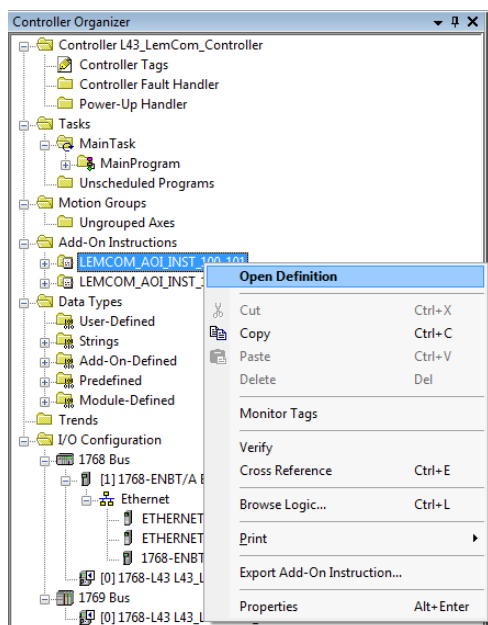


LEMCOM Add-On Instructions

1155UM0045 Rev. A
01/2015

v1.0



LEMCOM

Connected to Allen Bradley Compact Logix L43 Rev. 20.12 via
the EtherNet/IP™ interface of the controller



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Important information

Please read this manual carefully before using Add-On Instructions and sample software. Make sure you understand its capabilities and limitations.

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Safety

These safety instructions are intended to prevent hazardous situations and/or equipment damage:



DANGER

Hazard with a high level of risk which, if not avoided, could result in death or serious injury.



CAUTION

Hazard with a low level of risk which, if not avoided, could result in minor injury or could cause damage to the equipment.

Others symbols:



INFORMATION

Recommendation, advice, reference to others documents.



ACCESSORY

Required or useful accessories.

Enumeration:

- Actions that can be performed in any order.
- 1. Actions that have to be performed in the indicated order.
- General enumeration.

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1 INTRODUCTION

1.1 Preliminary notes

This document gives all relevant information related to the Add-On Instructions (AOI) files provided to make LEMCOM vacuum pump integration and usage easier.

This document and related AOI

- help to establish the communication between a LEMCOM unit and an Allen Bradley CompactLogix controller via the EtherNet/IP™ interface of the CPU.
- describe the use of the Add-On functions LEMCOM_AOI_INST_100_101 and LEMCOM_AOI_INST_100_102 in the RSLogix 5000 software.



Users

This manual is intended to be used by skilled technicians and engineers who have experience working with automated systems.

AOI versions

This document is related to the following Add-On Instructions and sample files:

- LEMCOM_AOI_INST_100_101.L5X: v1.0
- LEMCOM_AOI_INST_100_102.L5X: v1.0
- LEMCOM_SAMPLE_i01.ACD

Manual version history

Revision	Date	Related AOI versions
		_INST_100_101.L5X _INST_100_102.L5X
A	01/2015	v1.0 v1.0

1.2 Disclaimer of Warranties

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- (2) the software or the software content will be free of bugs, errors, viruses or other defects;
- (3) any results, output, or data provided through or generated by the software will be accurate, up-to-date, complete or reliable;
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2 GENERAL DESCRIPTION

2.1 Reminder

Connection between PLC and LEMCOM unit can be established using the following I/O assembly instances:

Assembly instance	Type	Data size	Description
100	OUTPUT	4 bytes	Vacuum and blow-off control
101	INPUT	3 bytes	Gripping status (2 bytes) + Heartbeat (1 byte)
102	INPUT	19 bytes	Gripping status (2 bytes) + Heartbeat (1 byte) + Vacuum level (16 bytes)

Note: Refer to LEMCOM main user manual LMEIP-xx-x-1155UM0033 for detailed data description.

A choice has to be made between the 2 input assembly instances based on User's need (vacuum level needed or not).

A LEMCOM unit may be composed of 1 master module and 0 to 15 slave modules. Depending on the size of the LEMCOM unit used, only part of the Input / Output data is useful.

AOIs have been developed to support unit size of 1 to 16 modules.

2.2 AOI functions

The Add-On Instructions permit easy control and monitoring of LEMCOM vacuum pumps in the RSLogix 5000 program via the PLC software.

The following functions, depending on the communication parameters set for the LEMCOM unit, are supported by the respective AOI:

LEMCOM_AOI_INST_100_101:

Requires the following connection parameters: Input assembly 101 (3 bytes) / Output assembly 100 (4 bytes)

- Enable/disable vacuum on one or all of the LEMCOM modules
- Enable/disable blow-off on one or all of the LEMCOM modules
- Get EtherNet/IP Communication status (PLC ↔ LEMCOM)
- Read *Gripping Status* information of each LEMCOM module

LEMCOM_AOI_INST_100_102:

Requires the following connection parameters: Input assembly 102 (19 bytes) / Output assembly 100 (4 bytes)

- Enable/disable vacuum on one or all of the LEMCOM modules
- Enable/disable blow-off on one or all of the LEMCOM modules
- Get EtherNet/IP Communication status (PLC ↔ LEMCOM)
- Read *Gripping Status* information of each LEMCOM module
- Read *Vacuum Level* of each LEMCOM module

3 NETWORK SETTINGS

Set LEMCOM IP address according to your Ethernet network configuration using the embedded webserver or LEMCOM Manager PC software.

Note: LEMCOM master module is factory set with the IP address 10.3.182.163, subnet mask 255.255.255.0 and default gateway 10.3.182.195.

Refer to “**Network configuration**” chapter in main user manual LMEIP-xx-x-1155UM0033 for detailed configuration process.

4 RSLOGIX 5000 CONFIGURATION

This part of the manual refers to the RSLogix 5000 software version V20.01.00 (CPR 9 SR 5).

From this point, it is assumed that a new project has been created in RSLogix 5000 and the L43 controller and its Ethernet module (1768-ENBT) have been added to the “I/O Configuration” tree view.

