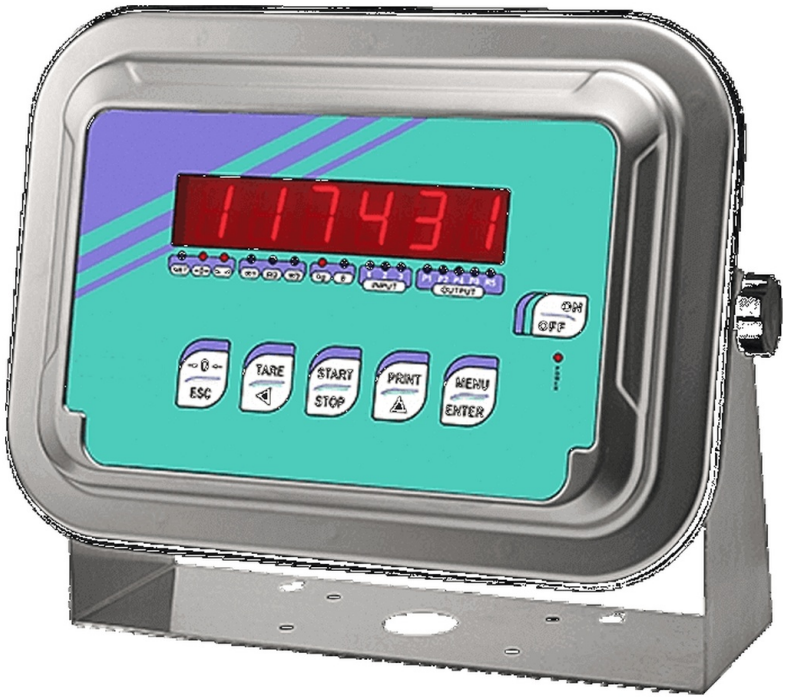
OCTOGON

MANUAL

EILH

WEIGHT INDICATOR, STAINLESS STEEL

Installation and user manual – Program 3, 6 or 14 products (3-6-14)



Document	Version	Date	Applies to
Installation and user manual	V00x	10/2026	EILH, program 3-6-14 (3, 6 or 14 products), versions P, Q, D, X

This manual describes installation, connection and operation of the EILH weight indicator with the batching program for 3, 6 or 14 products: wiring and relay modules, formulas, batching constants, the batching sequence, consumption, alarms, printouts, the analog output and the serial protocols.

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1 About this manual

Display texts are set in a fixed-width typeface, as they appear on the display, for example **CALIb**. Keys are written in square brackets (section 9.1). A menu path is a sequence of keys and display texts, for example:

Menu **000000** › **[ENTER]** › **FOrP** › **[TARE] [PRINT]** › **COnSt** › **[ENTER]** › **MIn**

000000 stands for the weight display. "[ENTER]+[ESC]" means: press [ENTER] immediately followed by [ESC]. "[TARE] [PRINT]" means: scroll to the next menu item with the arrow keys. In the menus changes are applied right after pressing [ENTER]; no further confirmation is required. The 7-segment display shows some letters in a simplified form (for example K and X look like H).

1.1 Symbols

Notice	Meaning
Caution	Risk of electric shock, or: this operation must be performed by skilled personnel.
Important	Pay particular attention to the following instructions.
Note	Further information.

1.2 Scope

The EILH is supplied with one of several programs; the instrument shows the program at switch-on (chapter 10). This manual applies to the batching programs for 3, 6 or 14 products (display **3PROD**, **6PROD** or **14PROD**); where the three versions differ, this is stated. The other programs and the approved (legal for trade) version have manuals of their own, available from octogon.

Of the options, this manual describes the analog output (chapter 15), the E/EC option (formula selection, section 7.5) and the external relay modules for 6 and 14 products (section 7.7). Connection and setup of the other options of the data sheet – fieldbuses, WiFi, additional RS485, USB, alibi memory, weight inputs, data transfer to PC, battery – and of the optional functions that are enabled in the program selection (section 23.5) are provided by octogon on request.

2 Safety, warranty and disposal

2.1 Recommendations for proper use

- Keep away from heat sources and direct sunlight.
- Protect the instrument from rain (except special IP versions).
- Do not wash with water jets (except special IP versions).
- Do not dip in water.
- Do not spill liquid on the instrument.
- Do not use solvents to clean the instrument.
- Do not install in areas subject to explosion hazard (except special Atex versions).

2.2 Recommendations for correct installation of the instrument

- The terminals indicated on the instrument's wiring diagram to be connected to earth must have the same potential as the weighed structure (same earthing pit or earthing system). If this cannot be ensured, connect the terminals of the instrument (including the terminal –SUPPLY) to the weighed structure with an earthing wire.
- Lead the cell cable individually to its panel input, do not share a conduit with other cables, and connect it directly to the instrument terminal strip without breaking its route with support terminal strips.
- Use "RC" filters on the instrument-driven solenoid valve and remote control switch coils.
- Avoid inverters in the instrument panel; if inevitable, use special filters for the inverters and separate them with sheet metal partitions.
- The panel installer must provide electric protections for the instruments (fuses, door lock switch etc.).
- It is advisable to leave the equipment always switched on to prevent the formation of condensation.

2.3 Maximum cable lengths

Connection	Length
RS485	1000 m with AWG24, shielded and twisted cables
RS232	15 m for baud rates up to 19200
Analog current output	up to 500 m with 0.5 mm^2 cable
Analog voltage output	up to 300 m with 0.5 mm^2 cable

2.4 Warranty

24 months from the date of the delivery note. The warranty covers only failures of defective components (due to construction defects or defects in materials) and includes replacement or repair of the components and related labour costs.

The warranty is automatically forfeited in the event of:

- tampering, deletion, removal of the identification label and/or serial number of the product;
- misuse, transformation, alteration, repair of products not carried out by the manufacturer.

A 1-year warranty from the date of the delivery note applies to defects in material or manufacture of the battery.

2.5 Guidelines for proper disposal

- This is electrical/electronic equipment and cannot be disposed of as municipal solid waste, but must be delivered to a recycling centre.
- Improper use or disposal can pollute the environment or damage human health.
- Non-compliance with these guidelines will be penalised in accordance with the regulations in force in the country of destination.
- Dispose of the packing and packaging as required by local regulations.

3 Installation of the load cells

3.1 Sizing of load cell capacity

For safety reasons, in case of static weighing, it is advisable to use the load cells at a maximum of 70–80 % of their nominal capacity (assuming that the load is uniformly distributed over the entire weighed structure); depending on the handling mode of the load (e.g. forklifts, bridge cranes), consider reducing the share of the nominal capacity further. With dynamic loads the installer has to estimate thrust speed, acceleration, frequency, etc.

3.2 Installing load cells

The load cells must be placed on rigid, stable in-line structures; use the mounting modules for load cells to compensate for misalignment of the support surfaces.

3.3 Connecting several cells in parallel

Connect several cells in parallel by using – if necessary – a watertight junction box with terminal box. The cell extension cables must be shielded, led individually into their piping or conduit and laid as far as possible from the power cables (with 4-wire connections use cables of at least 4 × 1 mm^2).

3.4 Protection of the cell cable

Use water-proof sheaths and joints in order to protect the cell cables.

3.5 Mechanical restraints (pipes, etc.)

When pipes are present, use hoses and flexible couplings with open mouthpieces with rubber protection; with hard pipes, place the pipe support or anchor bracket as far as possible from the weighed structure (at a distance of at least 40 times the pipe diameter).

3.6 Welding

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

3.7 Windy conditions, knocks, vibrations

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

3.8 Earthing the weighed structure

By means of a copper wire with suitable cross-section, connect the upper support plate of each cell with its lower support plate, then connect all the lower plates to a single earthing system. Electrostatic charges accumulated by the product rubbing against the pipes and the container walls are discharged to the ground without going through or damaging the load cells. Without a proper earthing system the weighing system may still work, but future damage to the cells and the connected instrument cannot be ruled out. Earthing continuity must not be ensured by using metal parts of the weighed structure.

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

4 Load cell testing

4.1 Load cell input test (quick access)

Menu **000000** › **[PRINT] 3 s** › **MU-CEL**

From the weight display, press [PRINT] for 3 seconds: the response signal of the load cells is displayed, expressed in mV with four decimals.

4.2 Load cell resistance measurement (digital multimeter)

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

4.3 Load cell voltage measurement (digital multimeter)

– Take out the load cell to be tested from underneath the container, or alternatively lift the container support.
– Make sure that the excitation of the two wires of the load cell connected to the instrument is 5 VDC ± 3 %.
– Measure the response signal between the positive and the negative signal wire by directly connecting them to the tester, and make sure that it is between 0 and ± 0.5 mV.
– Apply load to the cell and make sure that there is a signal increment.

Note If one of the above conditions is not met, please contact octogon.

5 Product description

5.1 Main specifications

Manufacturer type: WINOX-R

– Weight indicator with 6-wire load cell input, installable on table, front panel, wall or column
– 6-key keyboard
– Real-time clock/calendar with buffer battery
– Two serial ports (RS232 and RS485) for connection to: PC/PLC up to 32 instruments (max. 99 with line repeaters) by Modbus RTU protocol, remote display, printer
– Optional: integrated Profibus DP, DeviceNet, CANopen, Profinet IO, Ethernet/IP, Ethernet TCP/IP, Modbus TCP output

Versions P and D: switching power supply plug included, 24 V 450 mA, input 100 ... 240 VAC, 3 m cable. The instrument can be connected to an intelligent junction box (e.g. octogon ETLB) or to a weight transmitter.

Caution Versions Q, D and X are not compatible with the optional 115/230 VAC power supply.

5.2 Display

Display	Digit height	LED or symbols
red LED, 6 digits, 7 segments, semi-alphanumeric	20 mm	16 signalling LEDs

5.3 Versions and dimensions

Version	Max. encumbrance	Drilling
P – M16 × 1.5 cable glands · IP68 protection rating · power supply included	206 × 286 × 108 mm (connectors included)	160 × 248 mm
Q – removable terminal strip (panel front) · front panel IP68	206 × 286 × 96 mm (connectors included)	160 × 248 mm
D – D-Sub connector (table) · IP40 protection rating, front panel IP68 · power supply included	206 × 286 × 85 mm (connectors included)	–
X – Atex cable glands · Atex II 3GD (zones 2-22), IECEx · IP68 protection rating	206 × 286 × 108 mm (connectors included)	160 × 248 mm
Wall installation with bracket (can also be installed on table)	approx. 206 × 286 × 187 mm (bracket included)	–

The source gives the dimensions in the order height × width × depth.

5.4 Buffer battery

The instrument is equipped with an internal battery that keeps the internal clock running even in the event of power failure.

Important At the first start and after long periods of inactivity, leave the instrument on for at least 12 hours to fully charge the battery.

5.5 After a blackout

After a blackout the instrument does NOT come on again automatically; [ON/OFF] has to be pressed. To guarantee an automatic restart after a blackout, disable the ON key as follows:

- disconnect power supply and open the instrument;
- identify the flat connectors coming from the keypad on the main board;
- extract the 4-pole connector;
- short-circuit the two outer pins compared to the main board using the unused jumper inside the instrument;
- connect the 4-pole flat cable to the two pins still free, complying with the initial orientation.

