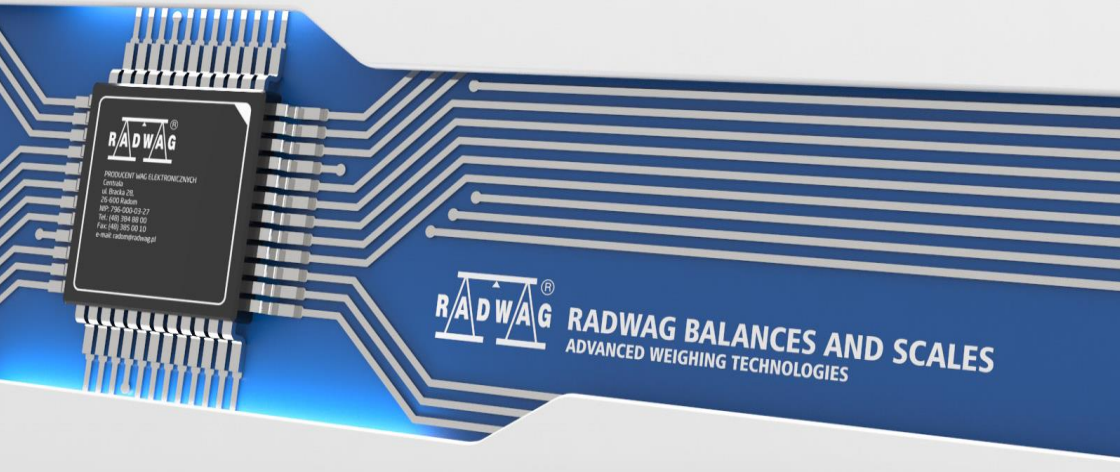
EtherNet/IP™

COMMUNICATION PROTOCOL:
MW-01-A Mass Converter

SOFTWARE MANUAL

ITKP-33-03-12-21-EN



DECEMBER 2021

CONTENTS

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1. MASS CONVERTER SETTINGS AND CONFIGURATION

To configure MW-01-A mass converter settings for communication via **EtherNet/IP** protocol run **"MwManager"** PC software and go to **<Parameters / Set Communication / Additional modules>** submenu. For detailed description of settings configuration read **"MwManager"** user manual.

2. DATA STRUCTURE

2.1. Input Address

2.1.1. Input Variables:

Variable	Offset	Length [WORD]	Data type
Mass	0	2	float
Tare	2	2	float
Unit	4	1	word
Scale status	5	1	word
LO threshold	6	2	float
Dosing process status	32	1	word
Input status	33	1	word
Min	34	2	float
Max	36	2	float
Fast dosing threshold	38	2	float
Precise dosing threshold	40	2	float
Adjustment status	50	1	word

2.1.2. 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 scale is kilogram [kg].

Platform status – determines status of a given weighing platform.

Status bits	
0	Measurement correct (the scale does not report any error)
1	Measurement stable
2	Scale indicates zero
3	Scale tared
4	Scale in II weighing range
5	Scale in III weighing range
6	Scale reports NULL error
7	Scale reports LH error
8	Scale 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 scale 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 mass converter inputs. Three least significant bits represent the mass converter inputs state.

Example:

Read HEX value: 0x0005

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

Inputs 1 and 3 take HI state.

MIN – returns **MIN** threshold value in an adjustment unit.

MAX – returns **MAX** threshold value in an adjustment unit.

Fast dosing threshold - returns fast dosing threshold value in an adjustment unit.

Slow dosing threshold - returns slow dosing threshold value in an adjustment unit.

Adjustment status – determines adjustment process status.

0x00 – process disabled/completed correctly.
0x01 – start mass/adjustment coefficient determination in progress.
0x02 – range exceeded.
0x03 – time exceeded.
0x04 – process aborted.

2.2. Output Address

Output variables list:

Variable	Offset	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
Output state	7	1	word
Min	8	2	float
Max	10	2	float
Fast dosing threshold	12	2	float
Precise dosing threshold	14	2	float
Adjustment mass	24	2	float

2.2.1. Output Registers

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

Bit No.	Operation
0	Zero the platform
1	Tare the platform
5	Process start
6	Process stop
8	Start mass determination
9	Adjustment factor determination
10	Write adjustment factor

Example:

Writing the register with 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

This causes balance taring.