4.1 Add a LEMCOM unit to RSLogix 5000 project

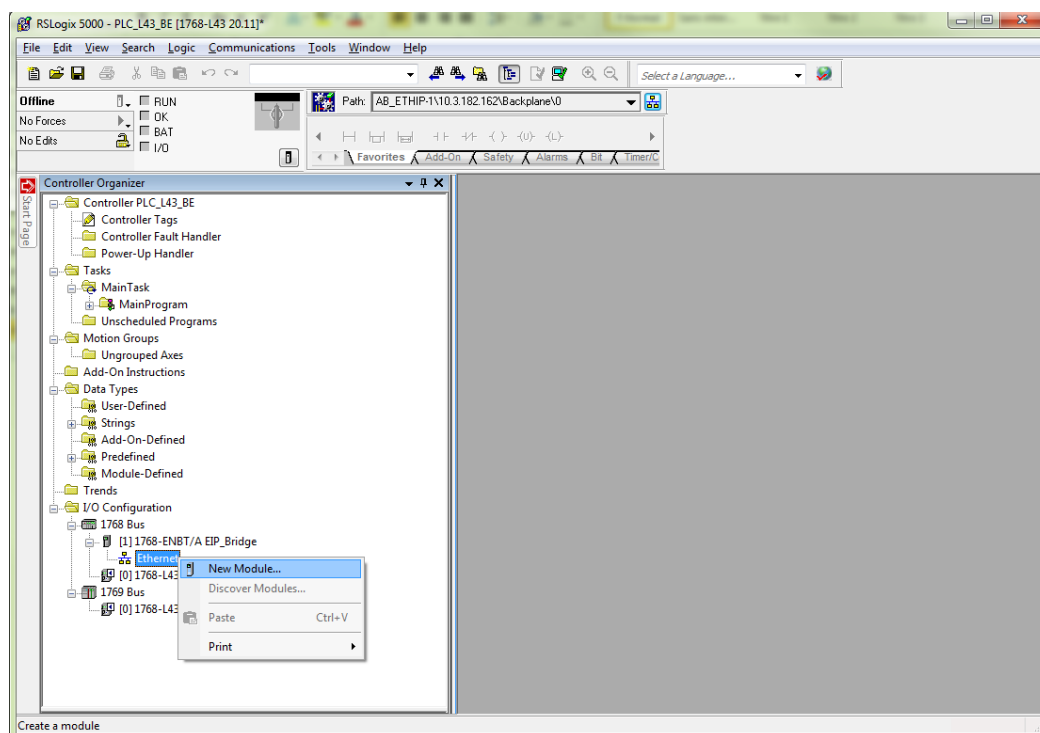


Figure 1 - Add a new module to the project

1. Right click on *Ethernet*
2. Click on *New module...*

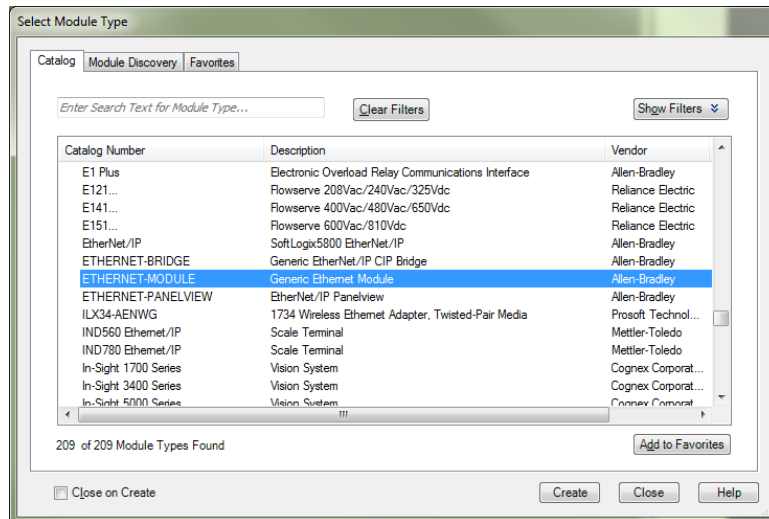


Figure 2 - Select Generic Ethernet Module

1. Select *Generic Ethernet Module* in the Catalog
2. Click on *Create*

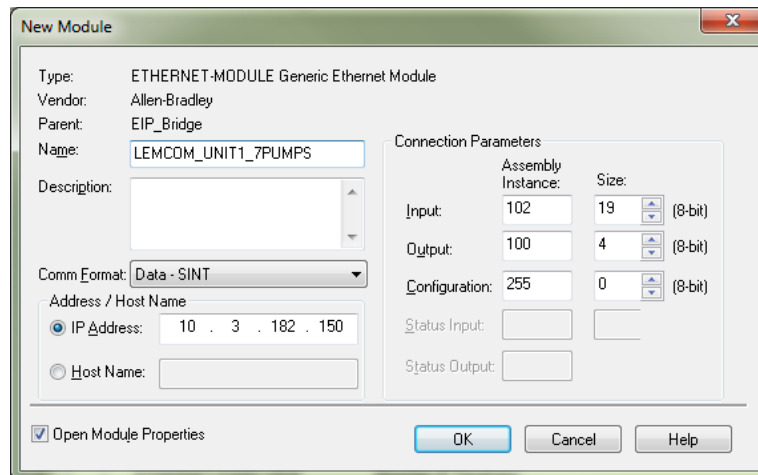


Figure 3 - New module parameters

1. Enter *LEMCOM_UNIT1_7PUMPS* as the name of the module (name is freely selectable)
 - In this example, a LEMCOM unit of 7 modules (1 master / 6 slaves) will be configured with the Add-On functions.
2. Set *Comm Format* to *Data – SINT*
3. Set the *IP address* of LEMCOM unit
4. Set *Connection Parameters* as shown in Figure 3.
5. Click on *OK* to confirm

