TECHNICAL MANUAL

DAT 700 Serial and analog weighing Indicator/Trasnmitter

PAVONESYSTEMS

INDEX

MAIN FEATURES OF USE

DAT 700 is produced in various hardware configurations according to the different options installed:

Feature	Available Options
Fieldbus	Rs485 Modbus (Standard) Profibus DP Profinet IO Ethernet Ethernet / IP EtherCAT CANopen
Analog output	None (Standard) Unipolar (0-10V, 0-5V, 0-20mA, 4-20mA) Bipolar (± 5 V, ± 10V)
Signal input	Analog load cells (Standard) Voltage input (0-10V) Current input (4-20mA)

INSTRUMENT FRONT PANEL

6-digit DISPLAY

Normally the display shows the measured net weight. According to the various programming procedures, the display is used for programming parameters to be entered into memory, i.e., messages that indicate the type of operation being performed and thus assist the operator in managing and programming the instrument.

STAND-BY FUNCTION

The display screen can take a stand-by state, during which time the screen brightness is reduced and the keypad is locked. All other functions of the instrument are active and functioning.
See the section on activating/deactivating the stand-by state.

KEYBOARD USE
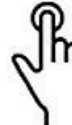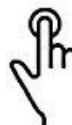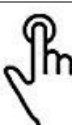
The instrument is programmed and controlled through the keyboard consisting of 3 mechanical keys, with the following function:

Symbol	Description
	Short press on the single key.
	Long press on the single key.

KEYBOARD USE

Here below a description of the keyboard use for the various standard procedures.

NAVIGATION PROGRAMMING MENU	
Operation	**Description**
👆 (▲)	Go to the next menu item.
👆 (▼)	Go to the previous menu item.
👆 (↵)	Access function related to the displayed item.
👆 (▲)	Exit menu or return to upper level.

PROGRAMMABLE VALUE COMPOSITION	
Operation	**Description**
👆 (▲)	Increment selected digit
👆 (▼)	Decrement selected digit
👆 (↵)	Select rightmost digit
👆 (▼)	Reset all digits to zero
👆 (↵)	End composition and store the value
👆 (▲)	Exit without saving changes

KEYBOARD USE

PREDETERMINED VALUE SELECTION

Operation	Description
⬆	Select upper value
⬇	Select lower value
↵	End selection and store the value
⬆	Exit without saving changes

VALUE DISPLAY IN MEMORY

Operation	Description
⬆	End display and return to upper menu.

KEYBOARD LOCK/UNLOCK FUNCTIONS

Operation	Description
⬇ + ↵	Keyboard Lock— The keys are disabled until the their unlocking. The display goes into reduced consumption mode. The instrument can be locked by prolonged pressing of the ZERO + PRG keys (5 seconds). Turning the instrument off and on automatically unlocks it.
⬇ + ↵	Keyboard Unlock—The keys are reactivated and the display brightness returns to standard. The instrument can be unlocked by long presses of the ZERO + PRG keys (5 seconds).

DISPLAY INDICATIONS

P39001

REJ-00

PRFNET

When the instrument is turned on, the displays are tested, then, in a timed sequence, appear:
- The identification code of the installed firmware. (Ex. P39001)
- The relevant version. (Ex. Rev.0.0)
- The resident communication interfaces. (Ex. PrfNet)

It is important to report these codes when requesting assistance

When a programming procedure is not in progress, the display shows the weight detected.
Under certain conditions, the following messages are reported:

Fixed messages

OVERLOAD The display will show this warning when the gross weight weighing on the scale exceeds the maximum capacity of the weighing system by more than 9 divisions.

UNDERLOAD When the indicated weight is less than -99999, the display shows this message.

O-L

Weight signal absent or out of reading range.

ER. MEM

Corrupted memory: pressing the ⏎ key restores default data, deleting any Calibration performed.

Flashing messages, alternating with weight detected

NO CAL

Weight calibration not performed.

NO COM

Fieldbus network disconnected.

E-F.BUS
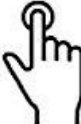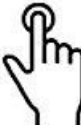
Fieldbus interface connection error.

ER. CRC

Communication error with the internal Fieldbus interface module.

OPERATIONAL FUNCTIONS

The following table shows the possible operations that can be performed from the keyboard while displaying the weight of the instrument.

Key	Operation	Function
SET		Set-Point function programming (See specific procedure)
SET		Peak display (See specific procedure)
FUN		Switching from Gross to Net Weight (See specific procedure)
ZERO		In Net Weight display: Self-weighted Tare (See specific procedure) In Gross Weight display: Semi-Automatic Zero (See specific procedure)
PRG		Serial string sending (if on-demand protocol on Rs232 selected) or printing (if printer protocol on Rs232 selected)
PRG + SET		Entering the Programming Menu
PRG		Entering the Programming Menu (5 seconds)

OPERATIONAL FUNCTIONS - TARE AND WEIGHT ZEROING

NET WEIGHT / GROSS WEIGHT DISPLAY SWITCHING

Allows switching the display from net weight to gross weight and vice versa. The displayed value is indicated by the NET LED (lit: net weight). If no tare weight is entered, the net weight is the same as the gross weight.
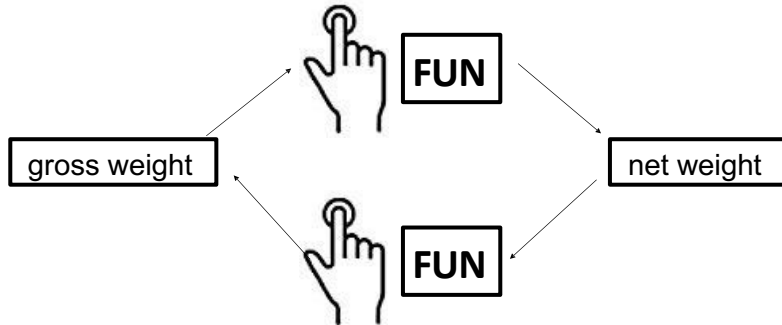
ZERO RESET (SEMIAUTOMATIC ZERO) (in gross weight display)
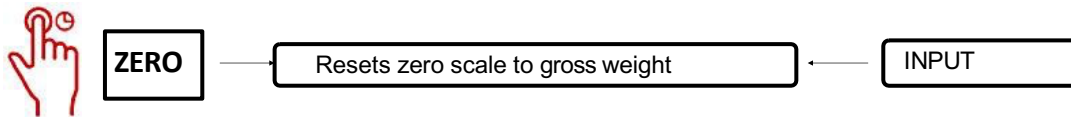
This operation is performed to correct small zero shifts of the scale. To perform the zeroing function, it is necessary to switch the display to gross weight (NET LED off).

The gross weight reset command is not executed under the following conditions:
- Unstable weight (weight does not stabilize within 3 sec. of the reset command).
- Gross weight, relative to the original zero calibration, greater (positive or negative) than the value of the parameter entered in divisions (0 to 200) in the menu item 0 BAND of PARAM menu (if this parameter is = 0, the function is disabled).

The gross weight zeroing operation is saved when the instrument is turned off (in case of automatic zeroing function at power-on turned off).

SELF-WEIGHTED TARE (AUTO-TARE) (in net weight display)
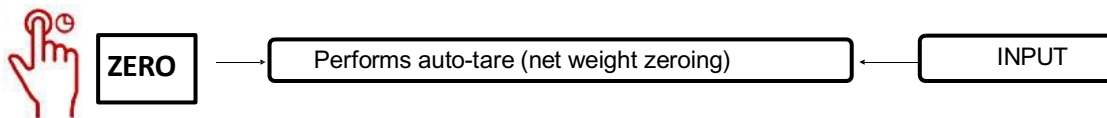
To perform the auto-tare function, it is necessary to switch the display to net weight. (NET LED on).

The auto-tare command is not executed under the following conditions:
- Unstable weight (weight does not stabilize within 3 sec. of auto-tare command).
- Gross weight exceeding maximum capacity.

If auto-tare is performed with gross weight = 0, any tare value is cancelled.

The tare value is saved when the instrument is turned off (in case the automatic zeroing function at power-up is disabled)
If run from input, the weight display automatically switches to net.

OPERATIONAL FUNCTIONS - PEAK AND HOLD FUNCTIONS

SWITCHING (NORMAL) WEIGHT / PEAK DISPLAY

The instrument continuously stores the peak weight value.

PEAK DISPLAY
This function is available only if the peak calculation function is enabled via the corresponding parameter in the instrument setup menu. The peak display is indicated by the letter P on the left of the display.
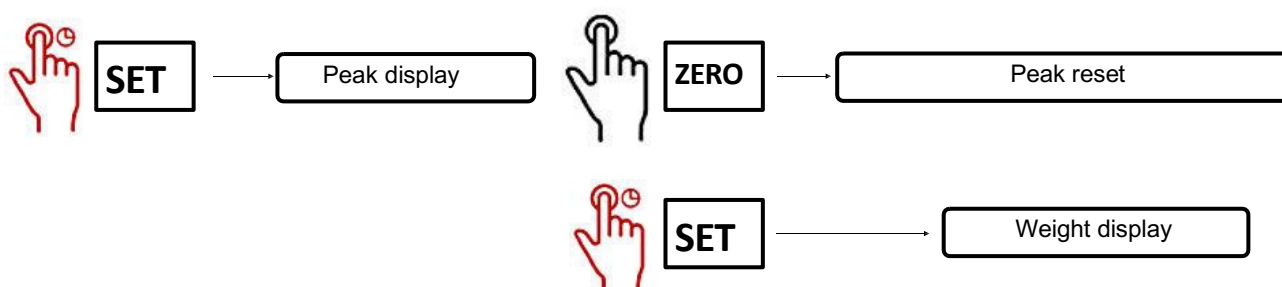
PEAK FUNCTION
In addition to display, the peak value can be used in the following functions:

FUNCTION	DESCRIPTION
LOGIC OUTPUTS	Set-points can be configured to have the peak value as a reference. (See the procedure for configuring operation of logic outputs).
SERIAL PORTS	Peak value acquisition (peak hold) through CONTIN, AUTOM, DEMAND, SLAVE and MODBUS protocols.
ANALOG OUTPUT	The value of the analog output can take the peak value (peak hold). (See the analog output configuration procedure).

HOLD FUNCTION

FREEZING OF WEIGHT ACQUIRED

It is possible to freeze the weight against a strain on the logic inputs if one of them is set in the HOLD mode.

SET Press the SET button while the weight is displayed

Menu	Message	Description	Type	Default	Range	Ind.Fieldbus
Setpoint	SETP. 1	Setpoint 1 Composition	Com.	0	0— Capacity	201 (MSB) 202 (LSB)
	SETP. 2	Setpoint 2 Composition	Com.	0	0— Capacity	203 (MSB) 204 (LSB)

- The set threshold values are compared with the weight to drive the corresponding logic output. The comparison criterion is established in the threshold set-up procedure.
- When the weight is undetectable or out of scale, the outputs are all turned off (open contact)

WEIGHING PERFORMANCE

Weighing can be performed in the following ways (depending on the setting of the communication ports).
- Automatic mode (when selecting "automatic" serial communication protocol).
- Via instrument keyboard (press ENTER key, in case of "on demand" serial communication protocol selection).
- From external input (in case of "on demand" serial communication protocol selection and "data transmission on demand" operation selected on at least one input).
- Via fieldbus, using the weighing performance command in the command register.

The conditions for carrying out the weighing are:
- Stable weight (or stabilized within 3 seconds of command).
- Since the last weighing was performed, the weight has changed by at least "delta weight" divisions.
- Gross weight equal to or greater than the minimum weighing (20 divisions) and less than the maximum capacity
- Non-nil net weight.

Solely in the case of weighing by key or by external input, weighing is allowed even with gross weight less than the minimum weighing or with zero net weight.

PROGRAMMING MENU

Press and hold the following keys simultaneously for a long time on the weight display screen to access the programming menu.

PRG + SET

Alternatively, to access the programming menu press and hold the following key in the weight display screen for 6 seconds.

PRG   6 seconds

If a password is programmed, (see menu funct) you will be prompted to set that password to access the menu.