A 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 tare value for a given platform
1	Setting LO threshold value for a given platform
2	Setting outputs state
3	Setting MIN threshold value
4	Setting MAX threshold value
5	Setting fast dosing threshold
6	Setting precise dosing threshold
7	Setting adjustment weight value

	***Complex command requires setting a respective parameter (offset from 2 to 24 – 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 platform 1 to the scale.

Performance of the command requires record of 2 registers:

offset 1 – command with a parameter - value 0x01 – i.e. tare setting,
offset 2 – platform number – value 0x01
offset 3 – tare value in float format - 1.0.

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

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: state of mass converter outputs.

Example:

Setting high state for output 1 and 2 of the scale.

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	0	1	1

After conversion to HEX it is 0x03.

Performance of the command requires record of 2 registers:

offset 1 – command with parameter - value 0x04 – i.e. write outputs state,
offset 7 – output mask 0x03.

As a result, outputs number 1 and 2 take high state.

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

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

Fast dosing threshold - complex command parameter: fast dosing threshold value (in adjustment unit).

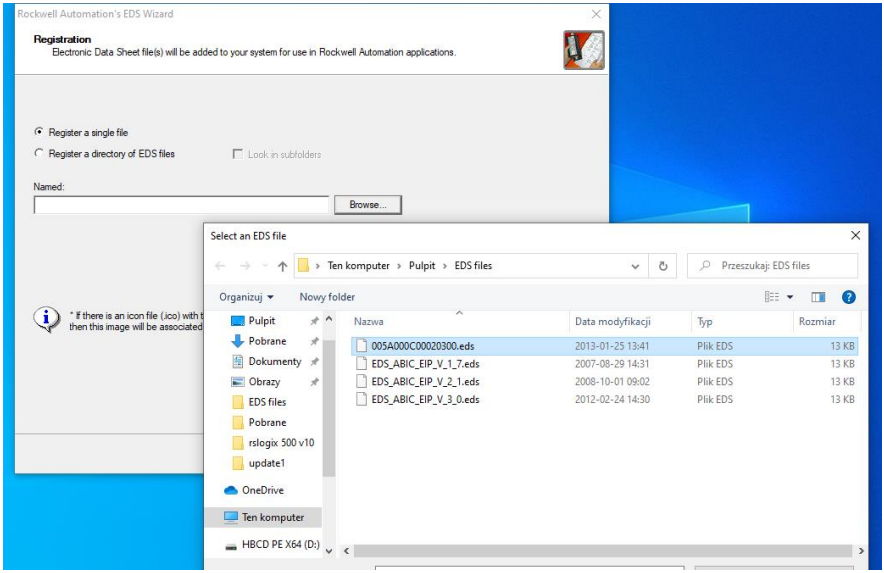
Slow dosing threshold - complex command parameter: fine dosing threshold value (in adjustment unit).

Adjustment weight mass setting - complex command parameter: Adjustment weight mass.

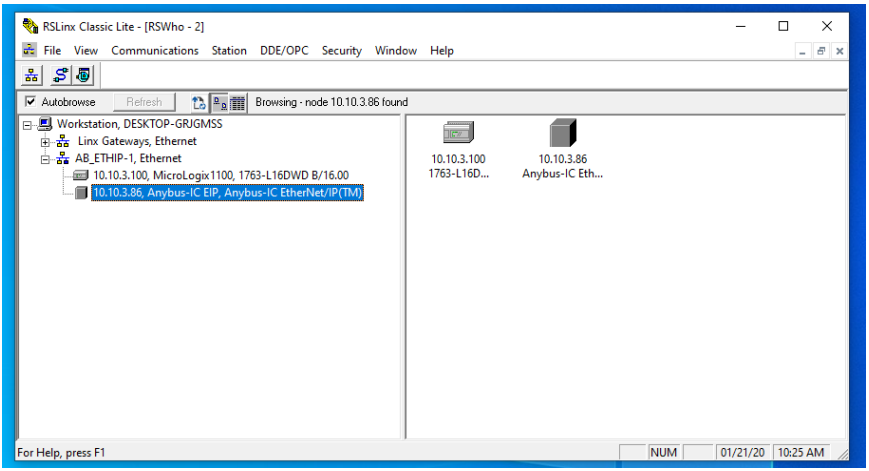
3. CONFIGURATION OF THE EtherNet/IP MODULE IN RS LOGIX ENVIRONMENT

3.1. 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.