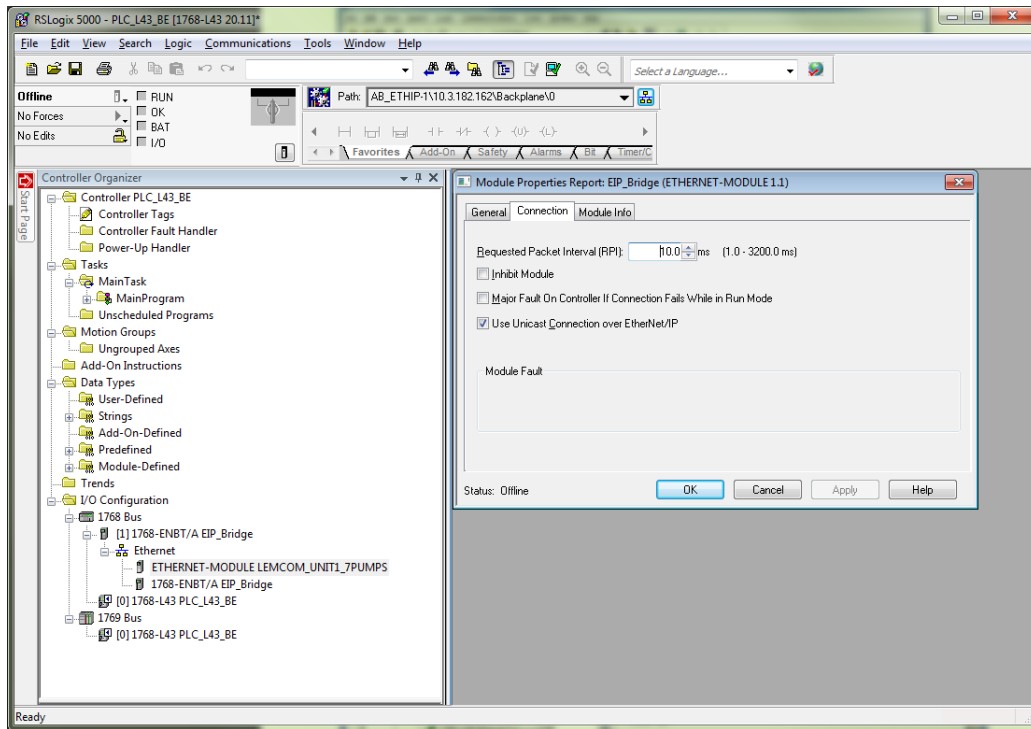
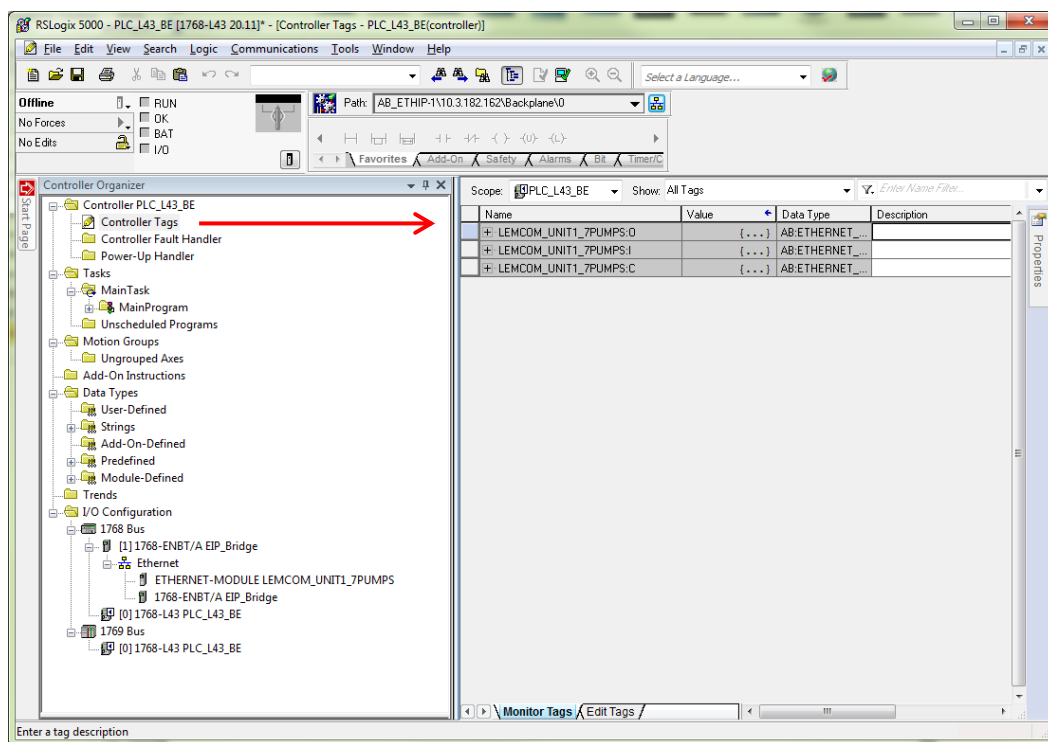


Figure 4 - Module connection settings (RPI and Unicast connection)

1. Set *Requested Packet Interval (RPI)* to 10ms in *Connection* tab
 - Lower RPI values may lead to communication issues.
2. Check *Use Unicast Connection over EtherNet/IP*
3. Click on *OK* to confirm
4. LEMCOM unit now appears in the tree view below the *Ethernet* node.



1. The RSLogix 5000 software automatically creates the Controller Tags that will be required as input and output variables (tags) in the Add-On Instructions.

4.2 Import Add-On Instructions to the project

First, download Add-On Instructions for LEMCOM vacuum pump from COVAL [website](#). The package contains AOI files and a sample project to illustrate AOI integration into PLC main routine.

