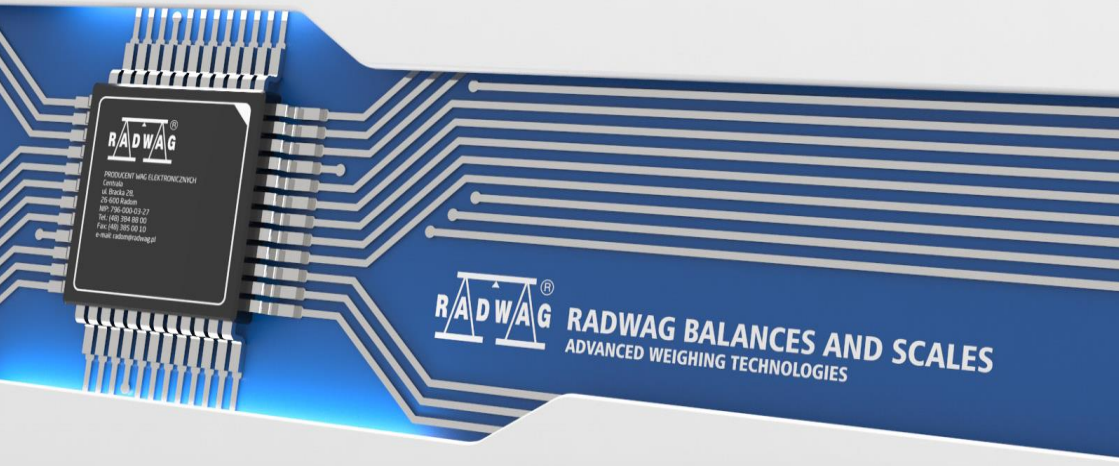
EtherNet/IP™

Communication Protocol of PUE HX7 Indicator

SOFTWARE MANUAL

ITKP-28-01-07-20-EN



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JULY 2020

"The drawings, photos and graphics used are for illustrative purposes only."

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1. DATA STRUCTURE

1.1. Input Address

1.1.1. Input Variables

Variable	Offset	Length [WORD]	Data type
Platform 1 mass	0	2	float
Platform 1 tare	4	2	float
Platform 1 unit	8	1	word
Platform 1 status	10	1	word
Platform 1 LO threshold	12	2	float
Platform 2 mass	16	2	float
Platform 2 tare	20	2	float
Platform 2 unit	24	1	word
Platform 2 status	26	1	word
Platform 2 LO threshold	28	2	float
Process status (Stop, Start)	64	1	word
Input state	66	1	word
Min	68	2	float
Max	72	2	float
Lot number	84	2	dword
Operator	88	1	word
Product	90	1	word
Customer	92	1	word
Packaging	94	1	word
Formulation	100	1	word
Dosing process	102	1	word

1.1.2. Input Registers

Platform mass – returns platform mass in a current unit.

Platform tare – returns platform tare in an adjustment unit.

Platform unit – determines a current mass unit of a given platform.

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

Example:

Read HEX value: 0x02. Binary form:

B1/7	B1/6	B1/5	B1/4	B1/3	B1/2	B1/1	B1/0	B0/7	B0/6	B0/5	B0/4	B0/3	B0/2	B0/1	B0/0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

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

Platform status – determines state of a given weighing platform.

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

Example:

Read HEX value: 0x13

B1/7	B1/6	B1/5	B1/4	B1/3	B1/2	B1/1	B1/0	B0/7	B0/6	B0/5	B0/4	B0/3	B0/2	B0/1	B0/0
0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1

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

LO threshold – returns value of platform's **LO** threshold in an adjustment unit.

Process status – determines status of the dosing\formulation process:

0x00 – process disabled
0x01 – process activated
0x02 – process aborted
0x03 – process completed

Input state – bitmask of indicator inputs. The first 4 least significant bits represent weighing indicator inputs.

Example:

Read HEX value: 0x000B

B1/7	B1/6	B1/5	B1/4	B1/3	B1/2	B1/1	B1/0	B0/7	B0/6	B0/5	B0/4	B0/3	B0/2	B0/1	B0/0
0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1

Inputs number 1, 2 and 3 take HI state.

MIN – returns **MIN** threshold value (in a current unit).

MAX – returns **MAX** threshold value (in a current unit).

Lot number – returns lot number. Numerical values exclusively! Non-numerical values are neglected.

Operator – returns a logged in operator code.

Product – returns a selected product code.

Customer – returns a selected customer code.

Packaging – returns a selected packaging code.

Formulation – returns a selected formulation code.

Dosing process – returns the value of a selected dosing process code.