6 Technical specifications

Item	Value
Power supply and consumption (VDC)	12/24 VDC ± 10 %; 6 W (standard)
Power supply and consumption (VAC)	115/230 VAC; 50–60 Hz; 6 VA (optional)
No. of load cells in parallel and supply	max. 8 (350 Ω); 5 VDC / 120 mA
Linearity / analog output linearity	< 0.01 % F.S.; < 0.01 % F.S.
Thermal drift / analog output thermal drift	< 0.0005 % F.S./°C; < 0.003 % F.S./°C
A/D converter	24 bit (16000000 points)
Max. divisions (measurement range ± 10 mV = sens. 2 mV/V)	± 999999
Measurement range	± 39 mV
Max. sensitivity of usable load cells	± 7 mV/V
Max. conversions per second	300
Display range	± 999999
No. of decimals / display increments	0 … 4 / x1 x2 x5 x10 x20 x50 x100
Digital filter / readings per second	10 levels / 5 … 300 Hz
Relay outputs	5 – max. 115 VAC; 150 mA (4 with analog output)
Digital inputs	3 – optoisolated 5 … 24 VDC PNP (2 with analog output)
Serial ports	RS485, RS232
Baud rate	1200, 2400, 4800, 9600, 19200, 38400, 115200
Humidity (non condensing)	85 %
Storage temperature	–30 … +80 °C
Working temperature	–20 … +60 °C
Optoisolated analog output (optional), 16 bit – 65535 divisions	0 … 20 mA; 4 … 20 mA (max. 300 Ω); 0 … 10 V; 0 … 5 V; ± 10 V; ± 5 V (min. 10 kΩ)

6.1 UL version

For the UL version the source states instead: relay outputs 5 – max. 30 VAC, 60 VDC; 150 mA (4 with analog output); working temperature –20 … +50 °C. Equipment to be powered by 12–24 VDC LPS or Class 2 power source.

6.2 Relay module RELE6PROD (6 and 14 products)

Item	Value
Power supply and consumption (VDC)	12/24 VDC (standard) ± 10 %; 2 W
Power supply and consumption (VAC)	115/230 VAC (optional); 50–60 Hz; 1.5 VA
Relay logic outputs	8 – max. 115 VAC; 2 A
Humidity (non condensing)	85 %
Storage temperature	–30 … +80 °C
Working temperature	–20 … +60 °C

The source gives no separate technical data for the RELE14PROD module.

7 Electrical connections

7.1 Basic information

– It is recommended that the power supply negative pole be grounded (connect the earthing system to the dedicated external terminal).
– It is possible to supply up to eight 350 Ω load cells or sixteen 700 Ω load cells.
– For 4-wire load cells, make a jumper between EX– and REF– and between EX+ and REF+ (section 7.4).
– Connect terminal –SUPPLY to the RS485 common of the connected instruments in the event that these receive alternating current input or that they have an optoisolated RS485.
– In an RS485 network with several devices, provide a 120 Ω termination resistance on the two devices located at the ends of the network (section 16.3).
– Option E/EC: selects the first 12 formulas (section 7.5).

7.2 Outputs, inputs and power supply

– Outputs 1 … 4 – 3 products version: products 1, 2 and 3 (outputs 1 … 3) and CYCLE END (output 4); 6 and 14 products versions: connected to the relay module RELE6PROD, which decodes them into the product and CYCLE END relays (section 7.7).
– Output 5 – 3 and 14 products versions: SLOW/ALARM (selectable, section 13.1); 6 products version: ALARM. In the 6 and 14 products versions output 5 supplies +5 VDC only if the relay is closed.
– Input 1: START · input 2: STOP · input 3: selectable – APPROVAL (default), SEMI-AUTOMATIC ZERO or NET/GROSS WEIGHT (section 13.2).
– With the analog output (option) input 3, output 5 (SLOW/ALARM or ALARM) and the E/EC option are no longer available.

Caution Connect the power supply specified on the plate on the back of the instrument. In the 115 V and 230 V versions, terminals +SUPPLY and –SUPPLY generate a continuous voltage of 24 VDC, only to be used as power supply for the instrument inputs.

7.3 Terminals of versions P, Q and X

Terminal	Signal
1	–
2	INPUT No. 3, selectable (+VDC min. 5 V, max. 24 V) · otherwise: +ANALOG OUTPUT (0 … 20 or 4 … 20 mA)
3	OUTPUT No. 5: SLOW/ALARM (3 and 14 products) · ALARM (6 products)** · otherwise: +ANALOG OUTPUT (0 … 10 V)
4	E/EC OPTION · otherwise: –ANALOG OUTPUT COMMON
5	RS485: –
6	RS485: +

Terminal	Signal
7	+SUPPLY (12/24 VDC) · 115/230 VAC version: +OUTPUT (24 VDC)*
8	–SUPPLY (12/24 VDC) · RS232, RS485: SHIELD, GND · E/EC OPTION: GND · 115/230 VAC version: –OUTPUT (24 VDC)*
9	RS232: TXD
10	RS232: RXD
11	OUTPUT No. 1: PRODUCT 1 (3 products) · 6 and 14 products: to the RELE6PROD module
12	OUTPUT No. 2: PRODUCT 2 (3 products) · 6 and 14 products: to the RELE6PROD module
13	OUTPUT No. 3: PRODUCT 3 (3 products) · 6 and 14 products: to the RELE6PROD module
14	OUTPUT No. 4: CYCLE END (3 products) · 6 and 14 products: to the RELE6PROD module
15	OUTPUT COMMON · 6 and 14 products: to the RELE6PROD module
16	INPUT No. 1: START (+VDC min. 5 V, max. 24 V)
17	INPUT No. 2: STOP (+VDC min. 5 V, max. 24 V)
18	INPUT COMMON (–VDC 0 V)
19	–LOAD CELL EXCITATION (–Exc) · LOAD CELL SHIELD
20	+LOAD CELL EXCITATION (+Exc)
21	+LOAD CELL REF/SENSE
22	–LOAD CELL REF/SENSE
23	–LOAD CELL SIGNAL (–Sig)
24	+LOAD CELL SIGNAL (+Sig)
L · N · earth	PHASE · NEUTRAL · GROUND (115/230 VAC version)

*) Use only as power supply for instrument inputs. **) 6 and 14 products versions: output No. 5 supplies +5 VDC only if the relay is closed. Terminal 1 has no signal in the source legend.

7.4 4-wire load cell

With a 4-wire load cell, jumper EX– with REF– (terminals 19 and 22) and EX+ with REF+ (terminals 20 and 21). Without these jumpers the instrument reports **ERCEL** (chapter 21).

7.5 E/EC option

With the E option (buttons, not included in the supply) or the EC option (selector switch) one of the first 12 formulas is selected; the batching is then started with the START input (section 20.2). Connection to terminal 4 (E/EC OPTION) and terminal 8 (GND). With the analog output the option is not available. Test: section 13.4.

7.6 Connectors of version D

Connector	Pin	Signal	Internal terminal	Internal colour
P1 power supply	–	+SUPPLY (12/24 VDC)	7	red
P1 power supply	–	–SUPPLY (12/24 VDC)	8	black
D1 female, load cell	1	–LOAD CELL EXCITATION (–Exc)	19	black
	2	–LOAD CELL REF/SENSE	22	yellow
	5	LOAD CELL SHIELD	19	–
	6	+LOAD CELL EXCITATION (+Exc)	20	red
	7	+LOAD CELL REF/SENSE	21	blue
	8	–LOAD CELL SIGNAL (–Sig)	23	white
	9	+LOAD CELL SIGNAL (+Sig)	24	green
D3 male, I/O, analog output, E/EC option	1	OUTPUT No. 1 (max. 24 V): PRODUCT 1 (3 products) · to the RELE6PROD module (6/14 products)	11	yellow
	2	OUTPUT No. 2 (max. 24 V): PRODUCT 2 (3 products) · to the RELE6PROD module (6/14 products)	12	blue
	3	OUTPUT No. 3 (max. 24 V): PRODUCT 3 (3 products) · to the RELE6PROD module (6/14 products)	13	white
	4	OUTPUT No. 4 (max. 24 V): CYCLE END (3 products) · to the RELE6PROD module (6/14 products)	14	green
	5	OUTPUT No. 5 (max. 24 V): SLOW/ALARM (3/14 products) · ALARM (6 products)** · otherwise: +ANALOG OUTPUT (0 ... 10 V)	3	orange

Connector	Pin	Signal	Internal terminal	Internal colour
	6	OUTPUT COMMON (max. 24 V) · to the RELE6PROD module (6/14 products)	15	purple
	7	INPUT No. 1: START (+VDC min. 5 V, max. 24 V)	16	grey
	8	INPUT No. 2: STOP (+VDC min. 5 V, max. 24 V)	17	pink
	9	INPUT No. 3, selectable (+VDC min. 5 V, max. 24 V) · otherwise: +ANALOG OUTPUT (0 ... 20 or 4 ... 20 mA)	2	brown
	10	INPUT COMMON (–VDC 0 V)	18	white/blue
	11	E/EC OPTION · otherwise: –ANALOG OUTPUT COMMON	4	red
	12	E/EC OPTION: GND · ANALOG OUTPUT: SHIELD	8	black
D4 male, RS232 serial port	2	RS232: RXD	10	yellow
	3	RS232: TXD	9	blue
	5	RS232: SHIELD, GND	8	black
D5 male, RS485 serial port with 24 VDC output	1	+OUTPUT (24 VDC)*	7	red
	2	–OUTPUT (24 VDC)*	8	black
	4	RS485: +	6	yellow
	5	RS485: SHIELD, GND	8	black
	6	RS485: –	5	blue
	7	RS485: –	5	blue
	9	RS485: +	6	yellow

Pins not listed have no signal in the source (D1: 3, 4; D3: 13 ... 15; D4: 1, 4, 6 ... 9; D5: 3, 8). *) Not available if the instrument is battery powered; use only if the instrument is connected to the provided 24 VDC power supply; maximum load 5 W. **) 6 and 14 products versions: output No. 5 supplies +5 VDC only if the relay is closed.

7.7 Relay modules RELE6PROD and RELE14PROD

In the 6 and 14 products versions the instrument outputs 1 ... 4 and the output common are connected to the external relay module RELE6PROD (products 1 ... 6, CYCLE END and – 6 products version only – SLOW). In the 14 products version the module RELE14PROD (products 7 ... 14) is connected in addition to the connector of the RELE6PROD. The RELE6PROD is supplied with 12 ... 24 VDC (RELE6PROD24V) or, as option, with 115/230 VAC (RELE6PROD-115V/-230V: phase and neutral on the terminals marked L and N); technical data: section 6.2.