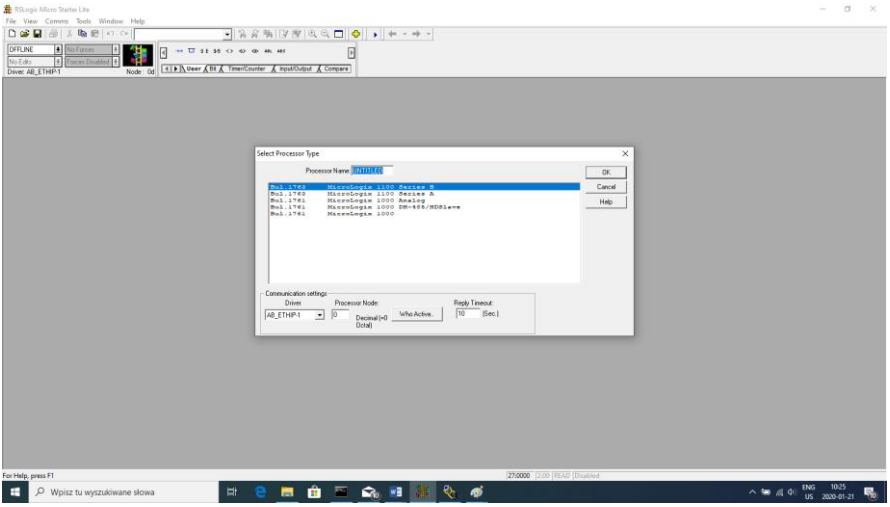


Upon connecting the scale and the Master controller to the network (make sure all devices and the PC are in the same subnet), they are visible as shown in the figure below.



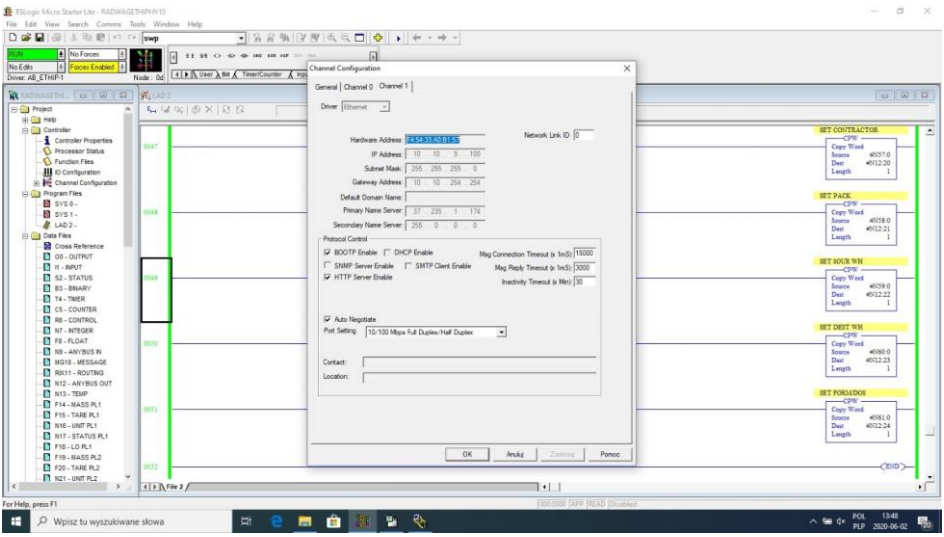
3.2. RSLogix Project

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.