1.2. Output Address

Input variables:

Variable	Offset	Length [WORD]	Data type
Command	0	1	word
Command with parameter	2	1	word
Platform	4	1	word
Tare	6	2	float

LO threshold	10	2	float
Output state	14	1	word
Min	16	2	float
Max	20	2	float
Lot number	32	2	dword
Operator	36	1	word
Product	38	1	word
Customer	40	1	word
Packaging	42	1	word
Formulation	48	1	word
Dosing process	50	1	word

1.2.1. Output Registers

Basic command – setting a respective value triggers direct performance of a given task, see the table:

Bit No.	Operation
0	Zero the platform
1	Tare the platform
2	Clear statistics
3	Save/Print
4	Process start
5	Process stop

Example:

Record of the register by value 0x02

B1/7	B1/6	B1/5	B1/4	B1/3	B1/2	B1/1	B1/0	B0/7	B0/6	B0/5	B0/4	B0/3	B0/2	B0/1	B0/0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

The above causes scale taring.

Basic command is executed once upon detecting that its bit has been set. If the command is to be executed more than once, it is necessary to zero the bit first, and reset it to the required value next.

Complex command – setting a respective value triggers performance of a given task, see the table:

Bit No.	Operation
0	Setting the tare value for a given platform
1	Setting LO threshold value for a given platform
2	Setting lot number
3	Setting output status
4	Operator selection
5	Product selection
6	Packaging selection
7	Setting MIN threshold value
8	Customer selection
9	Source warehouse selection
10	Target warehouse selection
11	Dosing process selection
12	Setting MAX threshold value

	***Complex command requires setting a respective parameter (offset from 4 to 50 – refer to output registers table)***
	***A command with a parameter is executed once upon detecting that its bit has been set. If the command is to be executed more than once, it is necessary to zero the bit first, and reset it to the required value next.***

Example:

Sending tare of 1.0 value for the 1st platform.

Performance of the command requires record of 3 registers:

offset 2 – command with a parameter - value 0x01 – i.e. tare setting,
offset 4 – number of a platform to which the tare is to be assigned - value 0x01 for platform 1,
offset 6 – tare value in float format - 1.0.

Platform – complex command parameter: weighing platform number (1 or 2).

Tare – complex command parameter: tare value (in an adjustment unit).

LO threshold – complex command parameter: LO threshold value (in an adjustment unit).

Output state – complex command parameter: determines state of the weighing indicator and communication module outputs.

Example:

Setting high state for output 1 and 3 of the indicator.

Output mask:

B1/7	B1/6	B1/5	B1/4	B1/3	B1/2	B1/1	B1/0	B0/7	B0/6	B0/5	B0/4	B0/3	B0/2	B0/1	B0/0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1

Upon conversion to HEX the result is 0x05

Performance of the command requires record of 2 registers:

offset 2 – command with a parameter - value 0x08 – i.e. output state record,
offset 14 – output mask 0x05.

As a result, outputs number 1 and 3 take high state.

MIN – complex command parameter: MIN threshold value (in the unit set for the active working mode).

MAX – complex command parameter: MAX threshold value (in the unit set for the active working mode).

Lot number – complex command parameter: lot number value. Numerical values exclusively! Non-numerical values are neglected.

Operator – complex command parameter: operator code (digits only).

Product – complex command parameter: product code (digits only).

Customer – complex command parameter: customer code (digits only).

Packaging – complex command parameter: packaging code (digits only)

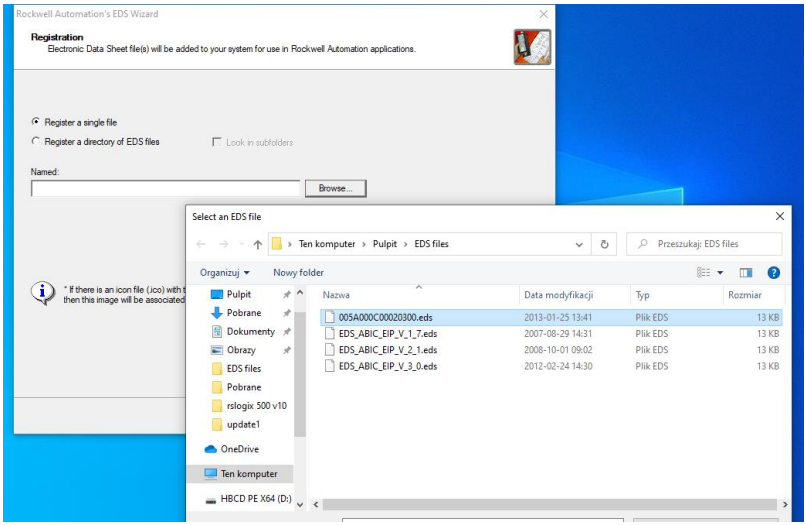
Formulation – complex command parameter: formulation code (digits only).

