAD 3 includes a program option for '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 or two additional units DIO 3 will give maximum 18 digital inputs and 18 digital outputs for the instrument TAD 3. See section 9.

Front panel

When 'Batching' is activated, the text 'BATCH' is displayed by normal operation, at the function key 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

Batching with TAD 3 means performing up to six activities in numerical order 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.

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

The following types of activities are available for the batching sequence:

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 make an output signal.
Latch off	used to break 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.

Setpoint values

The activity types **Weigh in**, **Weigh out**, **Timer**, **Timer w.outp**, **Manual**, and **Pulse batch** require Setpoint values.

All Setpoint values can be shown and edited in menu 'Batching' under the instrument Main menu.

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.

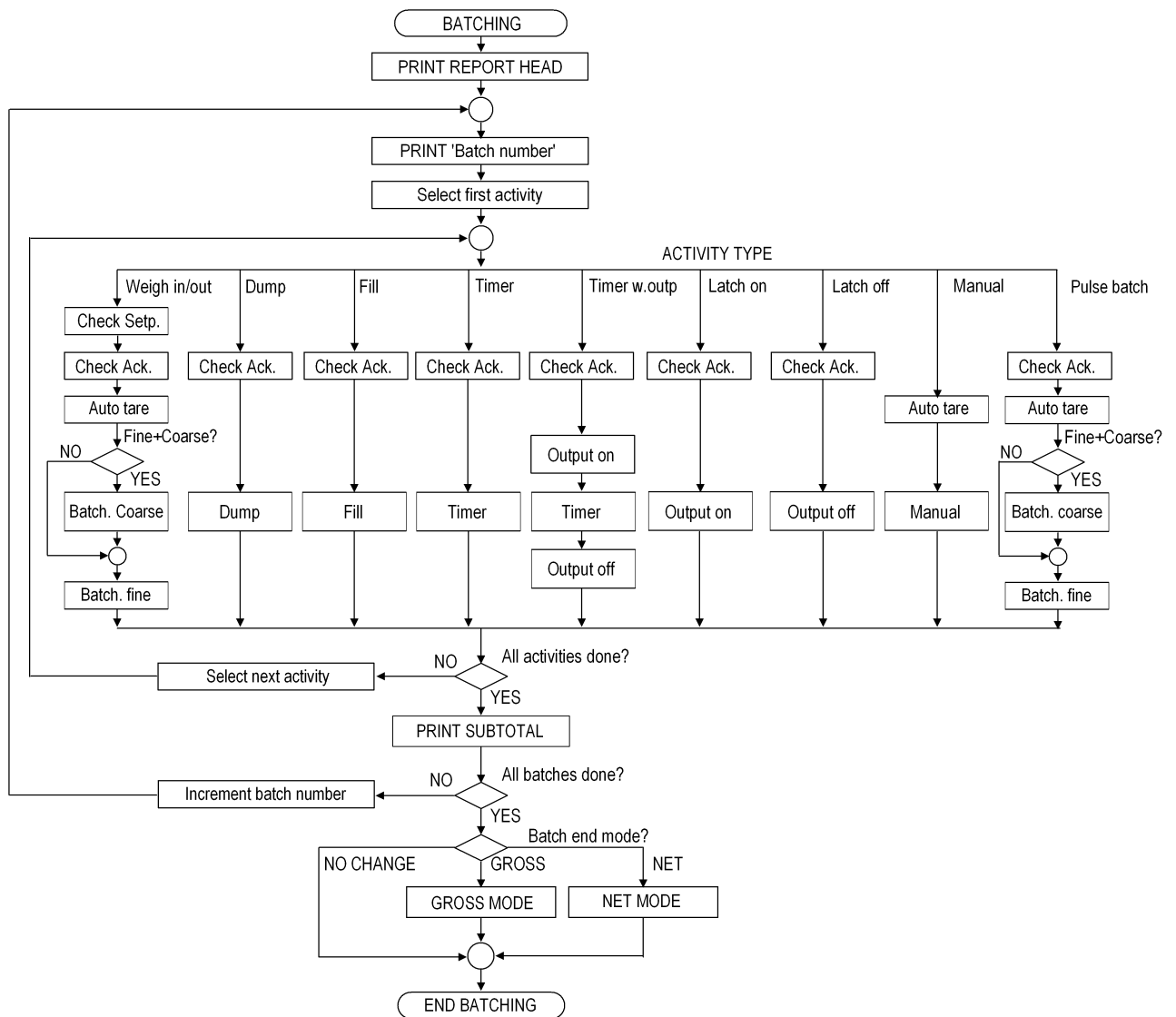


Figure 16. Principles how batching is carried out. The batching sequence can include up to six activities.

Activity description

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.

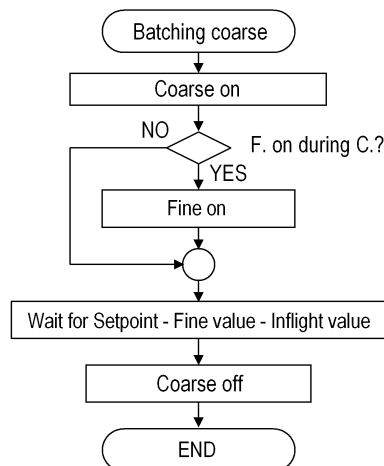


Figure 17. Flow chart for batching step "Batching coarse".

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.

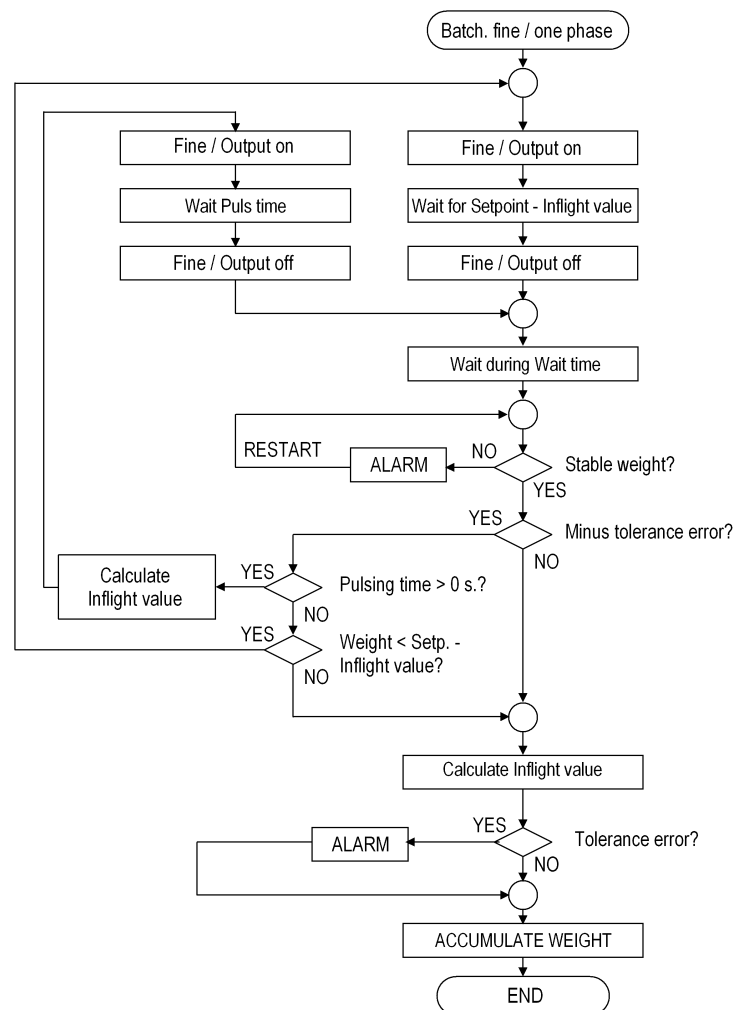


Figure 18. Flow chart for batching steps "Batching fine" and "Batching one phase".

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.

