



# **ATV Process on MB serial with M221** (I/O profile, using WRITE\_READ\_VAR)

**06/2015**

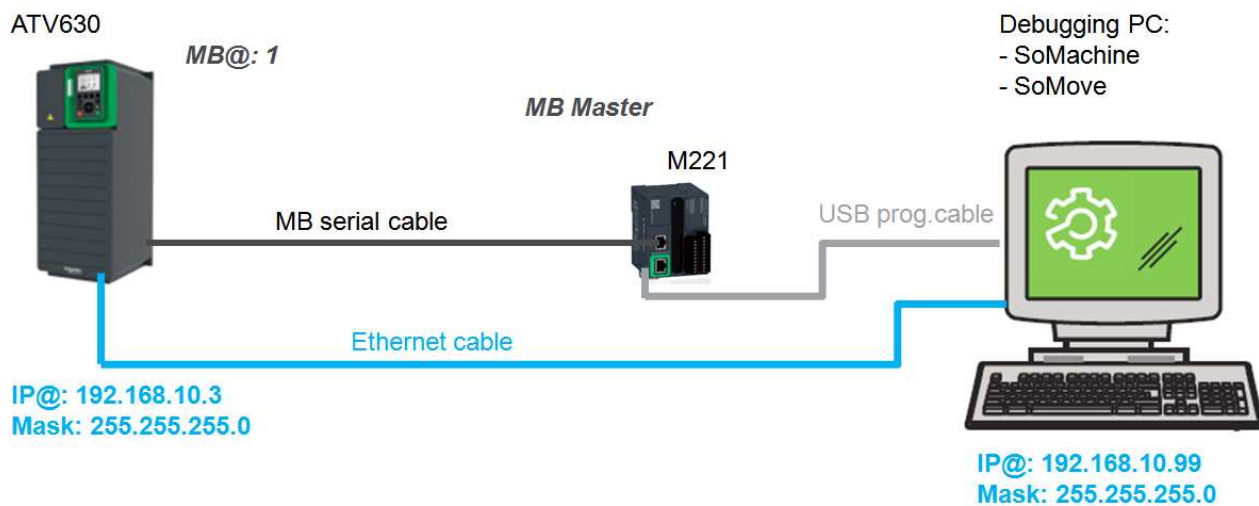
## Introduction

This document describes a basic application: **M221** controls the **ATV630** via **serial Modbus**, using **IO profile** and WRITE\_READ\_VAR (I/O scanning function – MB code 23)

