sylvac

English

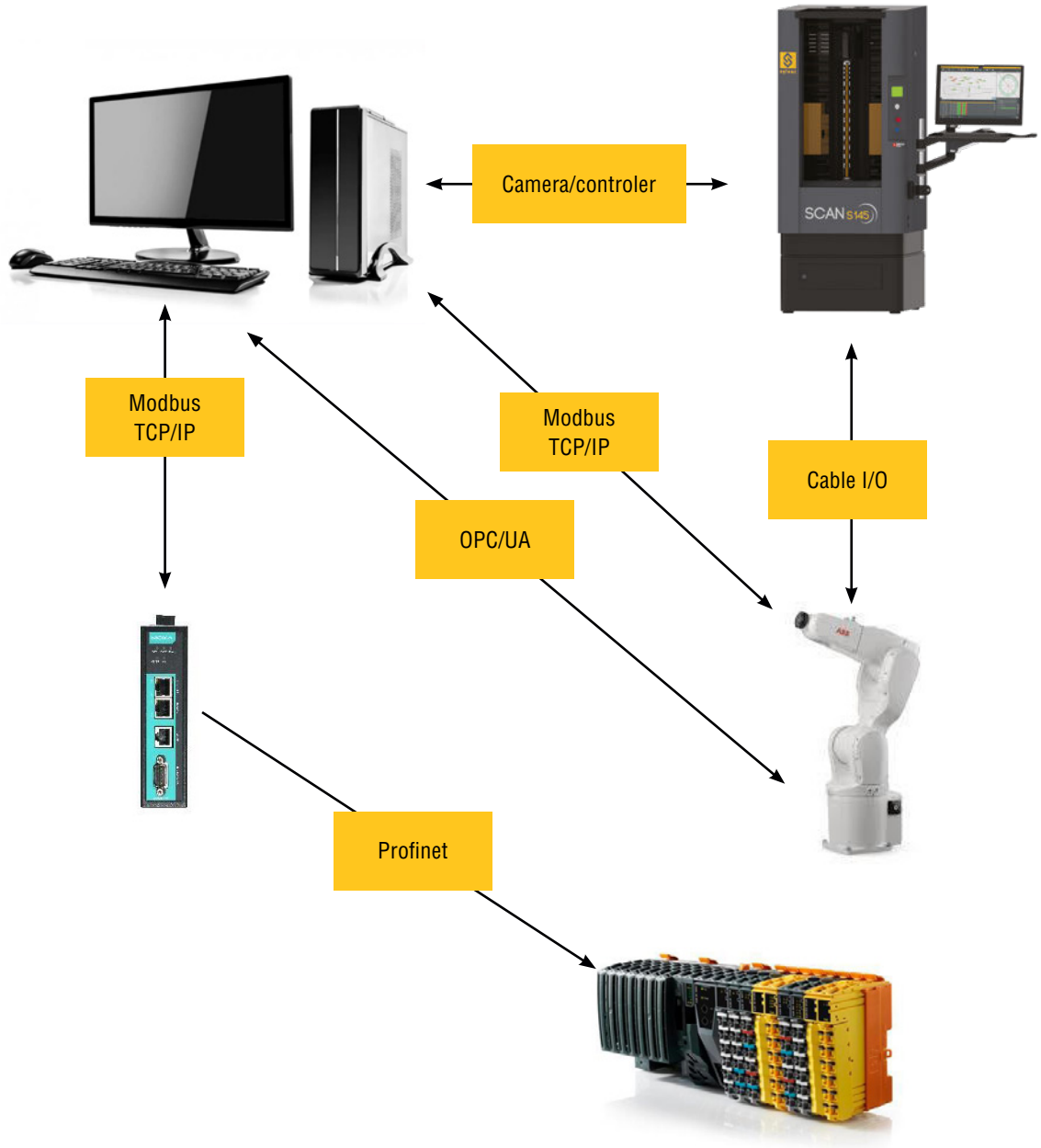
Automation Manual for

SCAN S145 V3

Robot

TABLE OF CONTENTS

1. SCHEMATIC DIAGRAM OF SYLVAC SOLUTION

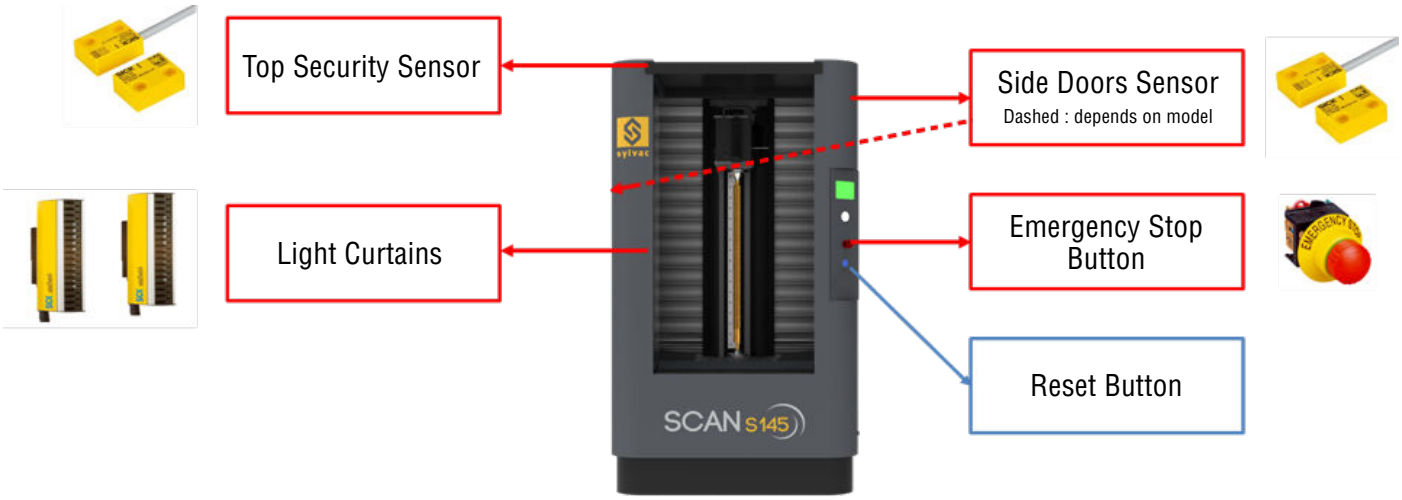


2. SAFETY SYSTEM

2.1 Functioning of the safety system

The Scan S145 has the following safety elements :

- An emergency stop button.
- A safety contact on the Top security sensor.
- A safety contact on the Side(s) door(s)
- A light curtain in front of the access to the measurement area.



In the case of the following states:
- Emergency Stop button is pressed
- Or/and the top sliding roof open
- Or/and the side(s) door(s) open
- Or/and the light curtains are switched off

The power in the Scan is switched off, the motors are no longer under power and the Scan S145 switches in a fault condition.

To restore the power in Scan S145 and be able to continue the measurements, two actions are required (in this order) :

1. Check the safety elements and restore them to their normal operating state (reset the safety signals).
2. Restart the Scan (using the Reset Button on the Scan).

2.2 Activating the robot mode

To use the machine in robot mode, simply switch the key position to Robot Mode in the side of the machine, next to the main ON/OFF switch.

As of now the Scan S145 is in fault mode, the robot is considered as an additional safety element and he must provide a doubled safety signal on the DSUB Security connector on the back of the machine (described in the section 2.6 Functioning of the safety system with a robot).

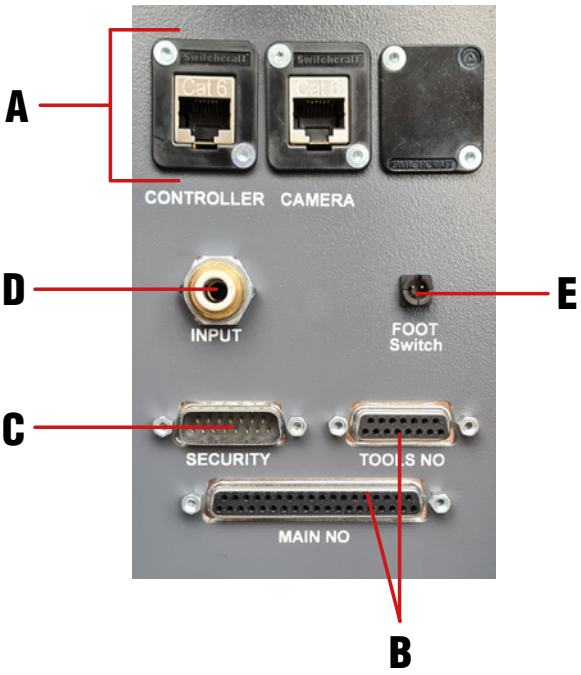
2.3. Activating the service mode

To be able to operate the machine in service mode, the safety key must be turned to the Service position (positioned on the right side of the machine). The key cannot be removed in this position.

This mode should only be used by a Sylvac service operator!

In this mode, the only active safety feature is the emergency stop button.

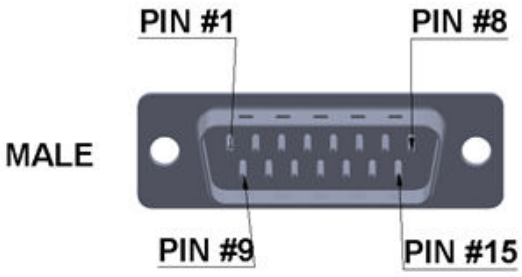
2.4. Connections of the Scan S145



A. Ethernet plug controller and camera
B. I/O connectors
C. Security connector
D. Pneumatic input
E. Footswitch input

2.5. Description of the D-SUB 15p safety connector

All inputs and outputs, to and from the Scan, must either be at +24V (binary 1) or at GND (binary 0). All signals to the Scan must come from the robot.

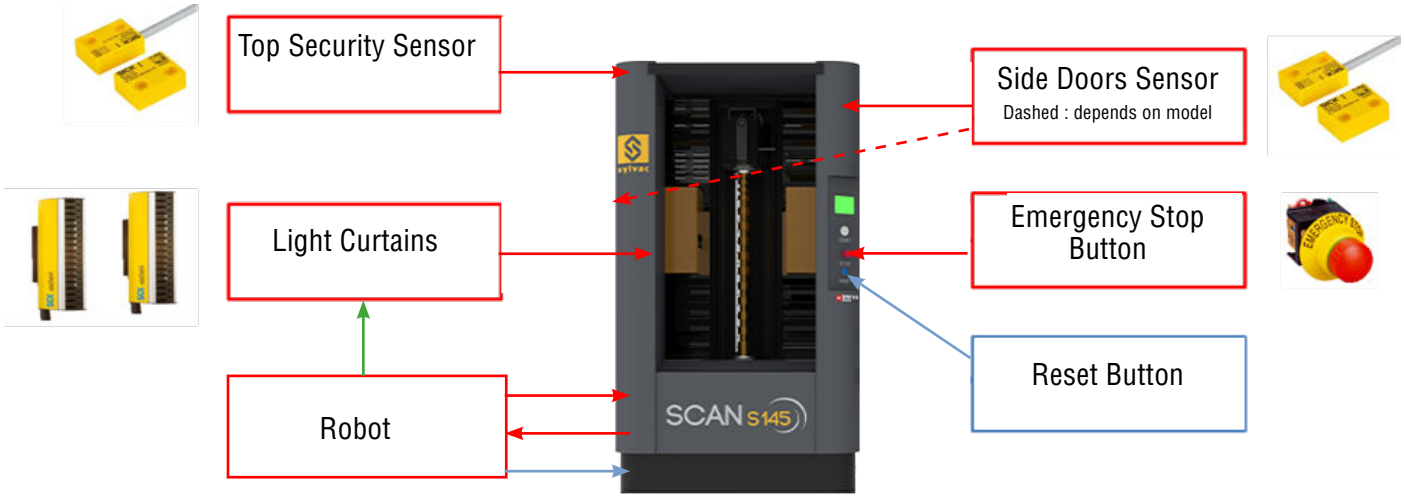


Pin	Function	Description	Direction	Type
1	+24V_ROB	Input +24V robot (common with other connectors)	Input	Persistent
2	SCAN_OK1	Safety output Scan ready 1	Output	Persistent
3	SCAN_OK2	Safety output Scan ready 2	Output	Persistent
4	ROBOT_OK1	Safety input robot ready 1	Input	Persistent
5	ROBOT_OK2	Safety input robot ready 2	Input	Persistent
6	+24V_SCAN	Output +24V Scan (common with the other connectors)	Output	Persistent
7	RESTART_ROB	Restart impulse from the robot	Input	Rising flank
8	RESTART_SCAN	Restart impulse from the Scan	Output	Rising flank
9	ROB_MUT1	Signal 1 to momentarily inhibit the light curtain	Input	Momentary
10	ROB_MUT2	Signal 2 to momentarily inhibit the light curtain	Input	Momentary
11		Not allocated		
12		Not allocated		
13	GND_ROB	Robot ground (common with the other connectors)	Input	Persistent
14	GND_SCAN	Scan ground (common with the other connectors)	Output	Persistent
15	SHIELD	Shielding	-	-

2.6. Functioning of the safety system with a robot

All red signals represent a D-SUB 15p safety connector pin.

When using the Scan with a robot, a double signal must be provided, which becomes a new safety element in addition to the emergency stop button.



In addition, the robot will be able to provide two «muting» signals that will temporarily disable operation of the light curtain to allow time for the robot to put down a part and exit.