Dosing process – complex command parameter: dosing process code (digits only).

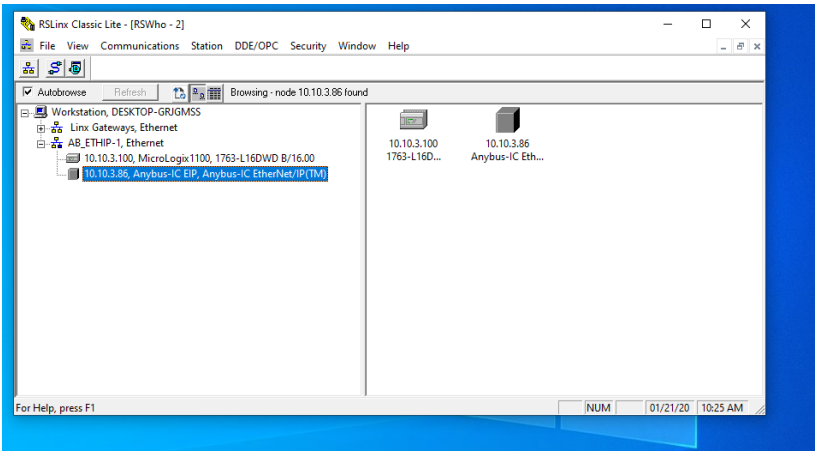
2. CONFIGURATION OF THE EtherNet/IP MODULE IN RS LOGIX ENVIRONMENT

2.1. RSLinxs Configuration

Start the operation in the environment by configuring the devices in RSLinx software. To do this, add EtherNet/IP module of the scale using EDS file and EDS Hardware Installation Tool.

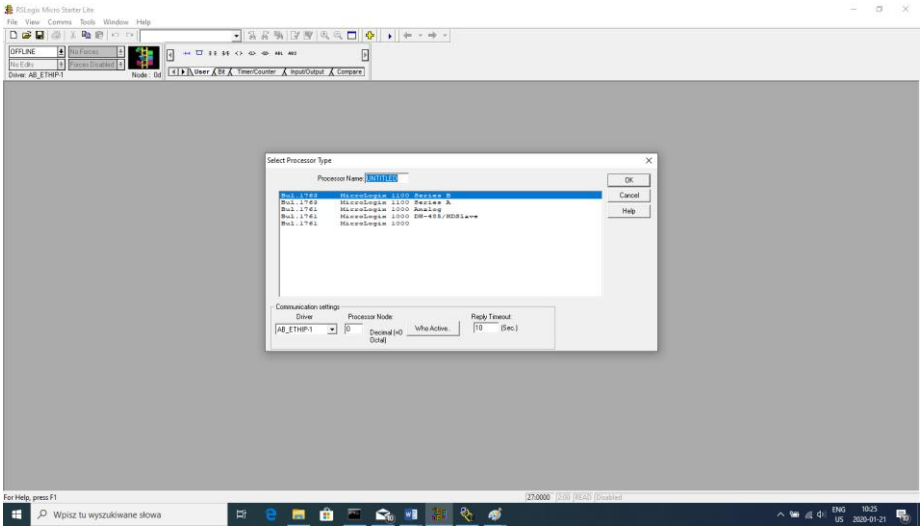


Upon connecting the scale and the Master controller to the network (make sure all devices and the PC are in the same subnet), they are visible as shown in the figure below.