Menu	Sub Menu	Name
SETUP	CALIBR.	Calibration Settings (*)
	ANALOG.	Analog output settings (Only with analog output configured)
	F1ELDB.	Fieldbus selection
	COM.POR.	Fieldbus and serial ports settings
	1N-OUT	Logic Input and Output Settings
	PARAM.	Metrological Weighing Parameter Settings (*)
	FILTER	Filter Settings
	FUNCT	Functional Features Settings
	UPL.DOW.	Set up memory upload/download function
	ACCESS	Display last 5 authorized personnel accesses (**)
	ALI.MEM.	Fiscal memory consultation (**)

CALIBRATION SETTINGS

Access to this menu is allowed only in case of FREE operation or in case of password access by authorized personnel (in case of METRIC- operation)

Sub Menu	Message	Name	Description	Type	De-fault	Range	Ind.Fi eldbus
CAL1BR.	RES0LV.	Division Value	Value of a single division, expressed in kg. The ratio of the system's maximum capacity to the division value constitutes the system's resolution (number of divisions). As a result of changing the division value, if the maximum capacity is not changed, the weight calibration is automatically corrected.	Sel.	1	0,0001 ÷ 50 Steps 1,2,5	(*)
	L.C. CAP.	Load cells capacity	Enter the value of the sum of the nominal capacities of the load cells, expressed in the selected unit of measurement. Following the change of this value, theoretical calibration is performed.	Com.	0	0 ÷ 999999	1103 (MSB) 1104 (LSB)
	L.C. SEN.	Load cells Sensitivity	Set the value corresponding to the average of the load cell sensitivities, in mV/V. Following the modification of the sensitivity value, the theoretical weight calibration is performed.	Com.	2 mV/ V	0.1 ÷ 4 mV/V	1105
	SYST.FS	Scale Bottom	Maximum capacity limit of the system. Following the change, the analog output scale bottom value is set.	Com.	0	0 ÷ Cell capacity	1301 (MSB) 1302 (LSB)
	DEAD L.	Fixed tare	Programming the fixed tare value (in kg). Following the change, a zero-tare calibration is performed.	Com.	0	0 ÷ Capacity	1106 (MSB) 1107 (LSB)
	CAL.TYP	Calibration	Selection of the type of calibration. Upon confirmation, one of the following procedures is initiated.	Sel.		Dead Weight or Table	
	DEAD W.	Dead Weight calibration	Zero and Sample Weight calibration and linearization to sample weights (***)	Spc			501÷ 503
	TABLE		Table calibration (****)	Spc			1151÷ 1172
	G-CAL	Calibration Gravity	Acceleration of gravity at the weight calibration site. (**)	Com.	0	977000 ÷ 984000	1108 (MSB) 1109 (LSB)
	G-USE	Use Gravity	Acceleration of gravity at the site of instrument use. (**)	Com.	0	977000 ÷ 984000	1110 (MSB) 1111 (LSB

(*) The setting of division values by fieldbus is done differently from that done by instrument. Refer to addresses 1101 and 1102 in the Modbus register table.

(**) These parameters are displayed only in the case of METRIC operation.

CALIBRATION

SAMPLE WEIGHTS CALIBRATION AND SAMPLE WEIGHTS LINEARIZATION

Once the function CAL1BR. selected, the Zero or Sample Weight calibration procedure can be carried out.

Zero calibration: (key ZERO long pressed): Perform the operation when the scale is unloaded but complete with the tare, at stabilized weight. Displayed weight should be zeroed. It is possible to repeat this operation several times. Exit function CAL. By key long pressing. PRG

Sample weight calibration: (**key** SET **short press**) Before this operation, load sample weight on scale and wait for stabilization; display shows detected value to calibrate, through the digiting of a programmable value. If the set value is higher than the resolution offered by the instrument, it is not accepted and the display shows an error message for a few seconds.

Confirm the weight value by pressing the **PRG** key.

Exit CAL. function by long pressing key PRG

Sample weight linearization: (**long press** SET **key**) Up to 5 linearization points on a positive scale are possible. Progressive of linearization points is alternately displayed with current weight. Press the key **SET** to set the loaded and stabilized sample weight value. Upon confirmation, the next step is taken. If 0 is set, the value is not stored. To end the procedure, long press **PRG** key. Less than 5 points can be stored. It is always possible to repeat calibrations.

(****) TABLE CALIBRATION

It allows up to five calibration points to be programmed manually, in addition to the zero value. The values correspond to those determined by the sample-weight linearization procedure. In this way it is possible to display the values determined automatically by that procedure or to modify and program them according to predetermined values.

Sub menu	Messagge	Name	Description	Type
DATA C.	0 S1G.	Zero signal	Signal value in mV/V matching the zero scale	Com.
	P1 JAL.	Point 1 weight	Weight value matching the 1st calibration point	Com.
	P1 S1G.	Point 1 signal	Signal value in mV/V matching the 1st calibration point	Com.
	P2 JAL.	Point 2 weight	Weight value matching the 2nd calibration point	Com.
	P2 S1G.	Point 2 signal	Signal value in mV/V matching the 2nd calibration point	Com.
	P3 JAL.	Point 3 weight	Weight value matching the 3rd calibration point	Com.
	P3 S1G.	Point 3 signal	Signal value in mV/V matching the 3rd calibration point	Com.
	P4 JAL.	Point 4 weight	Weight value matching the 4th calibration point	Com.
	P4 S1G.	Point 4 signal	Signal value in mV/V matching the 4th calibration point	Com.
	P5 JAL.	Point 5 weight	Weight value matching the 5th calibration point	Com.
	P5 S1G.	Point 5 signal	Signal value in mV/V matching the 5th calibration point	Com.
	GET 0	Zero signal acquisition	Signal acquisition function in mV/V corresponding to the zero scale	Spc

Values programmed to zero are disregarded. The data sheet calibration is automatically canceled when a new theoretical or sample weight calibration is performed.
Following the execution of the zero-signal acquisition function, the signals in the table are recalculated. An offset derived from the difference between the newly acquired zero signal and the old zero signal value is added to each signal value.

FILTER MENU

Sub Menu	Message	Name	Description	Type	Default	Range	Ind.Fieldbus
F1LTER	FACTOR	Filter factor **	Filter response (Hz)	Sel.	2 Hz	See table	1201
	C. RATE	Output rate ADC * **	Weight acquisition frequency (Hz)	Sel	Filter Factor Dependent	12,5 [0] 50 [1] 100 [2] 250 [3] 1000 [4]	1202
	AVERAG.	Average reading numbers*	Number of readings counted for the filter	Com.	Factor Dependent	0 ÷ 50	1203
	MONOT.	Monotony Time*	Evaluation time in case of signal changes (in mS)	Com.	Factor Dependent	0 ÷ 999	1204
	T.OSC1L.	Oscillations Time*	Time factor used to recognize repetitive signal oscillations. (in mS)	Com.	Factor Dependent	0 ÷ 9999	1205
	R.OSC1L.	Oscillations Range*	Reference signal width to detect repetitive signal oscillations. (in weight divisions)	Com.	Factor Dependent	0 ÷ 99	1206

These parameters are available only if Factor = MANUAL is selected

**) When switching from 12.5 Hz to a higher frequency, or vice versa, the weight on the scale must be stable, otherwise an error message is displayed.

*) Only in case of filter factor programmed to "MANUAL", this parameter value is independently programmable. Conversely, in case of filter factor programmed to a predetermined value, the value of the following parameters is also predefined, according to the following table.

Factor (Hz)	Settling Time (mS)	Freq ADC (Hz)	N readings	Monotony Time (mS)	Oscillations Time (mS)	Oscillations Range (div)
MANUAL [0]		Selectable	Settable	Settable	Settable	Settable
50 [1]	20	250	5	20	4000	10
25 [2]	40	100	5	40	3000	12
10 [3]	100	50	5	80	2500	16
5 [4]	200	50	10	100	2000	20
2 [5]	500	50	25	250	1500	25
1.25 [6]	800	12.5	10	300	1500	25
1 [7]	1000	12.5	12	400	1500	25
0.7 [8]	1500	12.5	19	500	1200	30
0.5 [9]	2000	12.5	25	600	1000	30

For Fieldbus or MODBUS settings, set index from [0] to [9].

PARAMETER MENU

Access to this menu is allowed only in case of FREE operation or in case of password access by authorized personnel (in case of METRIC operation)

Sub Menu	Message	Name	Description	Type	Default	Range	Ind.Fieldbus
PARAM.	USE	Instrument Operation	Selection of instrument operation. When changing from FREE operation to METRIC operation, password authentication of authorized personnel is required to confirm the setting.	Sel.	Free	Free [0] Trade [1]	
	MOT1ON	Weight Stability	Weight stability settable with 5 different ranges: 0 - Weight always stable 4 - Stable weight with the highest accuracy.	Com.	2	0 ÷ 4	1303
	AUTO-0	Auto-zero on start-up	This function performs an automatic zero calibration when the instrument is turned on, only if the detected weight stabilizes within the set threshold. To disable the function, set 0.	Com.	0	0—Capacity	1304 (MSB) 1305 (LSB)
	0-TRAC.	Zero tracking	The function is to perform a zero calibration automatically when the weight undergoes a slow change over time, determined by this parameter. To disable the function set none. The maximum weight that can be zeroed by this function is 2% of the system capacity.	Sel.	none	None [0] 0.5 div./sec [1] 1 div./sec [2] 2 div./sec [3] 3 div./sec [4]	1306
	0-BAND.	Resettable Divisions	Maximum number of resettable divisions with key >0< or input	Com	100	0—200	1307
	0-ALL.	Enable zero calibration	If enabled when the zero key is pressed for 5 seconds or the zero input is closed for 5 seconds, zero calibration is performed.	Sel.	OFF	OFF/ON	

FIELDBUS MENU

Sub Menu	Message	Name	Description	Type	Default	Range	Ind.Fieldbus
F1ELDB.		Fieldbus	Selects the externally connected fieldbus. Depending on this selection, the next serial port menu will be modified.	Sel.	none	RS485 [0] PROFIB [1] PROFNT [2] DEVNET [3] CANOP [4] ETHERN [5] ETH-IP [6] ETHCAT [7]	9004

I/O SETTINGS

Sub Menu	Message	Name	Description	Type	Default	Range	Ind.Fieldbus
1N OUT	FUN.IN.1 or FUN.IN.2	Input function 1 or 2	Selecting function paired with input.	Sel.	Zero	See table *	1401 (Fun 1) 1402 (Fun2)
	MODE 1 or MODE 2	Output mode 1 or 2	Selecting function paired with output.	Sel.		4 parameters to select. See table **	See table **
	HYST. 1 or HYST. 2	Input hysteresis 1 or2	Hysteresis value versus setpoint setting	Com.	2	0—Capacity	1407 (Out 1) 1414 (Out 2)
	TIMER 1 or TIMER2	Output timer 1 or 2	Timing by output. The output automatically disables after the programmed time (in sec.) 0=timing not activated	Com.	0	0 ÷ 9.99	1408 (Out 1) 1415 (Out 2)
	DELAY1 or DELAY2	Output delay 1 or 2	Output excitation delay with respect to the condition occurrence. (in sec.)	Com.	0	0 ÷ 9.99	1409 (Out 1) 1416 (Out 2)

*)

Function	Description
Zero [0]	Performs Zero Calibration
Tare [1]	Autotare
Del.Tar. [2]	Deletes Tare
Peak [3]	Reset peak function
Hold [4]	Holds acquired weight
Send [5]	On-demand data transmission (if on-demand protocol on Rs232 selected) or printing (if printer protocol on Rs232 selected).
Log [6]	Enables datalogger function

**)

Description
Address 1403 OUT1—1410 OUT2 Net [0]/**Gross** [1]/**Peak** [2]/**Process** [3] Threshold is compared with net weight, gross weight or peak. In the latter case, the threshold is compared with the last acquired peak value, even when the peak function is not enabled. The Process selection enables the output when the instrument is in regular operation.
Address 1404 OUT1—1411 OUT2 N. **Open** [0]/**N. Closed** [1] The relevant output is normally open or normally closed.
Address 1405 OUT1—1412 OUT2 Posit. [0]/**Negat.** [1]/**All** [2] Threshold is compared only with positive weights or only with negative weights.
Address 1406 OUT1—1413 OUT2 **Normal** [0]/**Stable** [1] The corresponding output is enabled even when in motion or only after the weight has stabilized.