Terminal	Signal	Instrument terminal (P, Q, X)	D3 pin (version D)
1	+SUPPLY (12/24 VDC)	–	–
2	–SUPPLY (12/24 VDC)	–	–
3	–	–	–
4	INSTRUMENT OUTPUT COMMON	15	6
5	INSTRUMENT OUTPUT No. 1	11	1
6	INSTRUMENT OUTPUT No. 2	12	2
7	INSTRUMENT OUTPUT No. 3	13	3
8	INSTRUMENT OUTPUT No. 4	14	4
9 · 10	PRODUCT 1 NO · COM		
11 · 12	PRODUCT 2 NO · COM		
13 · 14	PRODUCT 3 NO · COM		
15 · 16	PRODUCT 4 NO · COM		
17 · 18	PRODUCT 5 NO · COM		
19 · 20	PRODUCT 6 NO · COM		
21 · 22	CYCLE END NO · COM		
23 · 24	SLOW NO · COM (6 products version)		

Terminals of the RELE14PROD: 1 · 2 PRODUCT 7 NO · COM, 3 · 4 PRODUCT 8, 5 · 6 PRODUCT 9, 7 · 8 PRODUCT 10, 9 · 10 PRODUCT 11, 11 · 12 PRODUCT 12, 13 · 14 PRODUCT 13, 15 · 16 PRODUCT 14 (each NO · COM).

Decoding of the instrument outputs R1 ... R4 (outputs 1 ... 4); I = closed, 0 = open, X = any state. The same tables are used for the output test (section 13.4).

R1	R2	R3	R4	RELE6PROD	R1	R2	R3	R4	RELE14PROD
I	I	I	0	PROD. 1	0	0	0	I	PROD. 7
0	I	I	0	PROD. 2	I	0	0	I	PROD. 8
I	0	I	0	PROD. 3	0	I	0	I	PROD. 9
0	0	I	0	PROD. 4	I	I	0	I	PROD. 10
I	I	0	0	PROD. 5	0	0	I	I	PROD. 11
0	I	0	0	PROD. 6	I	0	I	I	PROD. 12
I	0	0	0	CYCLE END	0	I	I	I	PROD. 13
X	X	X	I	SLOW (6 products)	I	I	I	I	PROD. 14

7.8 Changing voltage 115/230 VAC

Applies only to version P with the 115/230 VAC option (not to versions Q, D and X).

Access the instrument board by removing the six bottom screws and work on the welding side: join the marked points using a stiff wire – for 230 VAC one bridge at the position marked 230, for 115 VAC one bridge at each of the two positions marked 115.

8 Batching program overview

The batching programs for 3, 6 or 14 products are used to realize a mixture of different products which are loaded on a single weighing structure. The instrument loads automatically a settable amount of each product, driving the relative batching organ (even two-speed) through the dedicated contact. Features:

- maximum 99 settable formulas, programmed in fixed or variable steps (chapter 19);
- batching resume after a blackout (section 20.8);
- automatic fall calculation (section 18.3) and autotare at batching start (section 18.5);
- tolerance error control (section 18.4);
- precision batching through the slow function or the tapping function (section 18.4);
- consumption storage for each product (section 20.9);
- print of batching data (section 18.5 and chapter 22);
- alarm contact (section 13.3).

Batching start: via keypad, setting formula and number of cycles, or via external contact (section 20.2). The batching sequence is described in section 20.1.

Formulas in steps: by default the order of the products in a formula is fixed and ascending (fixed steps); it is also possible to program the order of the products, even repeating the same product several times (variable steps, section 17.3).

Consumption: at the end of every batching the instrument stores the consumed amount of each product; it can be viewed on the display in standby (section 20.9).

Calibration: theoretical calibration with full scale and load cell sensitivity (section 11.2) or real calibration with sample weights (section 11.5).

Alarm management: if an alarm occurs during the batching, the instrument shows the alarm on the display, closes the related contact (if enabled) and waits for operator intervention to abort or continue the batching (chapter 21).

9 Keys, display and menu map

9.1 Keys

Key	Short press	Long press (3 s)	Into menus
[ON/OFF]	power-on	power-off	–
[ESC] (>0<)	semi-automatic zero	tare resetting	cancel or return to previous menu
[TARE] (left arrow)	gross › net	net › gross	select figure to be modified or go to previous menu item
[START/STOP]	batching start / stop	–	–
[PRINT] (up arrow)	print menu	mV load cell test	modify selected figure or go to next menu item
[ENTER] (MENU/ENTER)	setting formulas and batching constants	formula selection for the START input (EC not present, section 20.2)	confirm or enter in submenu
[ENTER]+[ESC]	setting general parameters (press [ENTER] immediately followed by [ESC])	–	–
[ENTER]+[TARE]	setting preset tare (press [ENTER] immediately followed by [TARE])	–	–

9.2 Signalling LEDs

LED	Function
POWER	power supply available
NET	net weight (semi-automatic tare or preset tare)
>0<	zero (deviation from zero not more than ± 0.25 divisions)
stability symbol	stability
kg	unit of measure: kg
g	unit of measure: g
W1 · W2 · W3	not used
INPUT 1 · 2 · 3	LED lit: input 1, 2 or 3 closed
P1 · P2 · P4 · P8 · R5	LED lit: output 1, 2, 3, 4 or 5 closed

Into menus the LEDs light up in sequence to indicate that no weight is displayed.

9.3 Formulas and batching constants menu

[ENTER] opens **FOrP**; [TARE] [PRINT] scroll to the other main items, [ENTER] opens the submenu.

Main item	Sub-items	Section
FOrP	**FOrP01** ... › **PrOd01 PrOd02** ... (fixed steps) or **01)P01** ... (variable steps)	19.1
CAnCFO	**FOrP00** ... › **SUrE**	19.2
tOtAL*	**123456** › **01.10.10** › **COn 1 COn 2 COn 3** ...	20.9
CAnCtO*	**SUrE**	20.10
COnSt	**MIn MASS tSIC tIMEAt tnLOAd tnUnLO MOdFAL FALL tOL SLOU SLOUOn SLOUOF AtArE tOtAL PrInt nCOPY PC SLAvE rALArM**	18

*) Only if **tOtAL** = **YES** in the constants.

9.4 System parameters menu

[ENTER]+[ESC] opens **CALIb**; [TARE] [PRINT] scroll to the other main items, [ENTER] opens the submenu.

Main item	Sub-items	Section
CALIb	**FS-tEO SEnSIb dIUIS ZErO IMP 0 UEIGHt vnIt**	11
FILtEr	value 0 … 9, then **ANTpOn** / **AntPOF**	12.1
PArA 0	**0 SEt AUtO 0 trAC 0**	12.2
AnALOG (option)	**tYPE MOdE AnA 0 AnA FS COr 0 COr FS**	15
SErIAL	**rS485** / **rS232** › **nOnE ModbUS rIP HDrIP HdrIPn YHL PrIntr UEIMOD UEIrIP** › **bAUd Addr dELAY PArItY StOP**	16
ALArM	**COnS EMPtY MASFOr tArE LOAd UnLOAd tOL FALL SLAvE**	13.3
Ovt-In	**In 3** · **Ovt 5** (3 and 14 products only)	13
EnErGY	**dISPLY**	17.1
tESt	**In Ovt AnALOG** (option) **EC** (option) **MU-CEL**	13.4
dAtE	date and time	17.2
PSUBLC	unlock password	23.4
SEttIn	**MAXPr FStEP nEXt P bLACH**	17.3
InFO	**GEnrIC OPZ**	17.4

Direct access from the weight display: [ESC] 3 s › **ZErO** (tare weight zero setting); [PRINT] 3 s › **MU-CEL** (mV test); [ENTER]+[TARE] › **P-tArE** (preset tare); [ENTER] 3 s › **FEST00** (formula for the START input, section 20.2).

10 Instrument commissioning

Turn the instrument on with [ON/OFF]. To turn it off press [ON/OFF] for about 3 seconds: when **OFF** appears, release the key. After a blackout the instrument does not come on again automatically (remedy: section 5.5).

Upon switch-on, the display shows in sequence:

- **111111** › **999999** (only in case of approved program);
- instrument model (**UInX**);
- **SU** followed by the software code (e.g. **SU 5**);
- program type: **3PROD**, **6PROD** or **14PROD** for the programs of this manual;
- **r** followed by the software version (e.g. **r 1.12.00**);
- **HU** followed by the hardware code (e.g. **HU 104**);
- serial number (e.g. **100515**).

Check that the display shows the weight and that the weight increases when the load cells are loaded. If not, check the connections and the correct positioning of the load cells.

- Instrument already theoretically calibrated (plant identification tag on the instrument and on the cover, load cell rated data entered): reset to zero (section 11.3), then check the calibration with sample weights and correct the indicated weight if necessary (section 11.5).
- Instrument not calibrated (no plant identification tag): load cell data unknown – real calibration (section 11.5); known – theoretical calibration (section 11.2); then reset to zero (section 11.3) and check with sample weights (section 11.5).
- Analog output: set type and full scale (chapter 15).
- Serial communication: set the parameters (chapter 16).
- Set the clock to the current date and time (section 17.2).

Required settings for the first batching: in the batching constants set the minimum weight (section 18.2); in the formulas menu set formula 01 (chapter 19). Start the batching with [START/STOP] or by closing the START contact (chapter 20).

11 Calibration and weight parameters

11.1 Programming of system parameters

From the weight display, press [ENTER] immediately followed by [ESC]. [ENTER]: enter a menu or confirm the data entry; [PRINT]: modify the displayed figure or menu item; [TARE]: select a new figure or modify the displayed menu item; [ESC]: cancel and return to the previous menu.

11.2 Theoretical calibration

Menu **000000** › **[ENTER]+[ESC]** › **CALIb** › **[ENTER]** › **FS-tEO** › **[ENTER]** › **SEnSIb** › **[ENTER]** › **dIUIS**

This function allows the load cell rated values to be set, in sequence:

– **FS-tEO** (default **dEMO**): system full scale = capacity of one cell × number of cells. Example: 4 cells of 1000 kg › full scale 1000 × 4 = 4000. The instrument is supplied with a theoretical full scale **dEMO**, corresponding to 10000. To restore factory values, set 0 as full scale.

– **SEnSIb** (default 2.00000 mV/V): load cell rated sensitivity; enter the average value of the cells, settable 0.50000 ... 7.00000 mV/V. Example 4 cells with 2.00100, 2.00150, 2.00200, 2.00250 › 2.00175 = (2.00100 + 2.00150 + 2.00200 + 2.00250) / 4.

– **dIUIS**: division (resolution), the minimum weight increment which can be displayed. It is calculated automatically after the calibration to 1/10000 of full scale; it can be changed between 0.0001 and 100 with x1 x2 x5 x10 increments.

Important By modifying full scale or sensitivity, the real calibration is cancelled and only the theoretical calibration is valid. If theoretical full scale and the full scale recalculated in real calibration are equal, the theoretical calibration is in use, otherwise the real one. By modifying the theoretical full scale, the system parameters containing a weight value are set to default.

11.3 Tare weight zero setting

Menu **000000** › **[ENTER]+[ESC]** › **CALIb** › **[ENTER]** › **FS-tEO** › **[TARE] [PRINT]** › **ZErO**

This menu may also be accessed directly from the weight display by holding [ESC] for 3 seconds. Perform it after the theoretical calibration. Use it to set to zero the weight of the empty system after commissioning and later to compensate zero variations due to product residues.

– Confirm **ZErO** with [ENTER]; the weight value to be set to zero is displayed, all LEDs are flashing.
– Confirm again: the weight is set to zero and stored to the permanent memory.
– Press [PRINT] to display the total weight reset by the instrument, the sum of all previous zero settings.