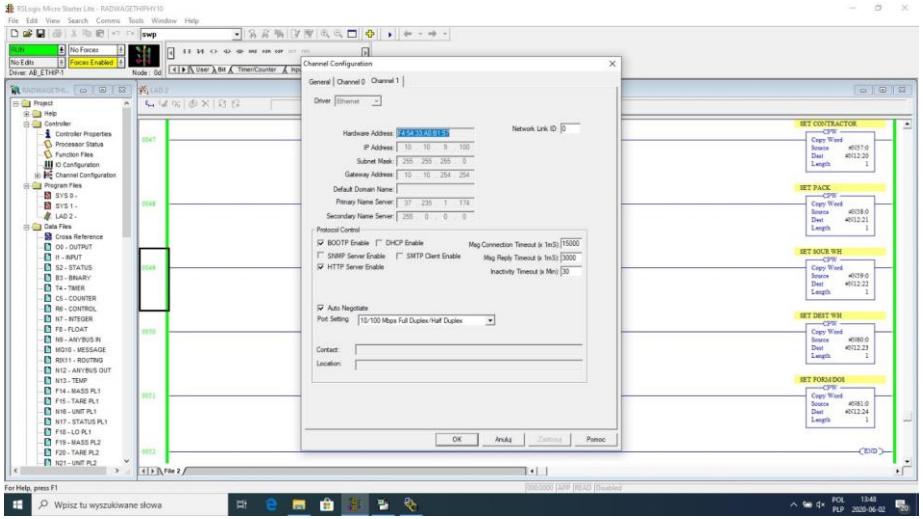


2.2. RSLogix Project

Start operation in the environment, to do it create a new project. In the controller window select the PLC that is to communicate with the scale.



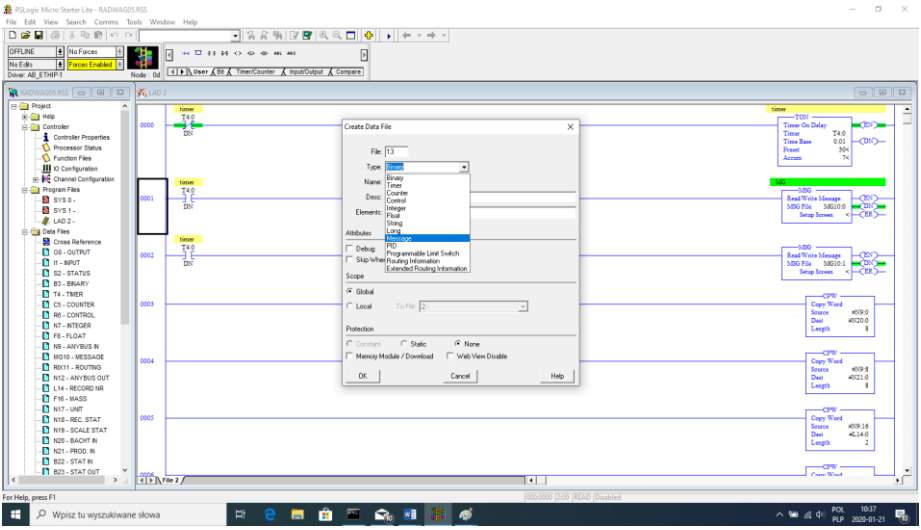
Confirm your choice and go to the project window. Next, configure the communication interface of the controller. To do that, select CHANNEL CONFIGURATION>CHANNEL 1 in the project tree. Here, you can declare the properties of this communication channel, e.g. IP address or subnet mask.



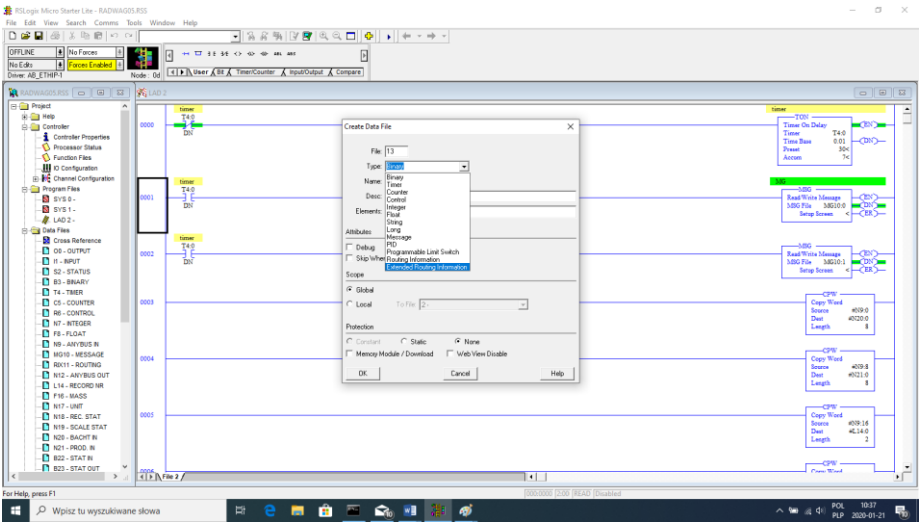
Upon configuration, check if connection with the PLC (online) is possible and download the project.