SERIAL PORTS SETTINGS – 485 CONFIGURATION

Sub Menu	Message	Name	Description	Type	Default	Range
COMPOR	T.SER.	Serial Mode	Select whether operation similar to DAT1400 or DAT100	Sel.	D1400	D1400 DAT11
	C1 MOD.	RS232 Output mode	Transmitted value selection with RS232 output	Sel.	NET	NET GROSS PEAK
	C1PROT.	RS232 Communication protocol	Select communication type for RS232 port	Sel.	None	No Tx continuous On demand Automatic Slave Printer
	C1BAUD.	RS232 Baud rate	Select baud rate for RS232 port	Sel.	9600	1200 2400 4800 9600 19200 38400 57600 115200
	C1FORM.	RS232 Frame	Frame type. In case of SLAVE protocol, 7-bit data format (E-7-1 and O-7-1) cannot be selected.	Sel.	N-8-1	N-8-1 N-8-2 E-7-2 E-8-1 O-7-2 O-8-1
	C2 MOD.	RS485 Output mode	Transmitted value selection with RS485 output.	Sel.	NET	As C1 Mod.
	C2PROT.	RS485 Communication protocol	Select communication type for RS485 port	Sel.	None	None Tx continuous On demand Automatic Slave ModBus
	C2BAUD.	RS485 Baud rate	Baud rate selection for RS485 port	Sel.	9600	As C1 Baud
	C2FORM.	RS485 Frame	Frame type. In case of SLAVE or MODBUS protocol, 7-bit data format cannot be selected (E-7-1 and O-7-1).	Sel.	N-8-1	As C1 Form.
	C2ADDR.	RS485 Address	Instrument communication address	Com	1	1 ÷ 32

SERIAL PORTS SETTINGS – ETHERCAT CONFIGURATION

Sub Menu	Message	Name	Description	Type	Default	Range
COMM. P	T.SER.	Serial Mode	Select whether similar operation to DAT1400 or DAT100	Sel.	D1400	D1400 / DAT11
	C1 MOD.	RS232 Output mode	Transmitted value selection with RS232 output.	Sel.	NET	NET / GROSS / PEAK
	C1PROT.	RS232 Communication protocol	Select communication type for RS232 port.	Sel.	None	None / Tx continuous On demand / Automatic Slave / Printer
	C1BAUD.	RS232 Baud rate	Baud rate selection for the RS232 port.	Sel.	9600	1200 / 2400 / 4800 9600 / 19200 / 38400 57600 / 115200
	C1FORM.	RS232 Frame	Frame type. In case of SLAVE protocol, 7-bit data format (E-7-1 and O-7-1) cannot be selected.	Sel.	N-8-1	N-8-1 / N-8-2 / E-7-2 E-8-1 / O-7-2 / O-8-1
	EN. FBUS.	Fieldbus Enabling	Enabling EtherCAT fieldbus, if OFF any error messages regarding EtherCAT communication are never displayed	Sel.	OFF	OFF ON
	INP.REG.	Input Area Size	Input area size for EtherCAT fieldbus (value expressed in Bytes).	Sel.	128	32 / 64 / 96 / 128
	OUT.REG.	Output Area Size	Output area size for EtherCAT fieldbus (value expressed in Bytes).	Sel.	128	32 / 64 / 96 / 128

In case of ETHERCAT fieldbus: devices should be connected with ring type (as per EtherCAT specification), refer to the installation manual for the use of INPUT ports and OUTPUT.

Four different XML configuration files are provided:
- "**Hilscher NIC 52-RE ECS V4.2.X 32 Byte.xml**" (input area 32 32 bytes, output area 32 bytes).
- "**Hilscher NIC 52-RE ECS V4.2.X 64 Byte.xml**" (input area 64 bytes, output area 64 bytes).
- "**Hilscher NIC 52-RE ECS V4.2.X 96 Byte.xml**" (input area 96 bytes, output area 96 bytes).
- "**Hilscher NIC 52-RE ECS V4.2.X 128 Byte.xml**" (input area 128 bytes, output area 128 bytes).

The file that corresponds to the size of the input and output areas selected in the instrument must be imported into the PLC (for example, if IMP.REG. =128 and OUT.REG. =128 is set in the instrument, the file "Hilscher NIC 52-RE ECS V4.2.X 128 Byte.xml" must be imported into the PLC). Multiple files with different sizes can be im- ported, but in this case, it will not be possible to perform the automatic research and configuration function for devices on the network.

SERIAL PORTS SETTINGS – PROFIBUS CONFIGURATION

Sub Menu	Message	Name	Description	Type	Default	Range
COMM. P	T.SER.	Serial Mode	Select whether similar operation to DAT1400 or DAT100	Sel.	D1400	D1400 DAT11
	C1 M O D .	RS232 Output mode	Transmitted value selection with RS232 output.	Sel.	NET	NET GROSS PEAK
	C1PROT.	RS232 Communication protocol	Select communication type for RS232 port	Sel.	None	None Tx continuous On demand Automatic Slave Printer
	C1BAUD.	RS232 Baud rate	Baud rate selection for the RS232 port.	Sel.	9600	1200 2400 4800 9600 19200 38400 57600 115200
	C1FORM.	RS232 Frame	Frame type. In case of SLAVE protocol, 7-bit data format (E-7-1 and O-7-1) cannot be selected.	Sel.	N-8-1	N-8-1 N-8-2 E-7-2 E-8-1 O-7-2 O-8-1
	EN. FBUS.	Fieldbus Enabling	Profibus fieldbus enabling, if OFF any error messages regarding Profibus communication are never displayed	Sel.	OFF	OFF ON
	ADDR.PR.	Profibus address	Profibus protocol communication address	Com.	1	1 ÷ 126
	INP.REG.	Input Area Size	Input area size for Profibus fieldbus (value expressed in Bytes).	Sel.	128	32 64 96 128
	OUT.REG.	Output Area Size	Output area size for Profibus fieldbus (value expressed in Bytes).	Sel.	128	32 64 96 128

If the module used is PROFIBUS HMS, the configuration file "hms_1810.gsd" must be provided to the customer.
If the module mounted is PROFIBUS X90, the configuration file "hil_x90.gsd" must be provided to the customer.

SERIAL PORTS SETTIINGS – PROFINET CONFIGURATION

Sub Menu	Message	Name	Description	Type	Default	Range
COMM. P	T.SER.	Serial Mode	Select if similar operation to DAT1400 or DAT100	Sel.	D1400	D1400 / DAT11
	C1 M O D.	RS232 Output mode	Transmitted value selection with RS232 output.	Sel.	NET	NET / GROSS / PEAK
	C1PROT.	RS232 Communication protocol	Selecting the communication type for the RS232 port.	Sel.	None	None / Tx continuous On demand / Automatic Slave / Printer
	C1BAUD.	RS232 Baud rate	Baud rate selection for the RS232 port.	Sel.	9600	1200 / 2400 / 4800 9600 / 19200 / 38400 57600 / 115200
	C1FORM.	RS232 Frame	Frame type. In case of SLAVE protocol, 7-bit data format (E-7-1 and O-7-1) cannot be selected.	Sel.	N-8-1	N-8-1 / N-8-2 / E-7-2 E-8-1 / O-7-2 / O-8-1
	EN. FBUS.	Fieldbus Enabling	Enabling Profinet fieldbus, if OFF any error messages regarding Profinet communication are never displayed	Sel.	OFF	OFF ON
	INP.REG.	Input Area Size	Input area size for Profinet fieldbus (value expressed in Bytes).	Sel.	128	32 / 64 / 96 / 128
	OUT.REG.	Output Area Size	Input area size for Profinet fieldbus (value expressed in Bytes).	Sel.	128	32 / 64 / 96 / 128

The XML configuration file for the PLC to be used from the two provided must be selected based on the type of option configured, specified on the external module identification label.

Option /PNet	Option /PNet X90
GSDML-V2.33-HILSCHER-NIC 5X-RE PNS-20170704.xml	**GSDML-V2.35-HILSCHER-NETX 90-RE-PNS-32byte-M-20200507.xml**

The instruments are supplied with the parameter "Profinet name" not configured and with an IP address of 0.0.0.0.

SERIAL PORT SETTINGS - ETHERNET/IP CONFIGURATION

Sub Menu	Message	Name	Description	Type	Default	Range
COMM. P	T.SER.	Serial Mode	Select if similar operation to DAT1400 or DAT100	Sel.	D1400	D1400 / DAT11
	C1 MOD.	RS232 Output mode	Transmitted value selection with RS232 output.	Sel.	NET	NET / GROSS / PEAK
	C1PROT.	RS232 Communication protocol	Selecting the communication type for the RS232 port.	Sel.	None	None / Tx continuous On demand / Automatic Slave / Printer
	C1BAUD.	RS232 Baud rate	Baud rate selection for the RS232 port.	Sel.	9600	1200 / 2400 / 4800 9600 / 19200 / 38400 57600 / 115200
	C1FORM.	RS232 Frame	Frame type. In case of SLAVE protocol, 7-bit data format (E-7-1 and O-7-1) cannot be selected.	Sel.	N-8-1	N-8-1 / N-8-2 / E-7-2 E-8-1 / O-7-2 / O-8-1
	EN. FBUS.	Fieldbus Enabling	Enabling Ethernet/IP fieldbus, if OFF any error messages regarding Ethernet/IP communication are never displayed	Sel.	OFF	OFF ON
	IP	IP address	Ethernet/IP protocol IP address	Com.	0.0.0.0	0.0.0.0 ÷ 255.255.255.255
	SUBNET.	Subnet Mask	Subnet Mask Ethernet/IP protocol	Com.	0.0.0.0	0.0.0.0 ÷ 255.255.255.255
	INP.REG.	Input Area Size	Input area size for Ethernet/IP fieldbus (value expressed in Bytes).	Sel.	128	32 / 64 / 96 / 128
	OUT.REG.	Output Area Size	Input area size for Ethernet/IP fieldbus (value expressed in Bytes).	Sel.	128	32 / 64 / 96 / 128

EDS configuration files "HILSCHER NIC 52-RE EIS V1.1 -32.EDS", "HILSCHER NIC 52-RE EIS V1.1 -64.EDS", "HILSCHER NIC 52-RE EIS V1.1 -96.EDS" and "HILSCHER NIC 52-RE EIS V1.1 -128.EDS" are provided.
The input and output area size set in the PLC (default input area 128 bytes, default output area 128 bytes) must match the input and output area size selected in the instrument ("INP.REG" and "OUT.REG" parameters).
In case of X90 module, the configuration files are as follows "HILSCHER NETX90 EIS V5-32.EDS," "HILSCHER NETX90 EIS V5-64.EDS," "HILSCHER NETX90 EIS V5-96.EDS," and "HILSCHER NETX90 EIS V5-32.EDS."

SERIAL PORT SETTINGS - CANOPEN CONFIGURATION

Sub Menu	Message	Name	Description	Type	Default	Range
COMM. P	T.SER.	Serial Mode	Select whether similar operation to DAT1400 or DAT100	Sel.	D1400	D1400 DAT11
	C1 MOD.	RS232 Output mode	Transmitted value selection with RS232 output.	Sel.	NET	NET GROSS PEAK
	C1PROT.	RS232 Communication protocol	Selecting the communication type for the RS232 port.	Sel.	None	Nessuna None continuous Tx On demand Automatic Slave Printer
	C1BAUD.	RS232 Baud rate	Baud rate selection for the RS232 port.	Sel.	9600	1200 / 2400 / 4800 9600 / 19200 / 38400 57600 / 115200
	C1FORM.	RS232 Frame	Frame type. In case of SLAVE protocol, 7-bit data format (E-7-1 and O-7-1) cannot be selected.	Sel.	N-8-1	N-8-1 N-8-2 E-7-2 E-8-1 O-7-2 O-8-1
	EN. FBUS.	Fieldbus Enabling	Profibus fieldbus enablement, if OFF any error messages regarding Profibus communication are never displayed	Sel.	OFF	OFF ON
	ADDR.CO.	CANopen address	CANopen protocol communication address	Com.	1	1 ÷ 127
	BAUD.CO.	Baud rate CANopen	Baud rate selection for the CANopen product, values expressed in Kbit/sec.	Sel	20	10 20 50 125 250 500 1000

SERIAL PORT SETTINGS – ETHERNET CONFIGURATION

Sub Menu	Message	Name	Description	Type	Default	Range
COMM. P	T.SER.	Serial Mode	Select whether similar operation to DAT1400 or DAT100	Sel.	D1400	D1400 DAT11
	C1 MOD.	RS232 Output mode	Transmitted value selection with RS232 output.	Sel.	NET	NET GROSS PEAK

SERIAL PORT SETTINGS – ETHERNET CONFIGURATION

Sub Menu	Message	Name	Description	Type	Default	Range
COMM. P	C1PROT.	RS232 Communication protocol	Selecting the communication type for the RS232 port.	Sel.	None	None continuous Tx On demand Automatic Slave Printer
	C1BAUD.	RS232 Baud rate	Baud rate selection for the RS232 port.	Sel.	9600	1200 / 2400 / 4800 9600 / 19200 / 38400 57600 / 115200
	C1FORM.	RS232 Frame	Frame type. In case of SLAVE protocol, 7-bit data format (E-7-1 and O-7-1) cannot be selected.	Sel.	N-8-1	N-8-1 N-8-2 E-7-2 E-8-1 O-7-2 O-8-1
	C2 MOD.	RS485 Output mode	Transmitted value selection with RS485 output.	Sel.	NET	As C1 Mod.
	C2PROT.	RS485 Communication protocol	Selecting the communication type for the RS485 port.	Sel.	None	None continuous Tx On demand Automatic Slave ModBus
	C2BAUD.	RS485 Baud rate	Baud rate selection for the RS485 port.	Sel.	9600	As C1 Baud
	C2FORM.	RS485 Frame	Frame type. In case of SLAVE or MODBUS protocol, 7-bit data format cannot be selected (E-7-1 and O-7-1).	Sel.	N-8-1	As C1 Form.
	C2ADDR.	RS485 address	Instrument communication address	Com.	1	1 ÷ 32
	IP	IP address	Ethernet protocol IP address	Com.	192.168.0.201	0.0.0.0 ÷ 255.255.255.255
	SUBNET.	Subnet Mask	Subnet Mask Ethernet protocol	Com.	255.255.255.0	0.0.0.0 ÷ 255.255.255.255
	GATE.	Gateway	Gateway Ethernet protocol	Com.	192.168.0.1	0.0.0.0 ÷ 255.255.255.255
	PORT	Port	Communication port for Ethernet protocol	Com.	1800	1 ÷ 65535
	ETH.MOD.	Ethernet communication mode	Selection of the value transmitted via Ethernet protocol.	Sel.	NET	NET GROSS PEAK
	ETH.PRO.	Ethernet communication protocol	Selecting type of communication for Ethernet protocol	Sel.	None	None Tx continuous On demand Automatic Slave Modbus TCP

SETUP MEMORY UPLOAD/DOWNLOAD

This function allows downloading or uploading of the instrument setup memory.