11.4 Zero value manual entry

Menu **000000** › **[ENTER]+[ESC]** › **CALIb** › **[ENTER]** › **FS-tEO** › **[TARE] [PRINT]** › **IMP 0**

Caution Perform this procedure only if it is not possible to reset the weighed structure tare, for example because it contains product that cannot be unloaded.

Set the estimated zero value (–999999 ... 999999; default 0).

11.5 Real calibration (with sample weights)

Menu **000000** › **[ENTER]+[ESC]** › **CALIb** › **[ENTER]** › **FS-tEO** › **[TARE] [PRINT]** › **UEIGHt**

After the theoretical calibration and the tare weight zero setting, calibrate with weights of known value and correct the display if necessary. Load a sample weight of at least 50 % of the maximum quantity to be weighed. Confirming **UEIGHt**, the current weight is displayed flashing, all LEDs are off; adjust the value with the arrow keys if necessary and confirm – the new weight appears with all LEDs flashing. After a further confirmation **UEIGHt** is shown again; pressing [ESC] repeatedly returns to the weight display.

Example: system of maximum capacity 1000 kg and 1 kg division, sample weights of 500 kg and 300 kg. Load both and correct the indicated weight to 800. Remove the 300 kg weight – the system must show 500; remove the 500 kg weight too – the system must read zero. If not, a mechanical problem affects the linearity; correct it before repeating the procedure.

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

Linearisation on max. 8 points: repeat the procedure with up to eight different sample weights. It ends with [ESC] or after the eighth value; then only a new real calibration is possible (return to the weight display and re-enter the calibration menu). [PRINT] after confirming the sample weight shows the full scale recalculated from the maximum sample weight entered and the sensitivity **SEnSIb**.

11.6 Units of measure

Menu **000000** › **[ENTER]+[ESC]** › **CALIb** › **[ENTER]** › **FS-tEO** › **[TARE] [PRINT]** › **vnIt**

Display	Unit
kILOG	kilograms
G	grams
t	tons
LB	pounds
Neuton	newtons
LItre	litres
Bar	bars
Atm	atmospheres
PIECe	pieces
NEU-M	newton metres
KILO-m	kilogram metres
OTHER	other unit not included in the list

If the print function is enabled, the symbol of the selected unit is printed after the measured value.

12 Filter on the weight and zero parameters

12.1 Filter on the weight

Menu **000000** › **[ENTER]+[ESC]** › **CALIb** › **[TARE] [PRINT]** › **FILtEr**

The filter stabilises the weight display; a higher value increases the effect (0 ... 9, default 4). Confirming **FILtEr** shows the current value; after changing and confirming, the weight is displayed to check its stability. If it is not satisfactory, confirming brings back **FILtEr**. The filter stabilises a weight as long as its variations are shorter than the response time; set it according to the application and the full scale.

Filter value	Response time [ms]	Display and serial port refresh [Hz]
0	12	300
1	150	100
2	260	50
3	425	25
4 (default)	850	12.5
5	1700	12.5
6	2500	12.5
7	4000	10
8	6000	10
9	7000	5

Anti peak

When the weight is stable, the anti peak filter removes sudden disturbances with a maximum duration of 1 second. After the filter value select with [ENTER]: **ANTpOn** enabled (default), **AntPOF** disabled.

12.2 Zero parameters

Menu **000000** › **[ENTER]+[ESC]** › **CALIb** › **[TARE] [PRINT]** › **PArA 0**

– **0 SEt** (0 to full scale; default 300; with decimals 300 – 30.0 – 3.00 – 0.300): maximum weight resettable by external contact, keypad or serial protocol.
– **AUtO 0** (0 to 10 % of full scale; default 0): if at switch-on the weight is lower than this value, it is reset; set 0 to disable.
– **trAC 0** (1 ... 5, default **nOnE**): when the weight is stable and after a second deviates from zero by a number of divisions smaller or equal to this value, it is set to zero; **nOnE** disables. Example: **dIUIS** = 5, **trAC 0** = 2 › zero tracking for variations up to 10 (**dIUIS** × **trAC 0**).

13 Outputs, inputs, alarm relay and test

Menu **000000** › **[ENTER]+[ESC]** › **CALIb** › **[TARE] [PRINT]** › **Ovt-In** › **[ENTER]** › **In 3 / Ovt 5**

13.1 Outputs

– 3 products version: outputs 1 ... 3 = products 1 ... 3; output 4 = CYCLE END.
– 6 and 14 products versions: outputs 1 ... 4 drive the relay modules (decoding tables in section 7.7, test in section 13.4).
– 3 and 14 products versions – output 5 (**Ovt 5**, default **SLOU**): **ALArM** – the relay is closed when an alarm is present; **SLOU** – slow function for a precision batching (section 18.4).
– 6 products version – output 5: ALARM (the relay is closed when an alarm is present).

13.2 Inputs

– Input 1: START · input 2: STOP.
– Input 3 (**In 3**, default **COnS**): **ne-LO** (NET/GROSS) – closing the input for no more than one second performs a semi-automatic tare and the display shows the net weight; holding it closed for 3 seconds shows the gross weight again.
– **ZErO** (SEMI-AUTOMATIC ZERO) – closing the input for no more than one second sets the weight to zero (section 14.3).
– **COnS** (APPROVAL) – the instrument starts the batching only after verifying that this input is closed.

13.3 Alarm relay closure

Menu **000000** › **[ENTER]+[ESC]** › **CALIb** › **[TARE] [PRINT]** › **ALArM**

This menu item is only available if **Ovt 5** is set as **ALArM**. The closing of the ALARM relay can be enabled or disabled for each of the following alarms: approval contact (**COnS**), formula not programmed (**EMPtY**), maximum weight exceeded (**MASFOr**), minimum weight (**tArE**), no increase in weight (**LOAd**), no decrease in weight (**UnLOAd**), tolerance (**tOL**), fall (**FALL**), the PC did not read the batching data (**SLAvE**). **YES**: in presence of the alarm the relay is closed (default); **nO**: the relay is not closed even in presence of the alarm.

13.4 Test

Menu **000000** › **[ENTER]+[ESC]** › **CALIb** › **[TARE] [PRINT]** › **tESt**

Test	Meaning
In	inputs: open input **0**, closed input **1**
Ovt	outputs: **0** › the output must open; **1** › the output must close. 6 and 14 products versions: to activate the relay of a product, set the outputs R1 ... R4 according to the tables in section 7.7
EC	E/EC option: number of the formula selected by the option; without or with inactive option **EC-ER**
AnALOG	analog output option: the signal ranges from minimum to maximum; **MA** current, **VOLT** voltage
MU-CEL	millivolt: load cell response signal in mV with four decimals

14 Tare and zero

14.1 Semi-automatic tare (net/gross)

Close the NET/GROSS input or press [TARE] for less than 3 seconds: the instrument displays the net weight (just set to zero), NET lights up. Back to gross: keep the NET/GROSS input closed or press [TARE] for 3 seconds. The operation can be repeated many times, e.g. to load several products. Example: put the box on the scale, [TARE] – display zero net; introduce the product – display product weight.

- While the net weight is displayed, keep [PRINT] pressed to display the gross weight.
- Not allowed if the gross weight is zero (**InZErO**).
- The semi-automatic tare is lost upon instrument power-off.

14.2 Preset tare (subtractive tare device)

Menu **000000** › **[ENTER]+[TARE]** › **P-tArE**

A tare value is set manually and subtracted from the display, provided that **P-tArE** ≤ max. capacity. The last programmed value is shown; to apply it press [PRINT] and then [ENTER]. Back in the weight display the net weight is shown and NET lights up. To delete and return to gross: hold [TARE] for about 3 seconds or keep the NET/GROSS input closed for 3 seconds; the preset tare is set to zero, NET goes off.

- If a semi-automatic tare is entered, the preset tare function cannot be accessed.
- If a preset tare is entered, the semi-automatic tare is still possible; the two tares are added.
- Both types of tare are lost when the instrument is turned off.

14.3 Semi-automatic zero

Close the SEMI-AUTOMATIC ZERO input: the weight is set to zero. Or press [ESC] for less than 3 seconds: **STORE?** is displayed for 3 seconds, [ENTER] sets the weight to zero. Only allowed if the weight is lower than **0 SEt** (section 12.2); otherwise **t** ‾‾‾‾ (upper dashes) appears and the weight is not set to zero.

15 Analog output (option)

Menu **000000** › **[ENTER]+[ESC]** › **CALIb** › **[TARE] [PRINT]** › **AnALOG**

- **tYPE**: analog output type: 4 ... 20 mA, 0 ... 20 mA, 0 ... 10 V, 0 ... 5 V, ± 10 V, ± 5 V (default 4 ... 20 mA).
- **MOdE**: **GrOSS** follows the gross weight, **nEt** the net weight, **PLC** remote control via protocol (section 25.6).
- **AnA 0**: weight for the minimum analog output value. Only set a value other than zero to limit the range – e.g. full scale 10000 kg, 4 mA at 5000 kg and 20 mA at 10000 kg › 5000.
- **AnA FS**: weight for the maximum value; it must correspond to the value in the PLC program (default: calibration full scale). Example 4 ... 20 mA with 20 mA = 8000 kg › 8000.
- **COr 0**: zero correction so that the PLC indicates 0; "–" can be set on the last digit on the left. Example: with 4 ... 20 mA the PLC reads 4.1 mA at minimum › set 3.9 to obtain 4.0.
- **COr FS**: full scale correction so that the PLC indicates the value of **AnA FS**. Example: at full scale 19.9 mA › set 20.1 to obtain 20.0.

Caution For the ± 10 V and ± 5 V outputs the soldered jumper SW1 must be closed: open the instrument, locate the soldered jumper SW1 on the analog board mounted perpendicular to the main board and short the pads with a drop of tin.

Analog output type	Minimum	Maximum
0 ... 10 V	–0.150	10.200
0 ... 5 V	–0.150	5.500
± 10 V	–10.300	10.200
± 5 V	–5.500	5.500
0 ... 20 mA	–0.200	22.000
4 ... 20 mA	–0.200	22.000

The output can also be used in the opposite manner: **AnA 0** may be greater than **AnA FS**; the output then increases as the weight decreases. Example 0 ... 10 V with **AnA 0** = 10000 and **AnA FS** = 0: 0 kg › 10 V, 5000 kg › 5 V, 10000 kg › 0 V.

Important All analog outputs are ACTIVE and SINGLE ENDED and can only be connected to PASSIVE receiver devices. Voltage output: minimum load 10 kΩ; current output: maximum load 300 Ω.