Now add a new rung to the project ladder and create a MSG function enabling readout of data from the scale. Prior to adding the function, add new data files in the project tree:

- two-element MG (message) file, and

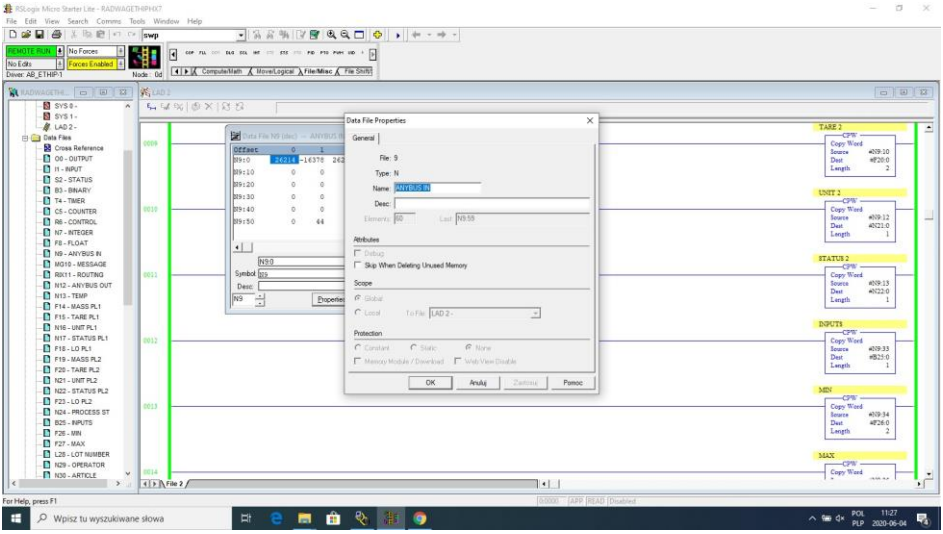


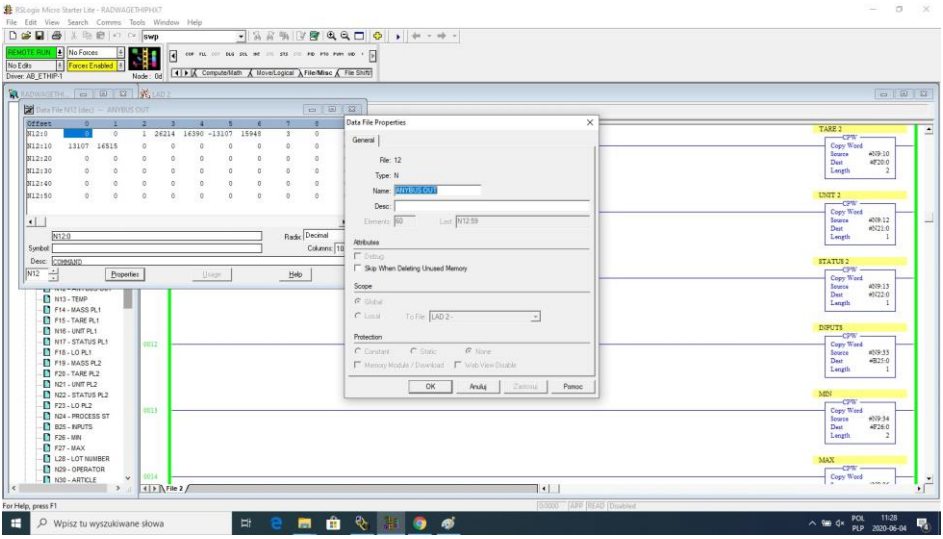
- RIX file.



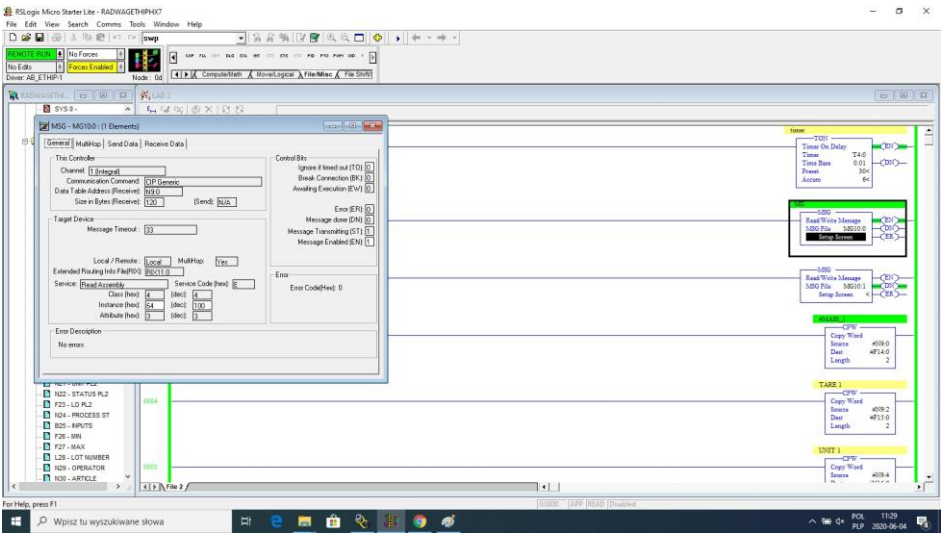
Add also two files of INTEGER type to store data read from the scale and data sent to the scale.