- **Download function**: instrument setup parameters are stored in a file.

- **Upload function**: the instrument is configured with the setup parameters read from a file.

To use these functions, it is necessary to enable the relevant procedure ("receive file" or "transmit file") in the TESTER 1008 instrument.

✋ The handheld TESTER 1008 must be connected to the serial COM1 (Rs232) of the instrument.

ANALOG OUTPUT SETTINGS

Sub Menu	Message	Name	Description	Type	Default	Range	Ind.Fie ldbus
ANALOG	RANGE	Analog output range	Selection of analog output type	Sel.	0– 10V	0-10V [0] 0-5V [1] 4-20mA [2] 0-20mA [3]	1506
	MODE	Analog output mode	Transmitted value selection with analog output.	Sel.	NET	NET [0] GROSS [1] PEAK [2]	1505
	AN 0	Fixed tare	Analog output offset	Com.	0		1501 (MSB) 1502 (LSB)
	AN FS	Scale Bottom	It is the weight corresponding to the Scale Bottom of the analog output, which may be different from the range of the weighing system.	Com.	Maximum capacity	0 –Capacity	1503 (MSB) 1504 (LSB)
	0 ADJ.	Zero adjustment	Procedure available to the user for zero adjustment (*)	Spc			
	FS.ADJ.	Scale Bottom adjustment	Procedure available to the user for Scale Bottom adjustment (*)	Spc			

(*)
The analog output is factory calibrated for each selectable range. This additional procedure is available to the user for adjustment for each selectable range. In case of complete reset of the setup memory (with PC configurator) the factory calibrations are reestablished.

Once you enter the test function OUT.AN, the following will appear:

OUT   0

where 0 indicates the output value (current or voltage as selected) expressed as % from Scale Bottom.

You can change this value from 0 to 100, with a 10 % interval, pressing the key to increase the output or key   to decrement the output.

FUN

SET

Press the button   PRG   to exit the function.

VISUALIZATION OF ACCESSES

✋ This menu is displayed only in case of METRIC operation.

Sub Menu	Message	Name	Description	Type	Default	Range	Ind.Fieldbus
ACCESS	ACC-01	Access 01	Procedure for displaying the authorized person's last access.	Spc			
	ACC-02	Access 02	Procedure for displaying the authorized person's second-last access.	Spc			
	ACC-03	Access 03	Procedure for displaying the authorized person's third-last access.	Spc			
	ACC-04	Access 04	Procedure for displaying the authorized person's fourth-last access.	Spc			
	ACC-05	Access 05	Procedure for displaying the authorized person's fifth-last access.	Spc			

ACCESS VISUALIZATION PROCEDURE

ID.0000   The display shows the identification code used for access (password table); in the case where access was via calibration jumper, the identification code 0000 is displayed. Press the ENTER key to continue with the display of the progressive access number

PR.0000   The display shows the progressive access number (this value is incremented with each access and is never reset). Press the ENTER key to exit the access display procedure.

FISCAL MEMORY CONSULTATION

This menu is displayed only in case of METRIC operation.

Sub Menu	Message	Name	Description	Type	Default	Range	Ind.Fieldbus
ALI.MEM.	SEE.MEM.	See fiscal memory	Procedure for consulting saved weighing in the fiscal memory.	Spc		0 ÷ 959999	

In case of METRIC operation and with fiscal memory enabled:
- Each weighing performed is stored in the fiscal memory.
- Each weighing is associated with an identification code (value between 0 and 959999).
- The weighing identification code is transmitted on a serial line at the time of weighing

FISCAL MEMORY CONSULTATION PROCEDURE

| 000000 | Enter the weighing identification code and confirm with ENTER key. |

| 0.000 | The display shows the net weight associated with the required ID code. Press the key ▼ to exit the fiscal memory consultation procedure. |

| NO COD. | If the required ID code is not present in the fiscal memory, the timed message "NO COD" is displayed. |

FUNCTIONAL FEATURE SETTINGS

The following tables describe all the parameters that can be set. In the last column, where present, the fieldbus address corresponding to the parameter is g i v e n . If the parameter is of type "Sel.", the value to be entered in the register for the desired selection is indicated between "[]".

Sub Menu	Message	Name	Description	Type	Default	Range	Ind.Fieldbus
FUNCT.	STD.BY	Stand By	Idle time beyond which it is automatically assumed the state of low brightness and keyboard lock. 0 = function disabled.	Com.	0	0 ÷ 999 sec (Min. value 5 sec.)	1001
	LOCH	Keyboard Lock	Setting 3 binary values that correspond to the 3 keys. 0 -> key not locked 1-> key locked (e.g. 0101 corresponds to blocking the 1st and 3rd keys)	Com.	000	000 ÷ 111 (binary)	1002
	P1N.COD.	Password Setting	If programmed, password must be entered to access the programming menu. In the case of subsequent access, it is no longer necessary to type password until the stand -by or you turn off the instrument.	Com.	0 (no password)	0 ÷ 9999	1003
	PEAH	Peak Function	Allows you to make the peak function available or not and to refer it to net weight or gross weight. In case the application does not provide this function, it is possible to disable it.	Sel.	NONE	NONE [0] NET [1] GROSS [2]	1004
	DAT.LOG.	Datalogger	Allows weight and I/O status to be stored in the optional memorization in Excel format. Logging can be of a single measurement or a continuous series of measurements from the beginning of the memorization (max 1000 measurements). The memory can contain a maximum of 60000 records, beyond which the oldest records are overwritten.	Sel.	NONE	NONE [0] SINGLE [1] CONTIN. [2]	1005

Sub Menu	Message	Name	Description	Type	Default	Range	Ind.Fieldbus
FUNCT.	LOG.TRG	Datalogger Trigger	In the case of activated datalogger, select whether storage takes place manually (by key or input), or upon activation of output 1 or 2. To start storage by key, press the first 2 keys on the left. Storage can be stopped at any time by pressing the first key on the left.	Sel.	MA-NUAL	MANUAL [0] OUT1 [1] OUT2 [2]	1006
	LOG.FRQ	Storage Frequency	In the case of activated datalogger, select frequency of data storage (datalogger). The maximum frequency corresponds to that of weight acquisition (maximum frequency 250 Hz).	Sel.	10 MIN	10 MIN. [0] 5 MIN. [1] 1 MIN. [2] 10 SEC. [3] 5 SEC. [4] 2 SEC. [5] 1 HZ [6] 5 HZ [7] 10 HZ [8] HIGH [9]	1007
	LOG.DNL.	Log download	Log download function, the records are transmitted through the port USB of the instrument. This function can be stopped in any time by pressing. ▼ At the end of the transmission is requested. is clearing the log, confirm with the PRG key or cancel with the key. ▼	Spc			
	LOG.ERS.	Loge deletion	Log deletion function, con- stop with ENTER key or cancel with. ▼	Spc			

Only in case of configured additional memory and FREE operation.

LOG DOWNLOAD

Records in memory are transmitted starting with the least recent.

<Time>	;	<Gross>	;	<Net>	;	<Peak>	;	<Inputs>	;	<Outputs>	CR	LF

Where:

Time: field consisting of 6 ASCII characters with the record duration value on right-justified (value expressed in seconds from 0 to 999999, with no insignificant zeros). In case of LOG function configured to store a single record at a time, this field is always worth 0.

Gross / Net / Peak: fields consisting of 8 ASCII characters with the weight value right-justified (without insignificant zeros, with any decimal point and negative sign).

Inputs: two ASCII characters, "0" (30h, input inactive) or "1" (31h, input active). Which indicates the status of input 1 and the status of input 2, respectively.

Outputs: two ASCII characters, "0" (30h, output off) or "1" (31h, output on). Which respectively indicate the status of output 1 and the status of output 2.

PROGRAMMING MENU

Menu	Message	Name	Description	Tipo
TEST	H1 RES.	Resolution x10	Weight display with 10 times higher resolution than the set resolution	Vis.
	PSUPPL.	Supply voltage	Display of correct voltage (RIGHT, LOW, HIGH)	Vis.
	RS 232	RS232 Test	Transmission and reception test (See specific description)	Test
	RS 485	RS485 Test	Transmission and reception test (See specific description)	Test
	MEMORY	Alibi memory Test	Fiscal memory test	Test

TEST FUNCTIONS - RS232 AND RS485

The test consists of transmitting the string received from the relevant serial line (echo) and displaying the number of strings received and the number of characters received in the last string.

$$00C= \ 00$$

Upon exit setup menu, if parameter changes have been made, the STORE message is displayed, to confirm with

 PRG

SETUP MEMORY UPLOAD/DOWNLOAD

This function allows downloading or uploading of the instrument's setup memory**:**

- **Download function**: instrument setup parameters are stored in a file.
- **Upload function**: the instrument is configured with setup parameters read from a file.

To use these functions, it is necessary to activate the relevant procedure ("receive file" or "transmit file") in the TESTER 1008 tool.

 The handheld TESTER 1008 must be connected to the serial COM1 (Rs232) of the instrument.

SERIAL COMMUNICATION PROTOCOLS

Continuous transmission is carried out at the weight update rate, consistent with the serial transmission baud rate. In case of communication on the Ethernet port, the frequency of continuous transmission is limited to 12.5 Hz.

In case of FREE operation, string transmitted with Continuous, On Demand, Automatic protocols:

STX	\<status\>	\<weight\>	ETX	\<chksum\>	EOT

String transmitted following weighing execution, in case of METRIC operation and On Demand protocol:

STX	\<status\>	\<weight\>	\<ID weighing\>	ETX	\<chksum\>	EOT

Where:

STX (start of text) = 0x02h, **ETX** (end of text) = 0x03h, **EOT** (end of transmission) = 0x04.

\<status\> = character encoded as per the table below (bit = 1 if TRUE condition)
\<weight\> = field consisting of 8 ASCII characters with right-justified weight value. (without

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	1	1	Tare Entered	Zero Band	Stable Weight	Zero Center

insignificant zeros, and possible decimal point and negative sign).
The transmitted weight value can be net weight, gross weight or peak value, depending on the selection of transmitted data (MODE parameter) in the serial communication port configuration menu (see relevant section).
In overweight conditions, the field takes the value: "^^^^^^^^".
In underweight condition (negative weight greater than 99999) the field takes the value: "　　　　　　　　　".
In weight reading error conditions, the field takes the value: "O-L".

\<weighing identifier\> = field consisting of 7 ASCII characters with the weighing identifier code right-justified (without insignificant zeros).

\<csum\> = checksum of the string data. It is calculated by performing exclusive OR (XOR) of all characters STX (or \<Ind\>) to ETX excluding the latter; the result of the XOR is decomposed into 2 characters by separately considering the upper 4 bits (first character) and the lower 4 bits (second character); the 2 characters obtained are then ASCII encoded; (example: XOR = 5Dh; \<csum\> = "5Dh" i.e. 35h and 44h).

In the case of **automatic** and **on-demand** communication protocols, between 2 successive transmissions the weight must undergo a change of 20 divisions.

SLAVE PROTOCOL

LIST OF AVAILABLE COMMANDS:

1. Net weight, gross weight or peak request.
2. Weighing execution command.
3. Auto Tare Command
4. Semi-automatic zero command
5. Peak value reset command
6. Two weight threshold programming.
7. Programmed threshold request.
8. Logic outputs activation
9. Logic inputs status request
10. Store thresholds in permanent memory command
11. Switch display from gross weight to net weight
12. Switch display from net weight to gross weight
13. Tare cancellation command.
14. Net weight request
15. Gross weight request.

The unit connected to the instrument (typically a personal computer) performs MASTER functions and is the only unit that can initiate a communication procedure. The communication procedure must always consist of the transmission of a string by the MASTER, which is followed by a response from the SLAVE concerned.