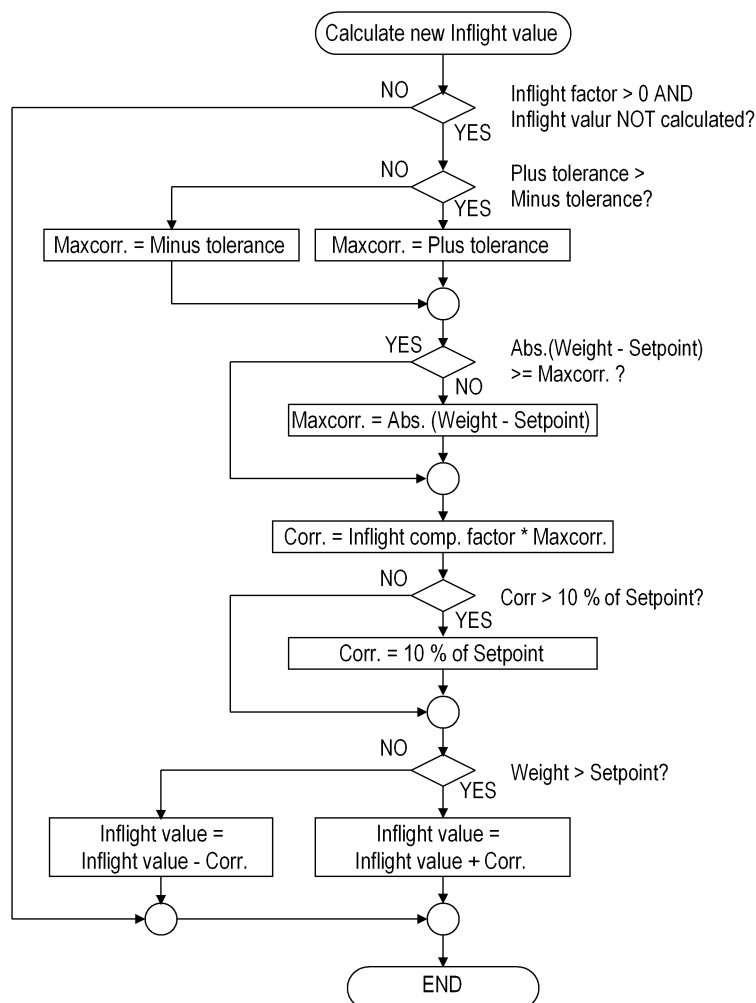


Figure 19. Automatic adjustment of Inflight value.

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 x **Plus tolerance** or Setpoint value x **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 x **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 x 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.

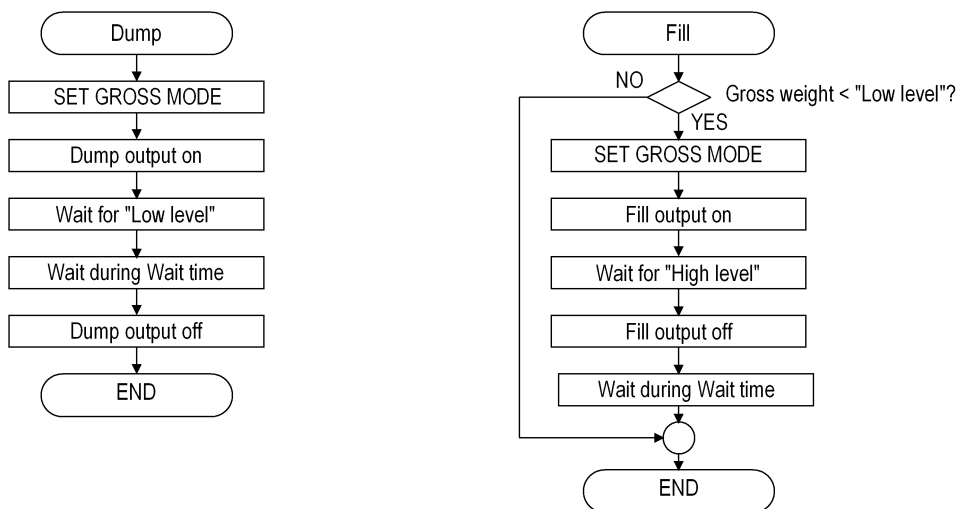


Figure 20. Flow charts for the Dump and Fill activities.

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).

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.



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

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.

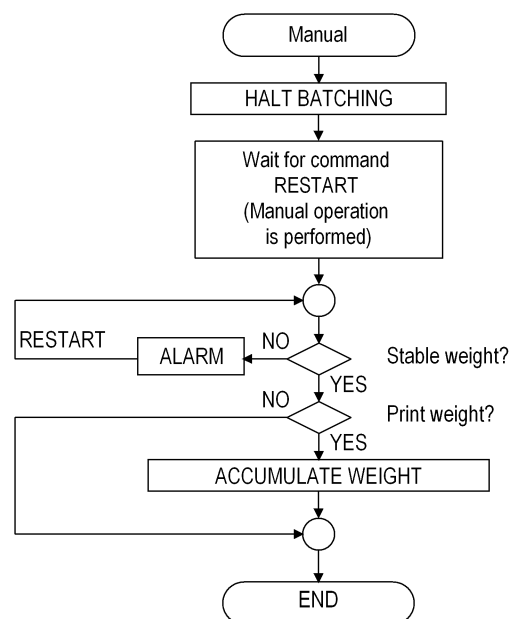


Figure 22. Flow chart for activity Manual.

Batching parameters

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 front panel keys or by serial communication. The menu is available under "Edit set-up", provided normal measuring operation has been stopped.

Menu 'Batching parameters' is also available during normal measuring operation, in the instrument Main menu.

Parameters marked with * can also be edited during a batching in progress.

Printout of parameters can be ordered if a printer is connected.

Printout or manual recording of all parameters is recommended after editing. These recordings will be extremely valuable if an instrument has to be replaced.

Modbus register numbers for all parameters are given on page 7-24.

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

Menu 'Batching parameters'

Display no of B.

- [0] No
- [1] Yes
- <No>

Defines if it should be possible to select a number of batches.

No: Not possible to select a number of batches (always one batch).

Yes: Possible to select a number of batches.

Display B-size

- [0] No
- [1] Percent
- [2] Weight
- <No>

Defines if it should be possible to select the 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

- [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

- [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.

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

The following batching parameters are available in six sets, one for each activity in the instrument.

Activity type	Defines the type of activity.
[0] Not used	Not used: The activity is not used.
[1] Weigh in	Weigh in: Weigh in activity.
[2] Weigh out	Weigh out: Weigh out activity.
[3] Dump	Dump: Dumping activity.
[4] Fill	Fill: Filling activity.
[5] Timer	Timer: Timer activity.
[6] Timer w. outp	Timer w. outp: Timer activity with output.
[7] Latch on	Latch on: Latch on activity.
[8] Latch off	Latch off: Latch off activity.
[9] Manual	Manual: Manual activity.
[10] Pulse batch <Not used>	Pulse batch: Pulse batching activity.

Activity name	Activity name (12 character string). The activity name is used to identify the activity in the instrument and on printouts.
----------------------	--------------------------------------------------------------------------------------------------------------------------------

Weighing In or Out (Activity type = Weigh in or Weigh out)

Batching mode	Defines if it is a one phase batching or a Coarse/Fine batching.
[0] One phase	One phase: One phase batching (only one output).
[1] Fine+Coarse < Fine+Coarse >	Fine+Coarse: Coarse-fine batching (two outputs used).

Output no	Defines the output used for one phase batching. The output must be defined as B.activity in the set-up menu 'Outputs'.
[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 <01>	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		Defines the output used for coarse batching.
[0]	01	The output must be defined as B.activity in the set-up menu 'Outputs'.
[1]	02	
[2]	11	Note: This parameter is only shown if Batching mode is set to Fine+Coarse .
[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	
	<01>	
Fine output no		Defines the output used for fine batching.
[0]	01	The output must be defined as B.activity in the set-up menu 'Outputs'.
[1]	02	
[2]	11	Note: This parameter is only shown if Batching mode is set to Fine+Coarse .
[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	
	<01>	

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
F. on during C. [0] No [1] Yes <No>		<p>Defines if the fine output shall be active during the coarse batching phase.</p> <p>Note: This parameter is only shown if Batching mode is set to Fine+Coarse.</p> <p>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.</p>
Fine value * Range: +/-999999 Unit: Measurem. unit. <0.0>		<p>The amount of material batched in the fine batching phase.</p> <p>Note: This parameter is only shown if Batching mode is set to Fine+Coarse.</p>
Minus tolerance * Range: 0.00 - 100.00 Unit: %. <100.00>		<p>Minus tolerance value.</p> <p>100 % = No tolerance check.</p>
Plus tolerance * Range: 0.00 - 100.00 Unit: %. <100.00>		<p>Plus tolerance value.</p> <p>100 % = No tolerance check.</p>
Inflight factor * Range: 0 - 100 Unit: %. <0>		<p>Automatic inflight compensation is performed with this factor. The "Inflight value" is corrected with the resulting batching error multiplied by this factor.</p> <p>0 = No automatic inflight compensation.</p>
Inflight value * Range: 0 - 999999 Unit: Measurem. unit. <0.0>		<p>Batching will be completed (output deactivated) when this value remains to batch.</p> <p>If automatic inflight compensation is used, this value is adjusted after each batch.</p>
Wait time * Range: 0.1 - 999.9 Unit: s. <5.0>		<p>Time from completed batching (outputs off) to stability check and tolerance check.</p>