In the example two files were created: ANYBUS IN (N9), 120 bytes, and ANYBUS OUT (N12), 120 bytes.



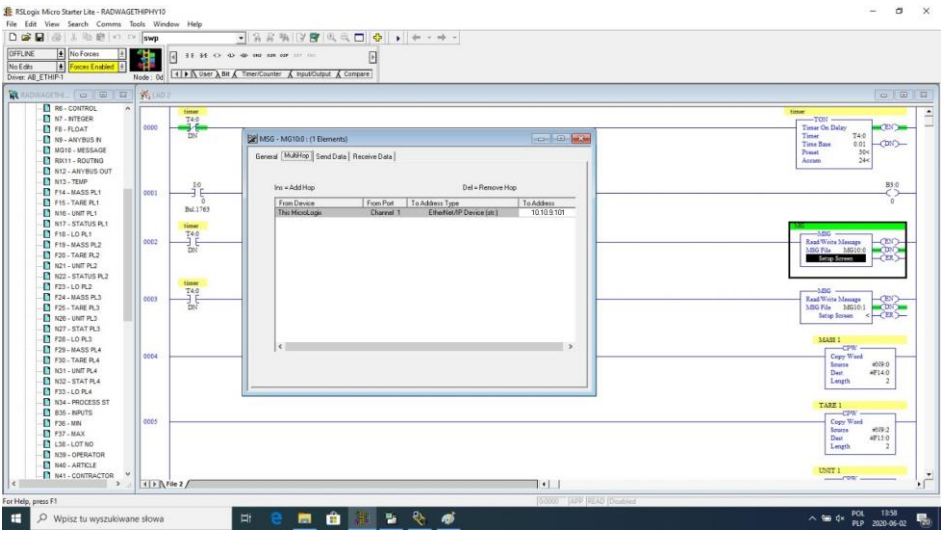


You can now add MSG functions, one for data readout and one for data record.

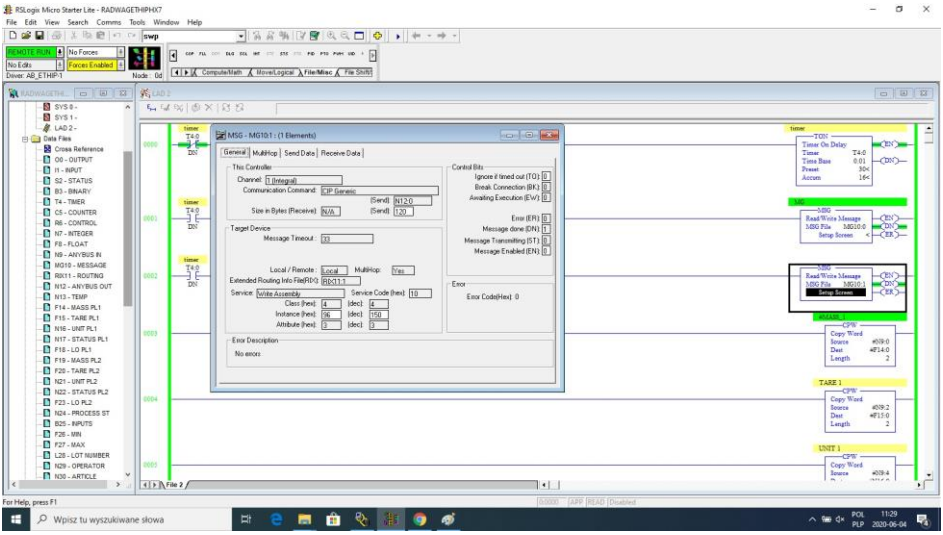


Configuration procedure:
Channel – select 1 (integral), which corresponds to EtherNet/IP.
Communication Command – CIP Generic.
Data Table Address – N9:0 – the file for data readout.
Size in Bytes – 120 – size of the input registers table.
Extended Routing Info File – RIX11:0 – indicate RIX file.
Service: Read assembly.
Instance: 64.
MulitHop: Yes.

Go to the MultiHoop tab and enter IP address of the scale.



