MODBUS RTU

COMMUNICATION PROTOCOL:

PUE 7.1 Indicator
PUE HY10 Indicator
WLY Precision Scales
WPY Multifunctional Scales
HY10 Multifunctional Scales

USER MANUAL

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CONTENTS

1. GENERAL INFORMATION

Modbus RTU protocol implemented in the indicator can be applied when RS232 serial connector or Ethernet are used (Modbus over TCP). The protocol enables:

- Operation of up to 2 weighing platforms (mass readout, taring, zeroing, determining: tare value, LO, MIN and MAX thresholds of every platform),
- Input status readout,
- Output setting,
- Operator selection,
- Product selection,
- Customer selection,
- Packaging selection,
- Warehouse selection,
- Dosing selection,
- Formulations selection,
- Lot number selection,
- Process stop,
- Process start,
- Save/Print,
- Statistics zeroing.

2. IMPLEMENTED FUNCTIONS

Modbus RTU communication is based on 3 functions:

- 03 (0x03) Read Holding Registers – output data readout.
- 04 (0x04) Read Input Registers – input data readout.
- 16 (0x10) Write Multiple Registers – output data record.

3. MEMORY MAP

3.1. Input Address

Input variables list:

Variable	Address	Length [WORD]	Data type
Platform 1 mass	0	2	float
Platform 1 tare	2	2	float
Platform 1 unit	4	1	word
Platform 1 status	5	1	word
Platform 1 LO threshold	6	2	float
Platform 2 mass	8	2	float

Platform 2 tare	10	2	float
Platform 2 unit	12	1	word
Platform 2 status	13	1	word
Platform 2 LO threshold	14	2	float
Process status (Stop, Start)	32	1	word
Inputs status	33	1	word
Min	34	2	float
Max	36	2	float
Lot number	42	2	dword
Operator	44	1	word
Product	45	1	word
Customer	46	1	word
Packaging	47	1	word
Source warehouse	48	1	word
Target warehouse	49	1	word
Formulation/Dosing	50	1	word

Platform mass – response: platform mass in current unit.
Platform tare – response: platform tare in an adjustment unit.

Platform unit – determines currently displayed mass unit of a platform.

Unit bits	
0	gram [g]
1	kilogram [kg]
2	carat [ct]
3	pound [lb]
4	ounce [oz]
5	Newton [N]

Example:

bit No.	**B5**	**B4**	**B3**	**B2**	**B1**	**B0**
value	0	0	0	0	1	0

The unit of the weighing instrument is kilogram [kg].

Platform status – determines status of a weighing platform.

Status bits	
0	Measurement correct (weighing instrument does not report an error).
1	Measurement stable.
2	Weighing instrument indicates zero.
3	Weighing instrument is tared.
4	Weighing instrument is in II weighing range.
5	Weighing instrument is in III weighing range.
6	Weighing instrument reports NULL error.
7	Weighing instrument reports LH error.
8	Weighing instrument reports FULL error.

Example:

bit No.	**B8**	**B7**	**B6**	**B5**	**B4**	**B3**	**B2**	**B1**	**B0**
value	0	0	0	0	1	0	0	1	1

The weighing instrument does not report error, stable measurement in II weighing range.

LO threshold – response: **LO** threshold value of a platform in an adjustment unit.

Process status – determines process status:

Decimal value	**Process status**	**bit No.**	
		B1	**B0**
0	process disabled	0	0
1	process start	0	1
2	process stop	1	0
3	process completed	1	1

Inputs status – response: status of set inputs:

Input No.	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
OFF	0	0	0	0	0	0	0	0	0	0	0	0
ON	1	1	1	1	1	1	1	1	1	1	1	1

Example:

Mask of set 2 and 4 inputs: 0000 0000 0000 1010

MIN – response: **MIN** threshold value (in the current unit selected for active working mode).
MAX – response: **MAX** threshold value (in the current unit selected for active working mode).
Lot number – response: lot number.
Operator – response: code of logged in operator.
Product – response: code of selected product.
Customer – response: code of selected customer.
Packaging – response: code of selected packaging.
Source warehouse – response: code of selected source warehouse.
Target warehouse – response: code of selected target warehouse.
Formulation – response: code of selected formulation.

3.2. Output Address

Output variables list:

Variable	Address	Length [word]	Data type
Command	0	1	word
Command with parameter	1	1	word
Platform	2	1	word
Tare	3	2	float
LO threshold	5	2	float
Outputs status	7	1	word
Min	8	2	float
Max	10	2	float
Lot number	16	2	dword
Operator	18	1	word
Product	19	1	word
Customer	20	1	word
Packaging	21	1	word
Source warehouse	22	1	word
Target warehouse	23	1	word
Formulation/Dosing	24	1	word

Basic command – setting respective value performs the task in accordance with the table:

Decimal value	Command
1	Zero the platform
2	Tare the platform
4	Delete statistics
8	Save/Print
16	Start
32	Stop (error)

Example:

0000 0000 0010 0000 – process start.

Complex command – setting respective value performs the task in accordance with the table:

Decimal value	Command
1	Setting tare value for a given platform
2	Setting LO threshold value for a given platform
3	Setting lot number
4	Setting outputs status
5	Operator selection
6	Product selection
7	Packaging selection
8	Setting MIN threshold value
9	Customer selection
10	Source warehouse selection
11	Target warehouse selection
12	Dosing selection
16	Setting MAX threshold value

Complex command requires setting address of respective parameter (from 2 to 24 – refer to: "Complex command parameters").

Example:

0000 0000 0000 0010 – command sets LO threshold to the value set in LO parameter (address 5 – refer to: "*Complex command parameters*").

Platform – complex command parameter: weighing platform number.
Tare – complex command parameter: tare value (in an adjustment unit).
LO threshold – complex command parameter: LO threshold value (in an adjustment unit).
Outputs status – complex command parameter: determines status of weighing indicator outputs.

Output No.	12	11	10	9	8	7	6	5	4	3	2	1
OFF	0	0	0	0	0	0	0	0	0	0	0	0
ON	1	1	1	1	1	1	1	1	1	1	1	1

Example:

Mask of active 2 and 4 outputs: 0000 0000 0000 1010

MIN – complex command parameter: MIN threshold value (in the current unit selected for active working mode).
MAX – complex command parameter: MAX threshold value (in the current unit selected for active working mode).
Lot number – complex command parameter: lot number.
Operator – complex command parameter: code of logged in operator.
Product – complex command parameter: code of selected product.
Customer – complex command parameter: code of selected customer.
Packaging – complex command parameter: code of selected packaging.
Source warehouse – complex command parameter: code of selected source warehouse.
Target warehouse – complex command parameter: code of selected target warehouse.
Formulation – complex command parameter: code of selected formulation.

A command or a command with parameter is executed once when its bit setting is detected. If the command with the same bit is to be executed again, zero the bit.

Example:

Command	address 1	address 0
Tare	0000 0000	0000 0010
Zero command bits	0000 0000	0000 0000
Tare	0000 0000	0000 0010

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