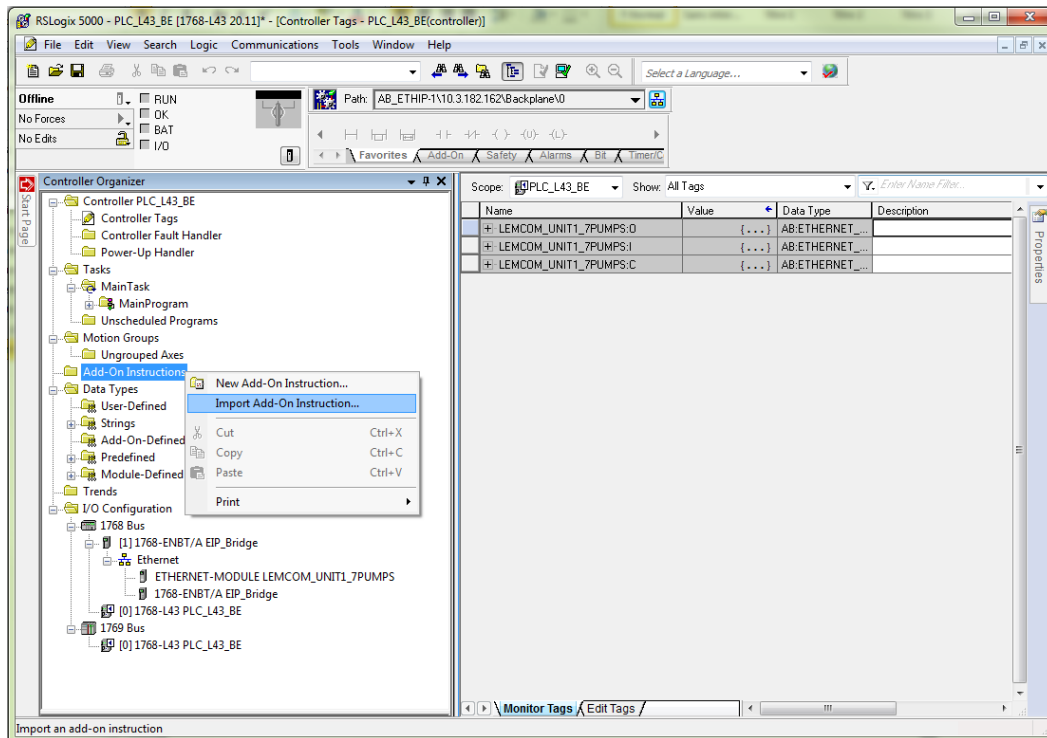


Figure 5 - Import AOI

1. Right click on *Add-On Instructions*
2. Click on *Import Add-On Instructions...*

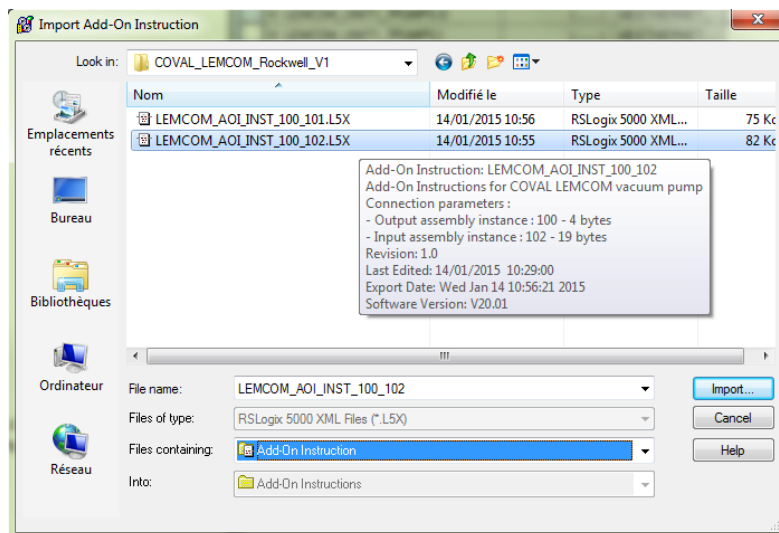


Figure 6 - Select AOI file according to Connection parameters

1. Select the Add-On Instructions file related to the connection parameters set while creating the module (either input assembly 101 or 102).
 - In this example, *LEMCOM_AOI_INST_100_102.L5X* has to be selected.
2. Click on *Import...*

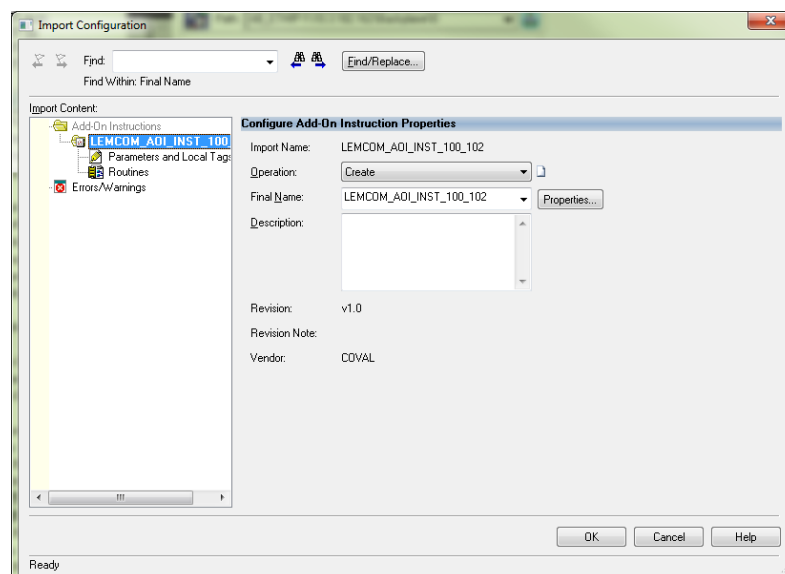


Figure 7 - Import AOI (Confirm)