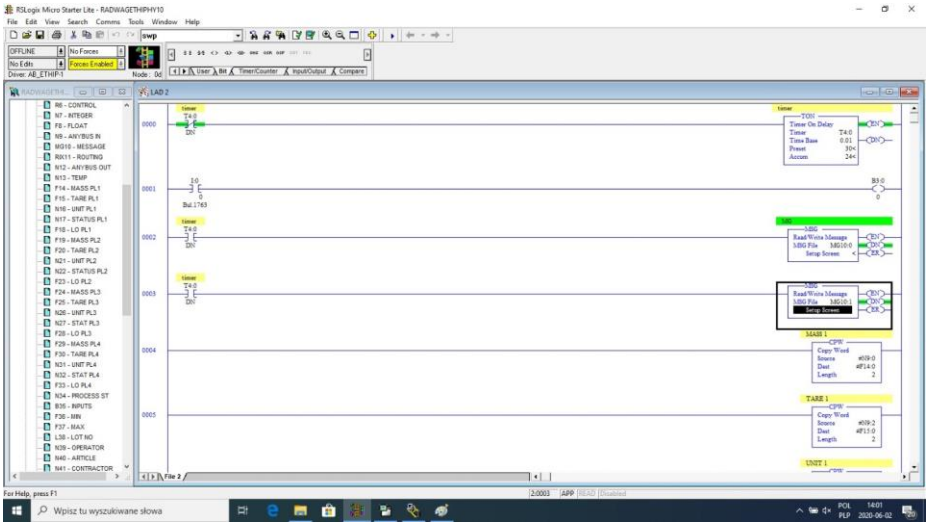
Create functions for record of data in the scale (analoguous set of actions):



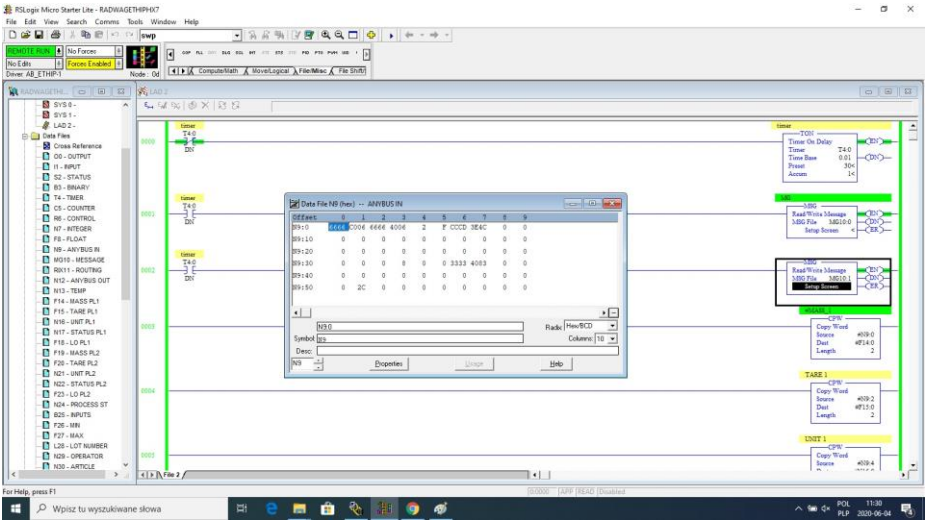
Channel – select 1 (integral), which corresponds to EtherNet/IP
Communication Command – CIP Generic
Data Table Address – N24:0 – the file for data record
Size in Bytes – 120 – size of the output registers table
Extended Routing Info File – RIX11:1 – set RIX file
Service: Read assembly

Instance: 96
MulitHop: Yes

Go to the MultiHoop tab and enter the IP address of the scale. In the example the functions are timer-triggered, this allows to control frequency of questions sent to the scale.

