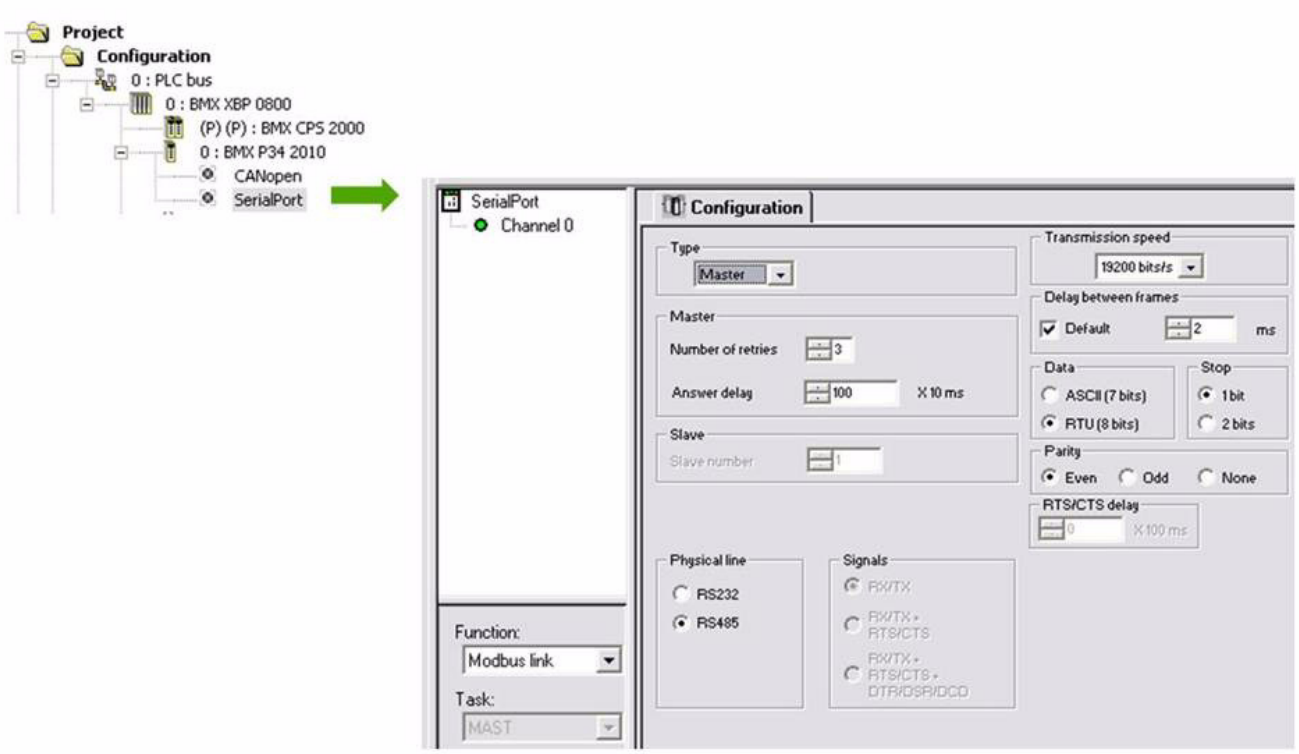
Connecting an ATV12 to a M340 PLC

Here is an example of an application that shows how to control an ATV12 from a M340 PLC equipped with a Modbus master serial port.
The program provides a control of the drive from an operator screen designed under Unity.
The example illustrates also the previous chapter

Configuration of the Modbus Master

The default settings of the serial port used as a Modbus master are compliant with the default settings of the ATV12.



Initialization

The communication is based on the READ_VAR , WRITE_VAR functions. During the first execution of the MAST task you can initialize the data structures used by these two functions. Devicepath describes the path to the device including its slave address. ReadVarMgt and WriteVarMgt are arrays used respectively by READ_VAR and WRITE_VAR. Only the 3rd element of these arrays is modifiable by the user: To define the time out duration of the requests

```
(* data initialization *)

(* Communication path to Modbus slave device at @ 3     *)
(* The device path can be modified later by the app.    *)
(* MSB of DevicePath[3] contains the device address     *)
DevicePath := ADDM ('0.0.0.3');
(* Time out duration   *)
ReadVarMGT[2]:=50;
WriteVarMGT[2]:=50;
```

Data structure declaration :

DevicePath	ADDM_TYPE	%MW50
DevicePath[0]	INT	%MW50
DevicePath[1]	INT	%MW51
DevicePath[2]	INT	%MW52
DevicePath[3]	INT	%MW53
DevicePath[4]	INT	%MW54
DevicePath[5]	INT	%MW55
DevicePath[6]	INT	%MW56
DevicePath[7]	INT	%MW57

ReadVarMGT	MBMgtTable	%MW40
ReadVarMGT[0]	INT	%MW40
ReadVarMGT[1]	INT	%MW41
ReadVarMGT[2]	INT	%MW42
ReadVarMGT[3]	INT	%MW43

Cyclical exchanges

In the example below the application manages 2 requests:
- "A read request of 4 words starting at Modbus address 12741 (NMA1) - Modbus function #3
- "A write request of 4 words starting at Modbus address 12761 (NCA1) - Modbus function #16

Requests are executed only each N x FAST task to avoid too much activity on the serial line.
The device can be modified (polling several devices) by writing in DevicePath[3].