DESCRIPTION OF COMMAND FORMAT:

Double quotes (quotation marks) enclose constant characters (respect upper and lower case); < and > symbols enclose variable numeric fields. The <Ind> field represents the instrument identifier, in case of communication on the Rs485 port it is obtained by adding 80h to the address value of the instrument (e.g. with address 3 <Ind> = 80h + 03h = 83h), in case of communication on the Rs232 port the <Ind> cam- po should always be worth 81h or in case of communication on the Ethernet port the <Ind> field should always be worth FFh.

1. NET WEIGHT, GROSS WEIGHT or PEAK REQUEST.
MASTER: **<Ind> "N" EOT**
INSTRUMENT: **<Ind> "N" <status> <weight> ETX <csum> EOT** or <**Ind> NAK EOT**

2. WEIGHING EXECUTION COMMAND
MASTER: **<Ind> "P" EOT**
INSTRUMENT: **<Ind> "P" <status> <weight> <ID weighing> ETX <csum> EOT** or **<Ind> NAK EOT**

This command is available only in the case of METRIC operation. The conditions for carrying out weighing are:

- Stable weight.
- Since the last weighing was performed, the weight has changed by at least 20 divisions (delta weight).
- Gross weight equal to or greater than the minimum weighing (20 divisions) and less than the maximum capacity.
- Non zero net weight.

SLAVE PROTOCOL

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3. AUTO TARE COMMAND
MASTER: **<Ind> "A" EOT**
INSTRUMENT: **<Ind> "A" ACK EOT**   or   **<Ind> NAK EOT**

4. SEMI AUTOMATIC ZERO COMMAND
MASTER: **<Ind> "Z" EOT**
INSTRUMENT: **<Ind> "Z" ACK EOT**   or **<Ind> NAK EOT**

5. PEAK VALUE RESET COMMAND
MASTER: **<Ind> "X" EOT**
INSTRUMENT: **<Ind> "X" ACK EOT**   or **<Ind> NAK EOT**

6. TWO WEIGHT THRESHOLDS PROGRAMMING
MASTER: **<Ind> "S" <s1> <s2> ETX <csum> EOT**
INSTRUMENT: **<Ind> "S" ACK EOT**   or **<Ind> NAK EOT**

Threshold values must be lower than the scale bottom parameter

7. PROGRAMMED THRESHOLDS REQUEST
MASTER: **<Ind> "R" EOT**
INSTRUMENT: **<Ind> "R" <s1> <s2> ETX <csum> EOT**   or **<Ind> NAK EOT**

8. LOGIC OUTPUTS ACTIVATION
MASTER: **<Ind> "U" <outputs> EOT**
INSTRUMENT: **<Ind> "U" ACK EOT**   or < **Ind> NAK EOT**

9. LOGIC INPUTS ACTIVATION
MASTER: **<Ind> "I" EOT**
INSTRUMENT: **<Ind> "I" <inputs> ETX <csum> EOT**   or **<Ind> NAK EOT**

10.COMMAND TO STORE THRESHOLDS IN PERMANENT MEMORY
MASTER: **<Ind> "E" EOT**
INSTRUMENT: **<Ind> "E" ACK EOT**   or **<Ind> NAK EOT**

<set1> and **<set2>:** formatted as <weight> field.
<outputs> and **<inputs>:** single ASCII character encoded as per the table below (bit = 1 if input/output active)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	1	1	0	0	Input 2 / output 2	Input 1 / output 1

SLAVE PROTOCOL

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11. DISPLAY COMMAND FROM GROSS WEIGHT TO NET WEIGHT
MASTER: **<Ind> "CN" EOT**
INSTRUMENT: **<Ind> "C" ACK EOT**   or   **<Ind> NAK EOT**

12. DISPLAY COMMAND FROM NET WEIGHT TO GROSS WEIGHT
MASTER: **<Ind> "CL" EOT**
INSTRUMENT: **<Ind> "C" ACK EOT**   or   **<Ind> NAK EOT**

13. TARE CANCELLATION COMMAND
MASTER: **<Ind> "DT" EOT**
INSTRUMENT: **<Ind> "D" ACK EOT**   or   **<Ind> NAK EOT**

14. NET WEIGHT REQUEST (used for repeater program)
MASTER: **<Ind> "W" "N" EOT**
INSTRUMENT: **<Ind> "W" <rep status> <net> ETX <csum> EOT**   or **<Ind> NAK EOT**

15. GROSS WEIGHT REQUEST (used for repeater program)
MASTER: **<Ind> "W" "G" EOT**
INSTRUMENT: **<Ind> "W" <rep status> <gross> ETX <csum> EOT** or **<Ind> NAK EOT**

Where:

<rep status>: character encoded as per the table below (bit = 1 in case of true condition).

Bit 7	*Bit 6*	*Bit 5*	*Bit 4*	*Bit 3*	*Bit 2*	*Bit 1*	*Bit 0*
0	0	1	1	Displayed weight 0 = net 1 = gross	Zero band	Stable weight	Zero center

<net> <gross> = field consisting of 8 ASCII characters with the right-justified net or gross weight value.
(without insignificant zeros, with any decimal point and negative sign).
In overweight conditions, the field takes the value: "^^^^^^^^."
In underweight condition (negative weight greater than 99999) the field takes the value: " _____ ".
In weight reading error conditions, the field takes the value: " O-L ".

PRINTER PROTOCOL

Data transmission protocol to Custom Plus printer.

Printing can be initiated by button (see OPERATING FUNCTIONS section) or by input (see I/O SETTINGS section).

The following is an example of printing.

```
Net            209.0 kg
Gross          211.5 kg
Tare             2.5 kg
Peak           268.5 kg
Code           212456
```

• The peak value is printed only if the peak calculation function is enabled.
• The weighing identifier code is printed only in case of METRIC operation and alibi memory configured.

The conditions for making the printout are:

• Stable weight (or stabilized within 3 seconds of command).
• Since the last weighing was performed, the weight has changed by at least 20 divisions (delta weight).
• Gross weight equal to or greater than the minimum weighing (20 divisions) and less than the maximum capacity.
• Non zero net weight.

Only in case of FREE operation, printing is allowed even with gross weight less than the minimum weighing or with zero net weight.

MODBUS COMMUNICATION PROTOCOLS (SERIAL TYPE = DAT1400)

The instrument parameters that can be read or programmed through the available communication interfaces on the instrument, depending on the hardware configuration, are listed in the following table.
R-type registers are the readable ones while W-type registers are the writable ones.
In case of Modbus TCP protocol, the address of the instrument ("Unit Identifier" field) must always be FFh. If a fieldbus (other than Modbus) is used, only R or R/W registers will be present in the input area, and only W or R/W registers will be present in the output area.
The registers are 16 bits in size.

MODBUS Address	Holding Register	R/W	Notes
0001	Status Register	R	See related table
0002	Gross weight (MSW)	R	INT. Value - Most significant word
0003	Gross weight (LSW)	R	INT. Value- Least significant word
0004	Net weight (MSW)	R	INT. Value- Most significant word
0005	Net weight (LSW)	R	INT. Value- Least significant word
0006	Peak (MSW)	R	INT. Value- Most significant word
0007	Peak (LSW)	R	INT. Value- Least significant word
0008	Digital Inputs	R	See related table
0009	Digital Outputs	R	
0101	Net weighed weight (MSW)	R	INT. Value- Most significant word
0102	Net weighed weight (LSW)	R	INT. Value- Least significant word
0103	Weighing Code (MSW)	R	INT. Value- Most significant word
0104	Weighing Code (LSW)	R	INT. Value- Least significant word
0201	Set-Point 1 (MSW)	R/W	INT. Value- Most significant word
0202	Set-Point 1 (LSW)	R/W	INT. Value- Least significant word
0203	Set-Point 2 (MSW)	R/W	INT. Value- Most significant word
0204	Set-Point 2 (LSW)	R/W	INT. Value- Least significant word
0501	Data Register (MSW)	W	INT. Value- Most significant word (See related table)
0502	Data Register (LSW)	W	INT. Value- Least significant word (See related table)
0503	Command Register	W	See related table
1001	Stand-By Function	R/W	INT. Value
1002	Keyboard Lock Function	R/W	See related table
1003	Password Function	R/W	INT. Value
1004	Peak Function	R/W	See correspondence on page10
1005	Data-Logger Function	R/W	See correspondence on page10
1006	Data-Logger Trigger	R/W	See correspondence on page10
1007	Data-Logger Frequency	R/W	See correspondence on page10

MODBUS COMMUNICATION PROTOCOLS (SERIAL TYPE = DAT1400)

MODBUS Address	Holding Register	R/W	Notes
1101	Weight division value (*)	R/W	See related table
1102	Decimals (*)	R/W	
1103	Load cells capacity (MSW) (*)	R/W	INT. Value- Most significant word
1104	Load cells capacity (LSW) (*)	R/W	INT. Value - Least significant word
1105	Load cells sensitivity (*)	R/W	INT. Value
1106	Fixed Tare (MSW) (*)	R/W	INT. Value- Most significant word
1107	Fixed Tare (LSW) (*)	R/W	INT. Value- Least significant word
1108	Calibration Gravity (MSW) (*)	R/W	INT. Value- Most significant word
1109	Calibration Gravity (LSW) (*)	R/W	INT. Value- Least significant word
1110	Use Gravity (MSW) (*)	R/W	INT. Value- Most significant word
1111	Use Gravity (LSW) (*)	R/W	INT. Value- Least significant word
1151	Table cal. Signal zero (MSW) (*)	R/W	INT. Value- Most significant word
1152	Table cal. Signal zero (LSW) (*)	R/W	INT. Value- Least significant word
1153	Table cal. Signal P1 (MSW) (*)	R/W	INT. Value- Most significant word
1154	Table cal. Signal P1 (LSW) (*)	R/W	INT. Value- Least significant word
1155	Table cal. Signal P2 (MSW) (*)	R/W	INT. Value- Most significant word
1156	Table cal. Signal P2 (LSW) (*)	R/W	INT. Value- Least significant word
1157	Table cal. Signal P3 (MSW) (*)	R/W	INT. Value- Most significant word
1158	Table cal. Signal P3 (LSW) (*)	R/W	INT. Value- Least significant word
1159	Table cal. Signal P4 (MSW) (*)	R/W	INT. Value- Most significant word
1160	Table cal. Signal P4 (LSW) (*)	R/W	INT. Value- Least significant word
1161	Table cal. Signal P5 (MSW) (*)	R/W	INT. Value- Most significant word
1162	Table cal. Signal P5 (LSW) (*)	R/W	INT. Value- Least significant word
1163	Table cal. Value P1 (MSW) (*)	R/W	INT. Value- Most significant word
1164	Table cal. Value P1 (LSW) (*)	R/W	INT. Value- Least significant word
1165	Table cal. Value P2 (MSW) (*)	R/W	INT. Value- Most significant word
1166	Table cal. Value P2 (LSW) (*)	R/W	INT. Value- Least significant word
1167	Table cal. Value P3 (MSW) (*)	R/W	INT. Value- Most significant word
1168	Table cal. Value P3 (LSW) (*)	R/W	INT. Value- Least significant word
1169	Table cal. Valore P4 (MSW) (*)	R/W	INT. Value- Most significant word
1170	Table cal. Value P4 (LSW) (*)	R/W	INT. Value- Least significant word
1171	Table cal. Value P5 (MSW) (*)	R/W	INT. Value- Most significant word
1172	Table cal. Value P5 (LSW) (*)	R/W	INT. Value - Least significant word
1201	Filter factor	R/W	See correspondence on page13
1202	Output rate ADC	R/W	See correspondence on page13
1203	Number of readings per average	R/W	INT. Value
1204	Monotony Time	R/W	INT. Value
1205	Oscillations Time	R/W	INT. Value
1206	Oscillations Range	R/W	INT. Value

(*) These registers can be changed only in case of FREE operation or in case of METRIC operation with calibration jumper enabled.