16 Serial communication

16.1 Setting

Menu **000000** › **[ENTER]+[ESC]** › **CALIb** › **[TARE] [PRINT]** › **SErIAL** › **[ENTER]** › **rS485 / rS232**

First select the port (**rS485** or **rS232**), then the protocol:

Protocol	Meaning
nOnE	no communication (default)
ModbUS	Modbus RTU, addresses 1 ... 99 (chapter 25)
rIP	continuous transmission to remote displays; the remote display shows net or gross weight according to its settings (**bAUd** = **9600**, **PArItY** = **nOnE**, **StOP** = **1**; section 24.1)
HDrIP	as **rIP**, for remote displays with decimal point (section 24.1)
HdrIPn	as **HDrIP**; if the remote display is set to gross and the instrument shows net, the remote display shows net alternated with **nEt**
YHL	continuous weight transmission (section 24.2)
PrIntr	printer (chapter 22)
UEIMOD / UEIrIP	weight reception (section 16.5)

16.2 Parameters

Parameter	Meaning
bAUd	transmission speed 1200, 2400, 4800, 9600, 19200, 38400, 115200 (default 9600)
Addr	instrument address 1 ... 99 (default 1)
dELAY	delay of the reply 0 ... 200 ms (default 0)
PArItY	**nOnE** no parity (default), **Euen** even, **Odd** odd parity
StOP	stop bits 1 or 2 (default 1)
EMPTY	printer: number of blank lines between one printout and the next
HEADER	printer: printing of a custom heading from PC: **YES** / **nO** (default **nO**)
PrtMOD	connected printer type: **P190**, **STAuP**, **STAut**, **tmt203**

The number of copies of the batching printout is set in the batching constants (**nCOPY**, section 18.5).

16.3 RS232 and RS485

Connection	Instrument	Counterpart
RS232 to PC (DB9 female)	RS232 TXD · RS232 RXD · GND	pin 2 · pin 3 · pin 5
RS485, several instruments	RS485 + · RS485 – · GND	RS485 + · RS485 – · GND of each instrument
RS485 directly to RS232 (no converter)	RS485 – · RS485 +	RXD · GND

– Terminals: RS485 – 5, RS485 + 6, GND 8; RS232 TXD 9, RXD 10, GND 8 (version D: connector D5 or D4, section 7.6).

– If the RS485 network exceeds 100 m or baud rates over 9600 are used, connect two 120 Ω terminating resistors between "+" and "–" on the terminal strip of the furthest instruments. With other instruments or converters refer to their manuals.

– A two-wire RS485 output may be used directly on the RS232 input of a PC or remote display; this allows A SINGLE instrument to be used in a ONE WAY mode.

– For an RS485 converter at the PC, follow its wiring diagram.

16.4 Weight reading via serial port

The transmitting instrument is the one connected to the load cell, the receiving instrument the one which receives the weight via RS485 or RS232. Outputs, serial ports and analog output of the receiving instrument work as described, using the weight received.

Caution For this the weight reading mode must be set as **SErIAL** (section 23.5).

16.5 WEIMOD and WEIRIP modes

UEIMOD: the instrument works as if it were directly connected to the load cell; calibration and zero setting are possible. Protocol Modbus, the receiving instrument is master, the transmitting one slave. Transmitting instrument: select the port, **ModbUS**, set the communication parameters and the filter value. Receiving instrument: select the port, **UEIMOD**, the same parameters as on the transmitting one: **bAUd**, **SLAvE** (address of the transmitting instrument, 1 ... 99, default 1), **dELAY**, **PArItY**, **StOP**. The transmitting instrument display is locked and shows the instrument model; to unlock it, disconnect the receiving instrument and release the keypad/display lock (section 23.6).

UEIrIP: the instrument receives the gross weight; calibration and zero setting on the transmitting instrument. Transmitting instrument: select the port, **rIP**, set the parameters. Receiving instrument: select the port, **UEIrIP**, **bAUd**, **dELAY**, **PArItY**, **StOP** as on the transmitting one, plus unit **vnIt** and decimals **DECIM** of the received weight; these two items appear in the main menu after setting **UEIrIP**.

UEIMOD and **UEIrIP** can only be enabled on one port; in case of conflict the port set last remains active. Connection transmitting › receiving instrument: RS485 +, RS485 – and –SUPPLY, or RS232 TX › RX, RX › TX and –SUPPLY (terminals section 16.3).

17 Energy saving, date, operation settings and info

17.1 Energy saving

Menu **000000** › **[ENTER]+[ESC]** › **CALIb** › **[TARE] [PRINT]** › **EnErGY** › **[ENTER]** › **dISPLY**

– **On**: display always on;

– **CHAnGE**: the display enters energy saving mode after about one minute of no activity; pressing a key or a weight change turns normal operation on again.

17.2 Date and time setting

Menu **000000** › **[ENTER]+[ESC]** › **CALIb** › **[TARE] [PRINT]** › **dAtE**

Pressing [ENTER] several times scrolls through day, month, year, hours, minutes; [TARE] selects the figure to modify, [PRINT] increases it, [ENTER] confirms and goes to the next item.

17.3 Operation settings

Menu **000000** › **[ENTER]+[ESC]** › **CALIb** › **[TARE] [PRINT]** › **SEttIn**

– **MAXPr**: maximum number of products and steps selectable in a formula – 1 ... 3 (3 products version), 1 ... 6 (6 products), 1 ... 14 (14 products). Example: 6 products version with the value 4 › products 1 ... 4 and at most 4 steps in each formula. Changing the value deletes all formulas.

– **FStEP** (default **nO**): formulas in variable or fixed steps. **YES**: products and quantities can be set in the desired order, even repeating the same product several times (VARIABLE STEPS); **nO**: the batching sequence of the products is fixed, only the quantities can be set (FIXED STEPS). Changing the value deletes all formulas.

– **nEXt P**: condition for switching from the end of a product (contact open) to the following product or to the closing of CYCLE END – **TIME** (default **YES**): the waiting time **tIMEAt** of the constants; **COMAND** (default **nO**): closing of the START input or [ENTER]; **STABLE** (default **nO**): stable weight.

– **bLACH** (default **MAn**): resume mode after a power failure during the batching – **AUt** (automatic): at power restore **bLACH** appears for 3 seconds, then the batching resumes from the point of interruption; **MAn** (manual): **bLACH** appears, [ENTER] resumes the batching, [ESC] stops it.

17.4 Info menu

Menu **000000** › **[ENTER]+[ESC]** › **CALIb** › **[TARE] [PRINT]** › **InFO**

GEnrIC: identification data of the instrument – **INSTRM** model, **SU COD** software code, **PROGRM** program type, **Fw wer** software version, **ser nV** serial number. **OPZ**: active options.

18 Batching constants

18.1 Programming of batching constants

Menu **000000** › **[ENTER]** › **FOrP** › **[TARE] [PRINT]** › **COnSt** › **[ENTER]** › **MIn ...**

From the weight display press [ENTER], then press the arrow keys until **COnSt** is displayed and confirm. [ENTER]: enter a menu or confirm the data entry; [PRINT]: modify the displayed figure or menu item; [TARE]: select a new figure or modify the displayed menu item; [ESC]: cancel and return to the previous menu.

18.2 Weights and times

Constant	Range; default	Meaning
MIn	0 to full scale; 10	minimum weight, value at which the scale is considered empty. The batching can only start if the weight is lower than this value; in the unloading phase the CYCLE END contact opens when the weight reaches this value and the safe emptying time is over.
MASS	0 to full scale; 0	settable and displayable maximum weight. If the displayed weight exceeds it by 9 divisions, ‾‾‾‾‾ (upper dashes) is displayed; a formula quantity greater than this value gives **Error** and is not stored. 0 disables the function.
tSIC	0.0 ... 999.9 s; 5.0	safe emptying time: in the unloading phase (CYCLE END closed) the instrument waits this time after reaching the minimum weight before opening the CYCLE END contact, for a perfect emptying of the scale.
tIMEAt	0.0 ... 999.9 s; 5.0	waiting time between the end of the batching of one product and the following one.
tnLOAd	0.0 ... 999.9 s; 0.0	no product load time: if the product is not loaded during the batching, the instrument waits this time before the alarm **LOAd**.
tnUnLO	0.0 ... 999.9 s; 0.0	no product unload time: if the product is not extracted in the unloading phase (cycle end), the instrument waits this time before the alarm **UnLOAd**. The control acts only after the unloading has started (weight decreased by at least 10 divisions).

18.3 Fall

The fall is the amount of product still falling after the batching STOP; it adds to the product already batched and causes inaccuracy. The instrument anticipates the STOP to reduce this uncertainty: with the AUTOMATIC fall it calculates the fall itself, with the MANUAL fall it applies the value set by the operator.

– **MOdFAL** (0 ... 1; default 0): 0 = MANUAL fall, 1 = AUTOMATIC fall.

– **FALL** (0 to maximum weight; default 0), for each product: the fall value to be applied (only with **MOdFAL** = 0), or display and modification of the fall calculated automatically (only with **MOdFAL** = 1).

Caution Set the waiting time **tIMEAt** so that the weight is stable at the end of the batching, otherwise the update of the AUTOMATIC fall is not correct.

18.4 Tolerance, slow and tapping

– **tOL** (0 to maximum weight; default 0), for each product: permitted deviation of the batched weight from the formula value. If the batched weight is higher or lower than the amount to be batched by more than the tolerance, the instrument closes the ALARM contact; [ENTER] continues the batching. Example: PRODUCT = 1000 and TOLERANCE = 100 › the batched weight must be between 900 and 1100 for the batching to continue. 0 disables the function.

– **SLOU** (0 to maximum weight; default 0), for each product: when the weight reaches the value set minus the fall value minus the slow value, the slow phase starts (the relative contact closes). If the value is higher than the weight to be batched, the whole batching runs in slow phase. 0 disables the function. Example: PRODUCT = 100, SLOW = 15 and FALL = 10 › the slow phase starts at 75.

– Tapping function, for batching organs without a slow speed: in the final phase the PRODUCT contact opens and closes in cycles to slow down the batching and increase the accuracy. The product amount batched with tapping is set in **SLOU**; **SLOUOn** (0 ... 9.9; default 0): time the PRODUCT relay remains closed in the slow phase; **SLOUOF** (0 ... 9.9; default 0): time it remains open. 0 disables the function.

18.5 Autotare, consumption, print and PC

Constant	Range; default	Meaning
AtArE	0 ... 1; 1	autotare (automatic tare at the batching start): 0 disabled, 1 enabled. Only possible if the gross weight is lower than the minimum weight **MIn**, otherwise the alarm **tArE?** is displayed.
tOtAL	**YES** / **nO**; **nO**	consumption memory (total batched quantity) for each product (section 20.9).
PrInt	**YES** / **nO**; **nO**	print of the batching data at cycle end (chapter 22).
nCOPY	1 ... 9; 1	number of copies of the batching printout.
PC	**YES** / **nO**; **nO**	check for a PC connected to the instrument every 10 seconds; without a PC the alarm **PC** is displayed alternated with the weight. Active only with the Modbus protocol.
SLAvE	**YES** / **nO**; **nO**	**YES**: the instrument waits for the PC to read the batching data before starting another batching; in case of recording failure the alarm **SLAvE** is displayed. **nO**: no waiting for data recording on the PC.
rALArM	0 to full scale; 0	with a value other than zero the ALARM/SLOW contact does not switch in case of alarm/slow but behaves as a setpoint contact: the relay closes when the weight reaches this value.

19 Formulas

19.1 Formulas programming

Select the formula to be programmed; up to 99 formulas can be set. Fixed or variable steps are selected with **FStEP** (section 17.3).

Fixed steps (FStEP = nO)

Menu **000000** › **[ENTER]** › **FOrP** › **[ENTER]** › **FOrP01 ...** › **[ENTER]** › **PrOd01 ...**

Only the quantity of each product to be batched can be set; the batching sequence of the products is not adjustable.