Cyclical communication

```
(* Modbus Requests are sent only each:
( ModbusRequestPeriod X FAST period X n) *)
if ModbusRequestPeriod >25 then
(* Read request to ATV12 : Modbus function 3 *)
IF not ReadVarBusy then
READ_VAR(DevicePath, '%MW' , 12741, 4, ReadVarMGT, %MW124:4);
(*Devicepath is initialized during Init_Sequence *)
END_IF;

(* Write request to ATV12 : Modbus function 16 *)
IF not WriteVarBusy then
WRITE_VAR(DevicePath, '%MW' , 12761, 4, %MW120:4, WriteVarMGT);

END_IF;
ModbusRequestPeriod:=0;
END_IF;
```

The key data are highlighted: address and lengh in the device source and destination of the data in the PLC.
The time out can be managed by the application in a separate way by testing the activity of the 2 bits: ReadVarBusy and WriteVarBusy

Overview of the communication tables:

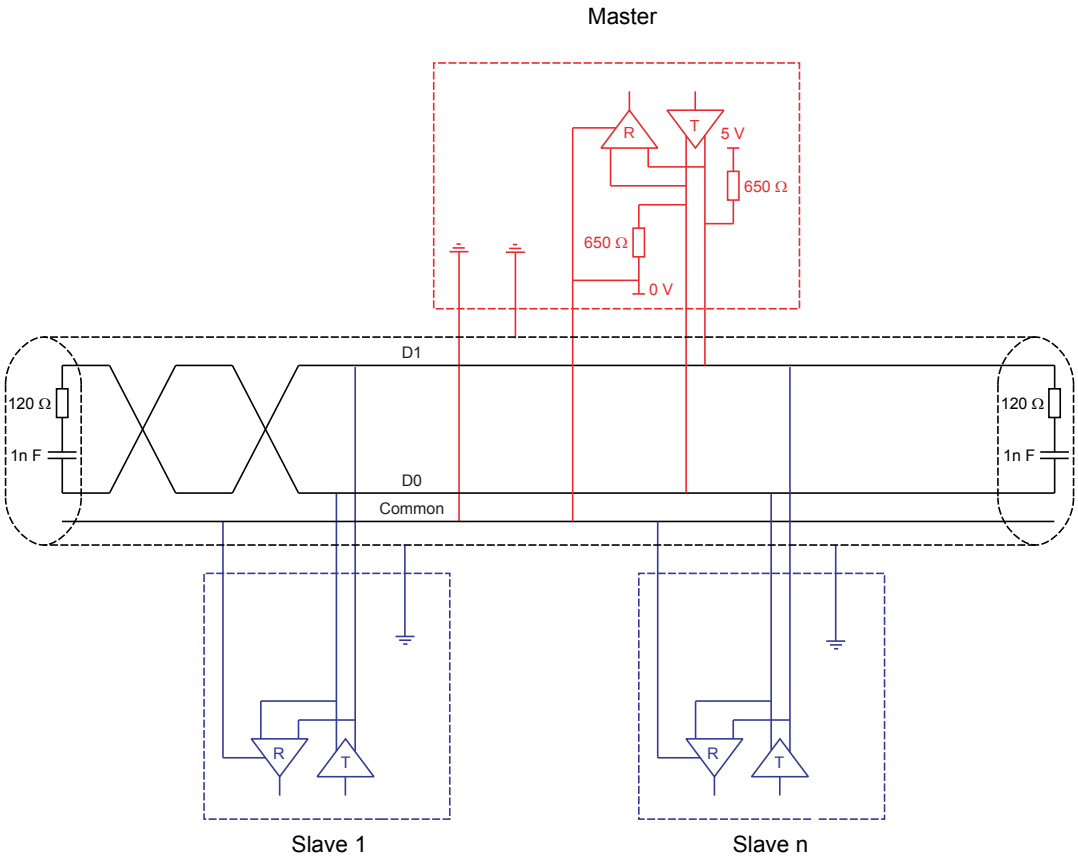
Name	Type	Address	Value	Comment
ATV12_NC	ATV12IOSCAN	%MW120		ATV12 com scanner IN (PLC > ATV)
ATV12_NC[0]	INT	%MW120		default : ATV 12 CMD Control Word
ATV12_NC[1]	INT	%MW121		default : ATV12 LFRD Frequency reference
ATV12_NC[2]	INT	%MW122		
ATV12_NC[3]	INT	%MW123		
ATV12_NM	ATV12IOSCAN	%MW124		ATV12 COM scanner OUT (ATV > PLC)
ATV12_NM[0]	INT	%MW124		default : ATV 12 ETA (status word)
ATV12_NM[1]	INT	%MW125		default : ATV 12 RFRD Output speed
ATV12_NM[2]	INT	%MW126		
ATV12_NM[3]	INT	%MW127		

Standard schematic

The standard schematic corresponds to the Modbus specification published on the Modbus.org site in 2002 (Modbus_over_serial_line_V1.pdf, Nov 2002) and in particular to the schematic of the 2-wire multidrop serial bus.

The ATV12 drive follows this specification.

Schematic diagram:



Type of trunk cable	Shielded cable with 1 twisted pair and at least a 3rd conductor
Maximum length of bus	1000 m at 19200 bps with the Schneider Electric TSX CSA●●● cable
Maximum number of stations (without repeater)	32 stations, ie. 31 slaves
Maximum length of tap links	• 20 m for one tap link • 40 m divided by the number of tap links on a multiple junction box
Bus polarisation	• One 450 to 650 Ω pulldown resistor at 5 V (650 Ω recommended) • One 450 to 650 Ω pulldown resistor at the Common (650 Ω recommended) This polarisation is recommended for the master.
Line terminator	One 120 Ω 0.25 W resistor in series with a 1nF 10 V capacitor
Common polarity	Yes (Common), connected to the protective ground at one or more points on the bus

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