For the robot to be able to send these signals to Scan S145, it must be provided with a +24V supply on +24V_ROB pin 1 and a GND on GND_ROB pin 13.

The status of the robot must be provided to the Scan by the ROBOT_OK1 pin 4 and ROB_OK2 pin 5, a binary 1 state indicates that the robot is ready and a binary 0 state that the robot is faulty.

The status of the Scan S145 is provided to the Robot by a doubled signal SCAN_OK1 pin 2 and SCAN_OK2 pin 3, a binary 1 indicates that the Scan is ready and a binary 0 that the Scan S145 is faulty.

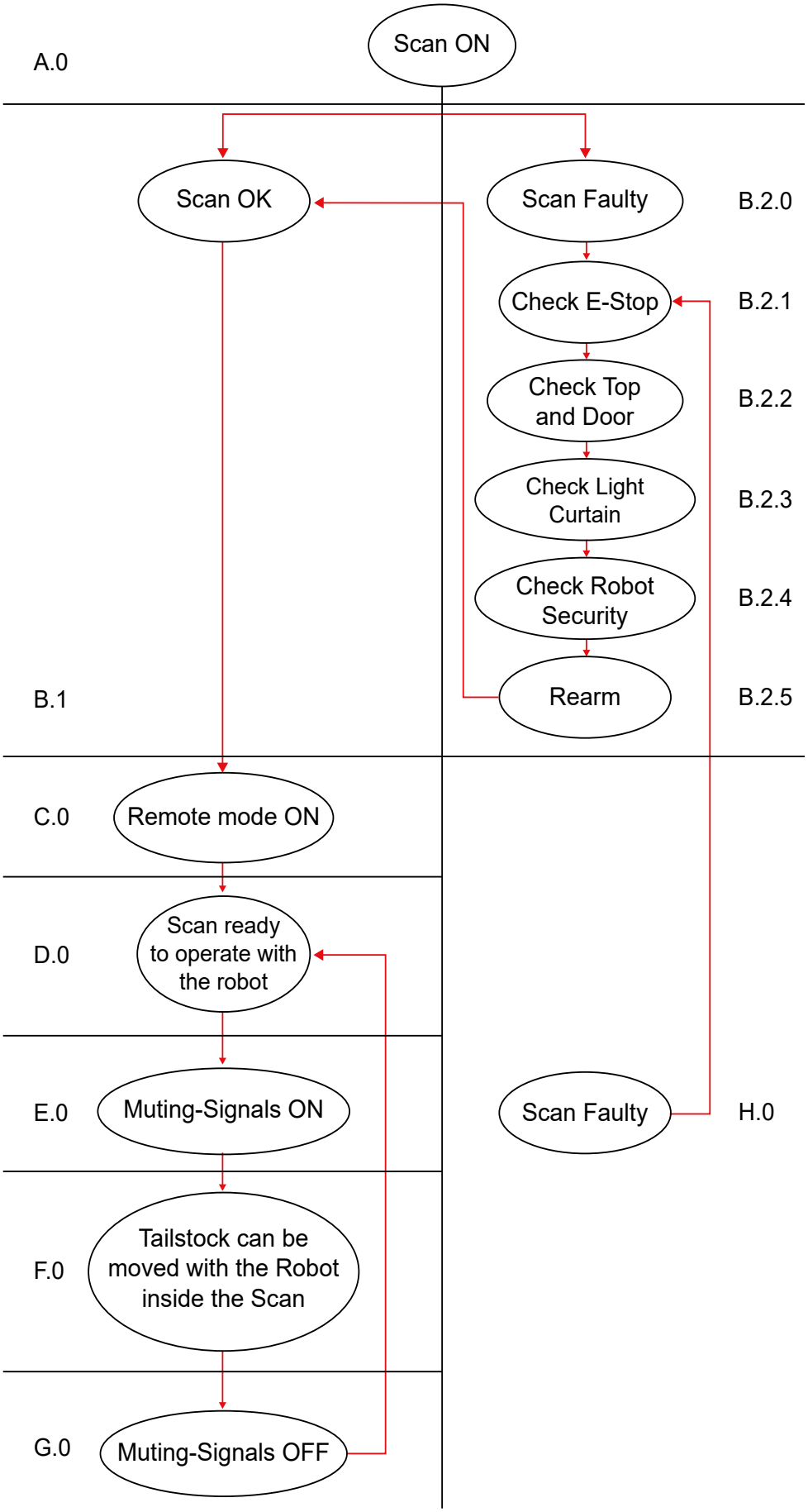
The light curtain can be disabled with the aid of the doubled signal ROB_MUT1 pin 9 and ROB_MUT2 pin 10, a binary 1 inhibits the light curtains and a binary 0 leaves them operating normally.

After one or more of the safety elements have been in the fault condition (emergency stop button, robot, trap safety contact, door safety contact, light curtain), the following two actions must be carried out (in this order) for the Scan to be ready again :

1. Check the safety elements and restore them to their normal operating state (restore the safety signals).
2. Start a measurement, from the Scan S145, ReflexScan or robot, or restart the Scan from the robot using the RESTART_SCAN pin8 (signal of at least 200 ms).

For the Scan and the robot to work together, the diagram in the next Section 2.6 must be observed.

2.7. Safety application diagram with a robot



2.8. Description of the safety application diagram with a robot

Each red signal refers to a pin of the D-SUB 15p safety connector.
Each signal must remain in the last defined state if not otherwise specified.
Binary 1 defines a state where there is +24V present.
Binary 0 defines a state where there is GND.
When the robot is connected to the Scan, the robot must provide the signals +24V_ROB Pin 1 ((Binary 1) and GND_ROB pin 13 (Binary 0) and all other necessary signals at the Scan input.

A.0 The Scan is turned on and a ReflexScan session is opened.

B.1 Scan OK (signals SCAN_OK1 pin 2 and SCAN_OK2 pin 3 in logic 1), go to step C.0.

B.2.0 Scan in fault state (signals SCAN_OK1 pin 2 and/or SCAN_OK2 pin 3 in logic 0).
B.2.1 Check the Scan emergency stop button (must be pulled out).
B.2.2 Check the Scan trap and door(s) (they must be closed).
B.2.3 Check the Scan light curtain (it must not be interrupted).
B.2.4 Check the safety signal from the robot (signal ROBOT_OK1 pin 4 and signal ROB_OK2 pin 5 in logic 1).
B.2.5 Restart the Scan (Logic 1 for at least 200 ms on the RESTART_SCAN pin 8 signal, then return to logic 0).

C.0 The remote control mode must be activated in ReflexScan.

D.0 The Scan is ready to work with the solution of your choice: Wired, OPCA/UA, Modbus TCP/IP, Profinet.
At this stage, the light curtain must not be interrupted, otherwise the Scan will fail !

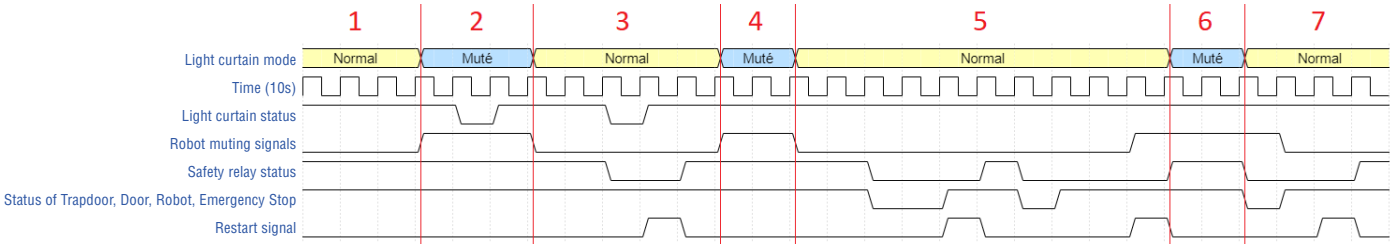
E.0 The Scan must receive the Muting signals (signals ROB_MUT1 pin 9 and ROB_MUT2 pin 10 in Binary 1). Measurement commands must not be sent to the Scan when these signals are present !

F.0 Now the Scan tailstock can be moved even if the robot crosses the light curtain. Once the robot has finished its operation, it must not cross the light curtain anymore!

G.0 The Scan should no longer receive Muting signals (signals ROB_MUT1 pin 9 and ROB_MUT2 pin 10 in Binary 0). Measurement commands can now be sent to the Scan.

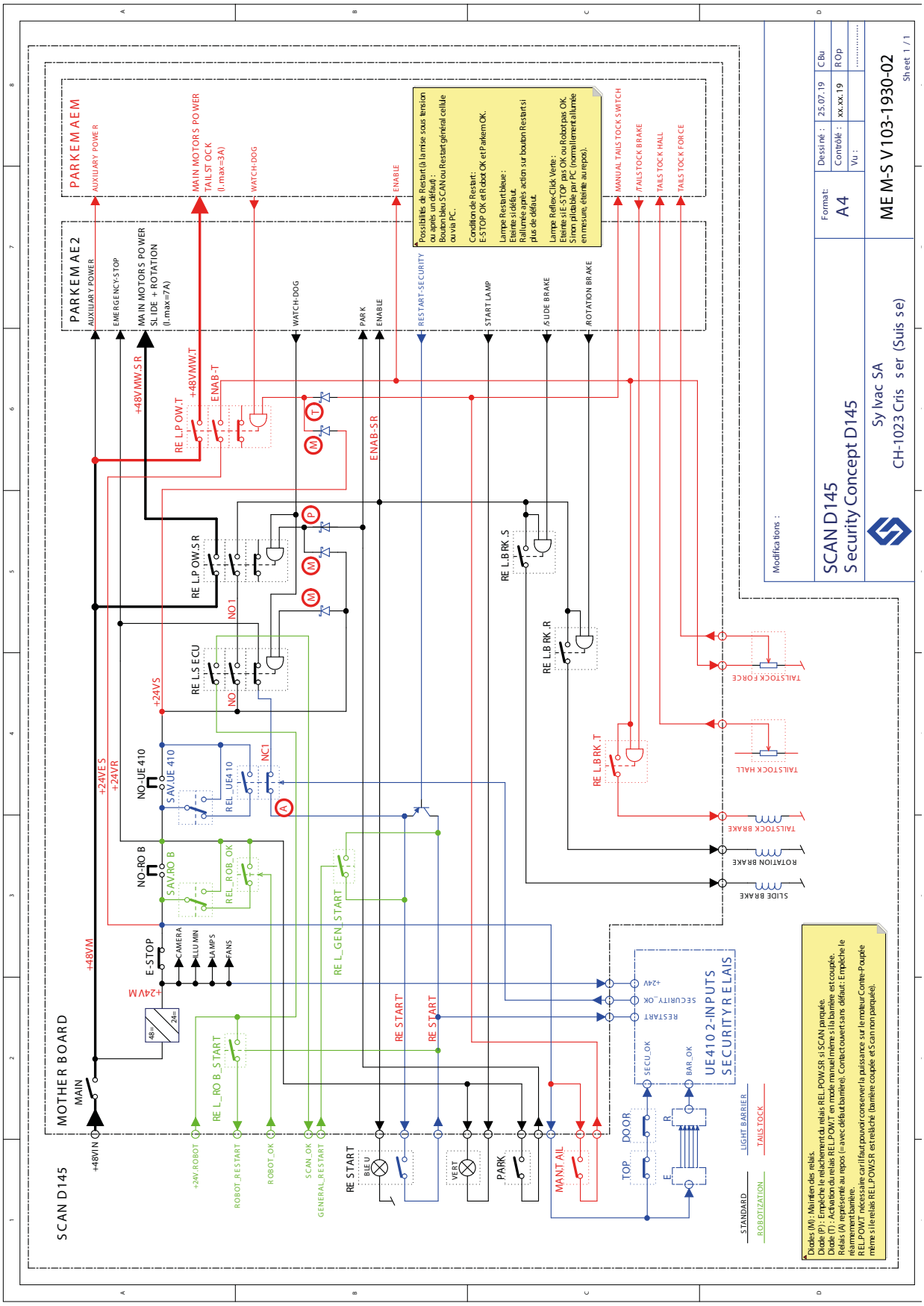
H.0 In the event of a fault occurring in the Scan or the robot during operation (signals SCAN_OK1 pin 2 and/or SCAN_OK2 pin 3 in logic 0 and/or signal ROB_OK1 pin 4 and/or signal ROB_OK2 pin 5 in logic 0), return to step B.2.1.

2.9. Chronogram of safety operation with a robot



1. Normal operation, no fault.
2. Light curtain disabled, crossing the barrier no longer creates an error.
3. Normal operation, light curtain fault, then Safety Relay OK after a Reset.
4. Light curtain disabled, no fault.
5. Normal operation, fault in one of the safety elements, then Safety Relay OK after a Reset, then fault in one of the safety elements
6. Light curtain disabled, no fault.
7. Normal operation, fault in one of the safety elements, then Safety Relay OK after a Reset.

2.10. Safety schematic diagram with a robot



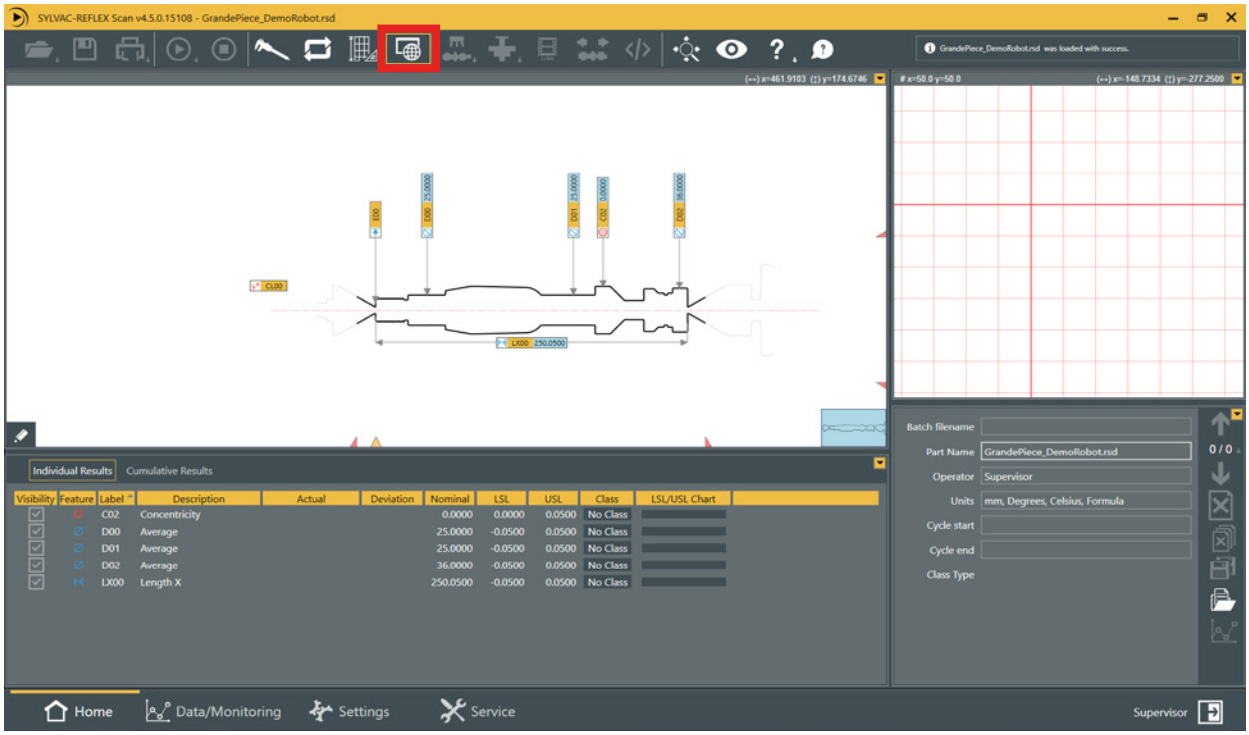
3. REMOTE MODE

Before starting any command with the Scan, regardless of the communication protocol chosen, the robot must check that “Remote Mode” is activated.

To activate the remote mode, go to the ReflexScan main screen (Home) and click on the Remote Mode button.

The robot can also choose to send the “Remote Lock” command to lock ReflexScan in the remote control mode.

3.1 Location of the Remote Mode button

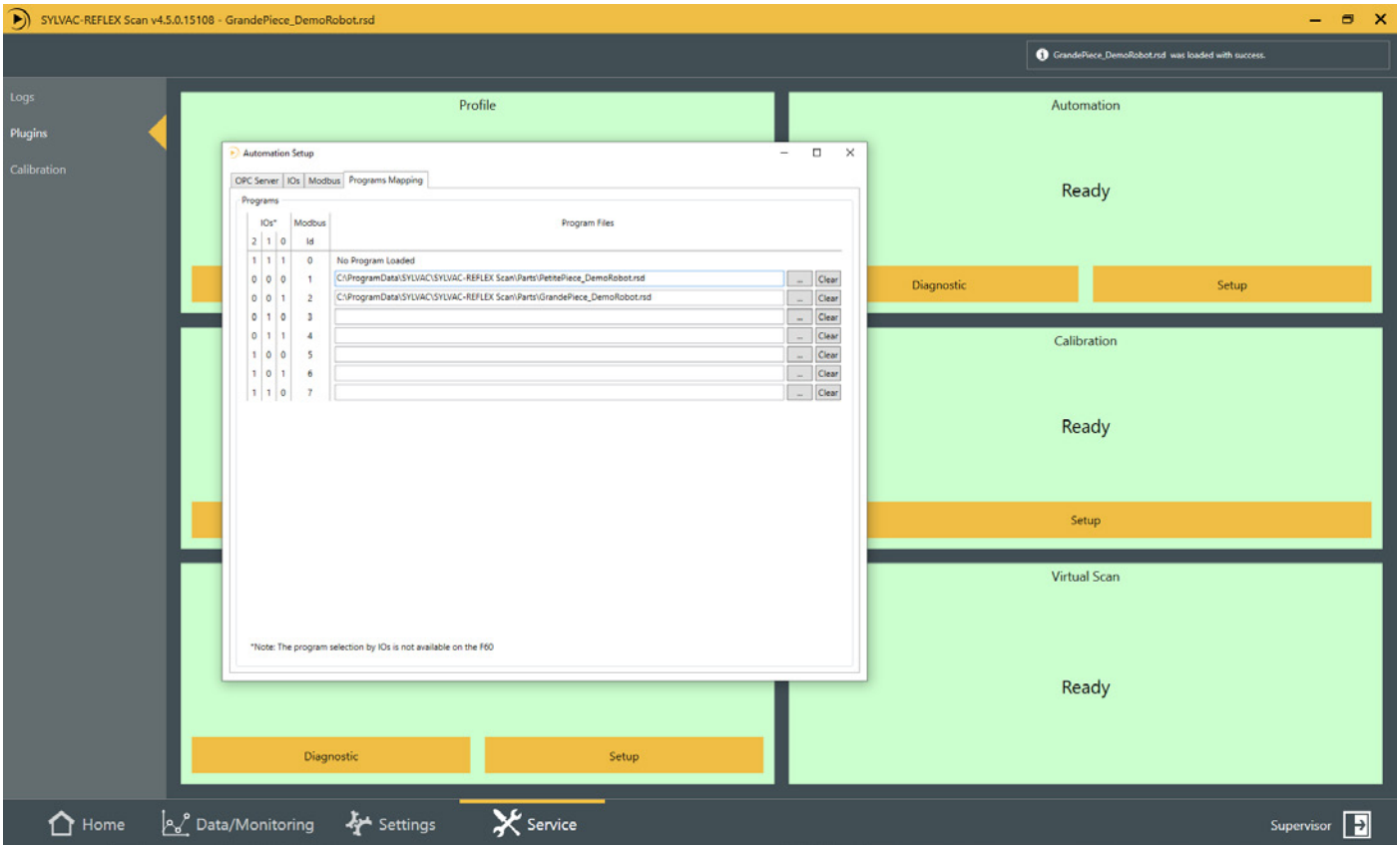


4. PROGRAM MAPPING

To be able to load programs from I/Os or Modbus, you have to assign them in the Setup of the «Automation» plugin using the “Service->Plugin->Automation->Setup” menu, then in the “Programs Mapping” tab.

For the I/Os, each program can be assigned to a 3-bit binary code, allowing up to 7 programs with code 111 indicating no active program.

For Modbus, each program can be assigned to an identifier from 1 to 7, with 0 indicating no active program.



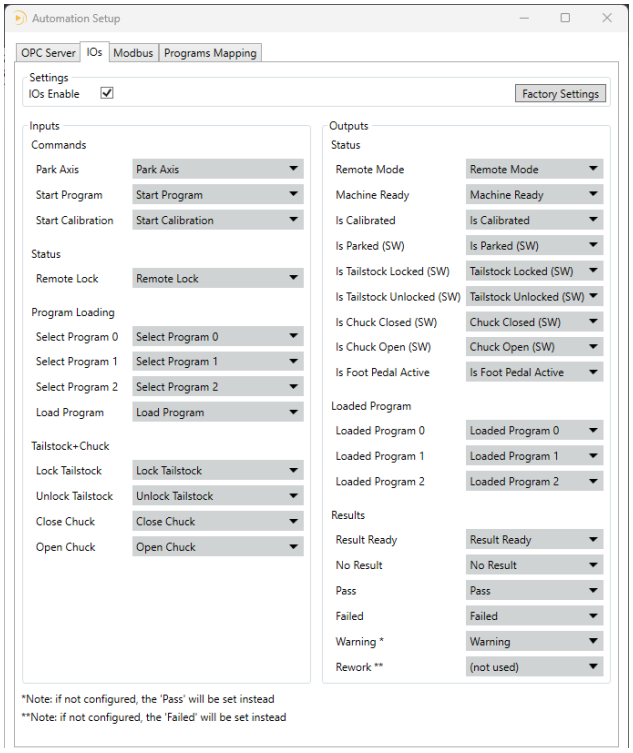
5. WIRED SOLUTION

The Scan can be controlled by electrical signals grouped on two D-SUB connectors.

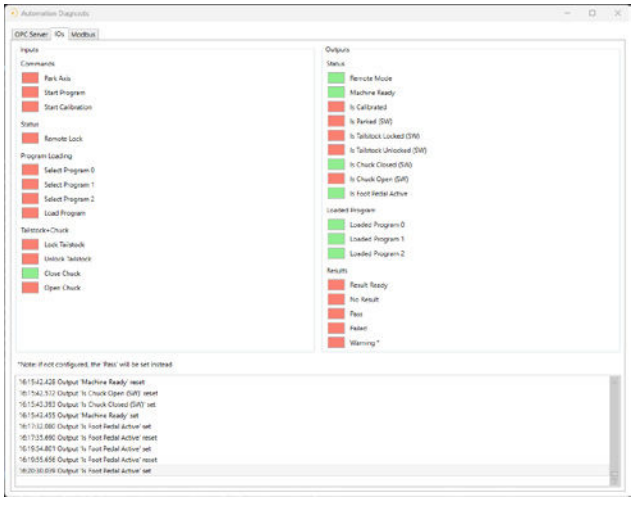
This approach is the most direct to implement, but also the most limited in its possibilities. For example, it is not possible to exchange analog values (e.g. axes position). Note that the number of available functions depends directly on the number of input/output signals of the Scan.

The first time you use them, the IOs have to be activated.
Go to the Setup ot the “Automation” plugin from the menu“Service->Plugin->Automation->Setup” and check IOs Enable in the IOs tab.
If you do not use IOs, IOs Enable must be unchecked.
To check the status of the IOs, go to the Diagnostics of the “Automation” plugin from the menu“Service->Plugin->Automation->Diagnostics” and check the status of the IOs in the drop-down window at the bottom of the IOs tab.

5.1 Configuration



5.2 Diagnostics



5.3 Description of the I/O diagnostics

Inputs		
Type	**Name**	**Details**
Commands		
	Park Axis	All axes move to their parking position.
	Start Program	Starts the loaded program.
	Start Calibration	Starts a calibration cycle.
Status		
	Remote Lock	Locks the Scan in remote mode.
Program Loading		
	Select Program 0	3-bit code (0 to 7) for program selection.
	Select Program 1	
	Select Program 2	
	Load Program	Loads (or unloads) the program according to the 3-bit code (0 to 7).
Tailstock + Chuck		
	Lock Tailstock	Lowers and locks the tailstock. The position and the force are defined by the program which is loaded.
	Unlock Tailstock	Raises and unlocks the tailstock. The position is defined by the loaded program. If there is no program, the tailstock moves up to the maximum position. **
	Close Chuck	Closes the pneumatic chuck. *
	Open Chuck	Opens the pneumatic chuck. *

Outputs		
Type	**Name**	**Details**
Status		
	Remote mode	“True” state when the Scan is in remote mode.
	Machine Ready	“True” state when the Scan is ready to receive a new command from the robot (e.g.: unlock tailstock).
	Is Calibrated	“True” state when the machine has been calibrated.
	Is Parked (SW)	“True” state when the axes are in parking position.
	Is Tailstock Locked (SW)	“True” state when the tailstock is locked on a part.
	Is Tailstock Unlocked (SW)	“True” state when the tailstock is unlocked. No longer on a part.
	Is Chuck Closed	“True” state when the pneumatic chuck is closed.
	Is Chuck Open	“True” state when the pneumatic chuck is open.
	Is Footpedal active	True if of the foot pedal is active once connected
Loaded Program		
	Loaded Program 0	3-bit code (0 to 7) of the currently selected program.

	Loaded Program 1	
	Loaded Program 2	
Results		
	Result Ready	“True” state when the program has finished its execution and the results are ready.
	No Result	“True” state when the program has not returned any results.
	Pass	“True” state when all measurement results are within the tolerances defined by the loaded program.
	Failed	“True” state when all measurement results are not within the tolerances defined by the loaded program.
	Warning	“True” state when one of the dimensions needs to be corrected in the program.

* Optional, you must install a pneumatic chuck to use these signals.
**Warning! A part that is not held properly before this signal is sent may fall and cause damage or injuries.

5.4 Description of the main D-SUB 37p I/O pins

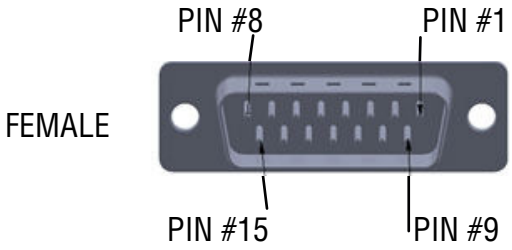
All inputs and outputs, to and from the Scan, must either be at +24V (binary 1) or at GND (binary 0). All signals to the Scan must come from the robot.

Pin	I/O SCAN	Function	Type of signal
1	+24V (Robot)	+24V from the robot (common with the other connectors)	
2	GND (Robot)	Ground from the robot (common with the other connectors)	
3	+24V (Scan)	+24V from the Scan (common with the other connectors)	
4	GND (Scan)	Ground from the Scan (common with the other connectors)	

5	IN1	Park axis	Rising edge
6	IN2	Start Program	Rising edge
7	IN3	Start Calibration	Rising edge
8	IN4	Remote Lock	Persistent
9	IN5	Select Program 0	Persistent
10	IN6	Select Program 1	Persistent
11	IN7	Select Program 2	Persistent
12	IN8	Load Program	Rising edge
13	IN9	Lock Tailstock	Rising edge
14	IN10	Unlock Tailstock	Rising edge
15	IN11	Reserve IN	
16	IN12	Reserve IN	
17	IN13	Reserve IN	
18	IN14	Reserve IN	
19	IN15	Reserve IN	
20	IN16	Reserve IN	
21	OUT1	Remote mode	Persistent
22	OUT2	Machine Ready	Persistent
23	OUT3	Is Calibrated	Persistent
24	OUT4	Is Parked (SW)	Persistent
25	OUT5	Tailstock Locked (SW)	Persistent
26	OUT6	Tailstock Unlocked (SW)	Persistent
27	OUT7	Loaded Program 0	Persistent
28	OUT8	Loaded Program 1	Persistent
29	OUT9	Loaded Program 2	Persistent
30	OUT10	Reserve OUT	
31	OUT11	Result Ready	Persistent
32	OUT12	No Result	Persistent
33	OUT13	Pass	Persistent
34	OUT14	Failed	Persistent
35	OUT15	Warning	Persistent
36	OUT16	Is Foot Pedal Active	
37	Earth	Shielding	

5.5 Description of pin D-SUB 15p I/O additional tools

All inputs and outputs, to and from the Scan, must either be at +24V (edge 1) or at GND (edge 0). All signals to the Scan must come from the robot.
This connector is used for more I/Os.



PIN	I/O SCAN	Function	Type of signal
1	+24V (Robot)	+24V from the robot (common with the other connectors)	
2	GND (Robot)	Ground from the robot (common with the other connectors)	
3	IN17	Close Chuck	
4	IN18	Open Chuck	
5	IN19		
6	IN20		
7	IN21		
8	IN22		
9	OUT17	Chuck Open (SW)	Persistent
10	OUT18	Chuck Closed (SW)	Persistent
11	OUT19		
12	OUT20		
13	OUT21		
14	OUT22		
15	Earth	Shielding	

6. OPC/UA SERVER

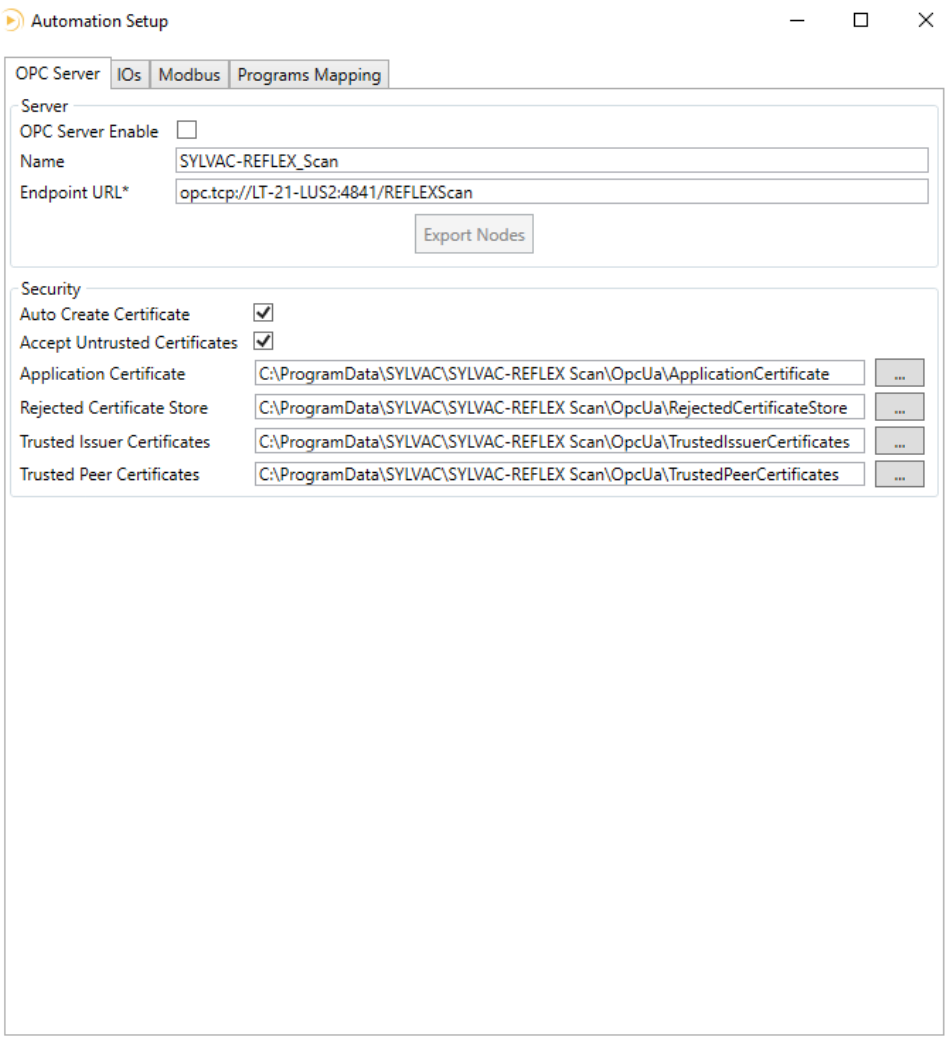
OPC UA is a communication protocol for the automation industry using an Ethernet port. It is the most flexible automation solution supported by the Scan (e.g. access to the details of a measurement result).

Note that the Scan only supports the binary protocol opc.tcp.

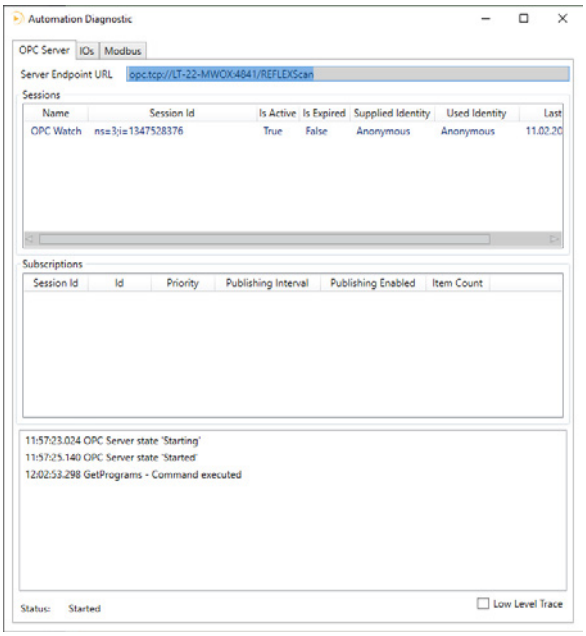
The first time you use it, you must activate the OPC Server to be able to use the protocol.
Go to the Setup of the “Automation” plugin from the menu“Service->Plugin->Automation->Setup” and check OPC Server Enable in the OPC Server tab.
If you are not using OPC/UA, OPC Server Enable must be unchecked.
To check the status of the OPC Server, go to the Diagnostics of the “Automation” plugin from the menu “Service->Plugin->Automation->Diagnostics” and check the status of the OPC Server in the drop-down window at the bottom of the OPC Server tab.

Note that the address of the Automation Ethernet port on the PC where ReflexScan is installed must be the same.

6.1 Configuration



6.2 Diagnostics



6.3 Methods

Methods	Description
Clear All Runs	Clear all runs from the memory
Close Chuck	Close the pneumatic chuck
Get Programs	Get the list of available programs
Get Results	Get the last measurement results
Load Program	Load a program using the program file name
Lock Tailstock	Move down and lock the tailstock
Move Rotation To Position	Move the Rotation axis to a specific position
Move Slide to Position	Move the Slide axis to a specific position
Move Tailstock to Position	Move the Tailstock axis to a specific position
Open Chuck	Open the pneumatic chuck
Park Axis	Move all axes to the parking/loading position
Remote Lock	Block the 'automation mode'
Set Custom SPC	<special>
Start Calibration	Start the execution of the calibration
Start Program	Start the execution of a measurement program
Stop Program	Stop the execution of the current program
Unlock Tailstock	Move up and unlock the tailstock
GetToolCorrections	Get the proposition for each corrector in an XML format or text format
ResetCorrectionStatus	Reset the 'Correction Status'

6.4 Nodes

Node	Descriptions
Rotation	Position of the Rotation [°]
Slide	Position of the Slide [mm]
Tailstock	Position of the Tailstock [mm]
ApplicationMode	Application Mode (e.g. Composer, ReflexClick, Replay, Remote)
ApplicationVersion	Version of SYLVAC-REFLEX Scan
Calibrated	Calibration state
ChuckStatus	The status of the pneumatic chuck ('Unknown', 'Closed', 'Open')
IsParked	Is machine in park position state
IsTailstockTouching	Flag set to True then the tailstock is touching a part
MachineID	Machine ID
MachineType	Machine Type (e.g. 'F60', 'F60T', 'F60L', 'F60LT', 'S145', 'S145L')
TailstockStatus	The status of the Tailstock ('Unknown', 'Locked', 'Unlocked')
ProgramName	Program Name
ProgramResult	Program Result (e.g. 'None', 'NoClass', 'Passed', 'WarningRework', 'WarningReject', 'Rework', 'Failed', 'Invalid')
ProgramState	Program State (e.g. 'Idle', 'Loading', 'Saving', 'Printing', 'Moving', 'LockingTailstock', 'UnlockingTailstock', 'Calibrating', 'Repositioning', 'Scanning', 'ResultsReady')
TraceField1	Program Trace Field 1
TraceField2	Program Trace Field 2
RegOutNum1	Register Output Numerical 1
RegOutNum2	Register Output Numerical 2
RegOutNum3	Register Output Numerical 3
RegOutNum4	Register Output Numerical 4
RegOutNum5	Register Output Numerical 5
CorrectionDate	Timestamp of last tool corrector proposition
CorrectionMachineName	Machine's name of last tool corrector proposition
CorrectionStatus	Correction Status (e.g. 'WaitingProposition', 'PropositionReady', 'ImpossibleToCorrect')

7. MODBUS TCP/IP SERVER

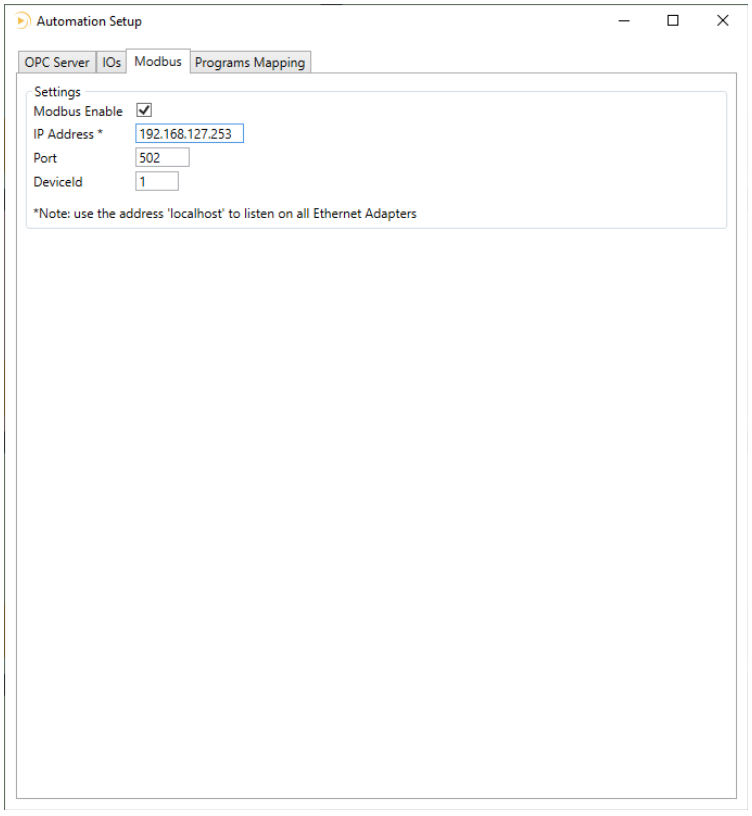
The Scan incorporates a Modbus TCP/IP Server that allows access to the main functions of the Scan.

When first used, Modbus must be enabled to use the protocol.
Go to the Setup of the “Automation” plugin from the menu“Service->Plugin->Automation->Setup” and check Modbus Enable in the Modbus tab.
If you do not use Modbus, Modbus Enable must be unchecked.
To check the Modbus status, go to the Diagnostics of the “Automation” plugin from the menu “Service->Plugin->Automation->Diagnostics” and check the Modbus status in the drop-down window at the bottom of the Modbus tab.