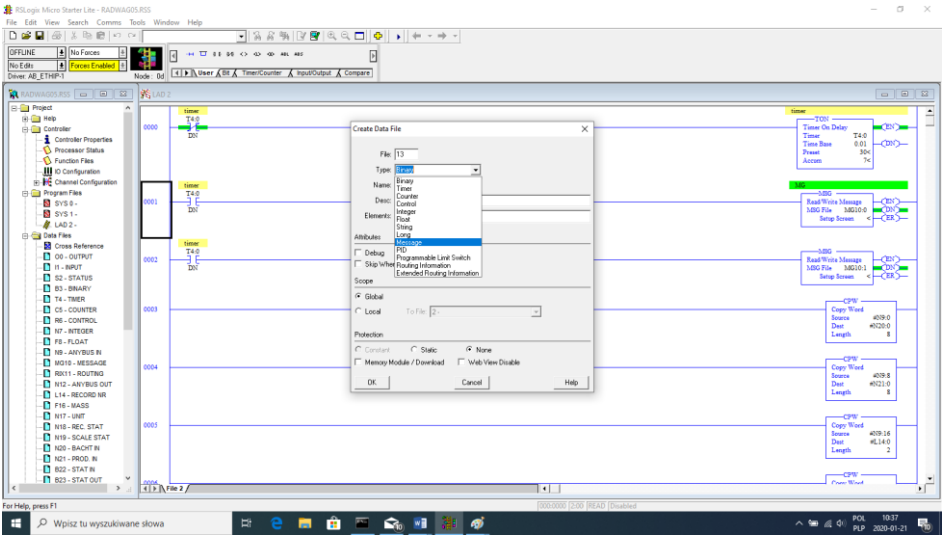
Confirm your choice and go to the project window. Next, configure the communication interface of the controller. To do that, select CHANNEL CONFIGURATION>CHANNEL 1 in the project tree.

Here, you can declare the properties of this communication channel, e.g. IP address or subnet mask.

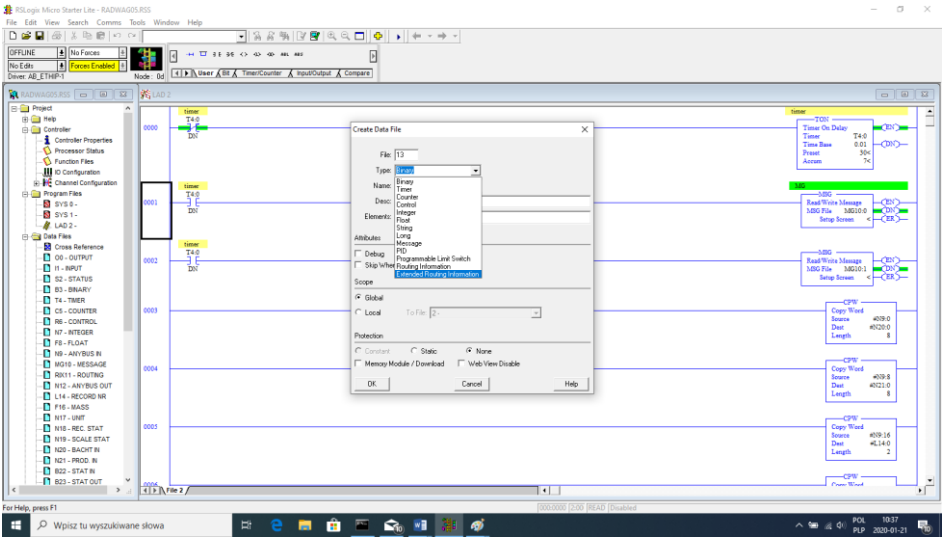


Upon configuration, check if connection with the PLC (online) is possible and download the project.

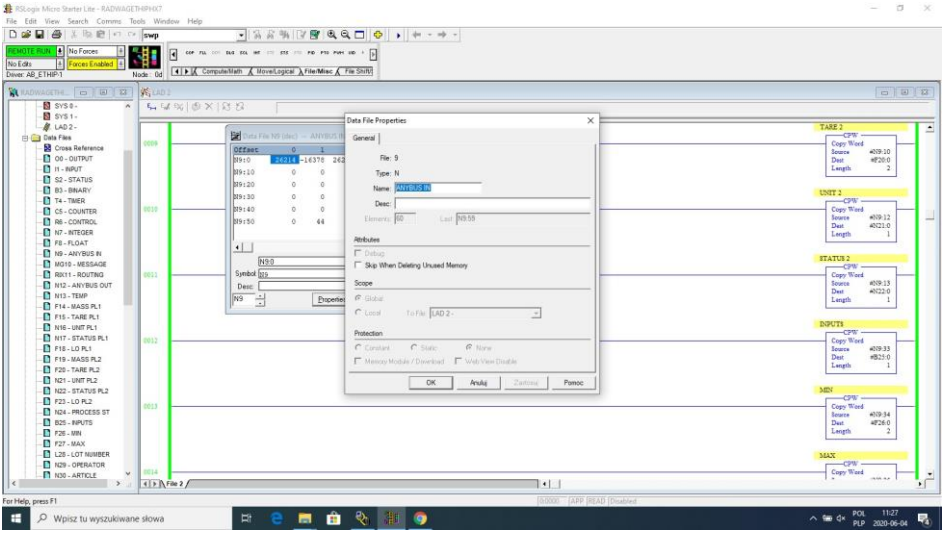
Now add a new rung to the project ladder and create an MSG function enabling readout of data from the scale.
Prior to adding the function, add new data files in the project tree: two-element MG (message).