MODBUS COMMUNICATION PROTOCOLS (SERIAL TYPE = DAT1400)

MODBUS Address	Holding Register	R/W	Notes
1301	Scale Bottom (MSW) (*)	R/W	INT. Value - Most significant word
1302	Scale Bottom (LSW) (*)	R/W	INT. Value- Least significant word
1303	Weight stability (*)	R/W	See correspondence on page 13
1304	Auto zero on startup (MSW) (*)	R/W	INT. Value- Most significant word
1305	Auto zero on startup (LSW) (*)	R/W	INT. Value- Least significant word
1306	Zero tracking (*)	R/W	See correspondence on page 13
1307	Resettable Divisions (*)	R/W	INT. Value- Most significant word
1308	Resettable Divisions (*)	R/W	INT. Value- Least significant word
1401	Input 1 function	R/W	See correspondence on page 14
1402	Input 2 function	R/W	See correspondence on page 14
1403	Output 1 mode —Function	R/W	See correspondence on page 14
1404	Output 1 mode —Logic	R/W	See correspondence on page 14
1405	Output 1 mode —Polarity	R/W	See correspondence on page 14
1406	Output 1 mode —Stability	R/W	See correspondence on page 14
1407	Output 1 hysteresis	R/W	INT. Value
1408	Output 1 timing	R/W	INT. Value
1409	Output 1 delay	R/W	INT. Value
1410	Output 2 mode —Function	R/W	See correspondence on page14
1411	Output 2 mode —Logic	R/W	See correspondence on page14
1412	Output 2 mode —Polarity	R/W	See correspondence on page14
1413	Output 2 mode —Stability	R/W	See correspondence on page14
1414	Output 2 hysteresis	R/W	INT. Value
1415	Output 2 timing	R/W	INT. Value
1416	Output 2 delay	R/W	INT. Value
1501	Analog Tare (MSW)	R/W	INT. Value- Most significant word
1502	Analog Tare (LSW)	R/W	INT. Value- Least significant word
1503	Analog Scale Bottom (MSW)	R/W	INT. Value- Most significant word
1504	Analog Scale Bottom (LSW)	R/W	INT. Value- Least significant word
1505	Analog Output Mode	R/W	See correspondence on page16
1506	Analog Output Range	R/W	See correspondence on page16
1507	Analog zero adjustment	R/W	INT. Value Zero points analog output, to terminate the adjustment procedure, it is necessary to send the command save data to permanent memory in the command register.
1508	Analog scale bottom adjustment	R/W	INT. Value Scale bottom points analog output, to finish the adjustment procedure, it is necessary to send the command save data in permanent memory in the command register.
2000	Monitor register	W	The programmed value is automatically copied to Monitor Register (2100).
2100	Monitor register	R	

(*) These registers can be changed only in case of FREE operation or in case of METRIC operation with calibration jumper enabled.

MODBUS COMMUNICATION PROTOCOLS (SERIAL TYPE = DAT11)

MODBUS Address	Holding Register	R/W	Notes
0001	Status Register	R	See related table
0002	No. decimal digits of weight	R	
0003	Gross weight (MSB)	R	Value signed in the complement of 2.
0004	Gross weight (LSB)	R	
0005	Net weight (MSB)	R	Value signed in the complement of 2.
0006	Net weight (LSB)	R	
0007	Peak (MSB)	R	Value signed in the complement of 2.
0008	Peak (LSB)	R	
0009	Logic inputs	R	DAT 700 / ANA only. In the other versions it is always 0.
0010	Logic outputs	R/W	Writing outputs only if thresholds are programmed to 0
0021	Threshold 1 (MSB)	R/W	Used only for DAT 700 / ANA
0022	Threshold 1 (LSB)	R/W	Used only for DAT 700 / ANA
0023	Threshold 2 (MSB)	R/W	Used only for DAT 700 / ANA
0024	Threshold 2 (LSB)	R/W	Used only for DAT 700 / ANA
0051	Data Register (MSB)	W	Write before or with the same query as Command Register
0052	Data Register (LSB)	W	
0053	Command Register	W	See related table
0100	Load cell capacity (MSB)	R/W	
0101	Load cell capacity (LSB)	R/W	
0102	Load cell sensitivity	R/W	
0103	Weight division value	R/W	See related table
0200	Weight filter factor	R/W	
0201	Weight stability factor	R/W	
0202	Auto zero threshold	R/W	
0203	Zero tracking factor	R/W	
0204	Zero band	R/W	
0205	Delta weight	R/W	Not used, fixed at 20 divisions
0301	Threshold 1 operation mode	R/W	See related table, Used only for DAT 700 / ANA
0302	Threshold 1 hysteresis	R/W	Used only for DAT 700 / ANA
0303	Threshold 2 operation mode	R/W	See related table, Used only for DAT 700 / ANA
0304	Threshold 2 hysteresis	R/W	Used only for DAT 700 / ANA
0401	Analog scale bottom (MSB)	R/W	Used only for DAT 700 / ANA
0402	Analog scale bottom (LSB)	R/W	Used only for DAT 700 / ANA
0403	Analog output func. mode	R/W	0 = gross, 1 = net, 2 = peak. Used only for DAT 700 / ANA
0404	Analog Output Range	R/W	0 = 0-20 mA, 1 = 4-20 mA, 2 = 0-10 V, 3 = 0-5 V
0405	Analog output value	W	0 = zero offset, 65535 = analog scale bottom

(*) These registers can be changed only in case of FREE operation or in case of METRIC operation with calibration jumper enabled.

MODBUS COMMUNICATION PROTOCOLS (SERIAL TYPE = DAT11)

TABELLA CODIFICA STATUS REGISTER

BIT	15...7	6	5	4	3	2	1	0
Description	Unused	**Zero run**	**Weight error**	**Over-load**	Tare entered	Zero band	Stable weight	Zero center

COMMAND REGISTER CODING TABLE FOR MODBUS RTU PROTOCOL

Register value	COMMAND REGISTER FUNCTION	DATA REGISTER FUNCTION
0x0001	Semi-automatic zero	-
0x0002	Auto tare	-
0x0003	Peak reset	-
0x0004	Switches to gross display	-
0x0005	Switches to net display	-
0x0006	Switches to peak display	-
0x0010	Zero weight calibration	-
0x0011	Scale bottom weight calibration	Sample weight
0x0020	Data storage in permanent memory	-
0x0030	Modbus-managed logic outputs and input function disabled	
0x0031	Logic outputs managed by instrument	
0x0040	Analog output managed by Modbus (value in register 40405)	
0x0041	Analog output managed by instrument	

✋ The value in the data register must be present when the command register is programmed.

EXAMPLE OF SCALE BOTTOM CALIBRATION: The sample weight to be set must be equal to the value you want to calibrate taking into account decimals as well. For example if you have a 30 kg scale with division value 0.02 if you want to calibrate to 15 kg in sample weight you need to put 1500 (0x05DC) which corresponds to 15.00 kg.

DIVISION VALUE CODING TABLE

Register value	0	1	2	3	4	5	6	7	8
Division value	0.0001	0.0002	0.0005	0.001	0.002	0.005	0.01	0.02	0.05

Register value	9	10	11	12	13	14	15	16	17
Division value	0.1	0.2	0.5	1	2	5	10	20	50

NB: compared to the old DAT11 there are 3 more division values (0.0001-0.0002-0.0005) as we have one more digit available.

LIMIT VALUES

- When the weight exceeds the programmed scale bottom, the output takes a value higher than the scale bottom of the analog output up to a limit value (saturation).
- When the weight is negative, the output takes a value lower than the minimum value up to a limit value (saturation).
- When the weight is undetectable and when the instrument is turned on, the analog output assumes a minimum value lower than the minimum nominal value.

FIELDBUS COMMUNICATION PROTOCOLS (SERIAL TYPE = DAT1400)

The following table lists the input area registers (produced by the instrument and read by the master), common to all PROFINET, ETHERCAT, ETHERNET/IP, PROFIBUS and DEVICENET fieldbuses.
The registers are 16 bits in size. The input area is updated with a maximum frequency of 125 Hz (80 Hz in case of PROFIBUS fieldbus). The size of the input area configured in the fieldbus master must match the size configured in the instrument.

Register address	INPUT AREA REGISTER	Notes
0	Status Register	See related table
1	Gross weight (MSB)	INT. Value- Most significant word
2	Gross weight (LSB)	INT. Value- Least significant word
3	Net weight (MSB)	INT. Value- Most significant word
4	Net weight (LSB)	INT. Value- Least significant word
5	Peak (MSB)	INT. Value- Most significant word
6	Peak (LSB)	INT. Value- Least significant word
7	Digital Inputs	See related table
8	Digital Outputs	
9	Monitor register	This value corresponds to the equivalent register in the output area.
10	Weighed net weight (MSB)	INT. Value- Most significant word
11	Weighed net weight (LSB)	INT. Value- Least significant word
12	Weighing Code (MSB)	INT. Value- Most significant word
13	Weighing Code (LSB)	INT. Value- Least significant word
14	Set-Point 1 (MSB)	INT. Value- Most significant word
15	Set-Point 1 (LSB)	INT. Value- Least significant word
16	Set-Point 2 (MSB)	INT. Value- Most significant word
17	Set-Point 2 (LSB)	INT. Value- Least significant word
18	Load cell capacity (MSB)	INT. Value- Most significant word
19	Load cell capacity (LSB)	INT. Value - Least significant word
20	Load cell sensitivity	INT. Value
21	Weight division value	See related table
22	Decimals	See related table
23	Fixed Tare (MSB)	INT. Value- Most significant word
24	Fixed Tare (LSB)	INT. Value- Least significant word
25	Stand-By Function	INT. Value
26	Keyboard Lock Function	See related table
27	Password Function	INT. Value
28	Peak Function	See correspondence on page10
29	Data-Logger Function	See correspondence on page10
30	Data-Logger Trigger	See correspondence on page10
31	Data-Logger Frequency	See correspondence on page10
32	Filter factor	See correspondence on page13
33	Output rate ADC	See correspondence on page13
34	Number of readings per average	INT. Value
35	Monotony Time	INT. Value
36	Oscillations Time	INT. Value
37	Oscillations Range	INT. Value

FIELDBUS COMMUNICATION PROTOCOLS (SERIAL TYPE = DAT1400)

Register address	INPUT AREA REGISTER	Notes
38	Scale Bottom (MSB)	INT. Value- Most significant word
39	Scale Bottom (LSB)	INT. Value- Least significant word
40	Weight stability	See correspondence on page13
41	Auto zero on start-up (MSB)	INT. Value- Most significant word
42	Auto zero on start-up (LSB)	INT. Value - Least significant word
43	Zero tracking	See correspondence on page13
44	Input 1 function	See correspondence on page14
45	Input 2 function	See correspondence on page14
46	Output 1 mode —Function	See correspondence on page14
47	Output 1 mode —Logic	See correspondence on page14
48	Output 1 mode —Polarity	See correspondence on page14
49	Output 1 mode —Stability	See correspondence on page14
50	Output 1 hysteresis	INT. Value
51	Output 1 timing	INT. Value
52	Output 1 delay	INT. Value
53	Output 2 mode —Function	See correspondence on page14
54	Output 2 mode —Logic	See correspondence on page14
55	Output 2 mode —Polarity	See correspondence on page14
56	Output 2 mode —Stability	See correspondence on page14
57	Output 2 hysteresis	INT. Value
58	Output 2 timing	INT. Value
59	Output 2 delay	INT. Value
60	Analog Fixed Tare (MSB)	INT. Value- Most significant word
61	Analog Fixed Tare (LSB)	INT. Value- Least significant word
62	Analog Scale Bottom (MSB)	INT. Value- Most significant word
63	Analog Scale Bottom (LSB)	INT. Value- Least significant word

FIELDBUS COMMUNICATION PROTOCOLS (SERIAL TYPE = DAT1400)

The following table lists the output area registers (written by the master and acquired by the instrument) common to all PROFINET, ETHERCAT, ETHERNET/IP, PROFIBUS and DEVICENET fieldbuses.
The registers are 16 bits in size. The registers written by the master in the output area, are read by the instrument with a maximum frequency of 125 Hz (80 Hz in case of PROFIBUS fieldbus).
The size of the output area configured in the fieldbus master must match the size configured in the instrument.