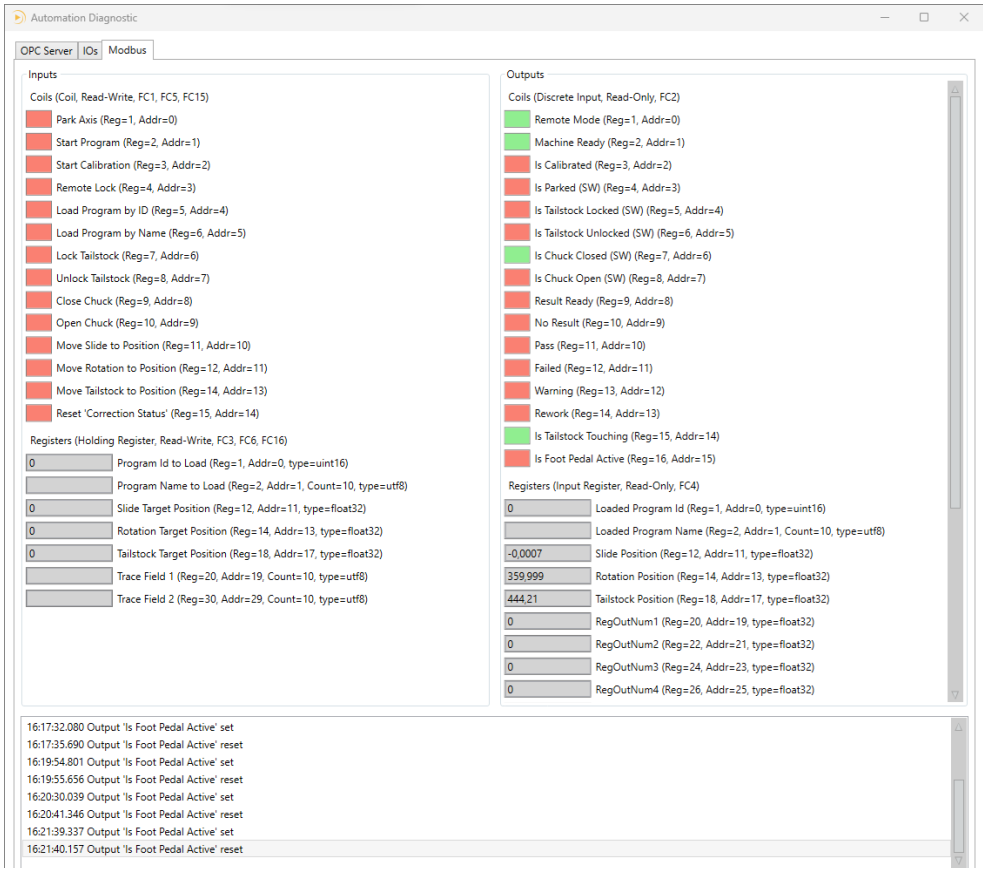
To change the Modbus IP address, go to the Setup of the “Automation” plugin from the menu “Service->Plugin->Automation->Setup” and then to the IP Address in the Modbus tab.

Note that the address of the Automation Ethernet port on the PC where ReflexScan is installed must be the same.

7.1 Configuration



7.2 Diagnostics



7.3 Input table (Coils, Read-Write, FC1, FC5, FC15)

Variable	Description	Address
Park Axis	Move the machine to the parking position	0
Start Program	Start the measurement of the part	1
Start Calibration	Start the calibration of the machine	2
Remote Lock	Lock «Remote Mode» from the scan (e.g.: robot working)	3
Load Program by Id	Load a program using its ID	4
Load Program by Name	Load a program using its name	5
Lock Tailstock	Lower the tailstock to clamp the part	6
Unlock Tailstock	Raise the tailstock to release the part	7
Close Chuck	Closes the chuck to clamp the part	8
Open Chuck	Opens the chuck to release the part	9
Move Slide to Position	Moves the slide to the desired position	10
Move Rotation to Position	Moves the rotation to the desired position	11
Move Tailstock to Position	Moves the tailstock to the desired position	13
Reset ‘Correction Status’	Reset the status of the corrector	14

7.4 Input table (Holding Register, Read-Write, FC3, FC6, FC16)

Variable	Description	Address	Type	Size
Program Id to Load	ID of the program to be loaded	0	uint16	2 bytes
Program Name to Load	Name of the program to be loaded	1	utf8[20]	20 bytes
Slide Target Position	Choose the position of the slide for displacement [mm]	11	float32	4 bytes
Rotation Target Position	Choose the position of the rotation for displacement [°]	13	float32	4 bytes
Tailstock Target Position	Choose the position of the tailstock for displacement [mm]	17	float32	4 bytes
Trace Field 1	Tracing field 1	20	utf8[20]	20 bytes
Trace Field 2	Tracing field 2	30	utf8[20]	20 bytes

7.5 Output table (Discrete Input, Read-Only, FC2)

Variable	Description	Address
Remote mode	Scan in remote mode	0
Machine Ready	Machine ready for measurement	1
Is Calibrated	Machine calibrated	2
Is Parked	Machine parked	3
Is Tailstock Locked	Tailstock closed	4
Is Tailstock Unlocked	Tailstock open	5
Is Chuck Closed	Chuck closed	6
Is Chuck Open	Chuck open	7
Result Ready	Measurement result available	8
No Result	No measurement result	9
Pass	Measurement result within tolerance	10
Failed	Measurement result out of tolerance	11
Warning	Measurement result within tolerance limit	12
Rework	Measurement result outside of tolerance, rework possible	13
IsTailstockTouching	Tailstock in contact with a part	14
Is Foot Pedal Active	Foot pedal active	15

7.6 Output table (Input Register, Read-Only, FC4)

Variable	Description	Address	Type	Size
Loaded Program Id	ID of the loaded program	0	uint16	2 bytes
Loaded Program Name	Name of the loaded program	1	utf8[20]	20 bytes
Slide Position	Current position of the slide [mm]	11	float32	4 bytes
Rotation Position	Current position of rotation [°]	13	float32	4 bytes
Tilt Position	Current tilt position [°]	15	float32	4 bytes
Tailstock Position	Current position of the tailstock [mm]	17	float32	4 bytes
RegOutNum1	Current value of register 1	19	float32	4 bytes
RegOutNum2	Current value of register 2	21	float32	4 bytes
RegOutNum3	Current value of register 3	23	float32	4 bytes
RegOutNum4	Current value of register 4	25	float32	4 bytes
RegOutNum5	Current value of register 5	27	float32	4 bytes
Correction Status	Status of correction (0:waiting, 1: ready, 2: error)	29	uint16	2 bytes
Correction1	Correction value 1	30	sint32	4 bytes
Correction2	Correction value 2	32	sint32	4 bytes
Correction3	Correction value 3	34	sint32	4 bytes
Correction4	Correction value 4	36	sint32	4 bytes
Correction5	Correction value 5	38	sint32	4 bytes
Correction6	Correction value 6	40	sint32	4 bytes
Correction7	Correction value 7	42	sint32	4 bytes
Correction8	Correction value 8	44	sint32	4 bytes
Correction9	Correction value 9	46	sint32	4 bytes
Correction10	Correction value 10	48	sint32	4 bytes

8. PROFINET VIA GATEWAY

The Scan machine can be controlled by a Profinet bus using a gateway Moxa MGate 5103 that converts ModbusTCP<>Profinet I/O Device.

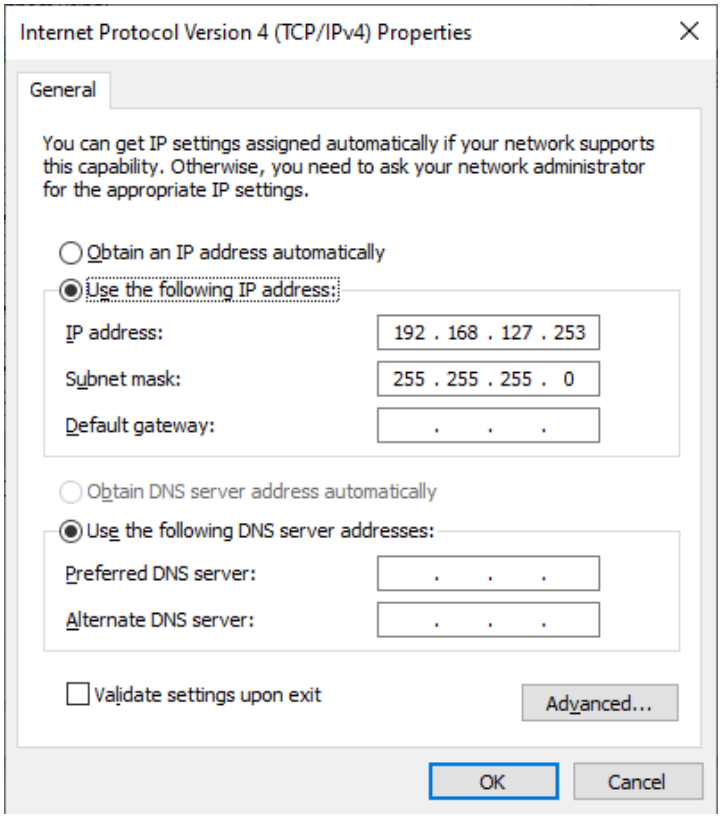
When RS+ software is installed, the configuration files needed for the gateway are copied to the disk in the 'Resources\Profinet' subdirectory of the Scan program.

The factory settings of the gateway are as follows :

IP address	192.168.127.254
Login	admin
Password	moxa

8.1 Configuration of the local IP address

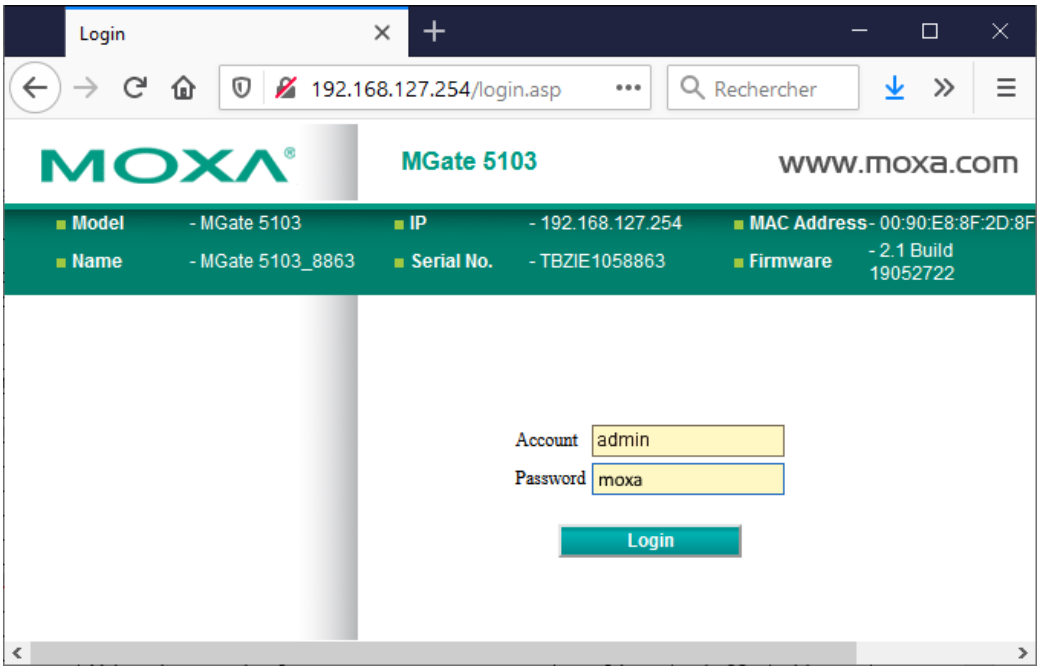
The network card must be configured to be in the same '192.168.127.*' subnet as the gateway and must match the one used for ModbusTCP.



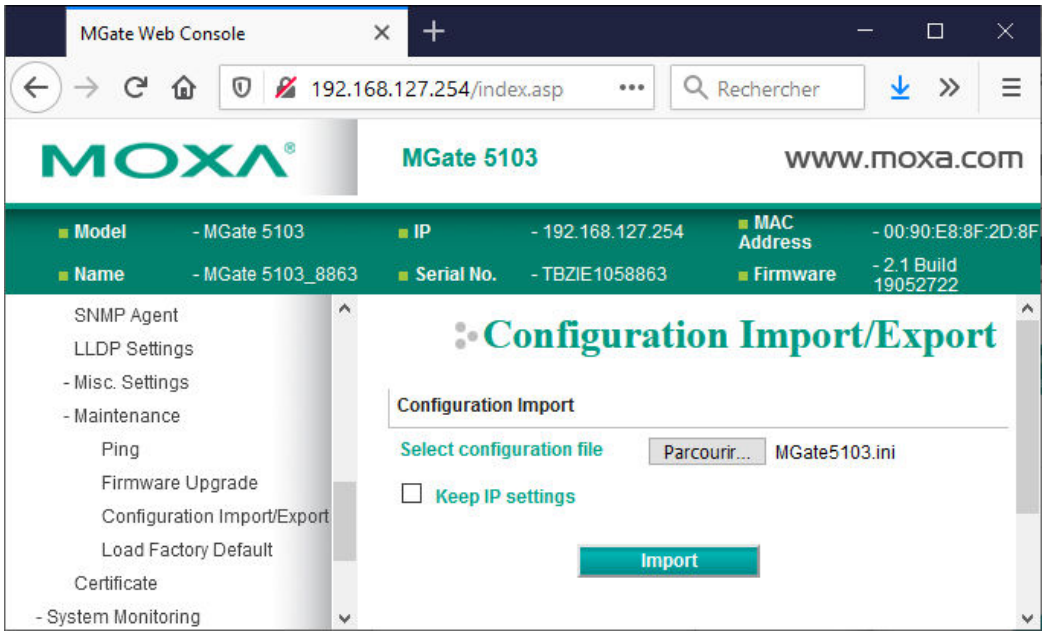
8.2. Gateway configuration

The gateway is configured via its web portal.

To set the gateway into ‘configuration’ mode, you must first switch it off, ensuring to disconnect all its Ethernet cables. You must then wait about ten seconds for the ‘beep’ when the power is restored before reconnecting the network cable between the gateway and the Scan computer.

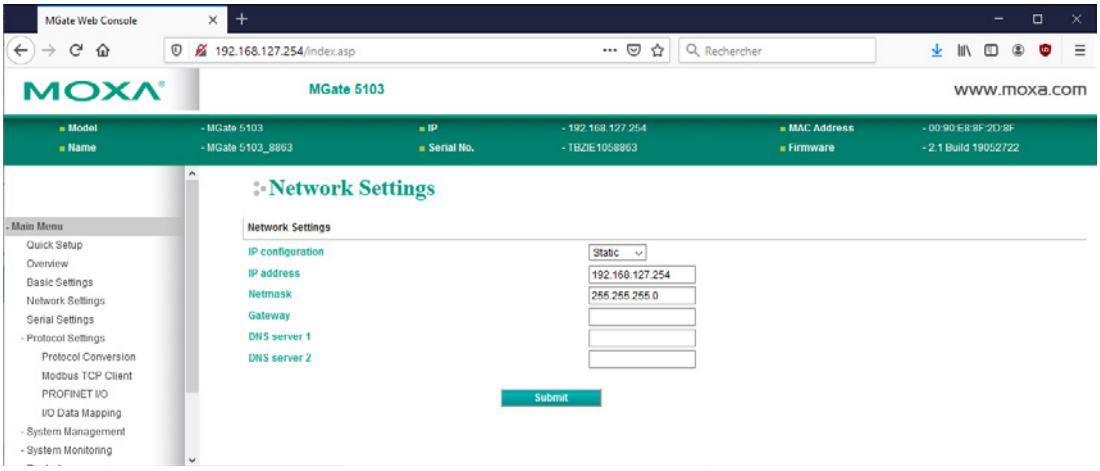


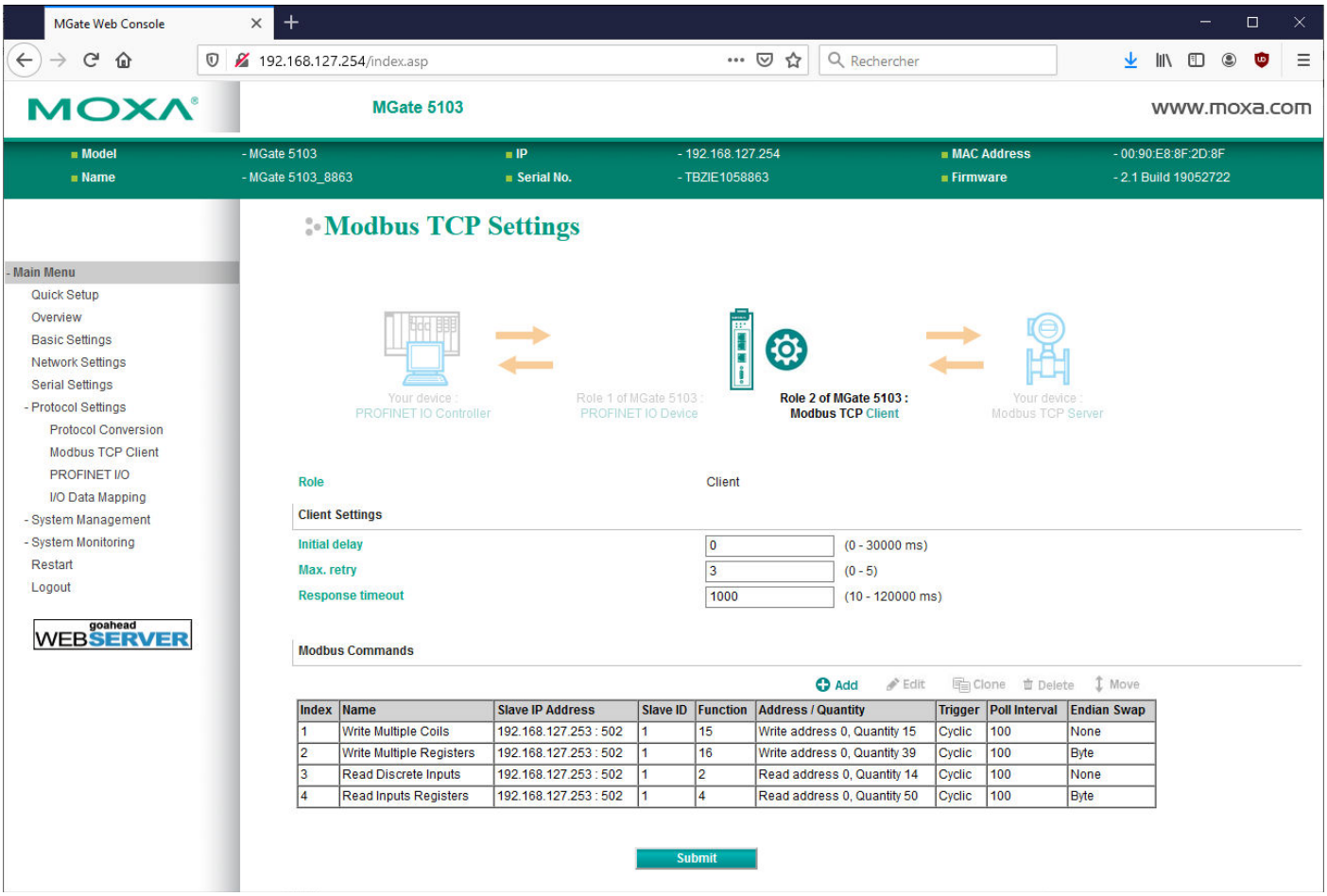
The ‘MGate5103.ini’ configuration file can be loaded to the gateway via the menu shown below.



8.3 Changing the IP address

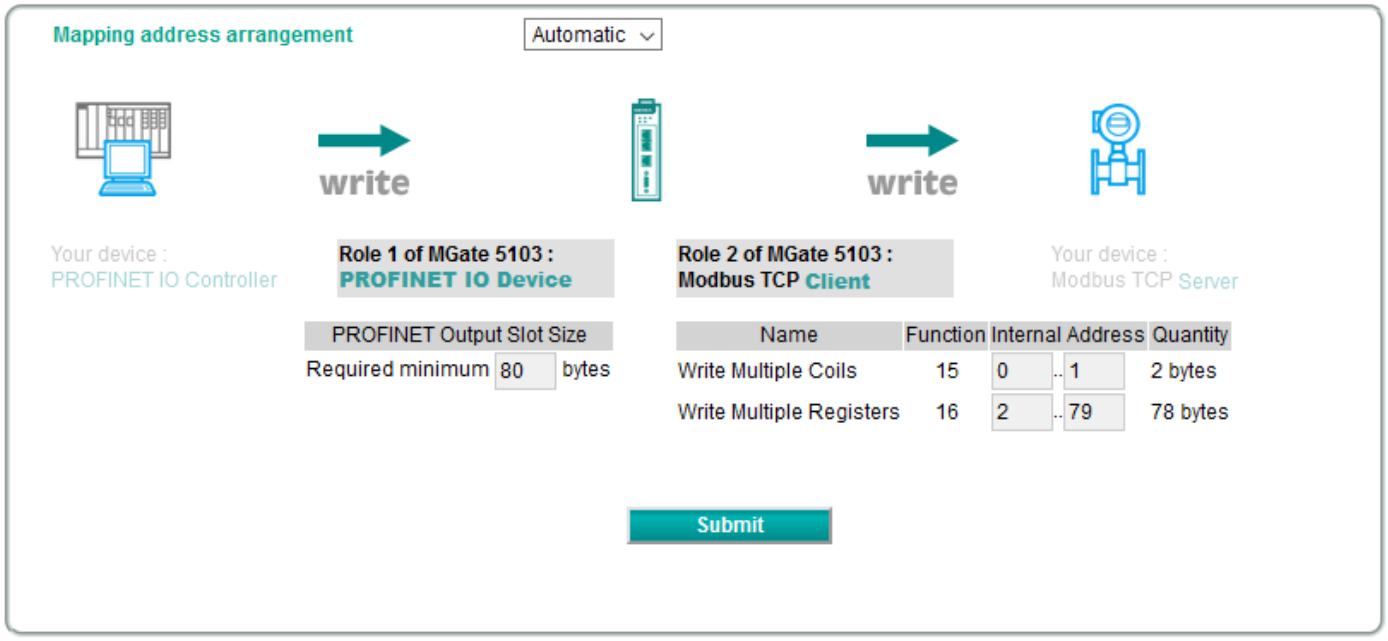
It is possible that the installation at the customer's site requires working in a different subnet. In this case, it is necessary to modify the IP address of the gateway, as well as the parameters of the four ModbusTCP commands.





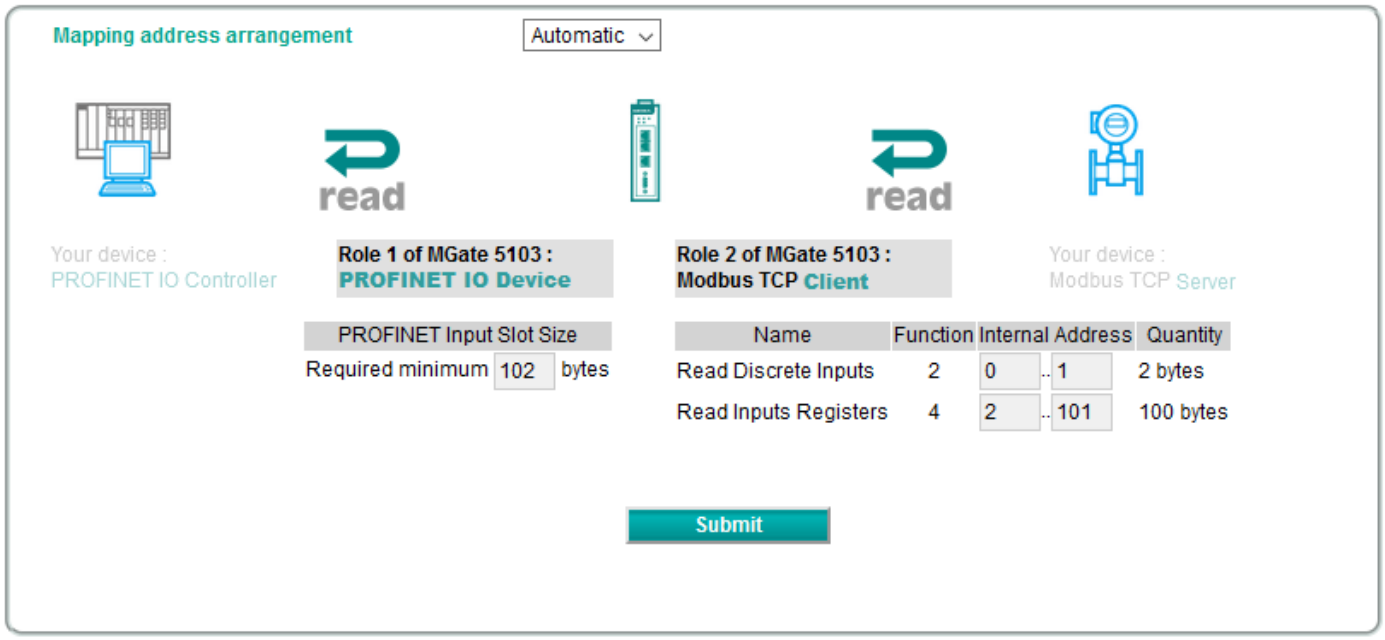
8.4 I/O data mapping

The mapping between the Modbus data and the two Profinet frames is handled automatically by the gateway. The position of each data in the frames will depend directly on the address of the Modbus registers.



bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0	PA	SP	SC	RL	LPID	LPN	LT	UT	CC	OC	MSL	MR	MTI	MTA	RC		Program Id to Load (uint16)															
32	Program Name to Load[0] (utf8)								Program Name to Load[1] (utf8)								Program Name to Load[2] (utf8)								Program Name to Load[3] (utf8)							
64	Program Name to Load[4] (utf8)								Program Name to Load[5] (utf8)								Program Name to Load[6] (utf8)								Program Name to Load[7] (utf8)							
96	Program Name to Load[8] (utf8)								Program Name to Load[9] (utf8)								Program Name to Load[10] (utf8)								Program Name to Load[11] (utf8)							
128	Program Name to Load[12] (utf8)								Program Name to Load[13] (utf8)								Program Name to Load[14] (utf8)								Program Name to Load[15] (utf8)							
160	Program Name to Load[16] (utf8)								Program Name to Load[17] (utf8)								Program Name to Load[18] (utf8)								Program Name to Load[19] (utf8)							
192	Slide Target Position (float32)																															
224	Rotation Target Position (float32)																															
256	Tilt Target Position (float32)																															
288	Tailstock Target Position (float32)																															
320	Trace Field 1 [0] (utf8)								Trace Field 1 [1] (utf8)								Trace Field 1 [2] (utf8)								Trace Field 1 [3] (utf8)							
352	Trace Field 1 [4] (utf8)								Trace Field 1 [5] (utf8)								Trace Field 1 [6] (utf8)								Trace Field 1 [7] (utf8)							
384	Trace Field 1 [8] (utf8)								Trace Field 1 [9] (utf8)								Trace Field 1 [10] (utf8)								Trace Field 1 [11] (utf8)							
416	Trace Field 1 [12] (utf8)								Trace Field 1 [13] (utf8)								Trace Field 1 [14] (utf8)								Trace Field 1 [15] (utf8)							
448	Trace Field 1 [16] (utf8)								Trace Field 1 [17] (utf8)								Trace Field 1 [18] (utf8)								Trace Field 1 [19] (utf8)							
480	Trace Field 2 [0] (utf8)								Trace Field 2 [1] (utf8)								Trace Field 2 [2] (utf8)								Trace Field 2 [3] (utf8)							
512	Trace Field 2 [4] (utf8)								Trace Field 2 [5] (utf8)								Trace Field 2 [6] (utf8)								Trace Field 2 [7] (utf8)							
544	Trace Field 2 [8] (utf8)								Trace Field 2 [9] (utf8)								Trace Field 2 [10] (utf8)								Trace Field 2 [11] (utf8)							
576	Trace Field 2 [12] (utf8)								Trace Field 2 [13] (utf8)								Trace Field 2 [14] (utf8)								Trace Field 2 [15] (utf8)							
608	Trace Field 2 [16] (utf8)								Trace Field 2 [17] (utf8)								Trace Field 2 [18] (utf8)								Trace Field 2 [19] (utf8)							