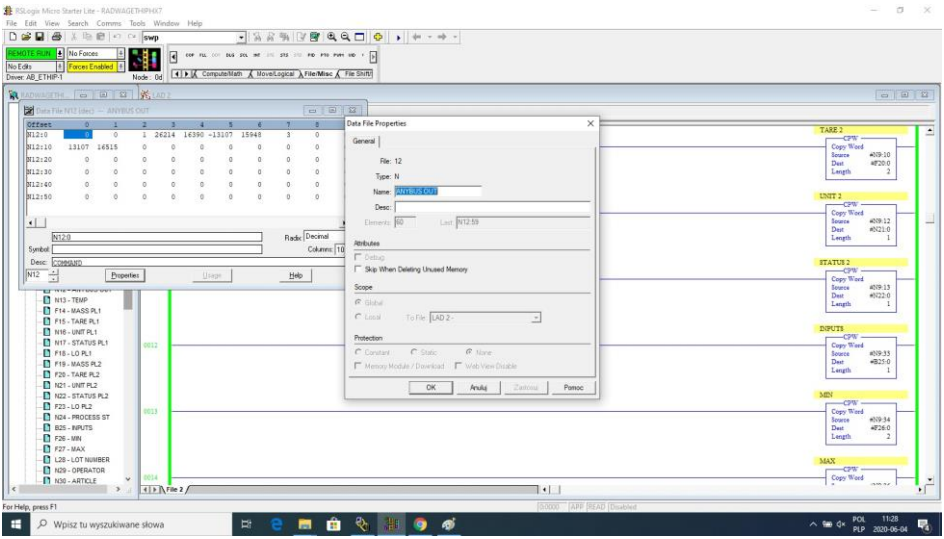


and RIX type files.

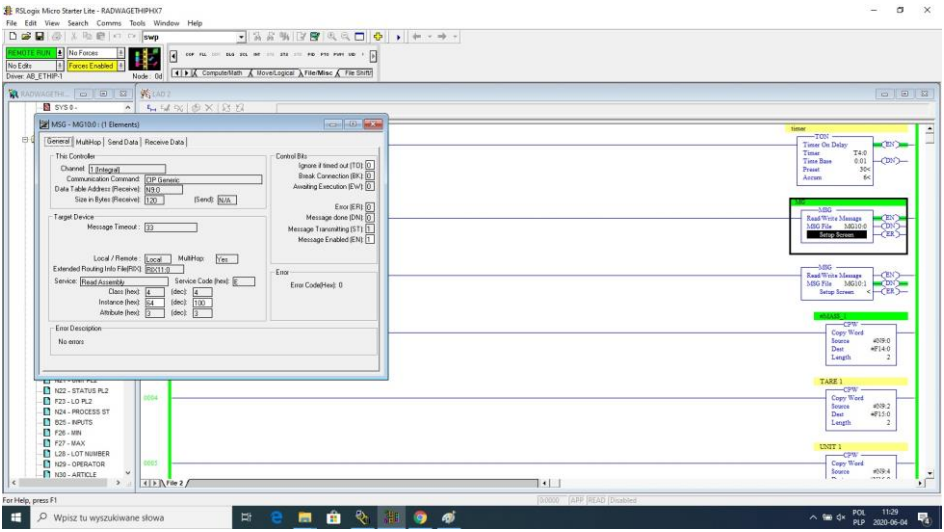


Add also two files of INTEGER type to store data read from the scale and data sent to the scale. In the example two files were created: ANYBUS IN (N9), 120 bytes, and ANYBUS OUT (N12), 120 bytes.