Register address	OUTPUT AREA REGISTER	Notes
0	Command Register	See related table
1	Data Register (MSB)	INT Value - Most Significant Word (See related table)
2	Data Register (LSB)	INT Value - Least Significant Word (See related table)
3	Monitor register	This value is copied to the equivalent input area register
4	Set-Point 1 (MSB)	INT Value - Most Significant Word
5	Set-Point 1 (LSB)	INT Value - Least Significant Word
6	Set-Point 2 (MSB)	INT Value - Most Significant Word (See related table)
7	Set-Point 2 (LSB)	INT Value - Least Significant Word
8	Load cell capacity (MSB) (*)	INT Value - Most Significant Word
9	Load cell capacity (LSB) (*)	INT Value - Least Significant Word
10	Load cell sensitivity (*)	INT Value
11	Weight division value (*)	See related table
12	Decimals (*)	
13	Fixed Tare (MSB) (*)	INT Value - Most Significant Word
14	Fixed Tare (LSB) (*)	INT Value - Least Significant Word
15	Stand-By Function	INT Value
16	Keyboard Lock Function	See related table
17	Password Function	INT Value
18	Peak Function	See correspondence on page 10
19	Data-Logger Function	See correspondence on page 10
20	Data-Logger Trigger	See correspondence on page 10
21	Data-Logger Frequency	See correspondence on page 10
22	Filter factor	See correspondence on page 13
23	Output rate ADC	See correspondence on page 13
24	Number of readings per average	INT Value
25	Monotony Time	INT Value
26	Oscillations Time	INT Value
27	Oscillations Range	INT Value

FIELDBUS COMMUNICATION PROTOCOLS (SERIAL TYPE = DAT1400)

Register address	OUTPUT AREA REGISTER	Notes
28	Scale Bottom (MSB) (*)	INT value - Most Significant Word
29	Scale Bottom (LSB) (*)	INT value - Least Significant Word
30	Weight stability (*)	See correspondence on page 13
31	Autozero on start-up (MSB) (*)	INT value - Most Significant Word
32	Autozero on start-up (LSB) (*)	INT value - Least Significant Word
33	Zero tracking (*)	See correspondence on page 13
34	Resettable Divisions (tasto >0<) (LSB) (*)	INT value
35	Input 1 function	See correspondence on page 14
36	Input 2 function	See correspondence on page 14
37	Output 1 mode—Function	See correspondence on page 14
38	Output 1 mode—Logic	See correspondence on page 14
39	Output 1 mode —Polarity	See correspondence on page 14
40	Output 1 mode —Stability	See correspondence on page 14
41	Output 1 hysteresis	INT value
42	Output 1 timing	INT value
43	Output 1 delay	INT value
44	Output 2 mode—Function	See correspondence on page 14
45	Output 2 mode —Logic	See correspondence on page 14
46	Output 2 mode —Polarity	See correspondence on page 14
47	Output 2 mode —Stability	See correspondence on page 14
48	Output 2 hysteresis	INT value
49	Output 2 timing	INT value
50	Output 2 delay	INT value
51	Fixed Analog Tare (MSB)	INT value - Most Significant Word
52	Fixed Analog Tare (LSB)	INT value - Least Significant Word
53	Analog Scale Bottom (MSB)	INT value - Most Significant Word
54	Analog Scale Bottom (LSB)	INT value - Least Significant Word
55	Analog Output Mode	See correspondence on page 16
56	Analog Output Range	See correspondence on page 16

(*) These registers can be changed only in case of FREE operation or in case of METRIC operation with calibration jumper enabled.

FIELDBUS COMMUNICATION PROTOCOLS (SERIAL TYPE = DAT11)

The following table lists the input area registers (produced by the instrument and read by the master) common to all PROFINET, ETHERCAT, ETHERNET/IP, PROFIBUS and DEVICENET fieldbuses.
The registers are 16 bits in size. The input area is updated with a maximum frequency of 125 Hz (80 Hz in case of PROFIBUS fieldbus). The size of the input area configured in the fieldbus master must match the size configured in the instrument.

Register address	INPUT AREA REGISTER	Notes
1	Status Register	See related table.
2	Gross weight (MSB)	Int 16 bits
3	Gross weight (LSB)	Int 16 bits
4	Net weight (MSB)	Int 16 bits
5	Net weight (LSB)	Int 16 bits
6	Peak (MSB)	Int 16 bits
7	Peak (LSB)	Int 16 bits.
8	Load cell capacity (MSB)	
9	Load cell capacity (LSB)	
10	Load cell sensitivity	
11	Weight division value	See related table.
12	Weight filter factor	
13	Weight stability factor	
14	Autozero threshold	Int 16 bits
15	Autozero threshold	Int 16 bits
16	Zero tracking factor	
17	Zero band	
18	Delta weight	
19	Monitor register	

FIELDBUS COMMUNICATION PROTOCOLS (SERIAL TYPE = DAT11)

The following table lists the output area registers (written by the master and acquired by the instrument) common to all PROFINET, ETHERCAT, ETHERNET/IP, PROFIBUS and DEVICENET fieldbuses.
The registers are 16 bits in size. The registers written by the master in the output area, are read by the instrument with a maximum frequency of 125 Hz (80 Hz in case of PROFIBUS fieldbus).
The size of the output area configured in the fieldbus master must match the size configured in the instrument.

Register address	OUTPUT AREA REGISTER		Notes
1	Data Register (MSB)	Int 16 bits	
2	Data Register (LSB)	Int 16 bits	
3	Command Register	See related table.	
4	Load cell capacity (MSB)		
5	Load cell capacity (LSB)		
6	Load cell sensitivity		
7	Weight division value	See related table.	
8	Weight filter factor		
9	Weight stability factor		
10	Autozero threshold (MSB)	Int 16 bits	
11	Autozero threshold (LSB)	Int 16 bits	
12	Zero tracking factor		
13	Zero band		
14	Delta weight		
15	Monitor register		

STATUS REGISTER CODING TABLE

Bit	15	14	13	12	11	10	9	8
Description	Not used	Not used	Not used	Not used	Not used	Not used	Memory flag	Not used

Bit	7	6	5	4	3	2	1	0
Description	Not calibrated	Weight error	Over-load	Under-load	Tare entered	Zero band	Stable weight	Zero center

COMMAND REGISTER CODING TABLE

Register value	COMMAND REGISTER FUNCTION	DATA REGISTER FUNCTION
0x0001	Semi-automatic zero	-
0x0002	Auto-tare	-
0x0003	Peak reset	-
0x0010	Zero weight calibration	-
0x0011	Calibration of Scale Bottom weight	Sample weight
0x0020	Data storage in permanent memory	-
0x7FFF	Direct memory access (Fieldbus only, no Modbus)	

The value in the data register must be present when the command register is programmed

CANOPEN - DESCRIPTION

The protocol supports the CiA DS301 "communication profile area."

Network management (NMT) manages the Pre-Operational, Operational, Stopped, Reset and Reset Communication states with related protocols.

Heartbeat protocol is supported, set to 1 second by default and can be disabled by programming the intervention time to 0. (Index = 1017h).

Emergency message management intervenes upon the occurrence, or cessation, of the following events:
- Sensor Fault (code = 5030h according to CiA DS404), when the load cell signal is not detectable due to missed or incorrect connection or failure of the instrument hardware.
- Sensor Calibration (code = 6310h in base a CiA DS404), when no weight calibration has been performed.
- Input Overload (code = F001h based on CiA DS404), when the load cell signal is out of the reading range of the instrument.

2 transmission PDOs are managed, with the following transmission types:
- Synchronous acyclic (00h): Data is transmitted in response to the SYNC signal only if the data has been updated since the previous transmission.
- Synchronous cyclic (01h): The data is transmitted in response to the SYNC signal even if it has not yet been updated.
- Asynchronous (FFh): This is the default operation of transmitting the PDO at a predetermined frequency programmable in the communication parameters (default = 0, transmission disabled).

PDO1 is mapped to transmit the following values (updated with 125 Hz frequency):
- Gross weight (Index = 2001h), formatted as Signed 32 bit.
- Net weight (Index = 2002h), formatted as Signed 32 bit.

PDO2 is mapped to transmit the following values (updated with 125 Hz frequency):
- Peak (index = 2003h), formatted as 32 bits.
- Status Register (index = 2000h), formatted as Unsigned 16 bit.
- Digital Inputs (index = 2004h), formatted as Unsigned 8 bit.
- Outputs (index = 2005h), formatted as Unsigned 8 bit.

CANOPEN - SPECIFICATIONS

NMT	NMT slave
Error checking	Heartbeat producer
Boot-up	Yes
Range node ID	1 - 127
CANopen bit-rates	10 – 500 kbit/sec
Number of PDO	2 TPDO
PDO mode	Event-triggered (timer) Synchronous (cyclic) Synchronous (acyclic)
PDO mapping	Yes (6 obj/PDO)
Emergency message	Yes (Producer)
Number of SDO	1 SDO server ("expedited" and "segmented" transfer) No SDO client
Sync	Sync producer: no Sync counter: no
Time stamp	No
Additional functions	-
Application layer	CiA 301 V 4.0.2
Supported Frameworks	-
Supported profiles	-
Certificate	No

CANOPEN - OBJECT DICTIONARY - COMMUNICATION PROFILE AREA

GENERIC PARAMETERS

Index	Sub-Index	Name	Description	Type	Attribute
1000h	0	DEV_TYPE	Device type information (*)	U32	R
1001h	0	ERR_REG	Error log	U8	R
1005h	0	COB_ID SYNC	COB_ID message Sync (80h)	U32	R/W
1010h	0	STORE_PAR	Number of sub-indexes (4)	U8	R
	1		Save all parameters (**)	U32	R/W
	2		Save communication parameters (**)	U32	R/W
	3		Save application parameters (function unmanaged, use command 0x0007 from Command Register)	U32	R/W
	0		Number of sub-indexes (4)	U8	R
	1		Read all parameters (***)	U32	R/W
	2		Read communication parameters (***)	U32	R/W
	3		Read application parameters (***)	U32	R/W
1014h	0	COB_ID EMCY	COB_ID message Emergency (80+Node_ID)	U32	R
1017h	0	HBT_TIME	Heartbeat Time (expressed in ms, default 1000 mS)	U16	R/W
1018h	0	OBJ_ID	Number of sub-indexes (4)	U8	CONST
	1		ID seller	U32	CONST
	2		Product Code	U32	CONST
	3		Version number	U32	CONST

(*) 00000194h (according to CiA DS404 for measuring devices).
(**) 65766173h ('a','v','e','s').
(***) 64616F6Ch ('d','a','o','l').

SDO SERVER PARAMETERS

Index	Sub-Index	Name	Description	Type	Attribute
1200h	0	SDO_PAR	Number of SDO records (2)	U8	R
	1		COB_ID Client->Server (rx) (= 600h + Node_ID)	U32	R
	2		COB_ID Server->Client (tx) (= 580h + Node_ID)	U32	R

CANOPEN - OBJECT DICTIONARY - COMMUNICATION PROFILE AREA (continued)

T_PDO COMMUNICATION PARAMETERS

Index	Sub-Index	Name	Description	Type	Attribute
1800h	0	AI_T_PDO_CPAR1	Number of sub-indexes (5)	U8	R
	1		COB_ID used by the PDO (180h + Node ID)	U32	R
	2		PDO transmission type [(*)]	U8	R
	3		Inhibition time (0)	U16	R/W
	4		Reserved	U8	R/W
	5		Even timer (expressed in ms, default 8 ms)	U16	R/W

(*) PDO transmission type:
  00h = synchronous acyclic (PDO is transmitted following receipt of SYNC, but only if a new measurement has been acquired).
  01h = synchronous cyclic (PDO is always transmitted following the reception of SYNC).
  FFh = asynchronous (default) (PDO is transmitted periodically according to the set time, setting "event timer" to zero disables transmission).

Other transmission types provided by the Cia DS-301 are not supported.

T_PDO PARAMETER MAPPING

Index	Sub-Index	Name	Description	Type	Attribute
1A00h	0	T_PDO_MPAR1	Number of "application objects" mapped in PDO (2)	U8	R
	1		Applic.Obj.map 1 [(*)]	U32	R
	2		Applic.Obj.map 2 [(*)]	U32	R

The sub-index structure from 1h to 6h is shown below.

Byte:	MSB		LSB
	index (16 bit)	sub-index (8 bit)	object length (8 bit)
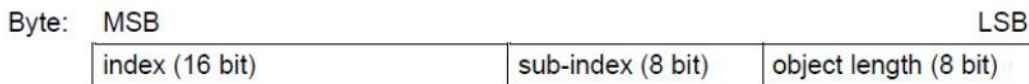
(*) The following default values are defined:

- Sub-index 0 = 2h.
- Sub-index 1 = 2001 0120h (Index = 2001h, sub-index 01.32-bit length).
- Sub-index 2 = 2002 0120h (Index = 2002h, sub-index 01.32-bit length).

CANOPEN - OBJECT DICTIONARY - COMMUNICATION PROFILE AREA (continued)

T_PDO COMMUNICATION PARAMETERS

Index	Sub-Index	Name	Description	Type	Attribute
1801h	0	AI_T_PDO_CPAR2	Number of sub-indexes (5)	U8	R
	1		COB_ID used by the PDO (280h + Node ID)	U32	R
	2		PDO transmission type [*]	U8	R
	3		Inhibition time ((0)	U16	R/W
	4		Reserved	U8	R/W
	5		Timer event (expressed in ms, default 8 ms)	U16	R/W

[*] PDO transmission type:

    00h = synchronous acyclic (PDO is transmitted following receipt of SYNC, but only if a new measurement has been acquired).

    01h = synchronous cyclic (PDO is always transmitted following the reception of SYNC).

    FFh = asynchronous (default) (PDO is transmitted periodically according to the set time, setting "event timer" to zero disables transmission).

Other transmission types provided by the Cia DS-301 are not supported.

T_PDO PARAMETER MAPPING

Index	Sub-Index	Name	Description	Type	Attribute
1A01h	0	T_PDO_MPAR2	Number of "application objects" mapped in PDO (4)	U8	R
	1		Applic.Obj.map 1 [*]	U32	R
	2		Applic.Obj.map 2 [*]	U32	R
	3		Applic.Obj.map 3 [*]	U32	R
	4		Applic.Obj.map 4 [*]	U32	R

The sub-index structure from 1h to 6h is shown below.