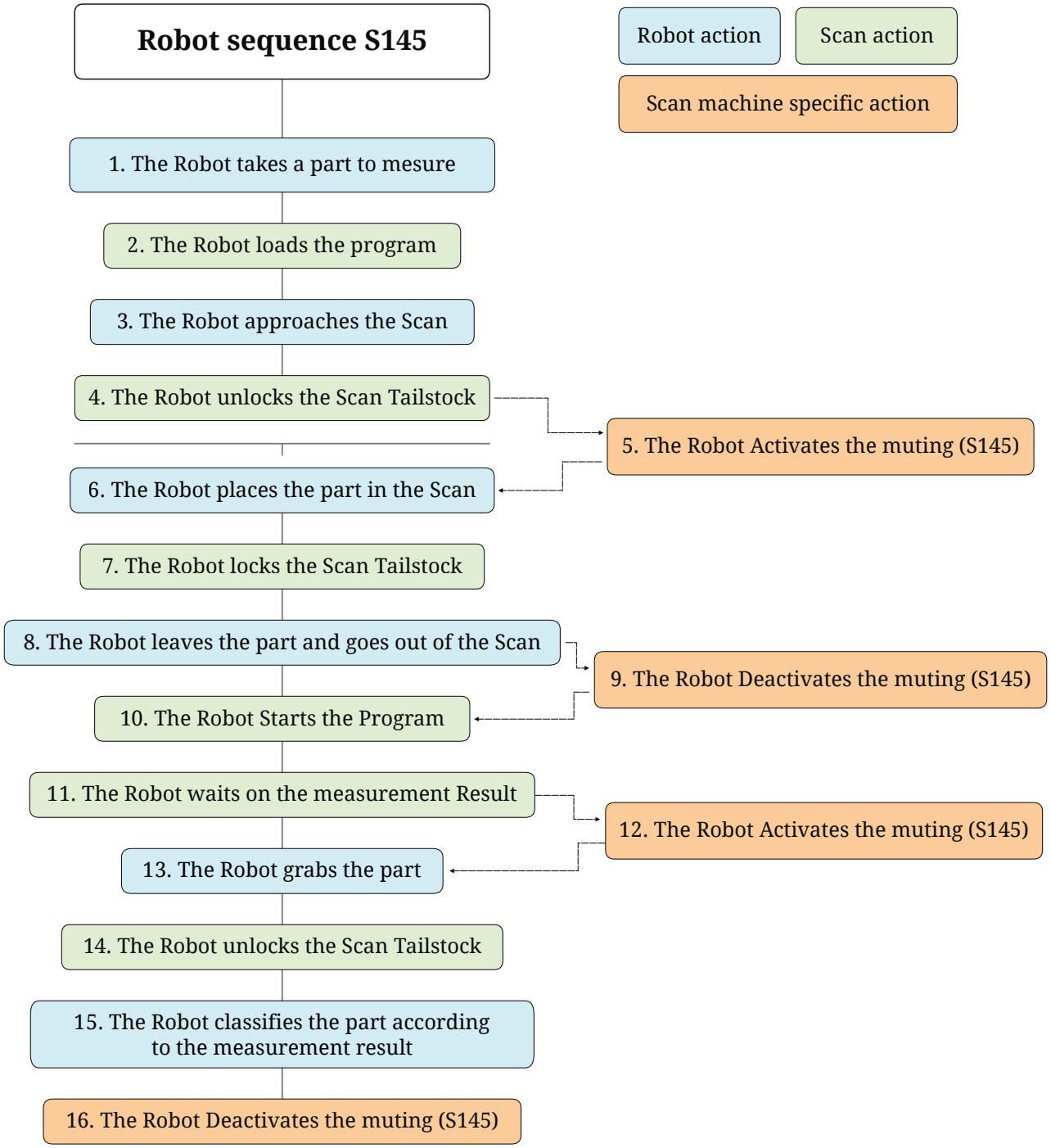
PA	Park Axis
SP	Start Program
SC	Start Calibration
RL	Remote Lock
LPID	Load Program By ID
LPN	Load Program by Name
LT	Lock Tailstock
UT	Unlock Tailstock
CC	Close Chuck
OC	Open Chuck
MSL	Move Slide To Position
MR	Move Rotation To Position
MTI	Move Tilt To Position
MTA	Move Tailstock To Position



bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0	RM	MR	IC	IP	ITL	ITU	ICC	ICO	RR	NR	P	F	W	R	ITT		Loaded Program Id (uint16)															
32	Loaded Program Name[0] (utf8)								Loaded Program Name[1] (utf8)								Loaded Program Name[2] (utf8)								Loaded Program Name[3] (utf8)							
64	Loaded Program Name[4] (utf8)								Loaded Program Name[5] (utf8)								Loaded Program Name[6] (utf8)								Loaded Program Name[7] (utf8)							
96	Loaded Program Name[8] (utf8)								Loaded Program Name[9] (utf8)								Loaded Program Name[10] (utf8)								Loaded Program Name[11] (utf8)							
128	Loaded Program Name[12] (utf8)								Loaded Program Name[13] (utf8)								Loaded Program Name[14] (utf8)								Loaded Program Name[15] (utf8)							
160	Loaded Program Name[16] (utf8)								Loaded Program Name[17] (utf8)								Loaded Program Name[18] (utf8)								Loaded Program Named[19] (utf8)							
192	Slide Position (float32)																															
224	Rotation Position (float32)																															
256	Tilt Position (float32)																															
288	Tailstock Position (float32)																															
320	RegOutNum1 (float32)																															
352	RegOutNum2 (float32)																															
384	RegOutNum3 (float32)																															
416	RegOutNum4 (float32)																															
448	RegOutNum5 (float32)																															
480	Correction Status (uint16)																Correction 1 (sint32)															
512	Correction 1 (sint32)																Correction 2 (sint32)															
544	Correction 2 (sint32)																Correction 3 (sint32)															
576	Correction 3 (sint32)																Correction 4 (sint32)															
608	Correction 4 (sint32)																Correction 5 (sint32)															
640	Correction 5 (sint32)																Correction 2 (sint32)															
672	Correction 6 (sint32)																Correction 7 (sint32)															
704	Correction 7 (sint32)																Correction 8 (sint32)															
736	Correction 8 (sint32)																Correction 9 (sint32)															
768	Correction 9 (sint32)																Correction 10 (sint32)															
800	Correction 10 (sint32)																															

RM	Remote Mode
MR	Machine Ready
IC	Is Calibrated
IP	Is Parked
ITL	Is Tailstock Locked
ITU	Is Tailstock Unlocked
ICC	Is Chuck Closed
ICO	Is Chuck Open
RR	Result Ready
NR	No Result
P	Pass
F	Failed
W	Warning
R	Rework
ITT	Is Tailstock Touching

9. EXAMPLE OF A ROBOT SEQUENCE



9.1 I/O sequence

1/ The Robot takes a part to be measured (Close gripper)

1.Turn “Select Program 0” = ON
2.Turn “Select Program 1” = OFF
3.Turn “Select Program 2” = OFF
2 4.Wait for “Machine Ready” = ON
5.Turn “Load Program” = ON
6.Wait for “Loaded Program 0” = ON AND “Loaded Program 1” = OFF AND “Loaded Program 2” = OFF
7.Turn “Load Program” = OFF

3/ The Robot approaches with the part in front of the Scan

8. Wait for “Machine Ready” = ON
4 9. Turn “Unlock Tailstock” = ON
10. Wait for “Is Tailstock Unlocked” = ON
5 11. Turn “ROB_MUT1” = ON
12. Turn “ROB_MUT2” = ON
11. Turn “Unlock Tailstock” = OFF

6/ The Robot places the part into the Scan

12. Wait for “Machine Ready” = ON
7 13. Turn “Lock Tailstock” = ON
14. Wait for “Is Tailstock Locked” = ON
15. Turn “Lock Tailstock” = OFF

8/ The robot deposits the part and leaves the scan (open the gripper)

9 8. Turn «ROB_MUT1» = OFF
9. Turn «ROB_MUT2» = OFF
16. Wait for «Machine Ready» = ON
10 17. Turn «Start Program» =ON
18. Wait for «Machine Ready» = OFF
19. Turn «Start Program» = OFF
11 20. Wait for «Result Ready» = ON AND «PASS» = ON OR «FAILED» = ON OR «Warning» = ON (OR No Result = ON)
21. Wait for «Machine Ready» = ON
12 8. Turn «ROB_MUT1» = ON
9. Turn «ROB_MUT2» = ON

13/ Robot goes inside the Scan machine to grab the part (Close gripper)

22. Turn «Unlock Tailstock» = ON
14 23. Wait for «Is Tailstock Unlocked» = ON
24. Turn «Unlock Tailstock» = OFF

15/ The robot takes the part and classify according to the measurement result

16 8. Turn «ROB_MUT1» = OFF
9. Turn «ROB_MUT2» = OFF

9.2 Modbus TCP/IP sequence

1/ **The Robot takes a part to measure**

1. Program Id to Load = 1
2. Load Program by ID= ON
2 3. Wait MachineReady = ON
4. Load Program by ID= OFF
5. WAIT Loaded Program Id = 1

3/ **The Robot approaches with the part in front of the scan**

6. Wait MachineReady = ON
4 7. UnlockTailstock = ON
8. WAIT IsTailstockUnlocked = ON
9. UnlockTailstock = OFF
5 11. Turn «ROB_MUT1» = ON
12. Turn «ROB_MUT2» = ON

6/ **The Robot places the part into the scan**

10. Wait MachineReady = ON
7 11. LockTailstock = ON
12. Wait IsTailstockLocked = ON
13. LockTailstock = OFF

8/ **The robot leaves the part and goes out of the scan (Open gripper)**

9 8. Turn «ROB_MUT1» = OFF
9. Turn «ROB_MUT2» = OFF

14. Wait MachineReady = ON
10 15. StartProgram =ON
16. Wait MachineReady = OFF
17. StartProgram = OFF

11 18. Wait ResultReady = ON AND PASS = ON OR FAILED = ON OR Warning = ON (OR No Result = ON)

12 11. Turn «ROB_MUT1» = ON
12. Turn «ROB_MUT2» = ON

13/ **Robot goes inside the scan to grab the part (Close gripper)**

20.UnlockTailstock = ON
14 21.WAIT IsTailstockUnlocked = ON
22.UnlockTailstock = OFF

15/ **The robot takes the part and classify according to the measurement result**

16 8. Turn «ROB_MUT1» = OFF
9. Turn «ROB_MUT2» = OFF

9.3 OPC/UA sequence

1/ **The Robot takes the part to measure**
2 1. Load Program (GoldPart.rsd)
2. WAIT LoadedProgram = GoldPart.rsd

3/ **The Robot approaches the part in front of the scan**
4 3. UnlockTailstock
4. WAIT TailstockStatus =Unlocked
5 11. Turn «ROB_MUT1» = ON
12. Turn «ROB_MUT2» = ON

6/ **The Robot places the part into the scan**
7 5. LockTailstock
6. Wait TailstockStatus = Locked

8/ **The robot leaves the part and goes out of the scan (open gripper)**
9 8. Turn «ROB_MUT1» = OFF
9. Turn «ROB_MUT2» = OFF
10 7. StartProgram
8. Wait ResultReady = ON AND PASS = ON OR FAILED = ON OR Warning = ON (OR No Result = ON)
11 9. Wait MachineReady = ON
12 11. Turn «ROB_MUT1» = ON
12. Turn «ROB_MUT2» = ON

13/ **Robot goes inside the scan to grab the part (Close gripper)**
14 10. UnlockTailstock
11. WAIT TailstockLockStatus=Unlocked

15/ **The robot brings the part to the right place according to the measurement result**
16 8. Turn «ROB_MUT1» = OFF
9. Turn «ROB_MUT2» = OFF

10. PNEUMATIC SYSTEM

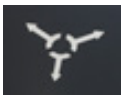
10.1 Features

2-position Electrovalves with dual control (bistable).
Operating pressure range: 0.1 to 0.7 MPa (1 to 7 bar).
Ambient and compressed air temperature: -10 to 50 °C.
Maximum response time: 15 ms.
Maximum operating frequency: 10 Hz.

10.2 Pneumatic connections

The Scan machine must be supplied with a +24V supply on +24V_ROB pin 1 and a GND on GND_COM pin 14 to be able to control The Scan machine Electrovalves.
The Scan machine must then be supplied with air via the INPUT connector at the rear of the machine.
Finally, the outputs of the Electrovalves at the front of the machine must be connected to the corresponding open and closed states.