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

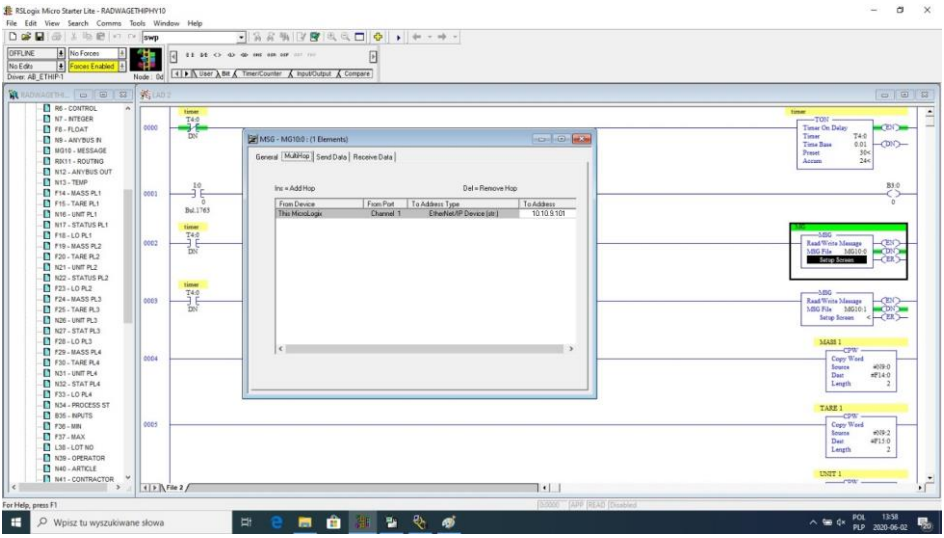


Configuration procedure:

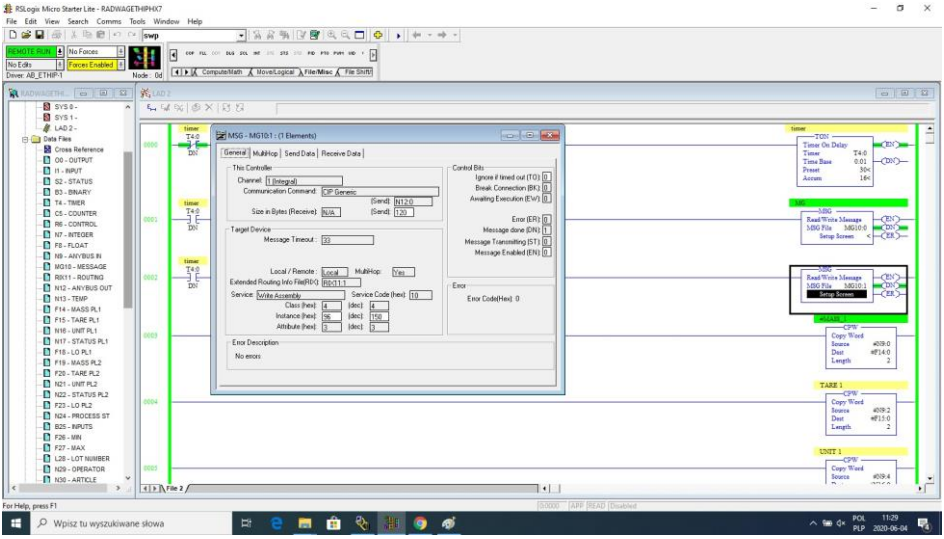
Channel – select 1 (integral), which corresponds to EtherNet/IP
Communication Command – CIP Generic.
Data Table Address – N9:0 – the file for data readout.
Size in Bytes – 102 – size of the input registers table.

Extended Routing Info File – RIX11:0 – select RIX file.
Service: Read assembly.
Instance : 64.
MulitHop: Yes.