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Pulsing time *		
	Range: 0.1 - 999.9	Time for one pulse on the output Fine/Output when the setpoint value is not reached after ordinary batching (minus tolerance error).
	Unit: s.	
	<0.0>	0 = No pulsing
Timeout value *		
	Range: 0 - 9999	Max. allowed time for complete batching of the component (activity).
	Unit: s.	
	<0>	0 = No timeout control.
Ack. type		
[0]	No test	Defines the type of acknowledgement control to be used before/during batching.
[1]	At start	No test: No acknowledgement control is performed.
[2]	Wait	At start: Acknowledgement control is performed at start of the activity.
[3]	Continuous	Wait: The instrument waits for the acknowledgement signal before it starts the activity.
[4]	Wait+contin.	Continuous: The acknowledgement control is performed continuously.
	<No test>	Wait+contin.: The instrument waits for the acknowledgement signal before it starts the activity and then the acknowledgement control is performed continuously.
Ack. input no		
[0]	01	Defines the input used for acknowledgement control.
[1]	02	The input must be defined as B.activity
[2]	11	in the set-up menu 'Inputs'.
[3]	12	Note: This parameter is NOT shown if
[4]	13	Ack.type is set to No test .
[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	
	<01>	

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

Dumping (Activity type = Dump)

Output no		Defines the output used for dumping.
[0]	01	The output must be defined as B.activity in the set-up menu 'Outputs'.
[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	
	<01>	
Low level *		The gross weight level at which "Wait time" starts.
	Range: +/-999999	
	Unit:	
	Measurem. unit.	
	<0.0>	
Wait time *		Time from that "Low level" is reached until the (dump) output is deactivated.
	Range: 0.1 - 999.9	
	Unit: s.	
	<5.0>	
Timeout value *		Max. allowed time for complete dumping.
	Range: 0 - 9999	0 = No timeout control.
	Unit: s.	
	<0>	
Ack. type		See under "Weighing In or Out"
Ack. input no		See under " Weighing In or Out"

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

Filling (Activity type = Fill)

Output no		Defines the output used for filling.
[0]	01	The output must be defined as B.activity in the set-up menu 'Outputs'.
[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	
	<01>	
Low level *		The filling starts if the gross weight is below this level, else no filling is performed.
	Range: +/-999999	
	Unit:	
	Measurem. unit.	
	<0.0>	
High level *		The gross weight level at which the(fill) output is deactivated.
	Range: +/-999999	
	Unit:	
	Measurem. unit.	
	<0.0>	
Wait time *		Time from that "High level" is reached until the filling is regarded as finished.
	Range: 0.1 - 999.9	
	Unit: s.	
	<5.0>	
Timeout value *		Max. allowed time for complete filling.
	Range: 0 - 9999	
	Unit: s.	
	<0>	0 = No timeout control.
Ack. type		See under " Weighing In or Out"
Ack. input no		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		Defines the output used for the timer.
[0]	01	The output must be defined as B.activity in the set-up menu 'Outputs'.
[1]	02	
[2]	11	Note: This parameter is only shown if Activity type is set to Timer w.outp .
[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	
	<01>	

Ack. type See under " Weighing In or Out"

Ack. input no See under " Weighing In or Out"

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

Latch on or Latch off (Activity type = Latch on or Latch off)

Output no		Defines the output used for the latch.
[0]	01	The output must be defined as B.activity in the set-up menu 'Outputs'.
[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	
	<01>	

On during halt		Defines if the (latch) output will remain activated during halts in batching sequence.
[0]	No	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.
[1]	Yes	
	<No>	

Ack. type See under " Weighing In or Out"

Ack. input no See under " Weighing In or Out"

Manual (Activity type = Manual)

Print weight		Defines if the weight value (from the scale or manually entered) is printed and accumulated.
[0]	No	No: No printing or accumulation. Yes: The weight value is printed and accumulated.
[1]	Yes	
	<No>	

Enter weight		Defines if the operator shall have the opportunity to manually enter a weight value.
[0]	No	No: Not possible to enter a weight value manually. Yes: Possible to enter a weight value manually.
[1]	Yes	
	<No>	

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

Pulse batching (Activity type = Pulse batch)

Batching mode	Defines if it is a one phase batching or a Coarse/Fine batching.
[0] One phase	
[1] Fine+Coarse	One phase: <i>One phase batching (only one output).</i>
< Fine+Coarse >	Fine+Coarse: <i>Coarse-fine batching (two outputs used).</i>

Output no	Defines the output used for one phase batching.
[0] 01	The output must be defined as B.activity
[1] 02	in the set-up menu 'Outputs'.
[2] 11	
[3] 12	Note: This parameter is only shown if
[4] 13	Batching mode is set to One phase .
[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	
<01>	

Coarse outp. no	Defines the output used for coarse batching.
[0] 01	The output must be defined as B.activity
[1] 02	in the set-up menu 'Outputs'.
[2] 11	
[3] 12	Note: This parameter is only shown if
[4] 13	Batching mode is set to Fine+Coarse .
[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	
<01>	

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Fine output no		
[0]	01	Defines the output used for fine batching. The output must be defined as B.activity in the set-up menu 'Outputs'.
[1]	02	
[2]	11	Note: This parameter is only shown if Batching mode is set to Fine+Coarse .
[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	
	<01>	
F. on during C.		
[0]	No	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.
[1]	Yes	
	<No>	
Fine value *		
	Range: +/-999999	The amount of material batched in the fine batching phase. Note: This parameter is only shown if Batching mode is set to Fine+Coarse .
	Unit: Pulse batch. unit.	
	<0.0>	

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Minus tolerance *	Minus tolerance value. Range: 0.00 - 100.00 Unit: %. <100.00>	Minus tolerance value. 100 % = No tolerance check.
Plus tolerance *	Plus tolerance value. Range: 0.00 - 100.00 Unit: %. <100.00>	Plus tolerance value. 100 % = No tolerance check.
Inflight factor *	Automatic inflight compensation is performed with this factor. The "Inflight value" is corrected with the resulting batching error multiplied by this factor. 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 *	Batching will be completed (output deactivated) when this value remains to batch. Range: 0 - 999999 Unit: Pulse batch. 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 *	Time from completed batching (outputs off) to tolerance check. Range: 0.1 - 999.9 Unit: s. <5.0>	Time from completed batching (outputs off) to tolerance check.
Pulsing time *	Time for one pulse on the output Fine/Output when setpoint value is not reached after the ordinary batching (minus tolerance error). Range: 0.1 - 999.9 Unit: s. <0.0>	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 *	Max. allowed time for complete batching of the component (activity). Range: 0 - 9999 Unit: s. <0>	Max. allowed time for complete batching of the component (activity). 0 = No timeout control.
Ack. type	See under "Weighing In or Out"	
Ack. input no	See under " Weighing In or Out"	

[index]	Range/Alternatives <default value>	Explanation and result of alternatives.
Pulse input no		
[0]	01	Defines the input used for pulse counting. The input must be defined as B. activity in the set-up menu 'Inputs'.
[1]	02	
	<01>	
No of decimals		
[0]	0	Defines if the number of decimals used for the pulse batching unit.
[1]	1	
[2]	2	
[3]	3	
	<0>	
Unit		
[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		
	Range: 0.001 - 999.999 Unit: – <1.000>	Number of counted pulses/Unit.

Modbus register definition for batching parameters.

The Modbus register numbers below are used to read and write the parameters in the "Float" format. To use the "Modicon float" format, add 5000 to the register numbers. See section Communication for explanation of the data formats.