Variable steps (FStEP = YES)

Menu **000000** › **[ENTER]** › **FOrP** › **[ENTER]** › **FOrP01 ...** › **[ENTER]** › **01)P01** › **[ENTER]** › **01)P01**

The step number, the product number and the quantity of product to be batched can be set. Example: **01)P03** – **01**: step number; **P03**: product number.

If a quantity higher than the maximum weight **MASS** of the batching constants is set, **Error** is displayed and the value is not stored.

19.2 Deleting formulas

Menu **000000** › **[ENTER]** › **FOrP** › **[TARE] [PRINT]** › **CAnCFO** › **[ENTER]** › **FOrP00** › **[ENTER]** › **SUrE**

Confirm **CAnCFO** with [ENTER]; to delete one formula enter its number, to delete all formulas enter 00 (**FOrP00**); confirm with [ENTER]. At the prompt **SUrE** confirm again with [ENTER] to delete, or press [ESC] to cancel the command.

20 Batching

20.1 Batching start and sequence

Menu **000000** › **[START/STOP]** › **FOr 01** › **[ENTER]** › **C 0001**

Press [START/STOP], select the formula (**FOr 01** ...), confirm with [ENTER] and set the number of batching cycles (**C 0001** ...). The first batching cycle then starts as follows:

1. The instrument checks that: the formula has been programmed, otherwise the alarm **EMPtY** is displayed; the amount set in the formula does not exceed the maximum weight **MASS**, otherwise **MASFOr** is displayed; the input IN3 (if set as APPROVAL) is closed, otherwise **COnS?** is displayed – close IN3 to start the batching; only if **AtArE** is set: the gross weight is lower than the minimum weight **MIn**, otherwise the alarm **tArE?** is displayed (the batching start can always be forced with [ENTER]); only if **tOtAL** = **YES**: if the consumed amount exceeds 999000, **tOtAL** appears for a second; if it exceeds 999999, it is automatically set to zero.

2. The batching of the first product of the formula starts; if the time **tnLOAd** is set and the product is not loaded by at least 20 divisions within this time, the alarm **LOAd** is displayed.

3. The number of the product to be batched (e.g. **P 1**) is displayed for 1 second, then the net weight; the product relay closes.

4. Only if **SLOU** is set: when the value set for the product minus the fall and slow values is reached, the SLOW contact closes (if foreseen); if tapping values are set, the product contact opens and closes according to the times **SLOUOn** and **SLOUOF**.

5. When the value set for the product minus any fall value is reached, the product contact opens and interrupts the product flow.

6. After the contact opening the weight is shown preceded by the letter **A**, and the instrument waits: only if **TIME** = **YES**: until the waiting time **tIMEAt** has elapsed; only if **COMAND** = **YES**: until the START input is closed or [ENTER] is pressed; only if **STABLE** = **YES**: until the weight is stable (section 17.3).

7. If the tolerance **tOL** is set and the batched quantity is lower than the set quantity minus the tolerance, one attempt of finishing re-start is made to improve the precision: the PRODUCT contact closes and the sequence returns to step 5, otherwise the alarm **tOL** appears. If the batched quantity is greater than the set amount plus the tolerance, the alarm **tOL** appears. [ENTER] cancels the alarm and continues the batching.

8. Only if **tOtAL** = **YES**: the consumption of the product just batched is stored.

9. If the formula contains another product, the instrument batches it, from step 3.

10. If there are no more products, the cycle end phase starts: the CYCLE END contact closes, the weight is shown preceded by the letter **E**, and the batching data are printed if printing is enabled.

11. When the product extraction starts, if the time **tnUnLO** is set and the product is not extracted by at least 20 divisions within this time, the alarm **UnLOAd** is displayed.

12. The batching ends (CYCLE END contact opens) only when the weight is lower than the minimum weight **MIn** and the safe emptying time **tSIC** has elapsed.

13. Only if **SLAvE** = **YES**: the instrument waits for the data recording on the PC before a new batching is possible. If several cycles have been set, the next cycle starts.

Note In case of alarm the batching can be cancelled with [ESC] or by closing the STOP input. With **AtArE** = 0 and **AZERO** = 0 a preset tare or a semi-automatic tare is kept at the start of the batching (**AZERO** is named in the source only here and in the printing examples; it is not listed in the menus).

20.2 Batching start from external contact

The formula can be selected with an external selector switch (E/EC option, section 7.5). After selecting the formula, close the START contact for at least 0.5 seconds; after the checks of section 20.1 the selected formula is batched. If the START contact is closed at the end of the batching, the same batching sequence is repeated.

Without the formula selection switch, the latest formula entered via the keypad is batched, or the formula is set in this menu: hold [ENTER] for 3 seconds, **FEST00** is displayed; set the formula number with the arrow keys and confirm with [ENTER]. With 00 the latest formula set via keypad is used.

20.3 Single product with automatic stop

Batches a single product without a special formula: from the weight display press [START/STOP], select the formula **FOr 00**, select the product (e.g. **PrOd 01**) and set its amount; confirm with [ENTER] to batch the selected product. The instrument updates the consumption, production and stock values (if present and enabled) and sends the data to the printer (if enabled).

20.4 Single product with stop by keyboard

Press [START/STOP], select **FOr 00**, select the product (e.g. **PrOd 01**) and set its amount to 0; confirm with [ENTER] to close the relay of the selected product and start the batching; press [START/STOP] to stop it. Consumption, production and stock values (if present and enabled) are updated and the data are sent to the printer (if enabled).

20.5 Unloading start with automatic stop

Unloads the whole scale content down to the minimum weight: press [START/STOP], select **FOr 00** and the product **PrOd 00**; confirm with [ENTER] to close the CYCLE END relay and start the unloading phase; it ends when the minimum weight is reached and the safe emptying time has elapsed.

20.6 Displaying during batching

During the batching the net weight is shown preceded by the letter **b**. [TARE] shows the product number; [PRINT] shows the formula number, pressed again the number of the running cycle.

20.7 Batching stop

– Open the START contact and close the STOP contact to stop the batching. If the START contact is closed, the alarm **StArt?** is displayed.

– To pause the batching at any time press [START/STOP]; **PAUSE** is displayed. [ENTER] resumes the batching, [START/STOP] pressed again cancels it completely.

20.8 Resume batching after a power cut

If a blackout occurs during the batching (unloading phase included), **bLACH** appears when power comes back: [ENTER] resumes the batching from the point of interruption, [ESC] cancels it and returns to the weight display. With **bLACH** = **AUt** in the operation settings (section 17.3) the batching resumes automatically after 3 seconds. Power failures do not delete the cycles still to be performed.

20.9 Consumption

Menu **000000** › **[ENTER]** › **FOrP** › **[TARE] [PRINT]** › **tOtAL** › **[ENTER]** › **123456** › **[ENTER]** › **01.10.10** › **[ENTER]** › **COn 1 ...**

With consumption enabled in the constants (**tOtAL** = **YES**) the quantities batched for each product are stored. Selecting **tOtAL** displays the total quantity consumed for all products (divided by 100), the deletion date and the quantity consumed for each product. The quantities are printed in full.

20.10 Consumption deletion

Menu **000000** › **[ENTER]** › **FOrP** › **[TARE] [PRINT]** › **CAnCtO** › **[ENTER]** › **SUrE**

Confirm **CAnCtO**; at the prompt **SUrE** confirm again with [ENTER], or press [ESC] to cancel the command. If the printer is enabled (chapter 16), an operation receipt is printed.

21 Alarms

Display	Meaning
tArE?	only with **AtArE** = 1: at batching start the weight on the scale is higher than the minimum **MIn**. [ESC] returns to the weight display, [ENTER] cancels the alarm and continues; if the weight falls below the minimum, the batching starts
COnS?	at batching start the APPROVAL input is open (input 3 set as **COnS**); close the input to enable the batching or cancel it with [ESC]
tOL	at batching end the weight differs from the formula value by more than the tolerance; [ENTER] cancels the alarm and continues
FALL	at batching start the fall value is higher than the product quantity to be batched; [ESC] cancels the alarm and the batching
EMPtY	at batching start the recalled formula is not programmed; [ESC] quits
MASFOr	at batching start the recalled formula exceeds the maximum weight; [ESC] quits
PAUSE	[START/STOP] was pressed during the batching; [ENTER] continues, [START/STOP] terminates the batching
bLACH	power failure during the batching: [ESC] cancels the batching, [ENTER] resumes it from the point of interruption
LOAd	during the batching the product is not loaded; cancelled automatically when the product increases; [START/STOP] twice cancels the batching
UnLOAd	during the unloading (CYCLE END closed) the product is not extracted; cancelled automatically when the product decreases; [START/STOP] twice cancels the unloading

Display	Meaning
StArt?	displayed for 3 seconds when the batching is stopped (STOP twice or STOP input) while the START input is closed; open the START input
PARSER	batching cancelled; [ESC] quits; if the alarm persists, contact octogon
ErUEIG	weight alarm, the current batching is cancelled; [ESC] returns to the weight display, check the alarm
ERCEL	load cell not connected or incorrectly connected; load cell signal exceeds 39 mV; conversion electronics (AD converter) malfunctioning; 4-wire cell without jumpers EX–/REF– and EX+/REF+
NO COM	communication problems between transmitter and receiver; check electrical connections and instrument configuration
ER OL	the weight display exceeds 110 % of full scale
EEROL	weight display on the transmitting instrument exceeds 110 % of full scale
ER AD	internal converter failure; check load cell connections, if necessary contact octogon
‾‾‾‾‾ (upper dashes)	the weight exceeds the maximum weight **MASS** by 9 divisions
ER OF	maximum displayable value exceeded (higher than 999999 or lower than –999999)
eErOF	maximum displayable value exceeded on the transmitting instrument
t‾‾‾‾ (upper dashes)	weight too high: zero setting not possible
max-pu	in real calibration, after the eighth sample weight has been entered
error	value beyond the permitted values; [ESC] quits the setting leaving the previous value (e.g. too many decimals for the full scale, value above the maximum, sample weight not matching the detected mV increase, analog output correction beyond the limits)
bLOC	lock active on menu item, keypad or display
NODISP	number greater than 999999 or less than –999999, cannot be displayed
BATrtC	buffer battery low, date and time lost; confirm with [ENTER], leave the instrument on for at least 12 hours; if the alarm persists contact octogon
DATE?	incorrect date detected; check and correct it in the **dAtE** menu
COMAND	waiting for the closing of START or for [ENTER] to continue the batching
PC	PC not connected
SLAvE	the PC has not read the batching data
InZErO	gross weight equal to zero: semi-automatic tare not possible

21.1 Serial protocol alarms

Alarm	Modbus RTU, status register	RIP*	HDRIP-N
ERCEL	bit 0	**__O-F_**	**_ERCEL**
ER OL	bit 3	**__O-L_**	**_ER_OL**
ER AD	bit 1	**__O-F_**	**_ER_AD**
‾‾‾‾‾ (upper dashes)	bit 2	**__O-L_**	**######**
ER OF	gross bit 4 · net bit 5	**__O-F_**	**_ER_OF**
t‾‾‾‾ (upper dashes)	response to the zero command: 'value not valid' error (code 3)	**__O-F_**	**O__SET**

"_" stands for a space. *) With remote displays on the **rIP** protocol, the display reads ‾‾‾‾‾ (upper dashes) if the message exceeds 5 digits.