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



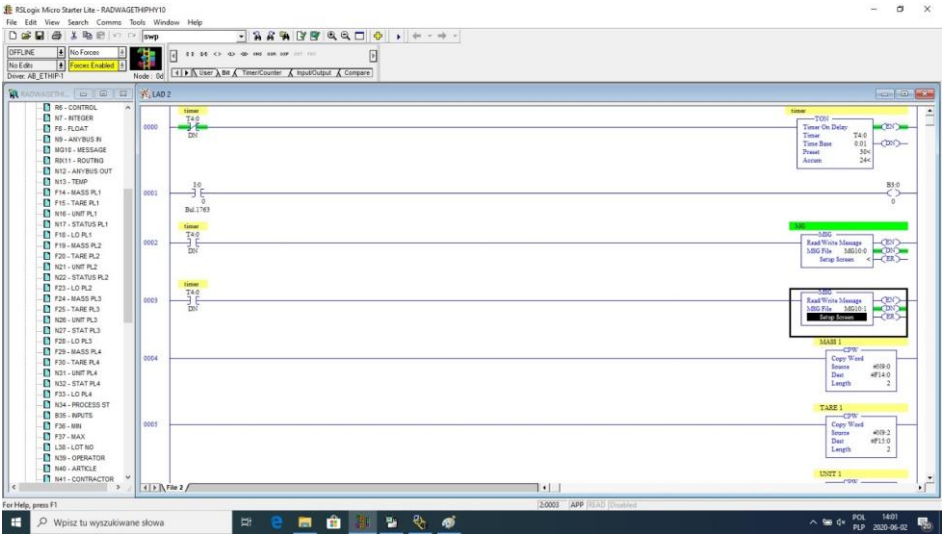
Create functions for record of data in the scale (analogous set of actions):



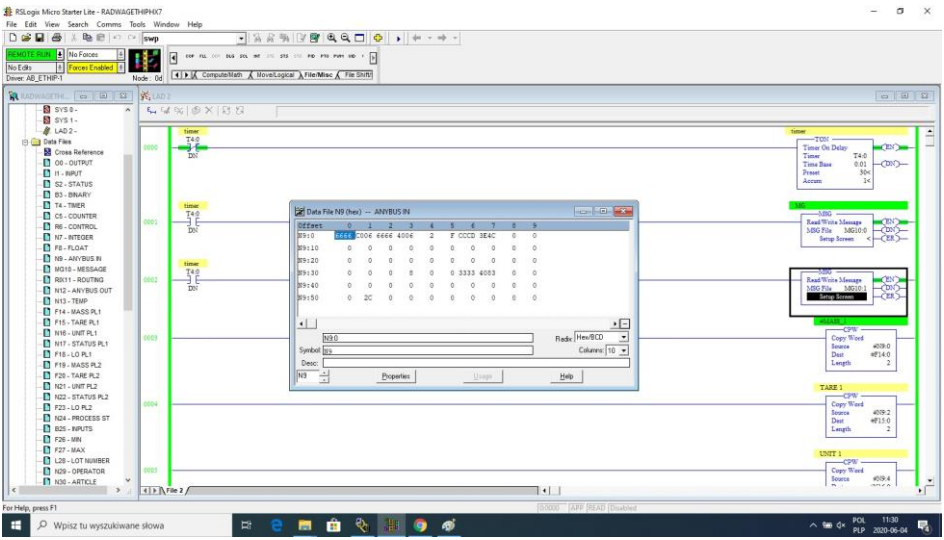
Channel – select 1 (integral), which corresponds to EtherNet/IP
Communication Command – CIP Generic.
Data Table Address – N24:0 – the file for data record.
Size in Bytes – 52 – size of the output registers table.
Extended Routing Info File – RIX11:1 – select RIX file.
Service: Read assembly.
Instance : 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.