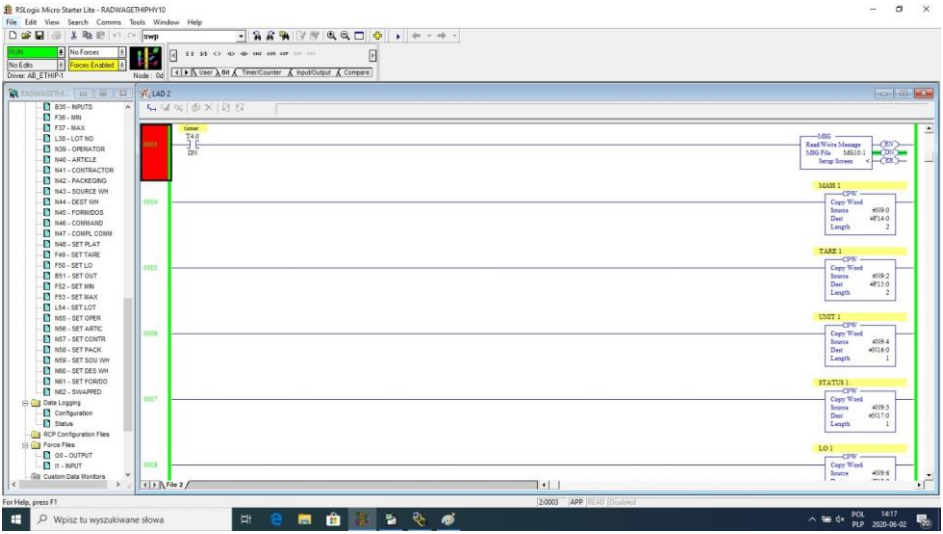


Now you can upload program to the controller and run it. Upon connecting to the PLC (online) in the N9 file it is possible to carry out data readout, the MSG function should not return any errors.

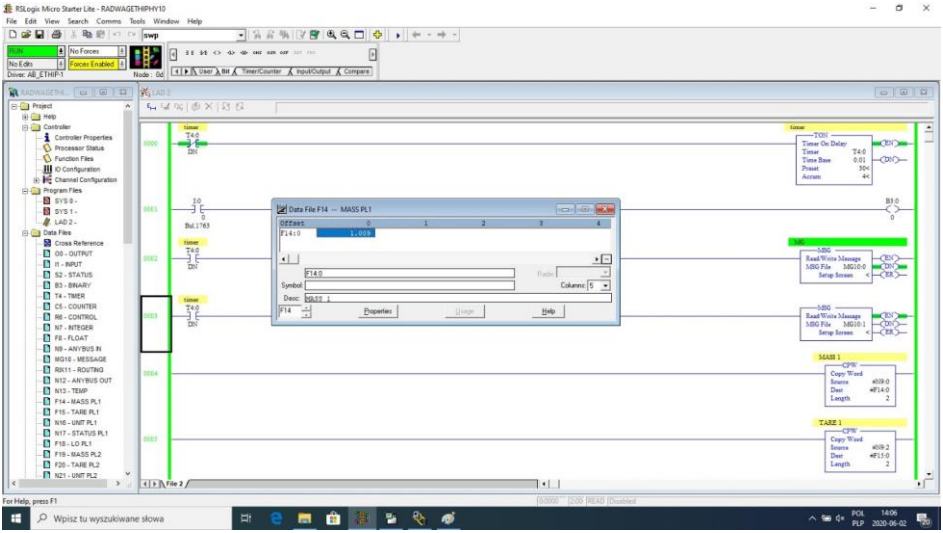


For the sake of order, you can create separate files for each scale variable.

Data between N9, N24 and variable files are written using CPW function. Mass readout function:

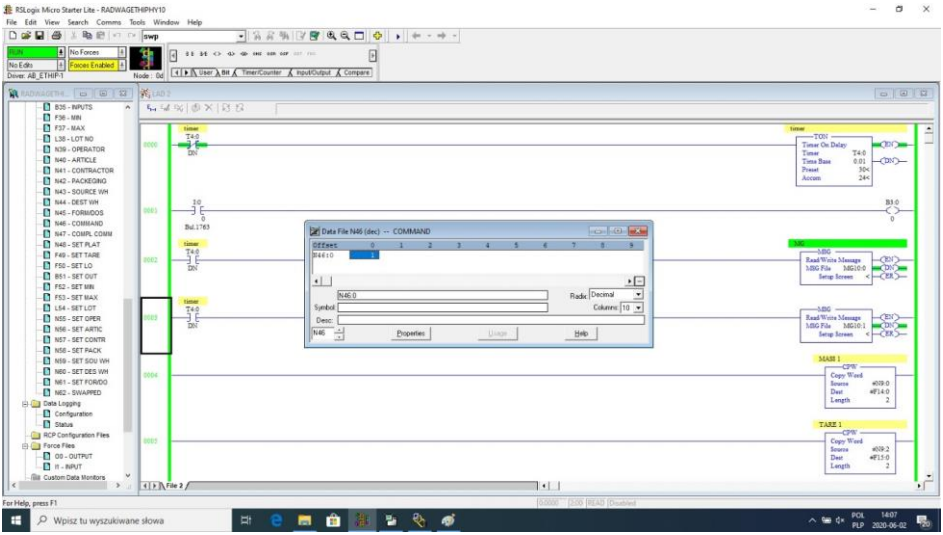


As a result, respective files contain correct data from the scale.
Mass readout example:



By record of respective values in files that correspond to output registers, particular scale functions are triggered.

Scale zeroing example:



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