With an alarm the relays open and the analog outputs go to the lowest possible value:

Range	0 ... 20 mA	4 ... 20 mA	0 ... 5 V	0 ... 10 V	± 10 V	± 5 V
Output value	–0.2 mA	3.5 mA	–0.5 V	–0.5 V	0 V	0 V

22 Printing examples

If the printer has been set (chapter 16), [PRINT] in the weight display opens the print menu:

- **UEIGHt**: prints the displayed weight;
- **COnSt**: prints the batching constants (minimum weight, maximum weight, etc.);
- **FOrP**: prints one or all formulas – [ENTER] shows **FOrP01**, set the formula number or 00 for all;

– **tOtAL**: prints the consumption (only if **tOtAL** = **YES**, section 18.5).

With **PrInt** = **YES** the batching data are printed at cycle end (section 18.5). "‹Model›" stands for the model identification printed by the instrument; the examples are those of the source (14 products version).

Batching in gross weight (AtArE = 0)

```
::::::::::::::::::::::::
‹Model›  14PROD   Addr:01
FORMULA:             01
CYCLE:       1/      1
DATE: 01/10/11 08:30:01
INIT.WEIGHT       10 kg
P01 G    301:    300 kg
P02 N    714:    700 kg
P05 N   1025:   1000 kg
TOT G   2040:   2000 kg
```

Batching with predetermined tare set (AtArE = 0, AZERO = 0)

```
::::::::::::::::::::::::
‹Model›  14PROD   Addr:01
FORMULA:             01
CYCLE:       1/      1
DATE: 01/10/11 08:30:01
PT                10 kg
INIT.N             3 kg
P01 N    301:    300 kg
TOT C            208 kg
P02 N    714:    700 kg
P05 N   1025:   1000 kg
TOT N   2040:   2000 kg
TOT C           2037 kg
```

Batching with semi-automatic tare from keyboard (AtArE = 0, AZERO = 0)

```
::::::::::::::::::::::::
‹Model›  14PROD   Addr:01
FORMULA:             01
CYCLE:       1/      1
DATE: 01/10/11 08:30:01
N                 10 kg
INIT.C             3 kg
TOT C            208 kg
P01 N    301:    300 kg
P02 N    714:    700 kg
P05 N   1025:   1000 kg
TOT N   2040:   2000 kg
TOT C           2037 kg
```

Batching in net weight (AtArE = 1)

```
::::::::::::::::::::::::
‹Model›  14PROD   Addr:01
FORMULA:             01
CYCLE:       1/      1
DATE: 01/10/11 08:30:01
TARE              10 kg
P01 N    301:    300 kg
P02 N    714:    700 kg
P05 N   1025:   1000 kg
TOT N   2040:   2000 kg
```

Constants printout

```
::::::::::::::::::::::::
‹Model›  14PROD   Addr:01
DATE: 01/10/11 08:30:01
      CONSTANTS
MIN                 10
MASS                 0
TIME SIC            5.0
TIME WAIT           5.0
TIME NLOAD          0.0
TIME NUNLOAD        0.0
FALL             MANUAL
TIME SLOWON         0.0
TIME SLOWOF         0.0
AUTOTARE            YES
TOTAL               NO
PRINT               NO
PC                  NO
SLAVE               NO
BLACKOUT         MANUAL
PR   FALL  TOLER   SLOW
02     0     0    200
03    52     0      0
06     0   100      0
```

Formula printout

```
::::::::::::::::::::::::
‹Model›  14PROD   Addr:01
DATE: 01/10/11 08:30:01
FORMULA:            01
P01              300 kg
P04              400 kg
P07             1000 kg
P11              400 kg
```

Consumption printout

```
::::::::::::::::::::::::
‹Model›  14PROD   Addr:01
DATE: 01/10/11 08:30:52
     CONSUMPTION
P01             2596 kg
P03             1066 kg
P04              487 kg
TOTAL           4149 kg
FROM: 01/09/11 09:16:45
```

Weight printout

```
::::::::::::::::::::::::
‹Model›  14PROD   Addr:01
DATE: 12/09/11 14:48:12
GROSS            1204 kg
NET              831 kg
TARE             373 kg
```

If the consumption is set to zero, “CONSUMPTION ERASED” is also printed.

23 Reserved for the installer

23.1 Menu locking

Any menu can be locked. Select the menu (e.g. **CALIb**) and press [ESC] and [TARE] simultaneously for 3 seconds: the display shows **C.ALIb** (the left point indicates the lock). When the operator tries to enter this menu, **bLOC** is displayed.

23.2 Menu unlocking

With **C.ALIb** displayed press [ENTER] and [PRINT] simultaneously for 3 seconds; the unlock password is requested (if enabled) and the display shows **CALIb** without point.

23.3 Temporary menu unlocking

With **C.ALIb** displayed press [PRINT] and [TARE] simultaneously for 3 seconds; after the password (if enabled) all menus, including the locked ones, can be entered and modified. Returning to the weight display restores the lock.

23.4 Setting unlock password

Menu **000000** › **[ENTER]+[ESC]** › **CALIb** › **[TARE] [PRINT]** › **PSUBLC**

The password must contain 6 characters; to change a customized password the current one is required. **000000** (default) disables the unlock password.

23.5 Data deletion and program selection

Caution Perform these operations only after contacting octogon. After each operation **DONE** is displayed, press [ENTER] to continue; [ESC] cancels without changes.

Upon power-on hold [ESC] until **PROG** is displayed, then:

- Constants restore (the calibration is not erased): confirm **PROG**, select **PASSu** with the arrow keys, set code 6935 and confirm.
- Program selection: confirm **PROG** and select the program with the arrow keys – for this manual **3PROD** (3 products batching), **6PROD** (6 products batching) or **14PROD** (14 products batching); **MULTI** means no program.
- Weight reading mode: **CELL** – from load cells, intelligent junction box or weight transmitter connected to the instrument; **SErIAL** – via serial port (WEIMOD or WEIRIP, section 16.5).
- Approval status: **nOtLEG** not approved; **LEGAL** approved, single interval*; **LEGMI** approved, multi-interval*; **LEGMR** approved, multiple range*.
- Active regulation (not with **nOtLEG**): **OIML**, **NTEP**.
- Connection of an intelligent junction box or weight transmitter (not with **SErIAL**): **EStYES** connected, **EStnO** not connected.
- Enabling of the optional functions (section 1.2).

*) For the approved version request the proper manual and procedure from octogon, stating hardware code and serial number (chapter 10). When the indicator is used with an intelligent junction box or weight transmitter, the approval status set on both devices must be the same. By confirming, the instrument is restored to default and data is erased.

23.6 Keypad or display locking

Press [ESC] immediately followed by [PRINT] and hold them down for about 5 seconds (also possible via the Modbus protocol):

- **FREE**: no lock;
- **KEY**: keypad lock – when a key is pressed **bLOC** is displayed for 3 seconds;
- **DISP**: keypad and display lock – the display shows the instrument model instead of the weight; when a key is pressed **bLOC** is displayed for 3 seconds.

24 Continuous transmission protocols

Common to the strings: with negative weight the first character from the left is "–" (ASCII 45); in case of error or alarm the weight is replaced by the messages of section 21.1. The checksum ckck is the XOR of the 8-bit ASCII codes of the characters between "&" and "\" (both excluded), as two hexadecimal digits 0 ... 9, A ... F in ASCII.

24.1 Continuous transmission to remote displays

The string is transmitted 10 times per second; **bAUd** = **9600**, **PArItY** = **nOnE**, **StOP** = **1**. **rIP**: remote displays e.g. octogon EDLD; **HDrIP** and **HdrIPn**: remote displays e.g. octogon EDLF, EDLG.

```
&NxxxxxxLyyyyyy\ckckCR
```

Character	Meaning
&	start (ASCII 38)
N	net weight identification (ASCII 78)
xxxxxx	6 characters of net weight (ASCII 48 ... 57)
L	gross weight identification (ASCII 76)
yyyyyy	6 characters of gross weight (ASCII 48 ... 57)
\	separation (ASCII 92)
ckck	2 checksum characters
CR	end (ASCII 13)

– **HDrIP**: the decimal point at the position shown on the instrument display can also be transmitted; if the value exceeds 5 digits, only the 5 most significant digits are transmitted, if negative no more than the 4 most significant; the decimal point shifts accordingly.

– **HdrIPn**: in addition the instrument transmits **nEt** every 4 seconds in the gross weight field if a net operation has been carried out.

– Below –99999 "–" is sent alternated with the most significant figure.

24.2 Continuous transmission YHL

The string is transmitted 5 times per second; after a net operation the net weight, otherwise the gross weight.

```
=xxxxxxxxx
```

Character	Meaning
=	start (ASCII 62)
xxxxxxxxx	9 characters of net or gross weight (ASCII 48 ... 57), LITTLE ENDIAN sorting

With negative weight the first character from the right is "–"; the decimal point is transmitted at the position given by the calibration. Example gross weight –20.7 kg: **=7.02000-**. In case of error or alarm "999999999" is sent.

25 Modbus RTU protocol

The Modbus RTU protocol allows the reading and writing of the registers listed below according to the Modicon PI-MBUS-300 specification. Selection: section 16.1. Check whether the Modbus master (or the development tool) numbers the registers from 40001 or from 0; in the second case the register is the table value minus 40001 (e.g. 40028 › 27).

Some data are written directly to the EEPROM, whose writing operations are limited (100000); avoid useless writings. The instrument does not write if the value equals the stored one. Numbers without prefix are decimal, with 0x hexadecimal.

25.1 Data format and functions

1 start bit; 8 data bits, least significant bit sent first; settable parity bit and stop bit. Use only the following functions – others could be incorrectly interpreted and generate errors or blocks of the system:

Function	Description
03 (0x03)	READ HOLDING REGISTER (read programmable registers)
16 (0x10)	PRESET MULTIPLE REGISTERS (write multiple registers)

The interrogation frequency depends on the baud rate (the instrument stands by for at least 3 bytes before calculating a response); **dELAY** (section 16.2) adds a further delay.

	Address	Function	Content	CRC	Bytes
Function 3 query	A	0x03	1st register 0x0000 · no. registers 0x0002	2 byte	8
Function 3 response	A	0x03	no. bytes 0x04 · 1st register 0x0064 · 2nd register 0x00C8	2 byte	3 + 2 × no. registers + 2
Function 16 query	A	0x10	1st register 0x0000 · no. registers 0x0002 · no. bytes 0x04 · value 1 0x0000 · value 2 0x0000	2 byte	7 + 2 × no. registers + 2
Function 16 response	A	0x10	1st register 0x0000 · no. registers 0x0002	2 byte	8

25.2 Broadcast requests and communication errors

– Broadcast (address 0): read requests are not executed and not answered; write requests are executed but not answered.

– The strings are checked by CRC. In case of communication error the slave does not respond; the master must consider a time-out.

– If a correctly received string is not executable, the slave responds with an exceptional response: address, function + 0x80, code, CRC – code 1 ILLEGAL FUNCTION (function not valid or not supported), 2 ILLEGAL DATA ADDRESS (data address not available), 3 ILLEGAL DATA VALUE (invalid value).

25.3 List of available registers

A maximum of 32 registers per query or response. R = read only, R/W = read and write; H/L = high/low half of the DOUBLE WORD. Listed are the registers that apply to the batching programs.