Display no of B.	41400	Batch printouts	41404
Display B-size	41402	Batch end mode	41406

Parameter	Act. 1	Act. 2	Act. 3	Act. 4	Act. 5	Act. 6
Activity type	41408	41458	41508	41558	41608	41658
Activity name	44600*	44606*	44612*	44618*	44624*	44630*
Batching mode	41410	41460	41510	41560	41610	41660
Output no	41412	41462	41512	41562	41612	41662
Coarse outp. no	41414	41464	41514	41564	41614	41664
Fine output no	41416	41466	41516	41566	41616	41666
F. on during C.	41418	41468	41518	41568	41618	41668
Fine value	41420	41470	41520	41570	41620	41670
Minus tolerance	41422	41472	41522	41572	41622	41672
Plus tolerance	41424	41444	41524	41544	41624	41644
Inflight factor	41426	41476	41526	41576	41626	41676
Inflight value	41428	41478	41528	41578	41628	41678
Wait time	41430	41480	41530	41580	41630	41680
Pulsing time	41432	41482	41532	41582	41632	41682
Timeout value	41434	41484	41534	41584	41634	41684
Ack. type	41436	41486	41536	41586	41636	41686
Ack. input no	41438	41488	41538	41588	41638	41688
Low level	41440	41490	41540	41590	41640	41690
High level	41442	41492	41542	41592	41642	41692
On during halt	41444	41494	41544	41594	41644	41694
Print weight	41446	41496	41546	41596	41646	41696
Enter weight	41448	41498	41548	41598	41648	41698
Pulse input no	41450	41500	41550	41600	41650	41700
No of decimals	41452	41502	41552	41602	41652	41702
Unit	41454	41504	41554	41604	41654	41704
Scale factor	41456	41506	41556	41606	41656	41706

* String set-up parameter (12 character -> 6 registers).
See section Communication for explanation of the string data format.

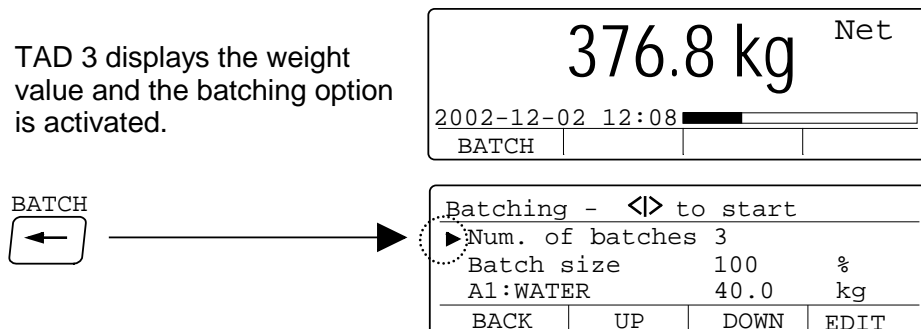
Operation

When TAD 3 is in normal operation, displaying the weight value, and the batching option is activated, this is indicated by the text BATCH at the function key to the left.

Pressing that key will open the Batching menu.

Menu Batching

TAD 3 displays the weight value and the batching option is activated.



The Batching menu shows the actual batch data in a scrolling list with a cursor that can be positioned by function keys UP and DOWN. In this list, editing of batch number, batch size, and Setpoint values for the activities can be performed by function key EDIT and the digit keys.

Num. of batches (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 weight is shown, the Setpoint values (except for Timer) will be scaled to produce the wanted batch size.

(Batch weight can be edited in the range 0.001 to 999999.0 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.

A1:, A2: etc. All used activities are listed. Each line shows the activity number (A1: etc.), the activity name (if a name is given in menu 'Batching parameters'), and actual Setpoint value.

(Setpoint values can be edited in the range 0 to 999999 units or seconds.)

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.

Next line shows the activity number and name (if defined), and the setpoint value, possibly scaled for the commanded batch size.

The bottom line shows the actual batching step and batch number (CNT:).

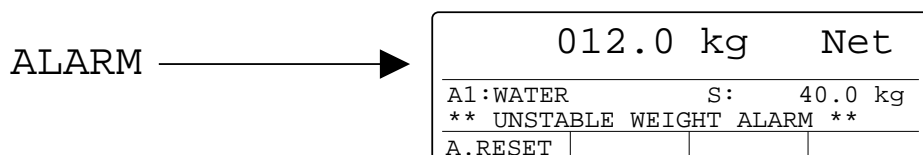


Batching can also be started from a digital input or via serial communication when normal weight is displayed, when menu Batching is open, and when the view Batching finished is displayed.

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 →

000.0 kg		Net	
A3:MAN	S:	2.0 kg	
HALTED, MANUAL	CNT:	1	
RESTART		SKIP.AC	RESET

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 →

000.0 kg				Net
Manual value:				
A3:MAN		S:	2.0 kg	
HALTED, MANUAL		CNT:	1	
RESTART	MANEDIT	SKIP.AC	RESET	

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 (Activity total) will also be created for the sum of all the above activities.

(Pulse batching values will be added to 'Activity total' only if the 'Unit' for Pulse batching is equal to 'Measurement unit'.)

For more information about accumulated weights, see page 5-8 and 5-9.

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 (number of batches, batch size, setpoints), 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

** 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).

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
40100 (1 reg)	40300	45300	Counter (free running)	R
40101 (3 reg)	40302	45302	Batch number	R
40104 (1 reg)	40304	45304	Activity number	R
40105 (3 reg)	40306	45306	Setpoint	R
40108 (3 reg)	40308	45308	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
40114 (1 reg)	40314	45314	Counter (free running)	R
40115 (1 reg)	40316	45316	Creation time, hour	R
40116 (1 reg)	40318	45318	Creation time, minutes	R
40117 (3 reg)	40320	45320	Batch number	R
40120 (3 reg)	40322	45322	Subtotal	R
40123 (3 reg)	40324	45324	Activity 1 setpoint	R
40126 (3 reg)	40326	45326	Act. 1 batched quantity	R
40129 (3 reg)	40328	45328	Activity 2 setpoint	R
40132 (3 reg)	40330	45330	Act. 2 batched quantity	R
40135 (3 reg)	40332	45332	Activity 3 setpoint	R
40138 (3 reg)	40334	45334	Act. 3 batched quantity	R
40141 (3 reg)	40336	45336	Activity 4 setpoint	R
40144 (3 reg)	40338	45338	Act. 4 batched quantity	R
40147 (3 reg)	40340	45340	Activity 5 setpoint	R
40150 (3 reg)	40342	45342	Act. 5 batched quantity	R
40153 (3 reg)	40344	45344	Activity 6 setpoint	R
40156 (3 reg)	40346	45346	Act. 6 batched quantity	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
40162 (1 reg)	40350	45350	Batching Status	R
40163 (1 reg)	40352	45352	Batching Step	R
40164 (1 reg)	40354	45354	Batching Alarm	R
40165 (3 reg)	40356	45356	Batch number	R
40168 (1 reg)	40358	45358	Current Activity	R
40169 (3 reg)	40360	45360	Current setpoint	R
40172 (3 reg)	40362	45362	Current quantity *	R

In registers Batching Status, Batching Step and Batching Alarm the status is described by codes, explained on pages 7-34 and 7-35.

- * – Displayed net weight for a Weigh in, Weigh out or Dump 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	Number of batches	R/W
44075 (3 reg)	41850	46850	Batch size	R/W
44078 (3 reg)	41852	46852	Activity 1 setpoint	R/W
44081 (3 reg)	41854	46854	Activity 2 setpoint	R/W
44084 (3 reg)	41856	46856	Activity 3 setpoint	R/W
44087 (3 reg)	41858	46858	Activity 4 setpoint	R/W
44090 (3 reg)	41860	46860	Activity 5 setpoint	R/W
44093 (3 reg)	41862	46862	Activity 6 setpoint	R/W

Accumulated weight registers for batching

Data type: Integer	Data type: Float (2 reg./value)	Data type: Modicon float (2 reg./value)	Explanation	R/W
40766 (3 reg)	40604	45604	Activity 1 acc. weight LOW	R/W
40769 (3 reg)	40606	45606	Activity 1 acc. weight HIGH	R/W
40772 (3 reg)	40608	45608	Activity 2 acc. weight LOW	R/W
40775 (3 reg)	40610	45610	Activity 2 acc. weight HIGH	R/W
40778 (3 reg)	40612	45612	Activity 3 acc. weight LOW	R/W
40781 (3 reg)	40614	45614	Activity 3 acc. weight HIGH	R/W
40784 (3 reg)	40616	45616	Activity 4 acc. weight LOW	R/W
40787 (3 reg)	40618	45618	Activity 4 acc. weight HIGH	R/W
40790 (3 reg)	40620	45620	Activity 5 acc. weight LOW	R/W
40793 (3 reg)	40622	45622	Activity 5 acc. weight HIGH	R/W
40796 (3 reg)	40624	45624	Activity 6 acc. weight LOW	R/W
40799 (3 reg)	40626	45626	Activity 6 acc. weight HIGH	R/W
40802 (3 reg)	40628	45628	Activity total acc. weight LOW	R/W
40805 (3 reg)	40630	45630	Activity total acc. weight HIGH	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.

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

(continued)

(continued)

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

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

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
56	Finish batching
57	Show weight after batching

8. Flow rate (program option)

General

From programme name T002A200, the Weight Indicator TAD 3 includes a program option for flow measurement. 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.

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.

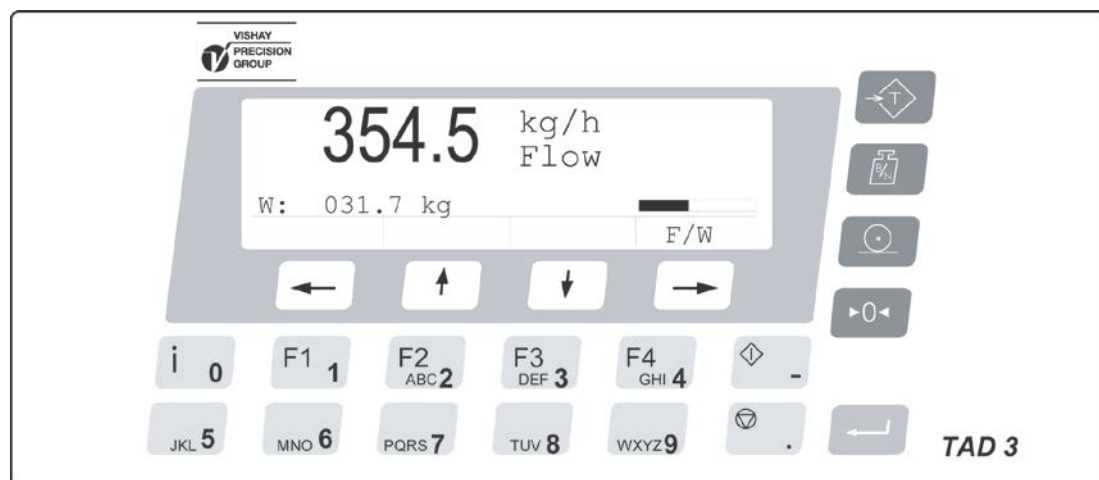
Operation

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

[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>

Modbus: 41312 (46312)

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

[0]	Unit/s
[1]	Unit/min
[2]	Unit/h
[3]	Unit*1000/m
[4]	Unit*1000/h
	<Unit/s>

Modbus: 41314 (46314)

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]	Off	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.
[1]	On	
	<On>	
Derivation time		Modbus: 41316 (46316)
	Range: 0.20 – 3600.00	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).
	Unit: s	
	<0.64>	

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", "*/ml" 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	m ³
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:
 $0.2 / 10 = 0.02 \text{ kg/s (72 kg/h)}$
- A derivation time of 100 seconds gives a flow rate error of:
 $0.2 / 100 = 0.002 \text{ kg/s (7.2 kg/h)}$

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 two 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 resistors for the I/O bus cable impedance should NOT be used.

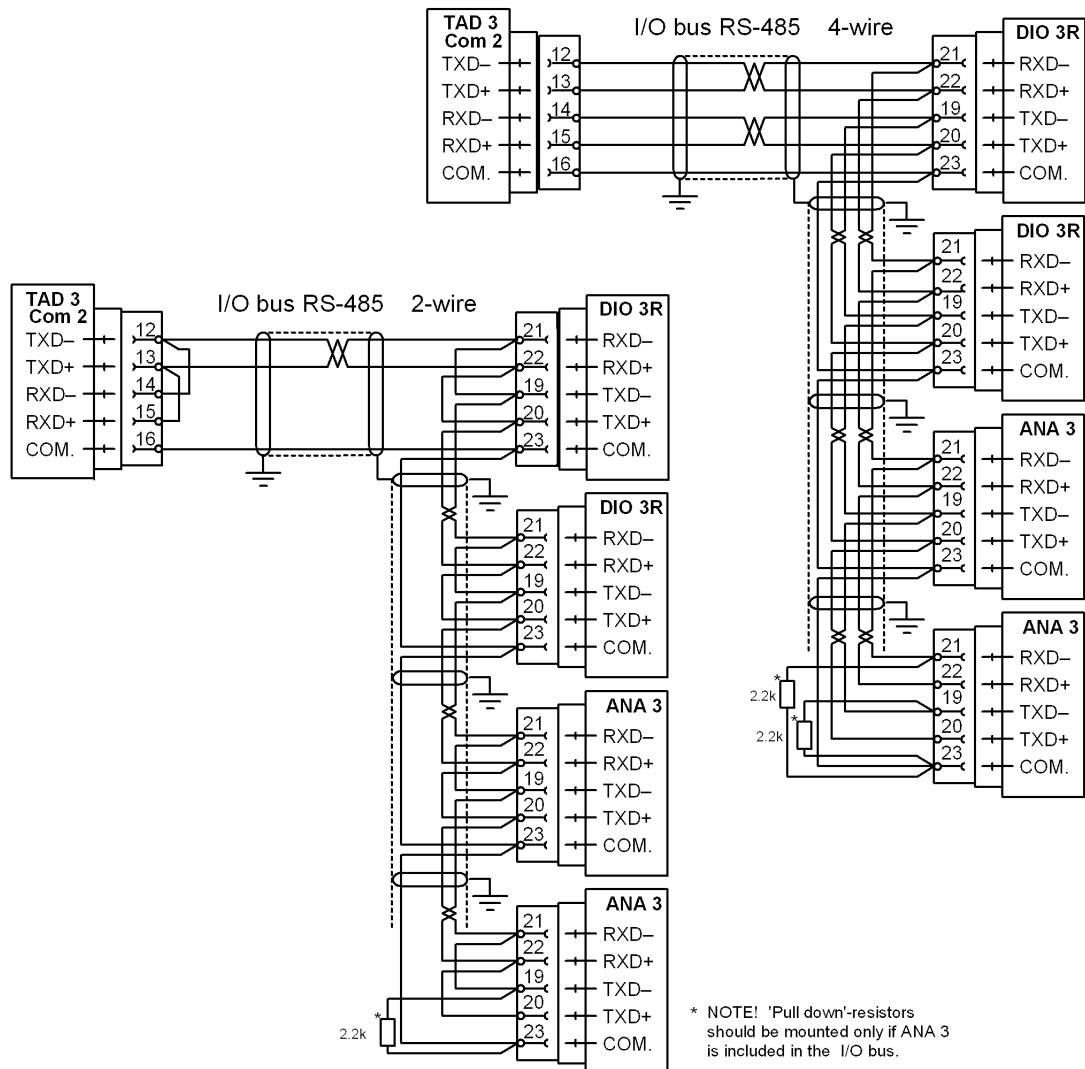


Figure 23. Maximum number of DIO 3R and ANA 3 units, connected to TAD 3 by 4-wire and 2-wire I/O bus cable.

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 indicator 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.

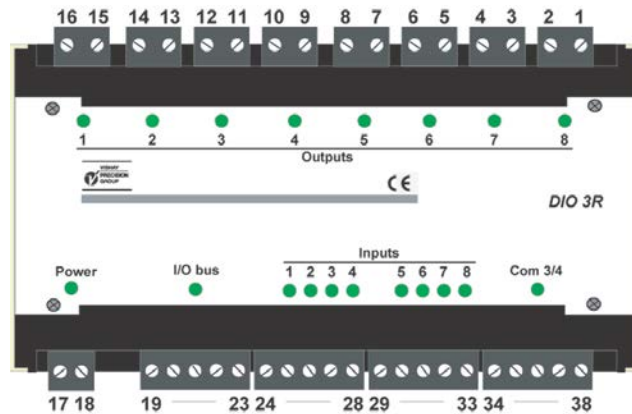


Figure 24. DIO 3R front panel and terminal blocks.

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.

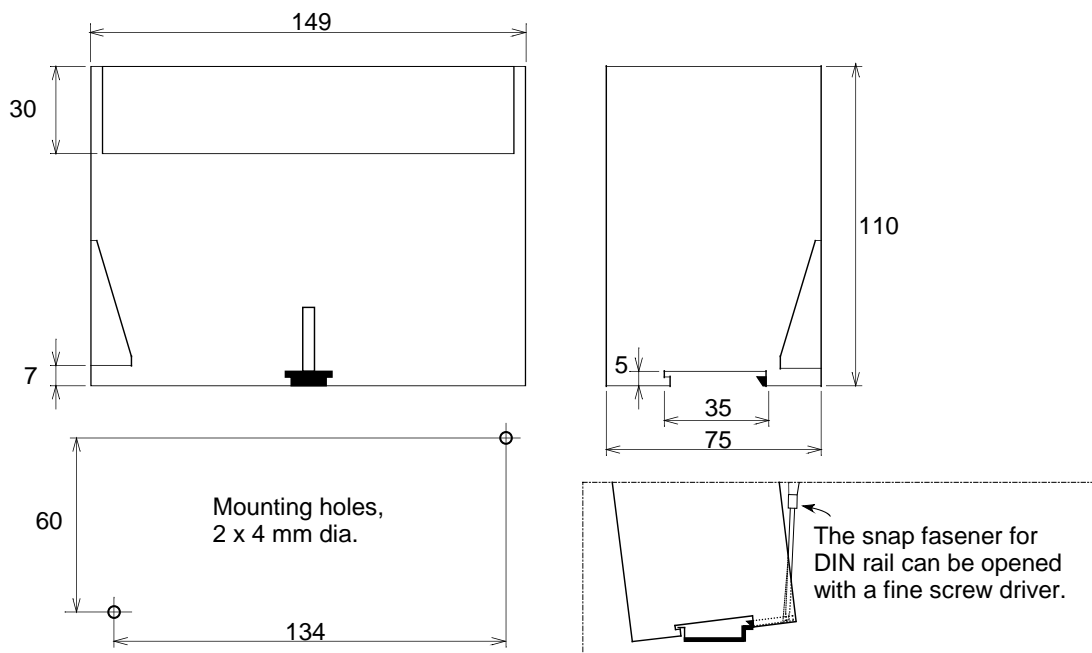


Figure 25. Mechanical dimensions for DIO 3R.

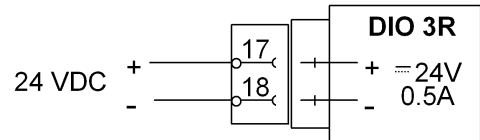
Electrical installation

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 electromagnetic 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.

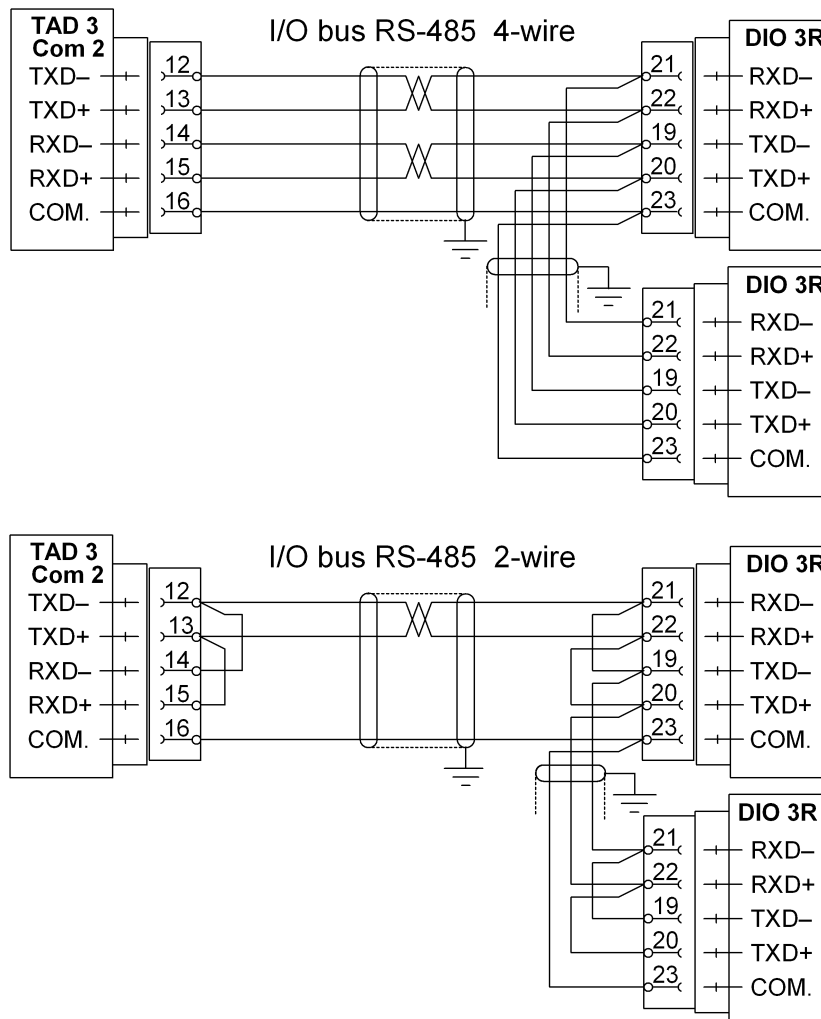
Unit DIO 3R should be connected to Com 2 at TAD 3 via the I/O bus.

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.

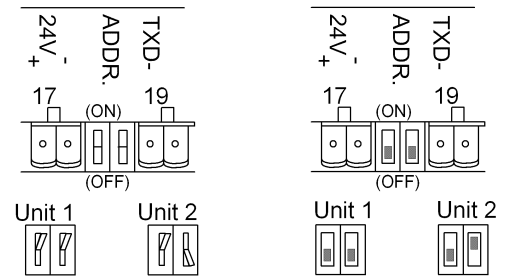
Parameter COM2:Mode in menu 'Edit set-up / Communication' must be set to 'I/O bus'.



DIO 3R unit number

Two switches between terminals 18 and 19 are provided for setting of the unit number for DIO 3R. The switches can be of two types.

DIO 3R unit	Switch left	Switch right
1	OFF	OFF
2	OFF	ON



For DIO 3R unit 1 the digital inputs and digital outputs are named 11 to 18.

For DIO 3R unit 2 the digital inputs and digital outputs are named 21 to 28.

Digital inputs

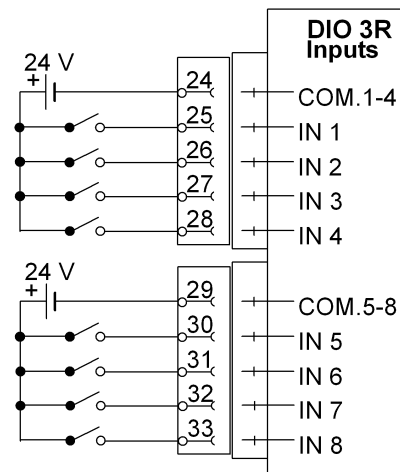
Terminals 24 – 28.
and 29 – 33.

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.



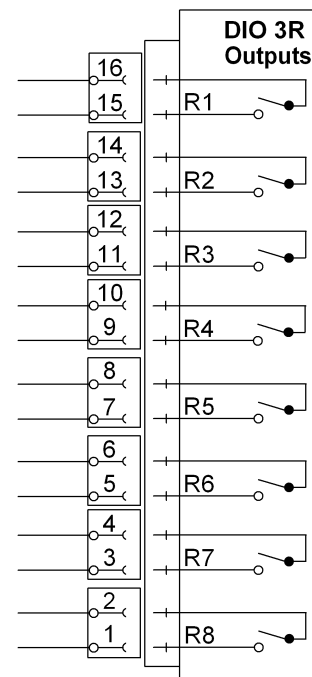
Digital outputs

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.