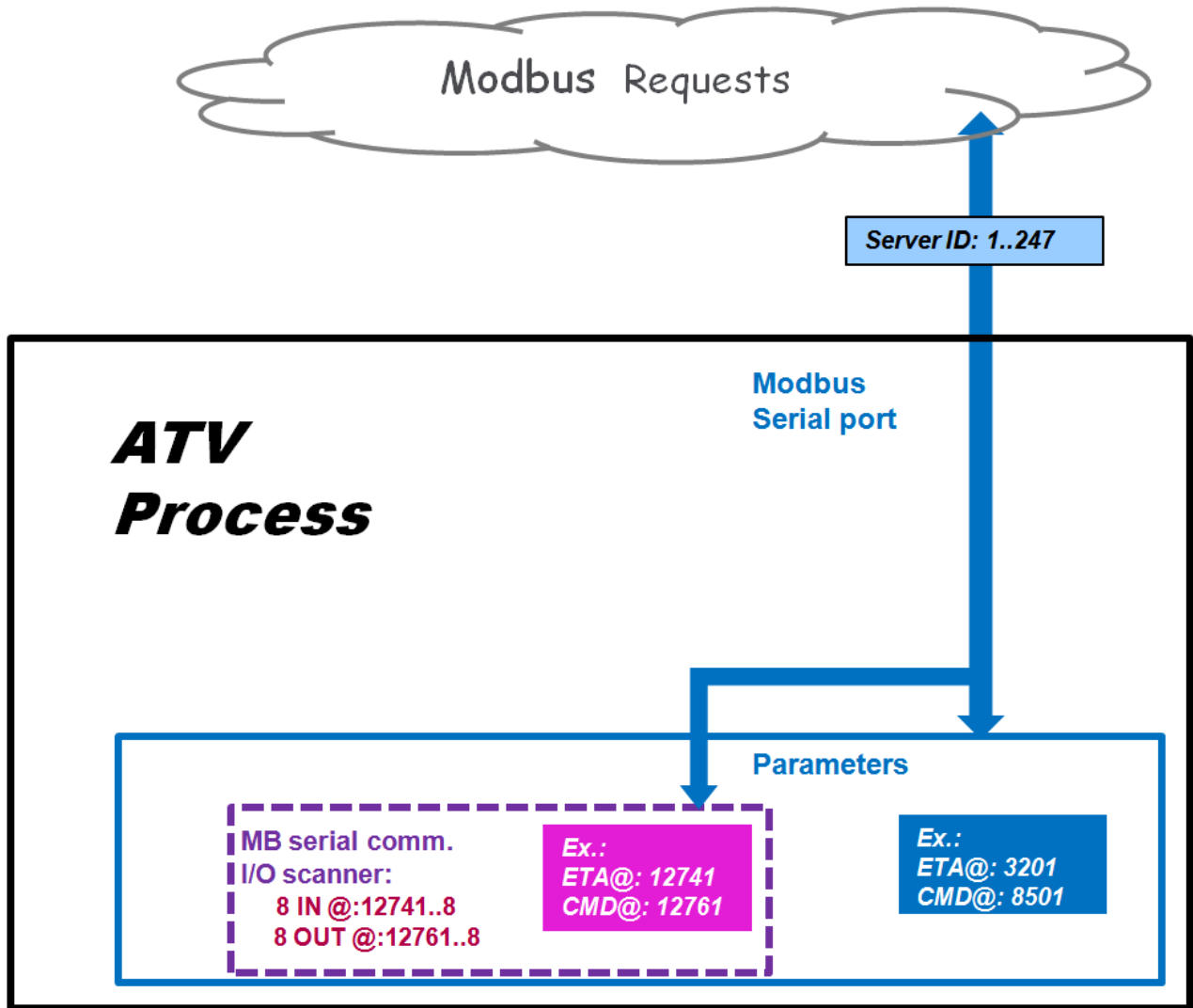
A PC with SoMachine Basic (ver.1.3 SP1) and SoMove (ver.2.2) is used as a programming, debugging and configuration tool, both for M221 and ATV630.

Intention was to deliver a kind of '**quick start-up guide**' for the mentioned set of devices.

## 1. Networking scheme:



## 2. Altivar Process Modbus servers



The embedded Modbus serial port has built-in Communication I/O scanner service which is exchanging data with the drive in an optimized way – this is the fastest possible way to exchange data via Modbus with ATV Process.

Access to Communication I/O scanner (as well as to other drive's parameters) is via **Server ID: 1..247**.



### 3. Data exchange scheme:

Data exchange is mastered by M221 *WRITE\_READ\_VAR* function (I/O scanner function - MB function code 23)

#### ATV Process

*MB @:1*

#### M221

*MB Master*

##### Com.scann.INPUTS

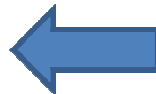
1	ETA
2	RFRD
...	
8	



%MW8
%MW9
...
%MW15

##### Com.scann.OUTPUTS

1	CMD
2	LFRD
...	
8	



%MW0
%MW1
...
%MW7

### 4. Altivar 630 configuration

For the purpose of this example we use IO profile:

#### I/O Profile

Using the I/O profile simplifies PLC programming.

The I/O profile mirrors the use of the terminal strip for control by utilizing 1 bit to control a function.

The I/O profile for the drive can also be used when controlling via a fieldbus. The drive starts up as soon as the `run` command is sent. 15 bits of the control word (bits 1...15) can be assigned to a specific function.