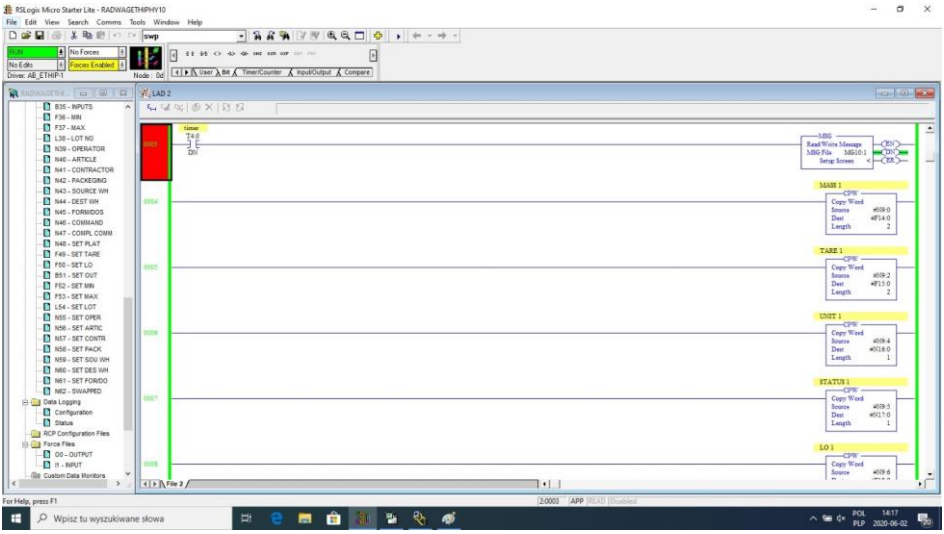


Now you can upload program to the controller and run it. Upon connecting to the PLC (online) in the N9 file it is possible to carry out data readout, the MSG function should not return any errors.



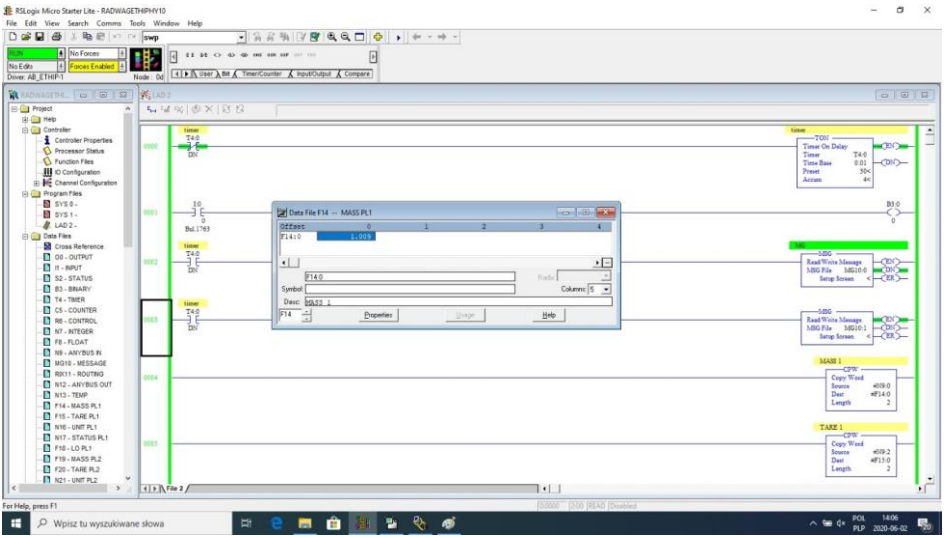
For the sake of order, you can create separate files for each scale variable.

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



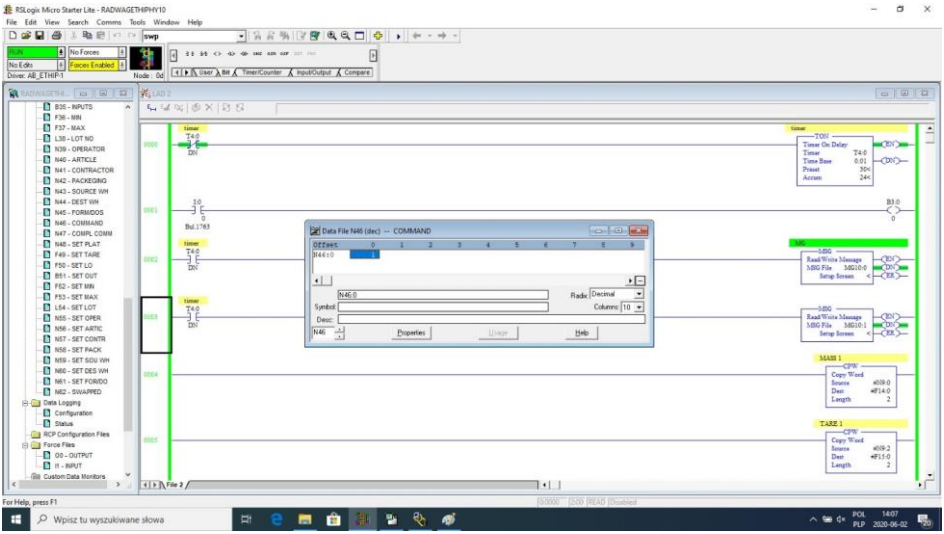
As a result, respective files contain correct data from the scale.

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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