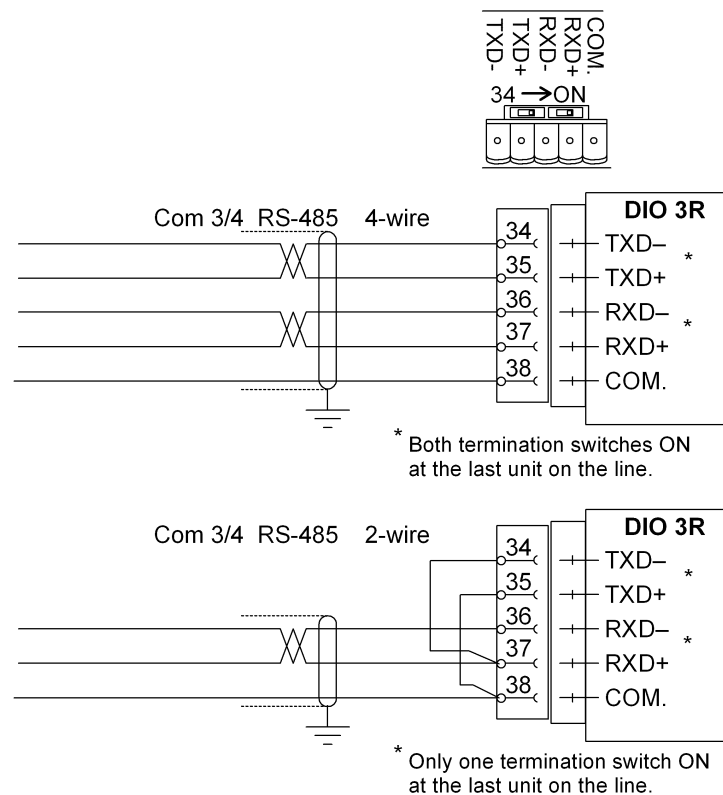
Serial port Com 3/4 on DIO 3R can be defined as Com 3 or Com 4 for TAD 3 in menu 'Edit set-up' / 'Communication'. This serial port, intended for RS-485 on 2-wires or 4-wires with common signal ground (COM.), should be used for connection of external units to TAD 3.

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.

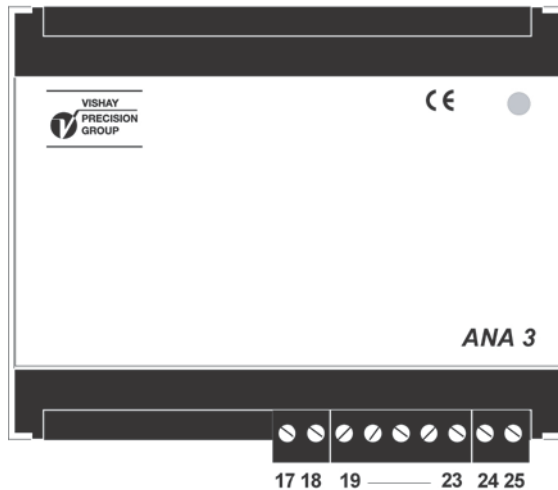


Figure 26. ANA 3 front panel and terminal blocks.

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.

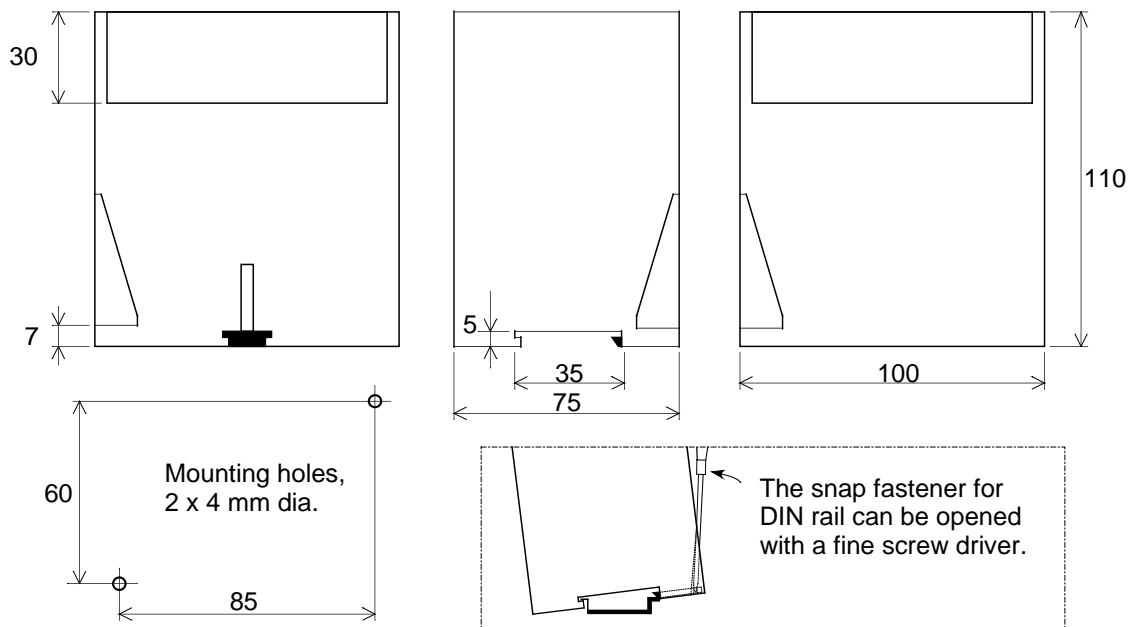


Figure 27. Mechanical dimensions for ANA 3.

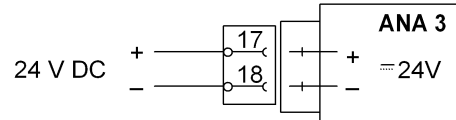
Electrical installation

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 electromagnetic 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.

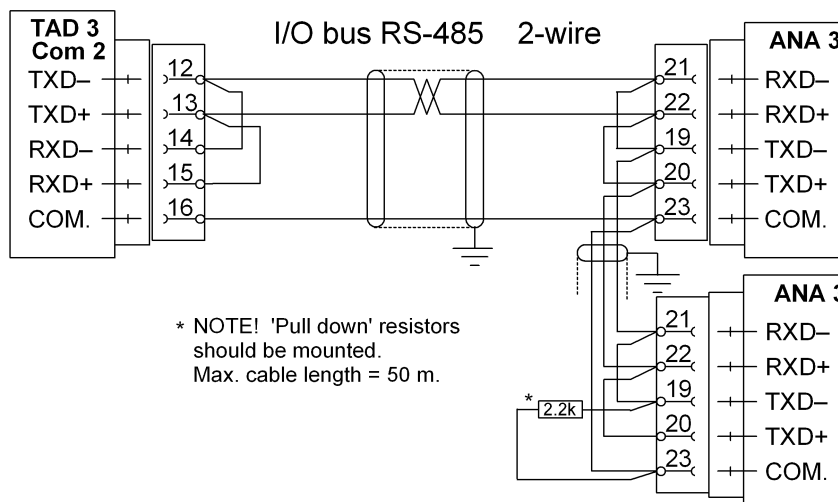
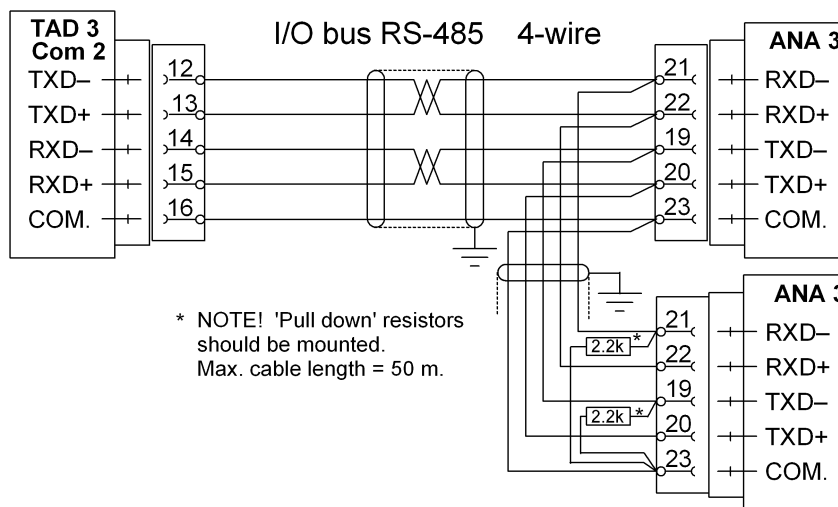
ANA 3 should be connected to Com 2 at TAD 3 via the I/O bus. In the I/O bus, the negative lines (RXD-, TXD-) must be connected to COM via 2.2 kohm resistors, mounted on separate terminals at the last unit according to diagrams below.

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.

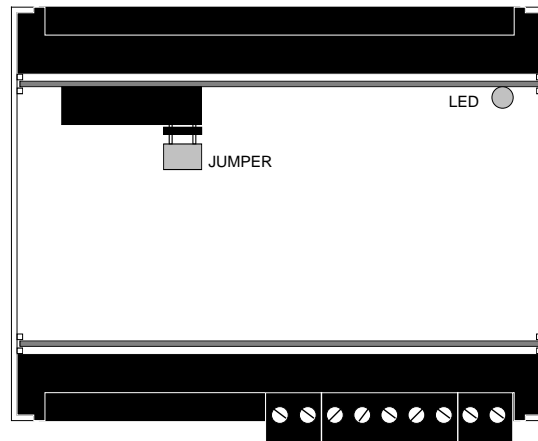


Figure 28. ANA 3 with the jumper in this position is 'Analogue output 1' for TAD 3.

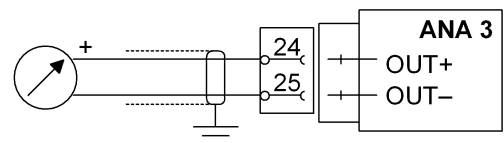
Analogue output

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.

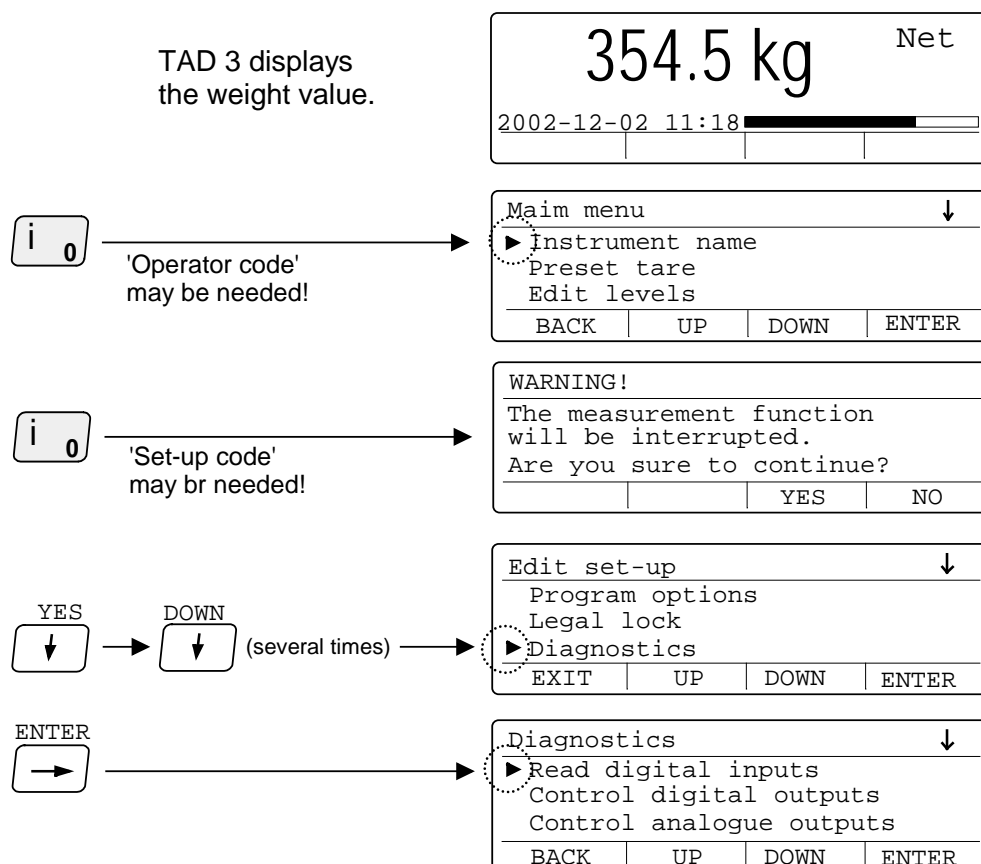
When an error is detected, the measuring functions are interrupted, all outputs are set passive, the analogue outputs are set to 0 V or 0 mA, and an error code will be displayed.

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.



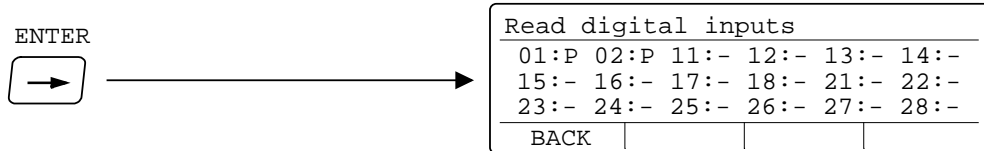
In menu 'Diagnostics' the cursor can be positioned at a sub menu name. When ENTER is pressed that sub menu will be opened.

Read digital inputs.

In this menu the status of all digital inputs to TAD 3, internally or by additional I/O units, can be monitored.

Status for the digital inputs can not be changed in this menu.

Position the cursor at sub menu name 'Read digital inputs' and press ENTER.



01 and 02 are internal inputs to TAD 3,
11 - 18 are inputs through additional unit I/O 1,
21 - 28 are inputs through additional unit I/O 2.

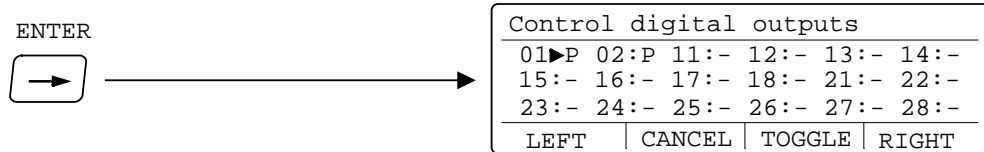
Inputs that are not available (or not existing) are marked minus (-).

Available inputs are marked 'A' when active, marked 'P' when passive.

Control digital outputs.

In this menu the status of all digital (relay) outputs from TAD 3, internally or by additional I/O units, can be monitored and edited.

Position the cursor at sub menu name 'Control digital outputs' and press ENTER.



01 and 02 are internal outputs from TAD 3,
11 - 18 are outputs through additional unit I/O 1,
21 - 28 are outputs through additional unit I/O 2.

Outputs that are not available (or not existing) are marked minus (-).

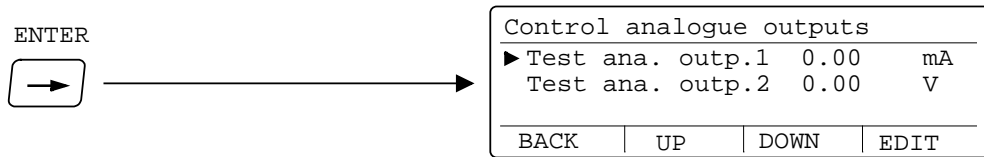
Available outputs are marked 'A' (active) or 'P' (passive).

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.

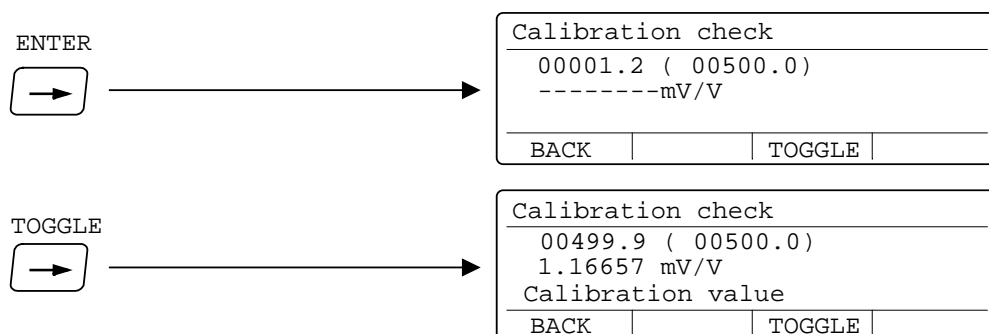
The following requirements must be fulfilled if the calibration value should be regarded as correct:

- 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.

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'.

(continued)

(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.

(continued)

(continued)

Error code	Explanation
171 – 176	Input/Output used in activity [1–6] not defined as B. activity. An input/output used in the batching activity 1–6 is not set to B. activity in the input/output menu.
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 %.
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.
193 – 198	Input/Output used in activity [1–6] not defined as B. activity. Exit set-up/restore not allowed, an input/output used in the batching activity 1–6 is not set to B. activity in the input/output menu.
199	COM3 and COM4 on the same unit. COM3 and COM4 must be on separate I/O units.
41000 - 41798	Exit Remote 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	.....	.....
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]	.....	.....

Appendix 1.

Set-up list, page 4.

Batch parameters for TAD 3**Address:**

Location/Notes:

Progr. name: Ser. no.: Date:

Activity no.: A

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

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

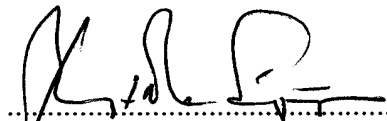
to which this declaration relates is in conformity with the
following standards or other normative documents

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



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Bengt-Åke Sjögren, Managing Director

Document no. 35184
Article no. 600 312 R11
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