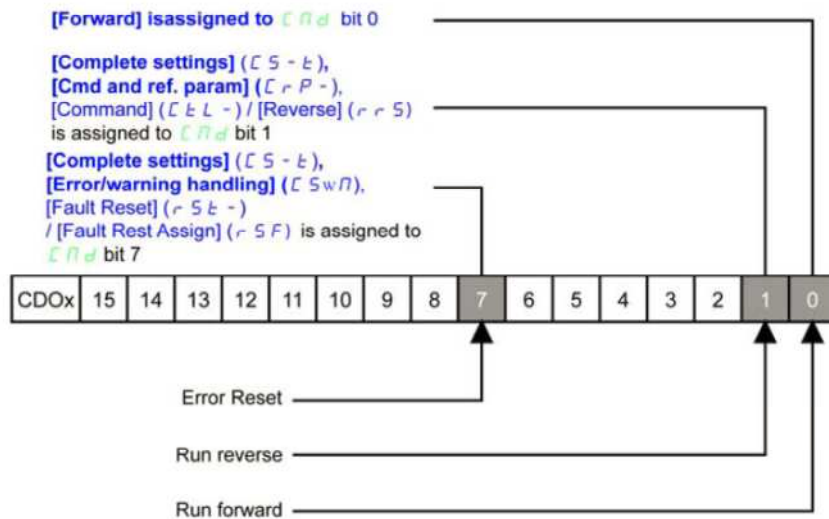
This profile can be developed for simultaneous control of the drive via:

- The terminals
- The Modbus control word
- The CANopen control word
- Ethernet Modbus TCP embedded
- The fieldbus module control word

The I/O profile is supported by the drive itself and therefore in turn by all the communication ports (integrated Modbus, CANopen, Ethernet, PROFIBUS DP, PROFINET, and DeviceNet fieldbus modules).



The I/O profile, here is a simple example, which can be extended with additional features. The command word is made of run forward (bit 0 of CMd), run reverse (bit 1 of CMd), and the function fault reset (bit 7 of CMd).



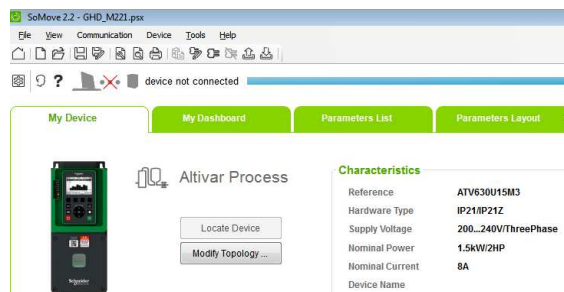
Reference and command are coming from Modbus serial.

Set of drive's parameters to organize I/O profile mode:

FR1	[Reference frequency1]	= Reference Frequency via Modbus
CHCF	[ Control mode]	= I/O mode
CD1	[Command channel1]	= Modbus communication
RRS	[Reverse assignment]	= Bit 1 Modbus ctrl word
RSF	[Fault reset]	= Bit 7 Modbus ctrl word
ADD	[Drive Modbus Address]	= 1

#### 4.1 Configuration steps:

##### 4.1.1 Using SoMove, create default project for your drive ex.: ATV630U15M3



#### 4.1.2 Change parameters necessary for I/O profile:

My Device My Dashboard Parameters List Parameters Layout x Diag

Drive

- Simply Start
- My Menu
- Modified Parameters
- Complete Settings
  - Motor Parameters
  - Command & Reference
  - Fan
  - Generic Functions
  - Generic Monitoring
  - Inputs & Outputs
- Pump
  - Pump Functions
  - Pump Monitoring
- Fieldbus
  - Port - Modbus Serial
  - Port - Modbus TCP

In: All Search

Code	Long Label	Current Value
Macro Configuration		
Motor parameters		
Sensors Assignment		
Command and Reference		
FR1	Configuration reference frequency 1	Reference Frequency via Modbus
FR1B	Configuration ref. 1B	Not configured
RCB	Select switching (1 to 1B)	Reference frequency channel 1
RIN	Reverse direction disable	Yes
CHCF	Control mode configuration	I/O mode
CCS	Command switching	Command channel 1
CD1	Command channel 1 assign	Modbus communication
CD2	Command channel 2 assign	Modbus communication
RFC	Freq Switching Assignment	Reference frequency channel 1
FR2	Configuration reference frequency 2	Not configured
COP	Copy Ch.1-Ch.2	No copy
FLOC	Forced Local frequency assignment	Not configured
FLOT	Time-out forc. local	10 s
FLO	Forced local assignment	Not assigned
RRS	Reverse assignment	Bit 1 Modbus ctrl word
TCC	2/3-wire control	2-wire control
TCT	Type of 2-wire control	Transition
PST	Stop key enable	Yes
BMP	HMI command	Disabled