Register	Description	EEPROM	Access
40001	firmware version	–	R
40002	instrument type	–	R
40003	year of manufacture	–	R
40004	serial number	–	R
40005	program type	–	R
40006	command register (section 25.5)	no	R/W
40007	status register (section 25.4)	–	R
40008 / 40009	gross weight H / L	–	R
40010 / 40011	net weight H / L	–	R
40012 / 40013	peak weight H / L	–	R
40014	divisions and units of measure (section 25.4)	–	R
40017	inputs	–	R
40018	outputs (read only in the batching programs)	no	R/W
40050	instrument status (section 25.4)	–	R
40051 ... 40060	register 1 ... 10 (exchange registers)	no	R/W
40065 / 40066	sample weight for instrument calibration H / L (with command 101)	–	R/W
40067 / 40068	weight value corresponding to zero of the analog output H / L	yes	R/W
40069 / 40070	weight value corresponding to full scale of the analog output H / L	yes	R/W
40073 / 40074	preset tare H / L (with command 130)	–	R/W

25.4 Status, inputs, outputs, divisions

Status register 40007	Meaning
Bit 0	load cell error
Bit 1	AD converter malfunction
Bit 2	maximum weight exceeded by 9 divisions
Bit 3	gross weight higher than 110 % of full scale
Bit 4	gross weight beyond 999999 or less than –999999
Bit 5	net weight beyond 999999 or less than –999999
Bit 7	gross weight negative sign
Bit 8	net weight negative sign
Bit 9	peak weight negative sign
Bit 10	net display mode
Bit 11	weight stability
Bit 12	weight within ± ¼ of a division around zero

Instrument status 40050	Meaning (3/6/14 products programs)
0	instrument in idle condition (weight displaying)
1	formulas displaying
2	batching constants displaying
3	consumption displaying
4	system parameters displaying
5	setting of formula number and cycles to batch
6	instrument in batching condition
7	**EMPtY** alarm
8	‾‾‾‾‾ (upper dashes) alarm
9	**COnS?** alarm
10	**tArE?** alarm
11	**LOAd** alarm
12	phase between the opening of the batched product contact and the next product or the closing of CYCLE END
13	batching pause
14	cycle end
15	**UnLOAd** alarm
16	**bLACH** alarm
18	**FALL** alarm
25	**tOL** alarm
26	instrument waits for the printing to complete
27	operating menu displaying
30	**usb er** alarm (only with DATAUSB option)
33	**ErUEIG** alarm
34 / 35	**MEMFUL** / **MEMOUr** alarm (only with DATAUSB or DATAPC option)
38	the operator is starting an automatic batching
39	the operator is starting a manual batching
40	**SLAvE** alarm

Values of 40050 that the source assigns to other programs or to optional functions are not listed. Inputs 40017: bit 0 ... 2 = input 1 ... 3. Outputs 40018: bit 0 ... 4 = output 1 ... 5; in the batching programs the outputs can only be read.

Register 40014: L byte = division, H byte = unit of measure.

L byte	Divisor	Decimals	H byte	Unit
0	100	0	0	kilograms
1	50	0	1	grams
2	20	0	2	tons
3	10	0	3	pounds
4	5	0	4	newton
5	2	0	5	litres
6	1	0	6	bar
7	0.5	1	7	atmospheres
8	0.2	1	8	pieces
9	0.1	1	9	newton metres
10	0.05	2	10	kilogram metres
11	0.02	2	11	other
12	0.01	2		
13	0.005	3		
14	0.002	3		
15	0.001	3		
16	0.0005	4		
17	0.0002	4		
18	0.0001	4		

25.5 Commands to the command register 40006

Command	Description
0	no command
7	semi-automatic tare enabling (net weight displaying)
8	semi-automatic zero
9	semi-automatic tare disabling (gross weight displaying)
21	keypad lock
22	keypad and display unlock
23	keypad and display lock
99	save data in EEPROM
100	tare weight zero setting for calibration
101	save first sample weight for calibration
104	real calibration cancellation
106	add sample weight for calibration
130	preset tare enabling
131	reserved
201	batching: START
202	batching: PAUSE
203	batching: RESUMES from PAUSE
204	batching: STOP
205*	batching: accepts the alarm and stops
206*	batching: ignores the alarm **tArE?**
207*	batching: ignores the alarm **tOL**
209	batching: continues when **COMAND** appears or when the instrument status is 12 (only if **COMAND** = **YES**)
250	confirmation of batching data reading
2000 ... 2999	constants and formulas reading and writing (section 25.8)
6811 / 6812	writing / reading the current value requested at the analog output
6813 / 6814	writing / reading the voltage value requested at the analog output

*) In case of an alarm during the batching, command 205 accepts the alarm and stops the batching; with the alarm **tOL** command 207 ignores it and continues the batching, with the alarm **tArE?** command 206. To execute the same command twice consecutively, send command 0 between them.

25.6 Analog output

– **MOdE** = **GrOSS** or **nEt** (chapter 15): write or read the weight for zero and full scale in registers 40067/40068 and 40069/40070.

– **MOdE** = **PLC**: the output is set directly. Multiply the value by 10000, write the H bytes into REGISTER 1 (40051) and the L bytes into REGISTER 2 (40052) and send command 6811 (current, value in mA) or 6813 (voltage, value in V). Reading: send command 6812 or 6814, read 40051/40052 and divide by 10000.

Example	REGISTER 1 (H)	REGISTER 2 (L)	Total
write current 14 mA, hexadecimal	0x0002	0x22E0	0x000222E0
decimal	2	8928	140000
read voltage, hexadecimal	0x0000	0xCF76	0x0000CF76
decimal	0	53110	53110 › 5.3110 V

25.7 Real calibration commands

– Unload the system and reset the displayed weight with command 100 (tare weight zero setting for calibration).

– Load a sample weight and write its value to registers 40065/40066.

– Command 101 saves the first sample weight and removes the previously saved values; command 106 adds a sample weight and keeps the previous ones.

– Up to 8 different sample weights for a linearisation; the same sample weight only once per calibration, no sample weights of value zero. If successful, 40065/40066 are set to zero.

– Command 104 cancels the real calibration and returns to the theoretical one; the tare reset is not cancelled.

Enter the sample weight in divisions (register 40014): 100 kg with division 0.001 › 100000. 40065/40066 are a 32-bit signed number; negative values in two's complement if necessary: –56 kg › 40065 = 0xFFFF (–1), 40066 = 0xFFC8 (–56).

25.8 Constants and formulas reading and writing

These commands use the exchange registers 40051 … 40060 together with the command register. Reading: write the values marked "set" into the exchange registers, send the reading command to 40006, read 40060 continuously until it shows the command echo (data ready) or 0xFFFF (error in the command), then read 40051 … 40060. Writing: write the values into the exchange registers and send the writing command.

Variable	Read	Write	Exchange registers
formulas programming (3/6/14 products)	2000	2001	40051/40052 quantity H/L · 40053 product no. (set) · 40054 step no. (set) · 40055 formula no. (set)
totals management (3/6/14 products)	2020	–	40051/40052 quantity H/L · 40053 product no. (set) · 40054 = 1 consumption (set)
totals deletion date and time	2022	–	40051 day · 40052 month · 40053 year · 40054 hours · 40055 minutes · 40056 seconds · 40057 = 1 consumption (set)
formula no. and cycles no. to run	2030	2031	40051 formula no. · 40052/40053 cycles H/L
current cycle	2032	–	40051/40052 cycle H/L · 40053/40054 step H/L · 40055/40056 product H/L · 40057/40058 set H/L
batching data reading	2100	–	section 25.9

– Formulas writing: quantity into 40051/40052, product number into 40053, step number into 40054 (only with **FStEP** = **YES**, otherwise 1), formula number into 40055; send 2001.

– Formulas reading: product number into 40053, step number into 40054 (only with **FStEP** = **YES**, otherwise 1), formula number into 40055; send 2000; read 40060 until it differs from 2000 (echo) or shows 0xFFFF (error); then read the quantity in 40051/40052.

25.9 Batching start, stop and data reading

– Start: write formula and number of cycles into 40051 … 40053 and send 2031; then send 201.

– Stop: send 204.

– Data reading: at the end of the batching send 1114 and check that 40051 = 1 (data ready). Unlike the other commands this one gives no echo; wait until bit 7 of 40060 is 1. Then send the queries below and read the exchange registers. After reading send 250: the instrument accepts the alarm **SLAvE** and continues the batching sequence.

Query (40006 = 2100)	Set before	Response in the exchange registers
batching step	40051 = step no.	40051/40052 real batched H/L · 40053/40054 theoretical batched H/L · 40055/40056 alarm H/L · 40057/40058 alibi ID H/L · 40059 product number · 40060 value detail
initial tare	40051 = 1005	40051/40052 value H/L · 40055/40056 alarm H/L · 40060 value detail
final gross weight	40051 = 1003	40051/40052 value H/L · 40055/40056 alarm H/L · 40057/40058 alibi ID H/L · 40060 value detail

Value detail: bit 0 = negative value (for the batching step it refers only to the real batched value), bit 7 = data ready. Alarms in 40055/40056: one byte per alarm, up to four alarms in chronological order.

Code	Alarm	Code	Alarm
0	no alarm	8	**LOAd**
1	general alarm	9	**UnLOAd**
2	**EMPtY**	12	batching STOP
3	**MASFOr**	13	**ErUEIG**
4	**tArE?**	14	**FALL**
5	**COnS?**	15	**SLAvE**
6	**bLACH**	27	**USb Er** (only with DATAUSB option)
7	**tOL**	28 / 29	**MEMFUL** / **MEMOUr** (only with DATAUSB or DATAPC option)

25.10 Communication example

Function 3, reading gross weight (4000) and net weight (3000) from 40008 ... 40011, instrument address h01 (values in hexadecimal with prefix h):

	String
Query	h01 h03 h00 h07 h00 h04 hF5 hC8
Response	h01 h03 h08 h00 h00 h0F hA0 h00 h00 h0B hB8 h12 h73

Structure: address, function, first register H/L, number of registers H/L, CRC16 L/H; the response contains address, function, byte count, the data and CRC16 L/H. Further CRC16 examples: Modicon PI-MBUS-300.

26 Directives and standards

According to the manufacturer's declarations of conformity (EU and United Kingdom, 12/12/2024):

Directive	Standards
2014/35/EU Low Voltage	EN 61010-1:2010+A1:2019 – not applicable for the VDC type (only for 230/115 VAC type)
2014/30/EU EMC	EN 55011:2016+A1+A11:2020 · EN 61000-6-2:2019 · EN 61000-6-4:2019 · EN 61000-4-2:2009 · EN 61000-4-3:2006+A2:2010 · EN 61000-4-4:2012 · EN 61000-4-5:2014+A1:2017 · EN 61000-4-6:2014
2014/31/EU NAWI (only if the M mark is applied)	EN 45501:2015 · OIML R76-1:2006
United Kingdom	Electrical Equipment (Safety) Regulations 2016, Electromagnetic Compatibility Regulations 2016, Non-automatic Weighing Instruments Regulations 2016 (only if the M mark is applied) – with the corresponding BS EN standards

The declarations of conformity are available from octogon on request.