When the “Open Electrovalve” signal is sent from ReflexScan, air flows through the output :



When the “Close Electrovalve” signal is sent from ReflexScan, air flows through the output :

The Electrovalve is bistable, thus the air always flows through one output at a time.

11. FOOTSWITCH CONNECTION

Currently, the foot pedal connector is not supported for safety reasons. The weight of the parts (up to 100kg) could cause serious injuries in case of a fall due to the release of a pneumatic chuck by the pedal.

12. TROUBLESHOOTING

12.1 In case of failure

All SYLVAC-SCAN machine have been designed for ease-of-use and trouble-free operation.

This section describes problems that might occur when starting up the system, whilst also listing some error messages which may be displayed when running the software.

12.2 Problems at start up

1. The system shows no signs of life :

    1. Check the power supply and connections, including those to the PC and the monitor.
    2. Check that the PC and monitor are turned on.

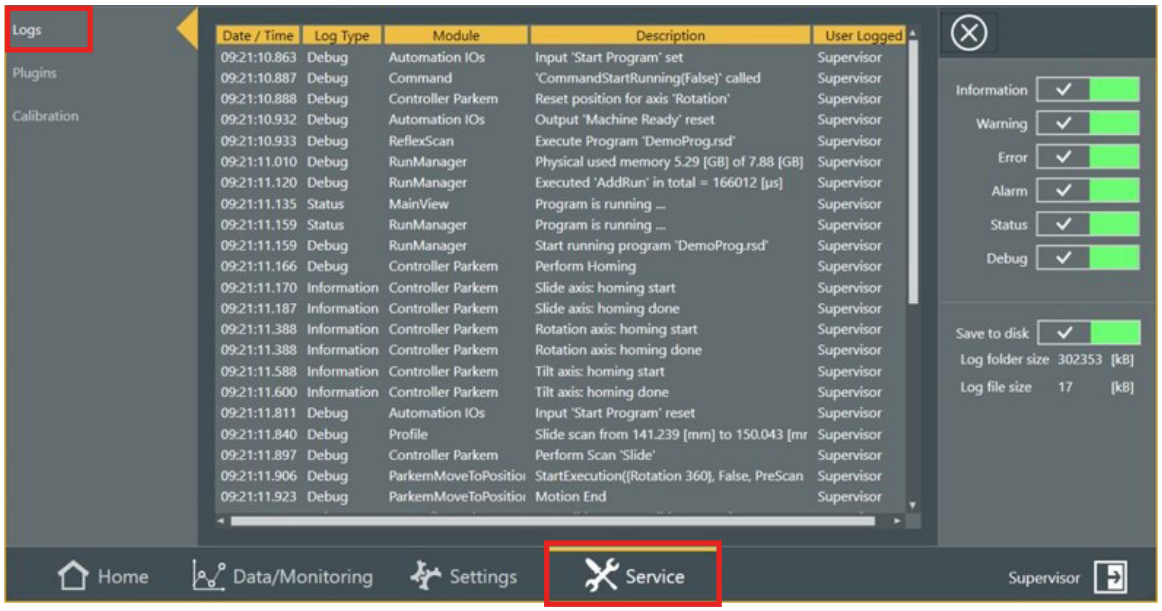
2. The PC starts but the LED does not light up.

    3. Check all cable connections.
    4. Contact your local SYLVAC's agent.

12.3 FAQ

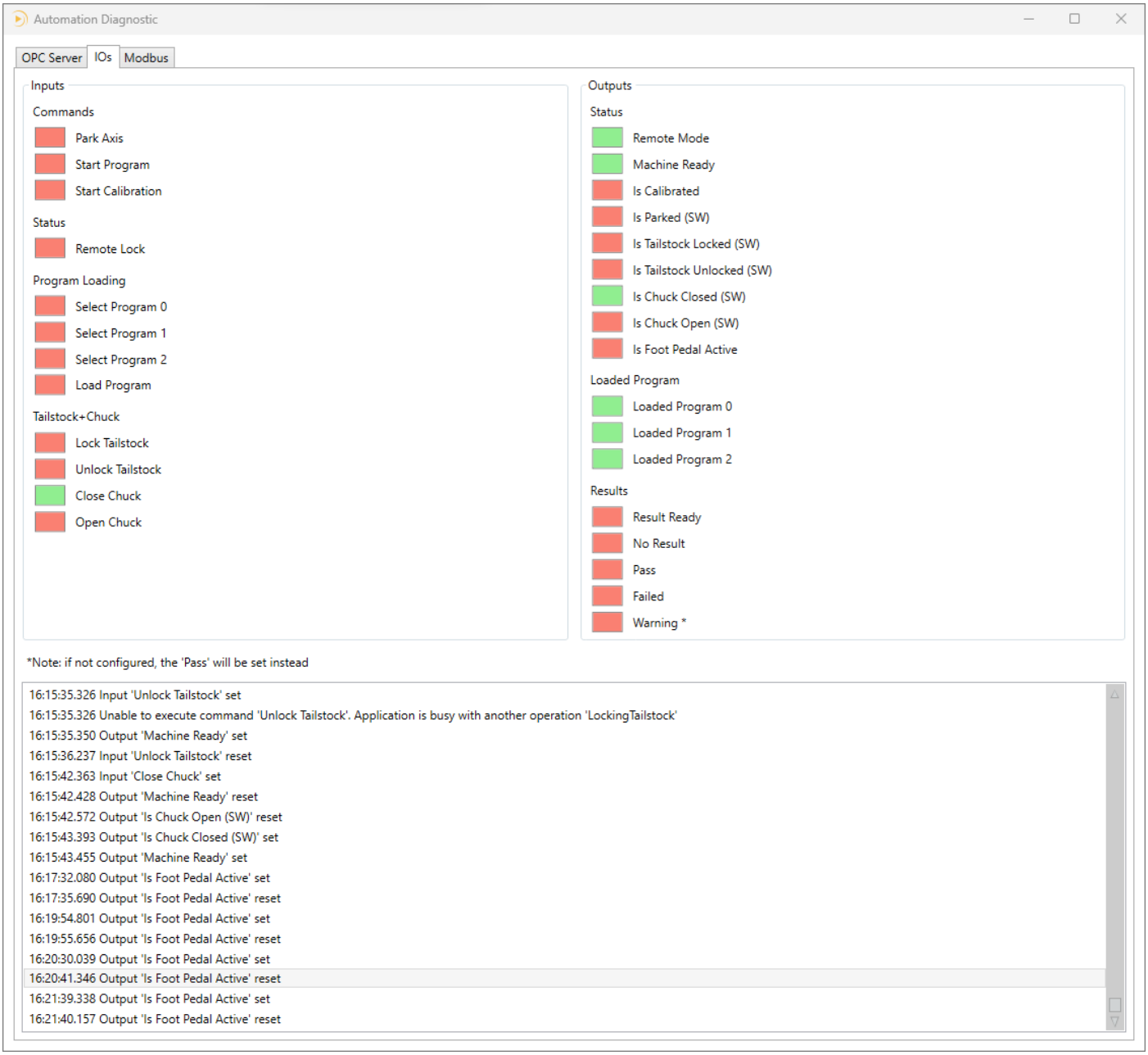
12.3.1 How to access the logs

1. Logs are the primary source of information for the diagnostic.
2. You can view the logs at ReflexScan -> Service -> Logs.
3. Logs are also stored in the folder 'C:\ProgramData\SYLVAC\SYLVAC-REFLEX Scan\Logs'.
4. When you contact the Sylvac Service Team, try always to attach the log file corresponding to the problem together with the corresponding time stamp.



12.3.2 There is no I/O signals emitted from the Scan machine

1. Check that there is +24V and GND from the robot on the right pins of the Scan.
2. Using a measuring device, check there is +24V on one of the corresponding green Output pins in the Automation Diagnostics.
3. Using a measuring device, check there is 0V on one of the corresponding red Output pins in the Automation Diagnostics.

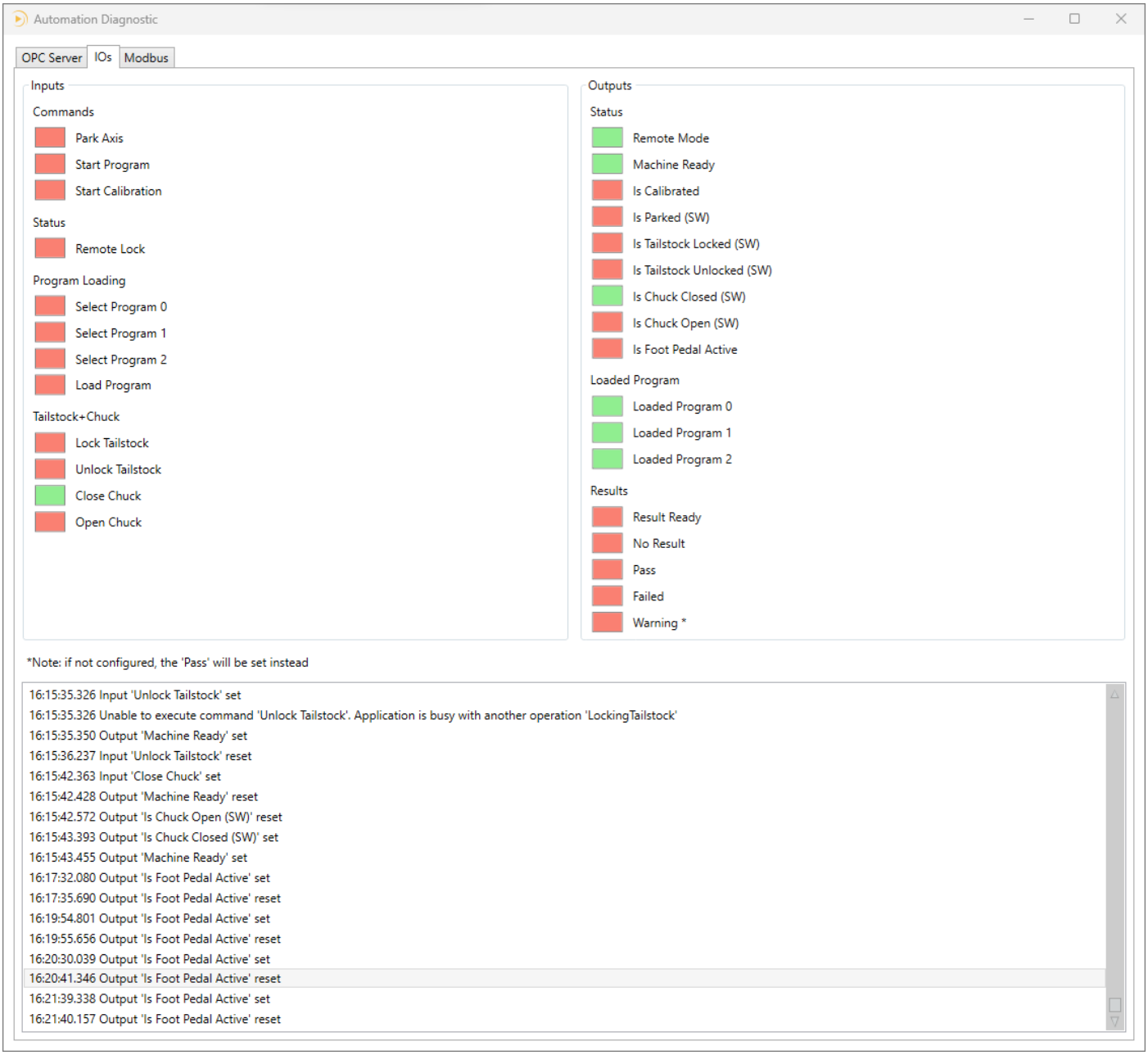


12.3.3 There is no signal from the robot

1. Contact the integrator of the robot.
2. Try to turn ON one output on the robot.
3. Check there is +24V on the appropriate pin.
4. Turn OFF one output on the Robot.
5. Check there is 0V on the appropriate pin.
6. If that doesn't work, ask the integrator of the robot to check the wiring.

12.3.4 The wrong program is loaded

1. Check the Program Mapping in the Automation Setup.
2. Verify that the robot turns on the right inputs: Select Program 0, Select Program 1, Select Program 2.



12.3.5 The Tailstock Lock/Unlock doesn’t work

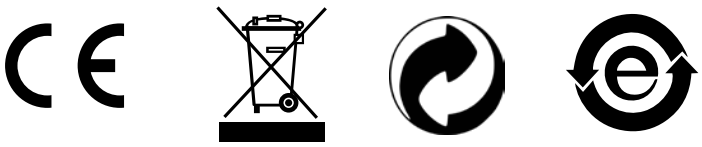
1. Contact the robot integrator.
2. Verify that the robot waits for «Machine Ready» = ON before sending a “Lock Tailstock”/”Unlock Tailstock” command.
3. This advice works well for all others commands.

12.3.6 The Tailstock doesn’t go to the correct position

1. Verify that the correct program is loaded
2. Verify that the good Tailstock position is set in the program
3. Verify manually that Tailstock is able to move freely in Normal mode and its encoder works fine

12.3.7 The security is OFF when the robot enters the Scan S145

1. The Muting signals must be ON when the robot goes into the Scan.
2. The Muting signals don't work if the Scan S145 status is false (emergency stop button active, light curtain interrupted, top or electronic door open).
3. The Muting signals must be commanded by the robot only.



Changes without prior notice
Sous réserve de toute modification
Änderungen vorbehalten

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