My Device My Dashboard Parameters List Parameters Layout x Diag

Drive

- Simply Start
- My Menu
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  - Generic Functions
  - Generic Monitoring
  - Inputs & Outputs
- Pump
  - Pump Functions
  - Pump Monitoring

In: All Search

Code	Long Label	Current Value
Macro Configuration		
Motor parameters		
Sensors Assignment		
Command and Reference		
Fan		
Generic functions		
Generic monitoring		
Input/Output		
Error/Warning handling		
Auto Fault Reset		
Fault reset		
RSF	Fault reset input assignment	Bit 7 Modbus ctrl word
RPA	Product restart assignment	Not assigned

My Device My Dashboard Parameters List Parameters Layout x

Drive

- Simply Start
- My Menu
- Modified Parameters
- Complete Settings
- Pump
- Fieldbus
  - Port - Modbus Serial
  - Port - Modbus TCP

In: All Search

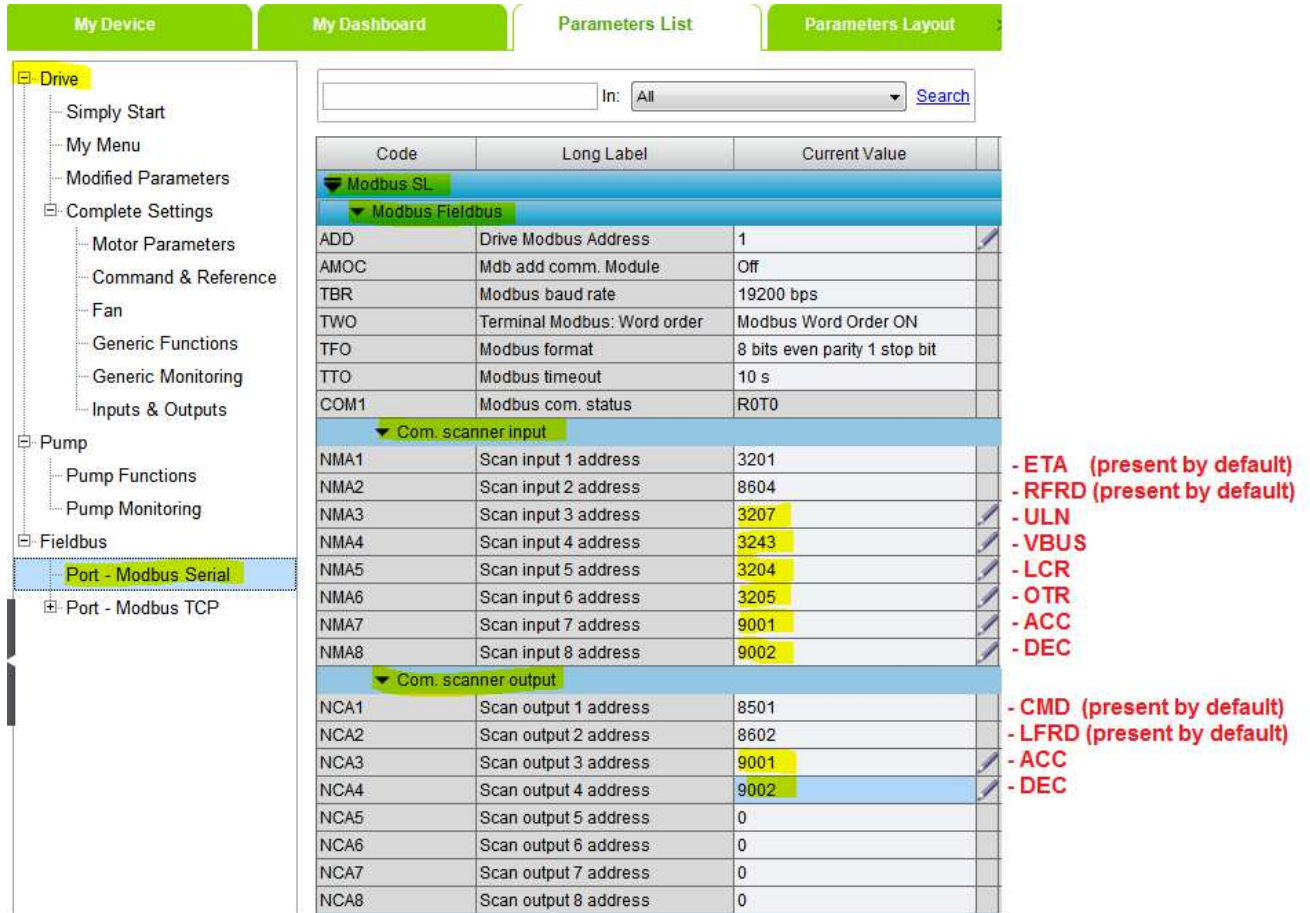
Code	Long Label	Current Value
Modbus SL		
Modbus Fieldbus		
ADD	Drive Modbus Address	1
AMOC	Mdb add comm. Module	Off
TBR	Modbus baud rate	19200 bps
TWO	Terminal Modbus: Word order	Modbus Word Order ON
TFO	Modbus format	8 bits even parity 1 stop bit
TTO	Modbus timeout	10 s
COM1	Modbus com. status	R0T0