Byte: MSB		LSB
index (16 bit)	sub-index (8 bit)	object length (8 bit)
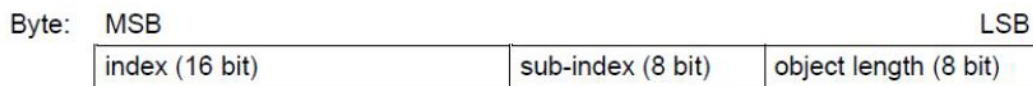
[*] The following default values are defined

- Sub-index 0 = 4h.
- Sub-index 1 = 2003 0120h (Index = 2003h, sub-index 01.32-bit length).
- Sub-index 2 = 2000 0110h (Index = 2000h, sub-index 01.16-bit length).
- Sub-index 3 = 2004 0108h (Index = 2004h, sub-index 01.8-bit length).
- Sub-index 4 = 2005 0108h (Index = 2005h, sub-index 01.8-bit length).

CANOPEN - OBJECT DICTIONARY - COMMUNICATION PROFILE AREA (continued)

PARAMETERS DEFINED BY THE MANUFACTURER

Index	Sub-Index	Name	Description	Type	Attribute
2000h	0	UD_STATUS	Number of sub-index (1)	U8	R
	1		Status Register	U16	R
2001h	0	UD_GROSS	Number of sub-index (1)	U8	R
	1		Gross weight	S32	R
2002h	0	UD_NET	Number of sub-index (1)	U8	R
	1		Net weight	S32	R
2003h	0	UD_PEAK	Number of sub-index (1)	U8	R
	1		Peak	S32	R
2004h	0	UD_IN	Number of sub-index (1)	U8	R
	1		Digital inputs	U8	R
2005h	0	UD_OUT	Number of sub-index (1)	U8	R
	1		Digital outputs	U8	R
2006h	0	UD_COMMAND	Number of sub-index (1)	U8	R
	1		Command Register	U16	W
2007h	0	UD_DATA	Number of sub-index (1)	U8	R
	1		Data Register	U32	W
2008h	0	UD_MONITOR_R	Number of sub-index (1)	U8	R
	1		Monitor Register (reading)	U16	R
2009h	0	UD_MONITOR_W	Number of sub-index (1)	U8	R
	1		Monitor Register (writing)	U16	W
200Ah	0	UD_W_VAL	Number of sub-index (1)	U8	R
	1		Weighing net weight	S32	R
200Bh	0	UD_W_CODE	Number of sub-index (1)	U8	R
	1		Weighing code	U32	R
200Ch	0	UD_SET_1	Number of sub-index (1)	U8	R
	1		Set-Point 1	S32	R/W
200Dh	0	UD_SET_2	Number of sub-index (1)	U8	R
	1		Set-Point 2	S32	R/W
200Eh	0	UD_CAPACITY	Number of sub-index (1)	U8	R
	1		Load cells capacity	S32	R/W
200Fh	0	UD_SENS	Number of sub-index (1)	U8	R
	1		Load cells sensitivity	U16	R/W
2010h	0	UD_DIV	Number of sub-index (1)	U8	R
	1		Weight value division	U8	R/W

CANOPEN - OBJECT DICTIONARY - COMMUNICATION PROFILE AREA (continued)

PARAMETERS DEFINED BY THE MANUFACTURER (continued)

Index	Sub-Index	Name	Description	Type	Attribute
2011h	0	UD_DEC	Number of sub-index (1)	U8	R
	1		Decimals	U8	R/W
2012h	0	UD_TARE_F	Number of sub-index (1)	U8	R
	1		Fixed Tare	S32	R/W
2013h	0	UD_STAND_B	Number of sub-index (1)	U8	R
	1		Stand by function	U16	R/W
2014h	0	UD_LOCK_T	Number of sub-index (1)	U8	R
	1		Keyboard lock function	U8	R/W
2015h	0	UD_PASS	Number of sub-index (1)	U8	R
	1		Password function	U16	R/W
2016h	0	UD_PEAK	Number of sub-index (1)	U8	R
	1		Peak function	U8	R/W
2017h	0	UD_LOG	Number of sub-index (1)	U8	R
	1		Datalogger function	U8	R/W
2018h	0	UD_FILT	Number of sub-index (1)	U8	R
	1		Filter factor	U8	R/W
2019h	0	UD_RATE	Number of sub-index (1)	U8	R
	1		Output rate ADC	U8	R/W
201Ah	0	UD_N_MEDIA	Number of sub-index (1)	U8	R
	1		Number of readings per average	U8	R/W
201Bh	0	UD_T_MON	Number of sub-index (1)	U8	R
	1		Monotony time	U16	R/W
201Ch	0	UD_T_OSC	Number of sub-index (1)	U8	R
	1		Oscillation time	U16	R/W
201Dh	0	UD_R_OSC	Number of sub-index (1)	U8	R
	1		Oscillation range	U8	R/W
201Eh	0	UD_SB	Number of sub-index (1)	U8	R
	1		Scale Bottom	S32	R/W
201Fh	0	UD_STAB	Number of sub-index (1)	U8	R
	1		Weight stability	U8	R/W
2020h	0	UD_AUTO_Z	Number of sub-index (1)	U8	R
	1		Autozero on start-up	S32	R/W
2021h	0	UD_INS_Z	Number of sub-index (1)	U8	R
	1		Zero tracking	U8	R/W

CANOPEN - OBJECT DICTIONARY - COMMUNICATION PROFILE AREA (continued)

PARAMETERS DEFINED BY THE MANUFACTURER (cont'd.)

Index	Sub-Index	Name	Description	Type	Attribute
2022h	0	UD_FUN_IN1	Number of sub-index (1)	U8	R
	1		Input function 1	U8	R/W
2023h	0	UD_FUN_IN2	Number of sub-index (1)	U8	R
	1		Input function 2	U8	R/W
2024h	0	UD_FUN_OUT1	Number of sub-index (1)	U8	R
	1		Output 1 mode - Function	U8	R/W
2025h	0	UD_LOG_OUT1	Number of sub-index (1)	U8	R
	1		Output 1 mode - Logic	U8	R/W
2026h	0	UD_POL_OUT1	Number of sub-index (1)	U8	R
	1		Output 1 mode - Polarity	U8	R/W
2027h	0	UD_STAB_OUT1	Number of sub-index (1)	U8	R
	1		Output 1 mode - Stability	U8	R/W
2028h	0	UD_IST_OUT1	Number of sub-index (1)	U8	R
	1		Hysteresis output 1	S32	R/W
2029h	0	UD_T_OUT1	Number of sub-index (1)	U8	R
	1		Output 1 Timing	U16	R/W
202Ah	0	UD_R_OUT1	Number of sub-index (1)	U8	R
	1		Output 1 delay	U16	R/W
202Bh	0	UD_FUN_OUT2	Number of sub-index (1)	U8	R
	1		Output 2 mode - Function	U8	R/W
202Ch	0	UD_LOG_OUT2	Number of sub-index (1)	U8	R
	1		Output 2 mode - Logic	U8	R/W
202Dh	0	UD_POL_OUT2	Number of sub-index (1)	U8	R
	1		Output 2 mode - Polarity	U8	R/W
202Eh	0	UD_STAB_OUT2	Number of sub-index (1)	U8	R
	1		Output 2 mode - Stability	U8	R/W
202Fh	0	UD_IST_OUT2	Number of sub-index (1)	U8	R
	1		Hysteresis output 2	S32	R/W
2030h	0	UD_T_OUT2	Number of sub-index (1)	U8	R
	1		Output 2 timing	U16	R/W
2031h	0	UD_R_OUT2	Number of sub-index (1)	U8	R
	1		Output 2 delay	U16	R/W
2032h	0	UD_ANA_T	Number of sub-index (1)	U8	R
	1		Analog fixed tare	S32	R/W

FIELDBUS COMMUNICATION PROTOCOLS (CONTINUED)

CANOPEN - OBJECT DICTIONARY - COMMUNICATION PROFILE AREA (continued)

PARAMETERS DEFINED BY THE MANUFACTURER (cont'd.)

Index	Sub-Index	Name	Description	Type	Attribute
2033h	0	UD_ANA_FS	Number of sub-index (1)	U8	R
	1		Analog Scale Bottom	S32	R/W
2034h	0	UD_ANA_M	Number of sub-index (1)	U8	R
	1		Analog output mode	U8	R/W
2035h	0	UD_ANA_R	Number of sub-index (1)	U8	R
	1		Analog output range	U8	R/W

FIELDBUS COMMUNICATION PROTOCOLS (CONTINUED)

STATUS REGISTER CODING TABLE (SERIAL TYPE = DAT1400)

Bit	15	14	13	12	11	10	9	8
Description	Setup (***)	Delta weight	Output 2	Output 1	Input 2	Input 1	Run Backup	Hold function

Bit	7	6	5	4	3	2	1	0
Description	Not calibrated	Weight error	Over-load	Under-load	Tare entered	Zero band	Stable weight	Zero Center

KEYBOARD BLOCK CODING TABLE

Bit	15-3	2	1	0
Description	Not Used	Active Up Arrow Key	Active DOWN Arrow Key	Active ENTER key

DIGITAL INPUT/OUTPUT CODING TABLE

Bit	15-2	1	0
Description	Not Used	IN/OUT 2 Active	IN/OUT 1 Active

DIVISION VALUES AND DECIMALS CODING TABLE

Address	Description	Accepted Values
1101	Division value	1 - 2 - 5 - 10 - 20 - 50
1102	Number of decimals	0 - 1 - 2 - 3 - 4

FIELDBUS COMMUNICATION PROTOCOLS (CONTINUED)

CODING TABLE COMMAND REGISTER / DATA REGISTER (SERIAL TYPE = DAT1400)

Register value	COMMAND REGISTER FUNCTION	DATA REGISTER FUNCTION
0x0001	Semi-automatic zero	-
0x0002	Auto-tare	-
0x0003	Delete Peak	-
0x0004	Zero Calibration (**)	-
0x0005	Sample Weight Calibration (**)	Sample weight value in MSB and LSB
0x0006	Analog Test	Value between 0 and 100 at intervals of 10 in LSB
0x0007	Data storage in permanent memory	-
0x000A	Weighing execution command	-
0x000B	Switching command from gross to net weight	-
0x000C	Switching command from net to gross weight	-
0x000D	Zero signal acquisition (table calibration)	-
0x0015	Linearization point storage (**)	Sample weight value in MSB and LSB
0x0055	Interruption of the linearization procedure (**)	-
0x3FFF	Enabling Reading Output Data Area (*)	-

(*) This command must be sent whenever registers in the Fieldbus Output Data Area are changed, in order to make the changes made effective in the instrument. **Caution**: when the instrument is turned on, the Output Data Area is completely reset to zero; the Fieldbus master must read the parameter values from the Input Data Area and copy them to the relevant registers in the Output Data Area, before sending the read enable command 0x3FFF in the Command Register. Otherwise, all parameters handled in the Output Data Area would be reset to zero. Do not use in case of CANopen fieldbus.

(**) Function available only in case of FREE operation or in case of METRIC operation with calibration jumper enabled.

(***) The instrument is in configuration phase (flag TRUE during access to instrument SETUP menu or during connection with PC software "Optimation").

FIELDBUS LINEARIZATION PROCEDURE

The linearization procedure replicates remotely the operations that can be performed from the keyboard as described in the manual for dead weight calibration:

- Zero calibration: send command 0x0004; perform the operation with the scale unloaded but complete with the tare, at stabilized weight. The gross weight acquired should be zeroed. It is possible to repeat this operation several times.
- Up to 5 linearization points on a positive scale are possible. Program the value of the actual weight loaded and stabilized in the Data Register and send command 0x0015. It is possible to verify the successful operation by checking the acquired gross weight; the instrument automatically goes to the next linearization point; if the weight is not stable, the operation is not performed. You can repeat the linearization command (0x0015) up to 5 points.
- End the linearization procedure by sending the command 0x0055 after the last point is acquired. It is possible to store a number of points less than 5.
- Send the command 0x0007 to save the calibration in permanent memory.

EU Declaration of conformity (DoC)

We

Pavone Sistemi S.r.l.

Via Tiberio Bianchi, 11/13/15

20863 Concorezzo, MB

declare that the DoC issued under our sole responsibility and belongs to the following product:

Apparatus model/Product: **DAT 700**

Type: Weighing instrument

The object of the declaration described above used as indicated in the installation manual and use, is in conformity with the relevant Union harmonisation legislation:

Directive **EMC 2014/30/EU** Electromagnetic Compatibility

The following harmonized standards and technical specification have been applied:

EN 61000-6-2

EN 61000-6-3 + A1

EN 61326-1

Directive **LVD 2014/35/EU** Low Voltage Directive

The following harmonized standards and technical specification have been applied:

EN 61010-1

Signed for end on behalf of:

Concorezzo: 08/01/2024

Di Reda Donato - Manager