1. Click on **OK** to confirm
2. Repeat the Import operation for other AOIs if needed.

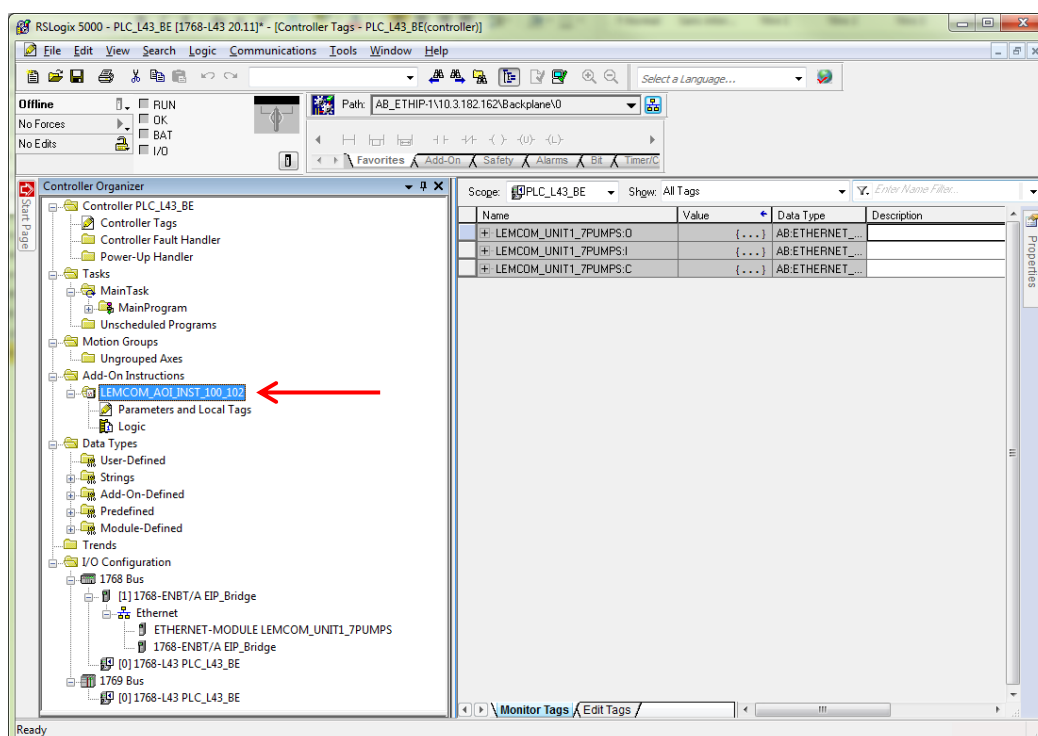


Figure 8 - AOI added to Add-On folder

1. After successful import, the instructions are displayed in the *Add-On Instructions* folder.

4.3 Integrate AOI into PLC main routine

After importing the Add-On Instruction file, it can be added to the PLC program as a ladder element.

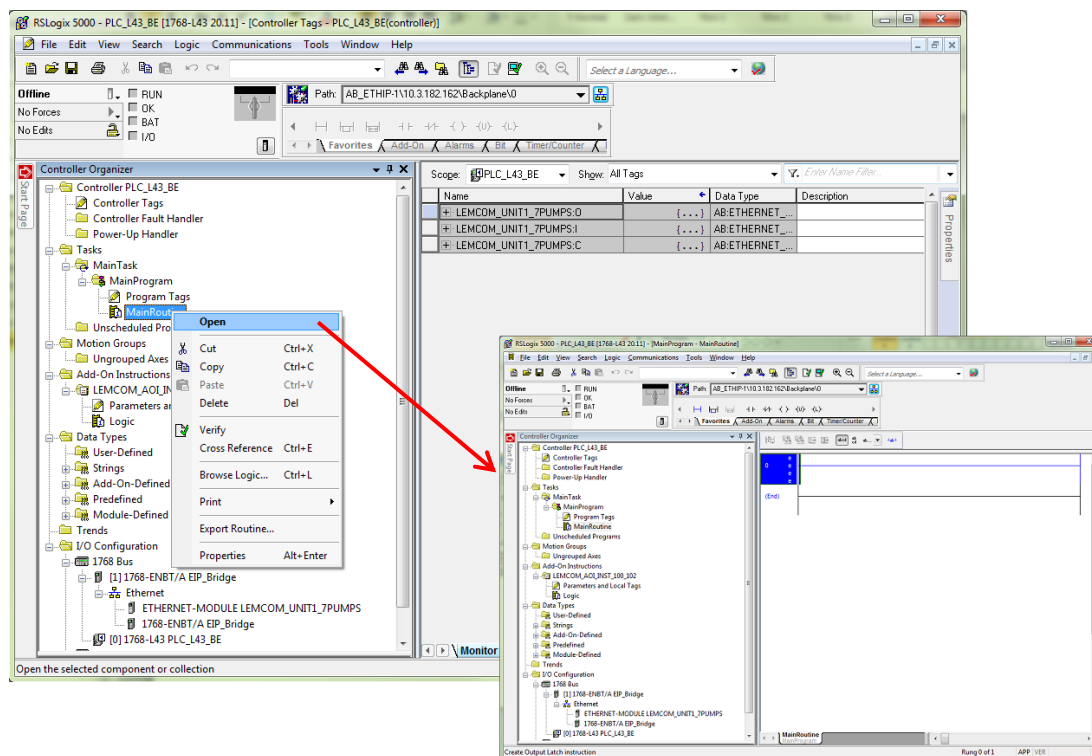


Figure 9 - Edit PLC program

1. Right click on *MainRoutine* in *MainProgram* folder
2. Click on *Open* to access to Ladder program window

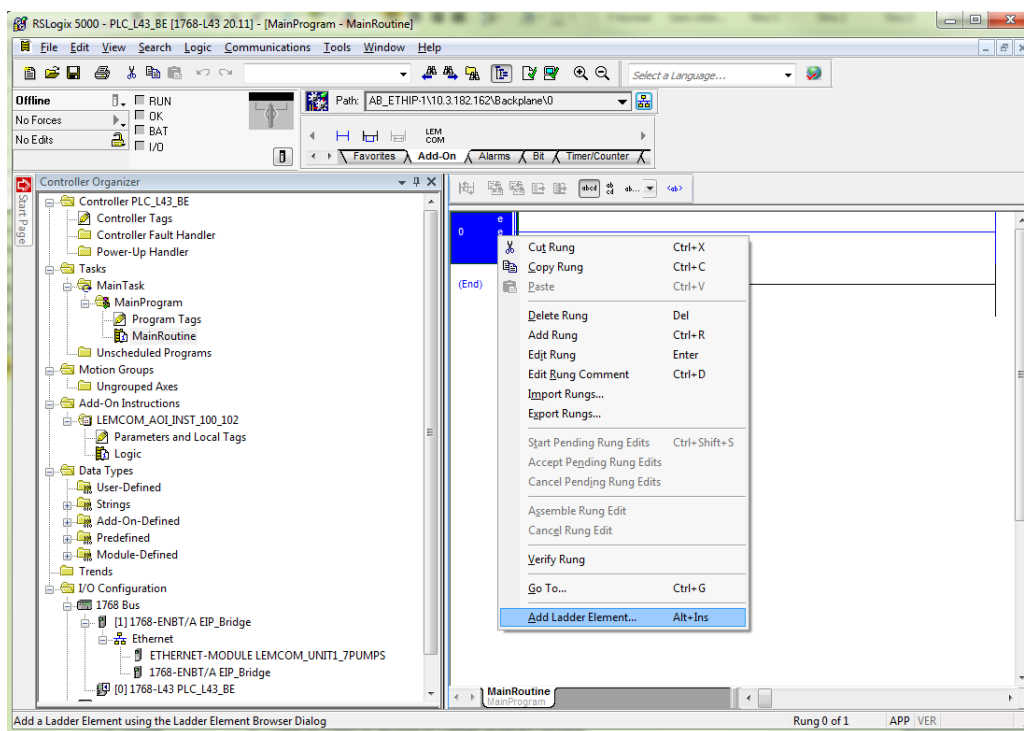


Figure 10 - Add Ladder element

1. Right click on first Rung
2. Click on *Add Ladder Element...*

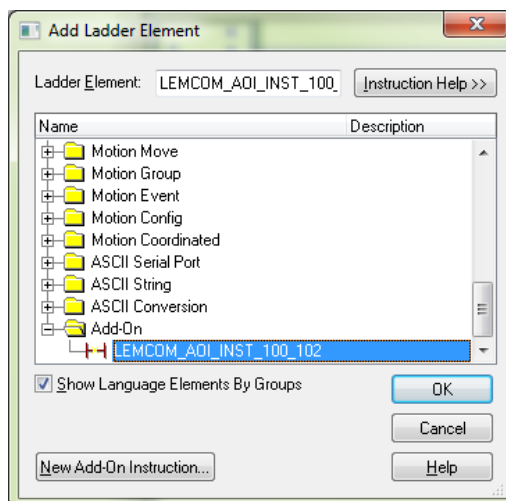


Figure 11 - Select AOI ladder element

1. Expand Add-On folder in the list
2. Select *LEMCOM_AOI_INST_100_102* ladder element

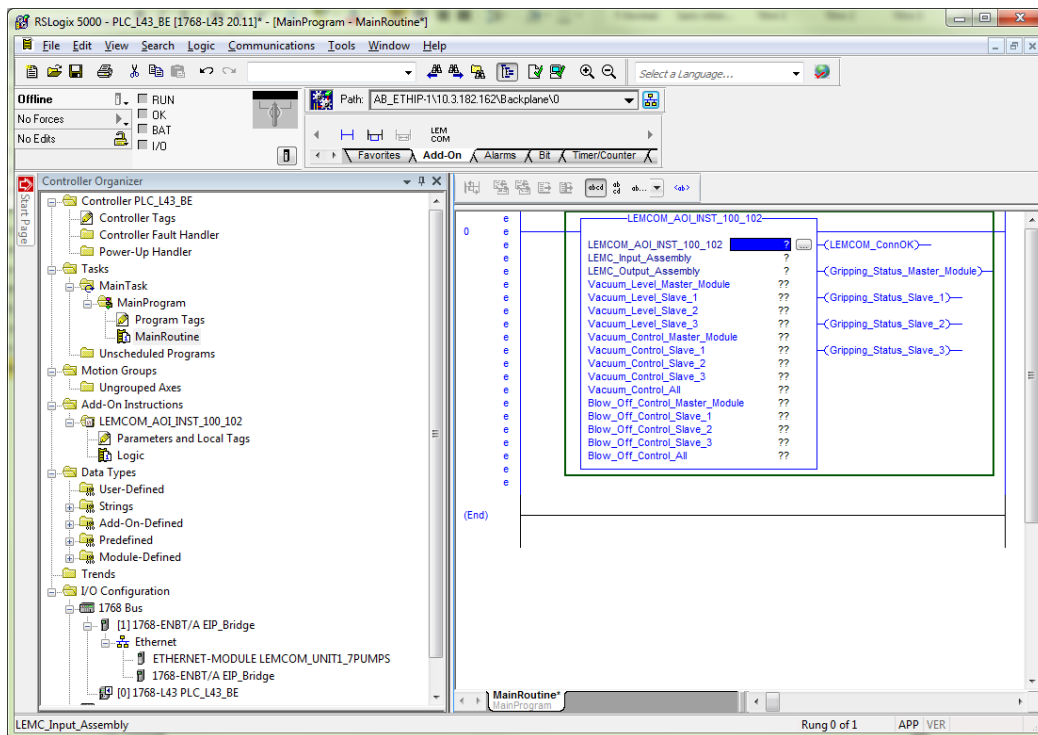


Figure 12 - Default Add-On element added to main routine

The instruction is integrated in the first rung and can now be configured.

4.4 Edit visible variables according to LEMCOM unit size

By default, the instruction block shows Inputs / Outputs suitable for a LEMCOM unit of 4 vacuum pumps (1 master and 3 slave modules):

- Our example assumes that the unit is made of 7 vacuum pumps.
- Instruction block can be edited to show all relevant Inputs / Outputs

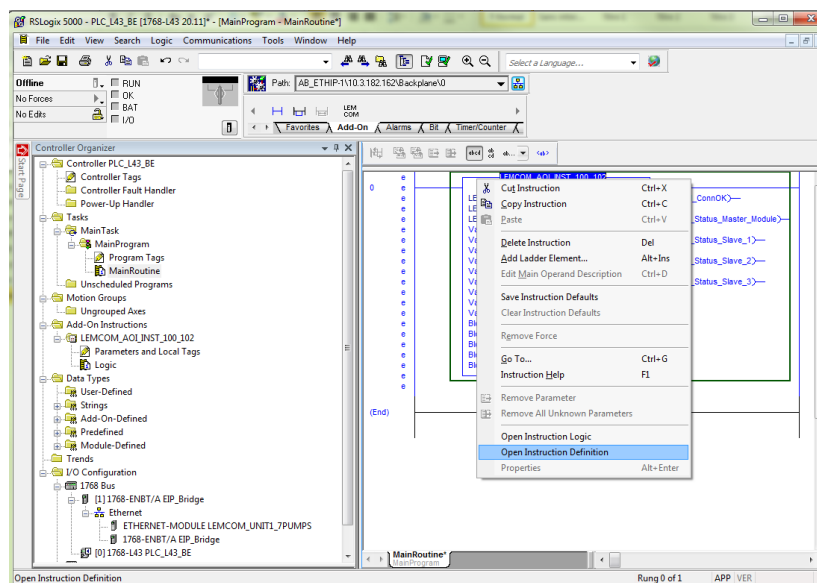


Figure 13 - Edit instruction settings

1. Right click on AOI block
2. Click on *Open Instruction Definition*

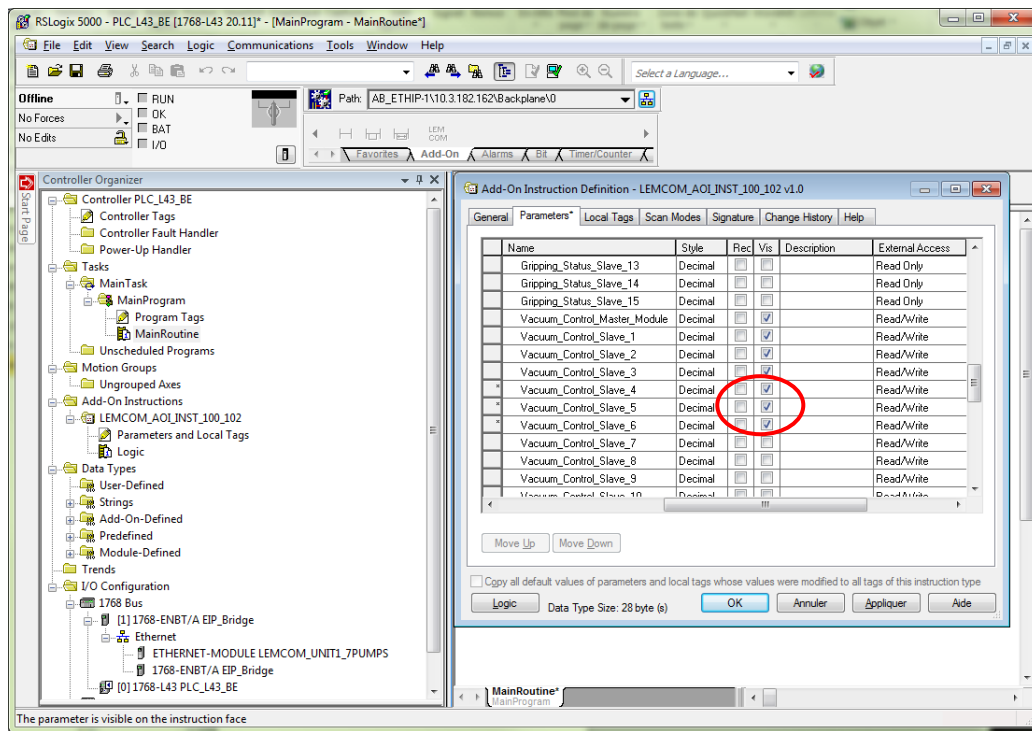


Figure 14 - Select visible variables

The parameters tab shows all the variables that may be used by the Add-On Instruction.

1. Check the *Vis* (Visible) boxes for all variables related to slave modules 4, 5 and 6:
 - a. Vacuum_Level_Slave_4 / Vacuum_Level_Slave_5 / Vacuum_Level_Slave_6
 - b. Gripping_Status_Slave_4 / Gripping_Status_Slave_5 / Gripping_Status_Slave_6
 - c. Vacuum_Control_Slave_4 / Vacuum_Control_Slave_5 / Vacuum_Control_Slave_6
 - d. Blow_Off_Control_Slave_4 / Blow_Off_Control_Slave_5 / Blow_Off_Control_Slave_6
2. Click on *OK* to confirm
3. Instruction block now shows input and output variables used to control and monitor the 7 vacuum pumps

4.5 Configure LEMCOM_AOI_INST_100_102 instruction

Once AOI ladder element is added to PLC program, it must be configured.

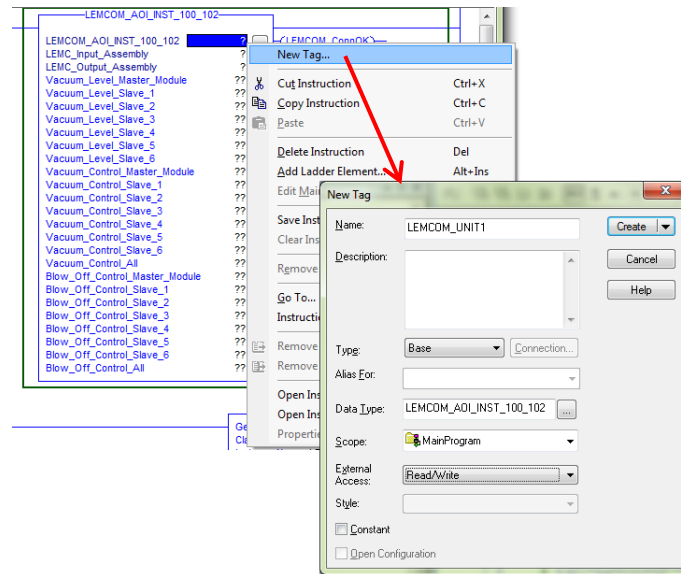


Figure 15 - Create controller tag for AOI

1. Right click on the 'question mark' next to LEMCOM_AOI_INST_100_102
2. Click on *New tag...*
3. Enter *LEMCOM_UNIT1* as the name of the tag (name freely selectable)
4. Click on *Create* to confirm

A new tag *LEMCOM_UNIT1* (Data Type LEMCOM_AOI_INST_100_102) is added to the *Program Tags* window.

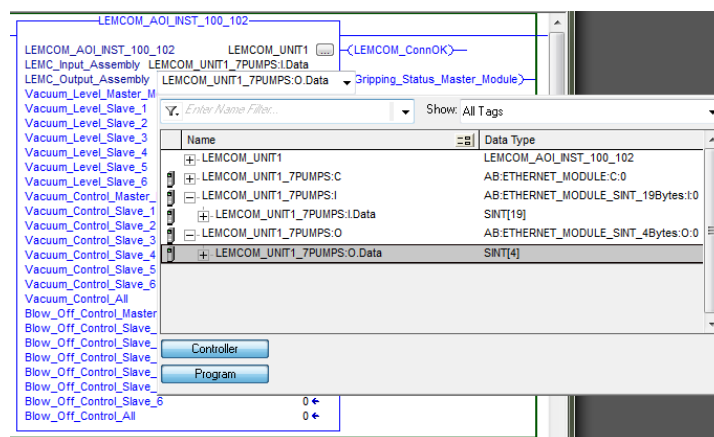


Figure 16 - Link AOI input/output to Assembly Instances

Create the link between AOI block inputs/outputs and input/output assembly instances:

1. Click on the 'question mark' next to *LEMC_Input_Assembly* to show the available controller tags
2. Select *LEMCOM_UNIT1_7PUMPS:I > LEMCOM_UNIT1_7PUMPS:I:Data*
3. Click on the 'question mark' next to *LEMC_Output_Assembly*
4. Select *LEMCOM_UNIT1_7PUMPS:O > LEMCOM_UNIT1_7PUMPS:O:Data*

4.6 Add a GSV command to get EtherNet/IP™ connection status

The *LEMCOM_AOI_INST_100_10x* needs the current status of the EtherNet/IP™ communication to the LEMCOM unit to manage the *Heartbit* bit located in Input assembly 101 or 102 and to update *LEMCOM_ConnOK* add-on output.

It requires the GSV command (Get System Value) from the existing library.

Using the *MODULE* object and *FaultCode* attribute, the GSV command monitors the status of the selected module and passes the *FaultCode* on to a defined variable as INT value.

The AOI checks for *FaultCode* = 0 to set *LEMCOM_ConnOK* output to 1. If *FaultCode* is not equal to 0, the connection with LEMCOM unit is faulted, *LEMCOM_ConnOK* is set to 0 and *Heartbit* bit in input assembly is forced to 0.

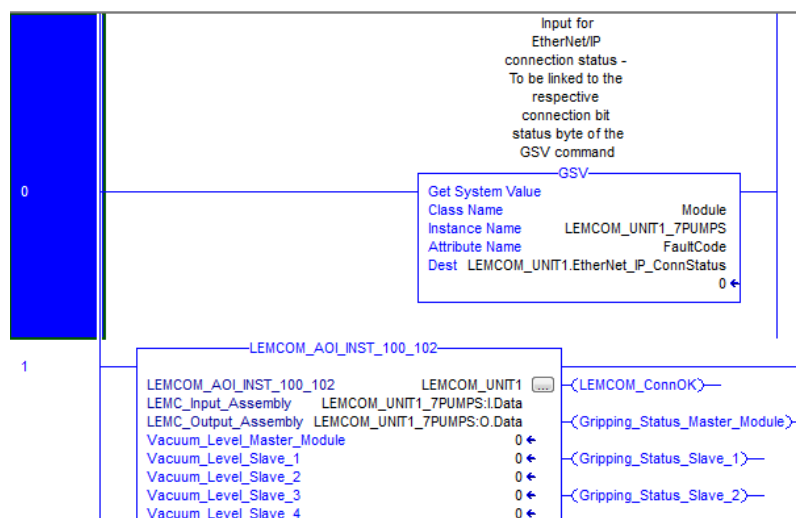


Figure 17 - GSV command to get module communication status

1. Create a new rung in the main program
2. Add a GSV element
3. Set *Class Name* to *Module*
4. Set *Instance Name* to *LEMCOM_UNIT1_7PUMPS* by selecting the corresponding module
5. Set *Attribute Name* to *FaultCode*
6. *Dest* is the destination variable (INT) where the *FaultCode* value will be written to be used by AOI logic. Select the *EtherNet_IP_ConnStatus* variable located in *LEMCOM_UNIT1* tag.

Communication status is now linked to the Add-On Instructions block.

5 AOI VARIABLES DESCRIPTION

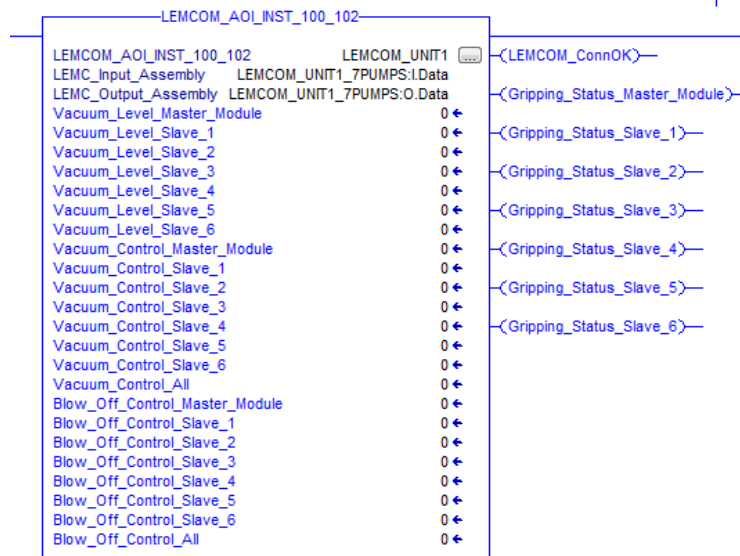


Figure 18 - AOI ladder block configured for a LEMCOM unit of 7 modules

This function block can be used to control and monitor a bank of 7 LEMCOM pumps (1 master + 6 slave modules) with input assembly 102 and output assembly 100 set as connection parameters.

- Note: Vacuum Level information would not be available with input assembly 101 and its related AOI file *LEMCOM_AOI_INST_100_101.L5X*.

Following functions are available with this instructions block:

- Enable/disable vacuum on one or all of the LEMCOM modules
- Enable/disable blow-off on one or all of the LEMCOM modules
- Get EtherNet/IP Communication status (PLC ↔ LEMCOM)
- Read *Gripping Status* information of each LEMCOM module
- Read *Vacuum Level* of each LEMCOM module

In every PLC cycle, the Add-On function block extracts and formats the data of the input assembly instance and provides these data on dedicated outputs of the block to be easily used in PLC program.

The function block also interprets and formats its dedicated inputs (vacuum and blow-off commands) to transmit them to the LEMCOM unit via the output assembly instance.

Input parameters

Name	Type	Description
LEMC_Input_Assembly	SINT[19]	Data field of the input assembly instance (Vacuum level, Gripping Status and Heartbit)
Vacuum_Control_Master_Module	BOOL	Enable/Disable vacuum on master module
Vacuum_Control_Slave_X	BOOL	Enable/Disable vacuum on slave module X
Vacuum_Control_All	BOOL	Enable/Disable vacuum on all modules
Blow_Off_Control_Master_Module	BOOL	Enable/Disable blow-off on master module
Blow_Off_Control_Slave_X	BOOL	Enable/Disable blow-off on slave module X
Blow_Off_Control_All	BOOL	Enable/Disable blow-off on all modules
EtherNet_IP_ConnStatus	INT	Variable used to store module communication status (To be linked to the respective connection bit status byte of the GSV command)

Output parameters

Name	Type	Description
LEMC_Output_Assembly	SINT[4]	Data field of the output assembly instance (Vacuum and blow-off commands)
Vacuum_Level_Master_Module	SINT	Vacuum level on master module (percent vacuum)
Vacuum_Level_Slave_X	SINT	Vacuum level on slave module X (percent vacuum)
Gripping_Status_Master_Module	BOOL	Gripping status on master module
Gripping_Status_Slave_X	BOOL	Gripping status on slave module X
LEMCOM_ConnOK	BOOL	EtherNet/IP connection to LEMCOM unit is OK