#### 4.1.3 Customize the Ethernet I/O scanner content by:

- Select the Com.scanner **Input** row (NMAx parameters) and enter address of the parameter you want to transfer: **ATV → PLC**
- Select the Com.scanner **Output** row (NMCx parameters) and enter address of the parameter you want to transfer: **PLC → ATV**

Ex.:



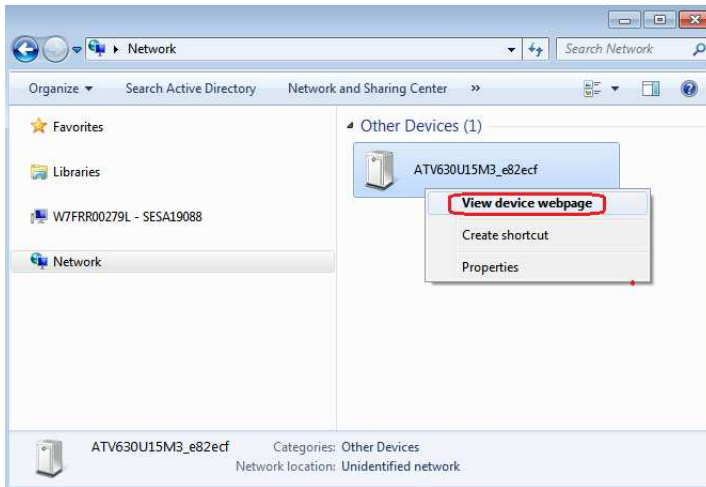
Code	Long Label	Current Value
<b>Modbus SL</b>		
<b>Modbus Fieldbus</b>		
ADD	Drive Modbus Address	1
AMOC	Mdb add comm. Module	Off
TBR	Modbus baud rate	19200 bps
TWO	Terminal Modbus: Word order	Modbus Word Order ON
TFO	Modbus format	8 bits even parity 1 stop bit
TTO	Modbus timeout	10 s
COM1	Modbus com. status	R0T0
<b>Com. scanner input</b>		
NMA1	Scan input 1 address	3201
NMA2	Scan input 2 address	8604
NMA3	Scan input 3 address	3207
NMA4	Scan input 4 address	3243
NMA5	Scan input 5 address	3204
NMA6	Scan input 6 address	3205
NMA7	Scan input 7 address	9001
NMA8	Scan input 8 address	9002
<b>Com. scanner output</b>		
NCA1	Scan output 1 address	8501
NCA2	Scan output 2 address	8602
NCA3	Scan output 3 address	9001
NCA4	Scan output 4 address	9002
NCA5	Scan output 5 address	0
NCA6	Scan output 6 address	0
NCA7	Scan output 7 address	0
NCA8	Scan output 8 address	0

- ETA (present by default)  
- RFRD (present by default)  
- ULN  
- VBUS  
- LCR  
- OTR  
- ACC  
- DEC  
- CMD (present by default)  
- LFRD (present by default)  
- ACC  
- DEC

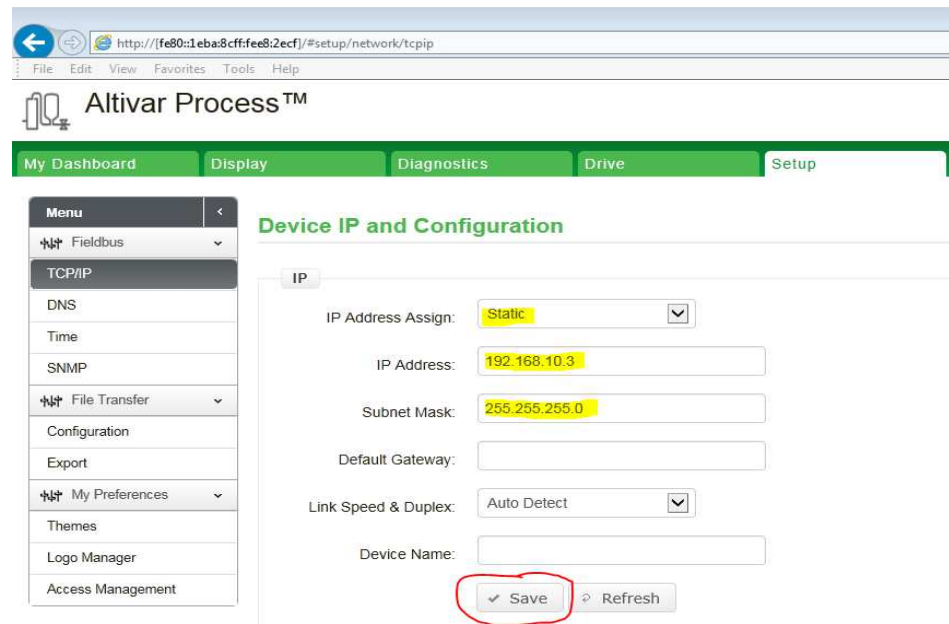
## 5. Transferring project to ATV Process via Ethernet

### 5.1 Assigning IP address to ATV630

Discover your ATV6xx on the network using par ex. Windows Explorer:



Open ATV6xx's webpage, set the IP@ and save it:

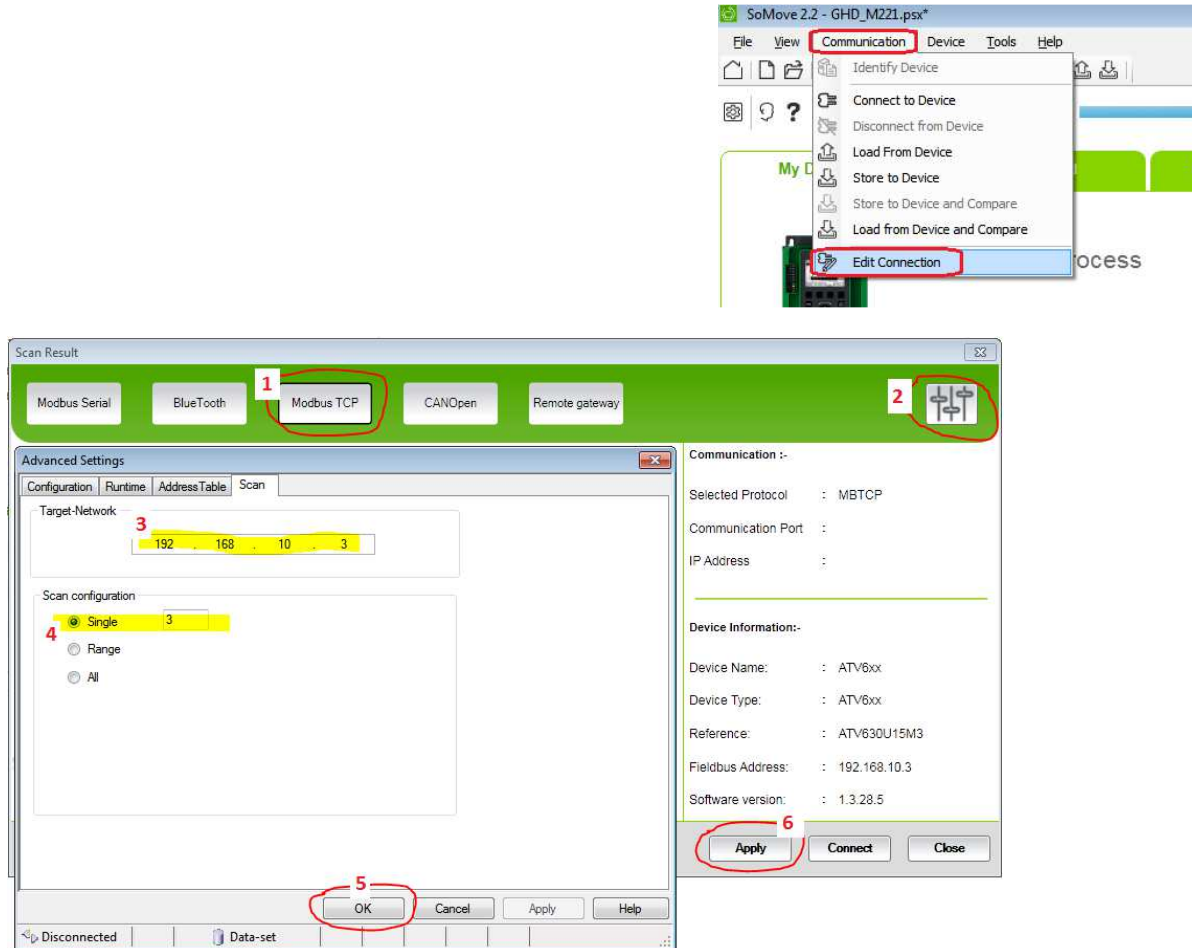


Power cycle the drive.



## 5.2 Transferring the project to ATV630

Come back to SoMove and set the connection to the drive:



Store the project from SoMove to the drive:

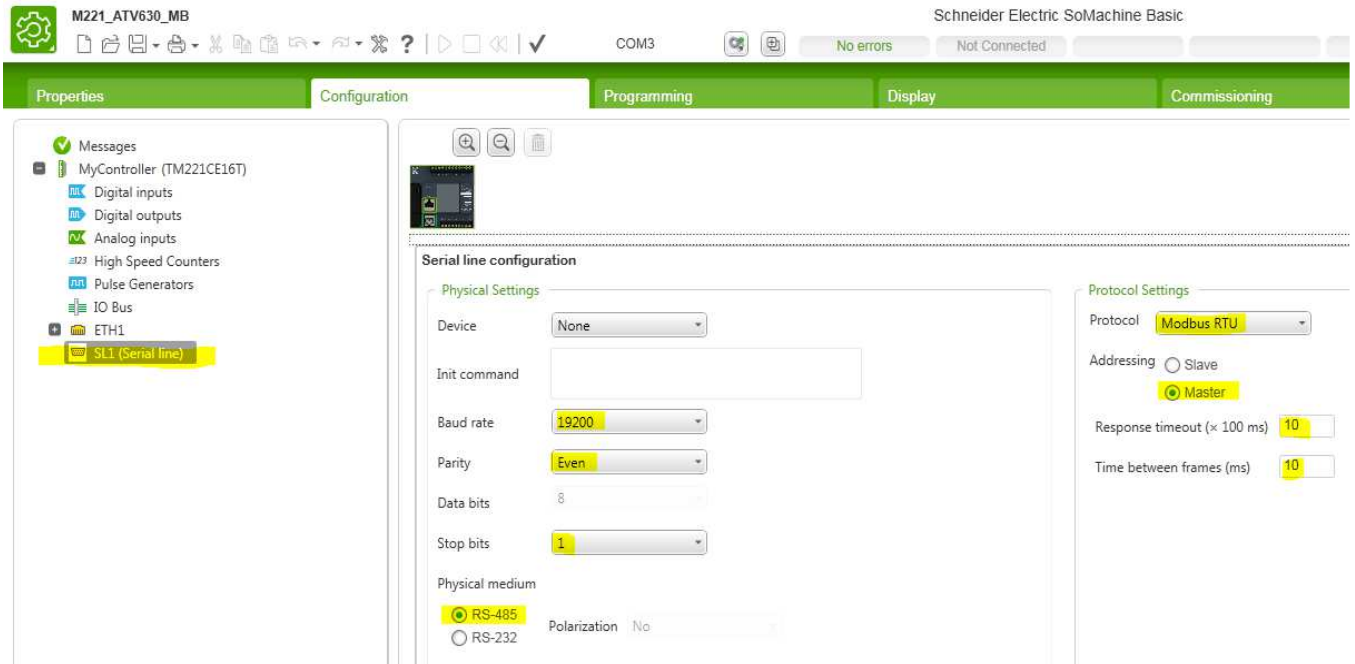


Power cycle the drive.



## 6. PLC application

After selecting the controller, check/enter its Modbus Master configuration:



The program:

Used	Address	Symbol	Link	Id	Timeout	ObjType	FirstWriteObj	WriteQuantity	IndexDataOut	FirstReadObj	ReadQuantity	IndexDataIn	Comment
<input checked="" type="checkbox"/>	%WRITE_READ_VAR0	1 - SL1	1	255	0 (Mult. reg. - Mbs 23)	12761	8	0	12741	8	8		

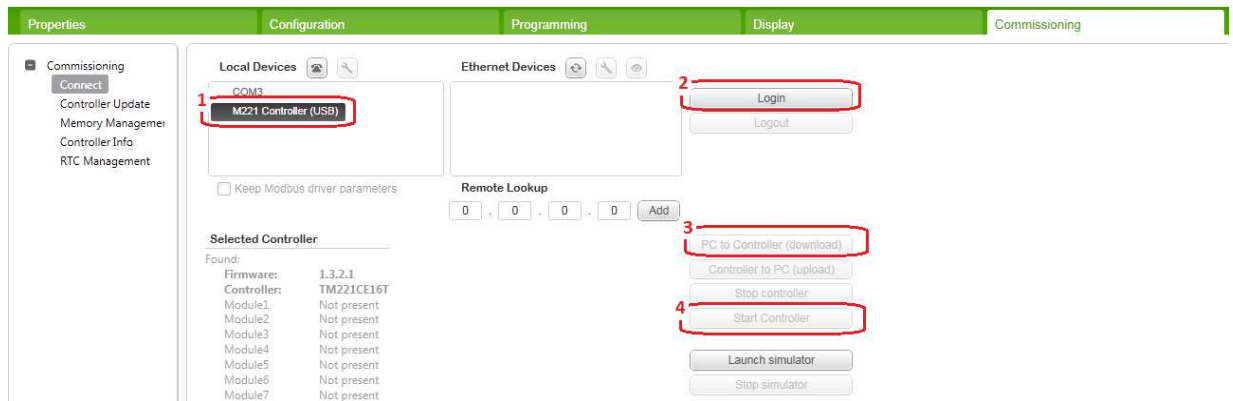
### Explanation:

Bit %M1[Forward] starts/stops forward the drive.  
 Bit %M2[Reverse] starts/stops reverse the drive.  
 Bit %M3[Reset\_Err] resets the drive's faults.  
 Word %MW1 [LFRD] is the setup speed for the drive.

Function block %WRITE\_READ\_VAR0 transfers:  
 %MW0...7 → ATV Com. scanner OUTPUTS  
 %MW8...15 ← ATV Com. Scanner INPUTS

Comm.scanner INPUT 1 [NMA1] is at address: 12741  
 Comm.scanner OUTPUT 1 [NMC1] is at address: 12761

Connect to M221, download the program and run controller:



Debug and check your program, using the Animation Table:

