

Modicon M340

Comunicação ATV71 em Profibus DPV1 através do módulo
Profibus Remote Master (PRM) - TCSEGPA23F14F

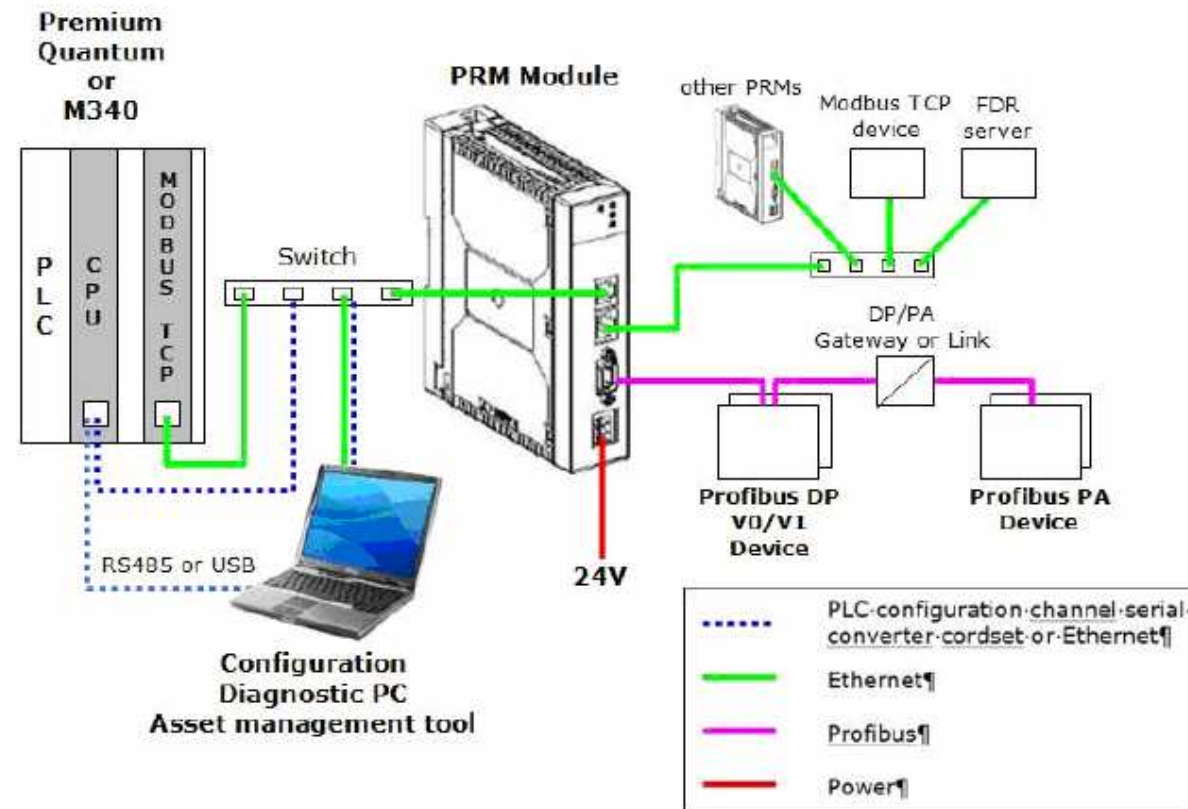
Atenção: Esta nota de aplicação requer a utilização dos manuais de software e hardware pertinentes aos produtos envolvidos para obter informações complementares.



Arquitetura

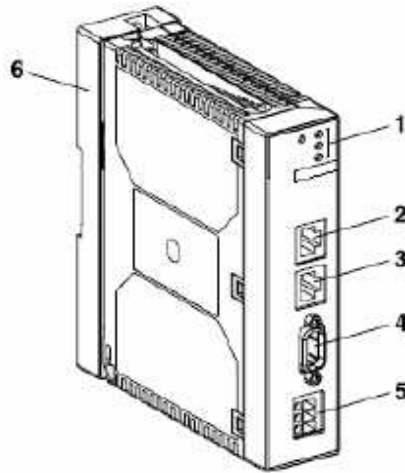
- Profibus Remote Master (PRM):

PRM module in its operating environment



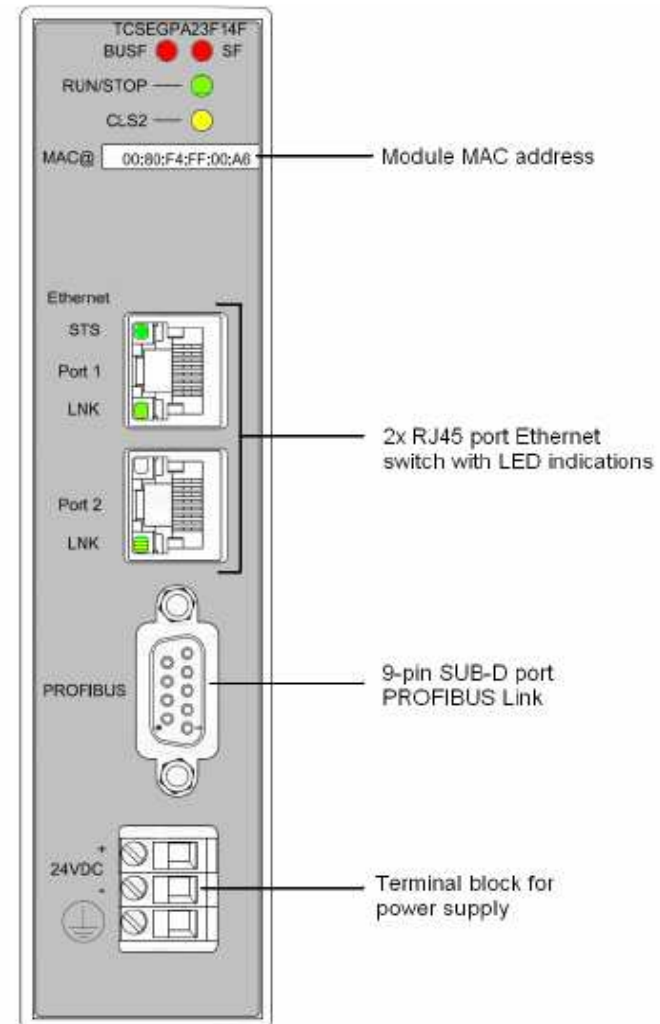
Arquitetura

● Profibus Remote Master (PRM):



PRM module

Reference	Description
1	4 LED indicators (See Diagnostics): - System fault detected - Bus fault detected - Run - CLS2
2 and 3	RJ45 connectors for Ethernet link (integrated switch)
4	9-pin SUB D connector for Profibus link
5	Screw terminal for 24 VDC power supply connection (See Power Supply)
6	Support plate for fixing the module directly to an AM1-DE200/DP200 DIN rail or to a Telequick AM1-PA pre-slotted plate



Arquitetura

● Profibus Remote Master (PRM):

The rotary switches are on the back of the module and must be set up prior to mounting the PRM module. Once the module is mounted, they will no longer be accessible.

Their primary role is to define the PRM IP address assignment mode:

By default, the PRM is configured to use the **factory IP address**: 10.10.xxx.yyy, where xxx and yyy are the last two numbers of the MAC address in decimal form. The MAC address is written on the front panel of the module.

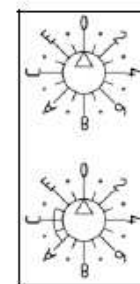
The lower switch is used to choose the IP addressing mode between **DHCP** and **Stored**; the upper switch is used in the DHCP mode for additional information:

- **DHCP**: the IP address is requested by the PRM to a DHCP server using a hardware device name.
The device name is a string
 - starting with the module reference: **TCSEGPA23F14F**
 - followed by a configurable numerical extension, in decimal from 000 to 159, based on the switches values:
Extension = Tens value (upper switch setting x 10)
+ Unit value (Lower switch setting).

For example if the upper switch is set to F (15) and the lower switch to 2, then the device name is TCSEGPA23F14F152
- **Stored**: the IP address is configured by the DTM ("Dedicated IP address" setting) and stored in the PRM as part of the PRM configuration file.

2 additional modes can also be triggered in some specific cases:

- **Clear IP**: temporary mode to delete the PRM configuration file including the stored IP address
- **Recovery**: specific Firmware update mode when the normal mode using the DTM is not working. To be used with the assistance of technical support only.



Switch	Position	Description/Meaning
Lower	0-9	DHCP mode selection Unit value of the device name extension (0,1,2,...9)
	A, B, C or D	Stored mode: IP comes with Conf file
	E	Clear IP : Configuration file deletion
	F	Recovery
Upper	0 to F (hexa)	Tens value of the device name extension (0, 1, .. 15). Used when the DHCP mode is selected.

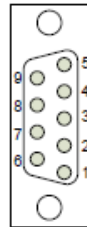
Note: the factory default setting is: upper switch at 0, lower switch at C
Note: the rotary switches position is read at power up only.

Arquitetura

● Profibus Remote Master (PRM):

Profibus connection

PRM Profibus Connector

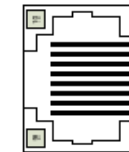


No.	Signal
1	Earth
2	Not connected
3	PFB B
4	RTS
5	PFB 0Vdc
6	PFB 5Vdc
7	Not connected
8	PFB A
9	Not connected

Ethernet connection

RJ45 Ethernet Connector

Illustration of the RJ45 shielded connector for the Ethernet link :



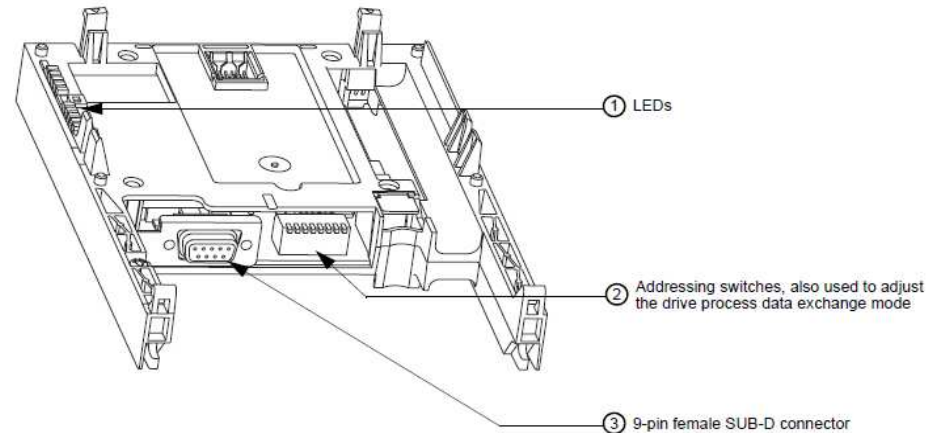
No.	Signal
1	Tx+
2	Tx-
3	Rx+
4	Not connected
5	Not connected
6	Rx-
7	Not connected
8	Not connected
9	Link/Activity LED
10	Link Status LED

Ethernet cables

Category 5 Shielded Twisted Pair (STP) with RJ45 connectors conforming to TIA-EIA-568A.

Arquitetura

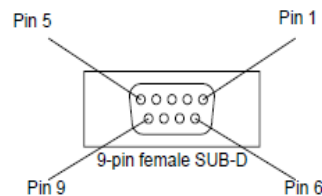
● Profibus DPV1 – Altivar 71:



Connection to the bus

Connector pinout

The transmission interface conforms to the RS 485 standard and is electrically isolated from the drive.



Pin	Signal	Pin	Signal	Pin	Signal
1	Not connected	4	Not connected	7	Not connected
2	Not connected	5	DGND (Ground)	8	RxD/TxD-P (Reception/Transmission +)
3	RxD/TxD-N (Reception/Transmission -)	6	VP (5 volts)	9	Not connected

Arquitetura

● Profibus DPV1 – Altivar 71:

Coding the drive address

An Altivar 71 is identified on the bus by its address, coded between 0 and 126.

The address corresponds to the binary number given by position 0 (up/OFF) or 1 (down/ON) of the 7 switches on the right of the card.

The least significant bits are on the right.

- Addresses 0 and 1 are usually reserved for the Profibus DP masters and must not be used to configure the Profibus DP address on an Altivar 71.
- It is not advised to use address 126, which is incompatible with SSA service (Set Slave Address) and with some network configuration softwares (Sycon, ...).

Examples:



Address 23



Address 89

The address can be checked via the display terminal (see Diagnostics section).

Altivar 71

- Configuração da comunicação:

Configuring PZDs (communication scanner)

PZDs are configured by configuring the communication scanner.

The 8 periodic output variables are assigned by means of parameters nCA1 to nCA8. They are configured using the graphic display terminal via the **[1.9 - COMMUNICATION]** (C D P -) menu and **[COM. SCANNER OUTPUT]** (D E S -) submenu. An nCA parameter with a value of zero does not designate any parameter in the drive. These 8 words are described in the table below:

Parameter name	Profibus variable	Default assignment
[Scan. Out1 address] (nCA1)	PZD1	Command word (CMD)
[Scan. Out2 address] (nCA2)	PZD2	Speed target (LFRD)
[Scan. Out3 address] (nCA3)	PZD3	Not used
[Scan. Out4 address] (nCA4)	PZD4	Not used
[Scan. Out5 address] (nCA5)	PZD5	Not used
[Scan. Out6 address] (nCA6)	PZD6	Not used
[Scan. Out7 address] (nCA7)	PZD7	Not used
[Scan. Out8 address] (nCA8)	PZD8	Not used

The 8 periodic input variables are assigned by means of parameters nMA1 to nMA8. They are configured using the graphic display terminal via the **[1.9 - COMMUNICATION]** (C D P -) menu and **[COM. SCANNER INPUT]** (I E S -) submenu. An nMA parameter with a value of zero does not designate any parameter in the drive. These 8 words are described in the table below:

Parameter name	Profibus variable	Default assignment
[Scan. In1 address] (nMA1)	PZD1	Status word (ETA)
[Scan. In2 address] (nMA2)	PZD2	Output speed (RFRD)
[Scan. In3 address] (nMA3)	PZD3	Not used
[Scan. In4 address] (nMA4)	PZD4	Not used
[Scan. In5 address] (nMA5)	PZD5	Not used
[Scan. In6 address] (nMA6)	PZD6	Not used
[Scan. In7 address] (nMA7)	PZD7	Not used
[Scan. In8 address] (nMA8)	PZD8	Not used

Altivar 71

- Configuração da comunicação:

Example of configuring PZDs via the graphic display terminal:

RDY	NET	+0.00Hz	0A
COM. SCANNER INPUT ☐			
Scan. In1 address	:		3201
Scan. In2 address	:		8604
Scan. In3 address	:		0
Scan. In4 address	:		0
Scan. In5 address	:		0
Code		Quick	☒
Scan. In6 address	:		0
Scan. In7 address	:		0
Scan. In8 address	:		0

RDY	NET	+0.00Hz	0A
COM. SCANNER OUTPUT ☐			
Scan. Out1 address	:		8501
Scan. Out2 address	:		8602
Scan. Out3 address	:		0
Scan. Out4 address	:		0
Scan. Out5 address	:		0
Code		Quick	☒
Scan. Out6 address	:		0
Scan. Out7 address	:		0
Scan. Out8 address	:		0

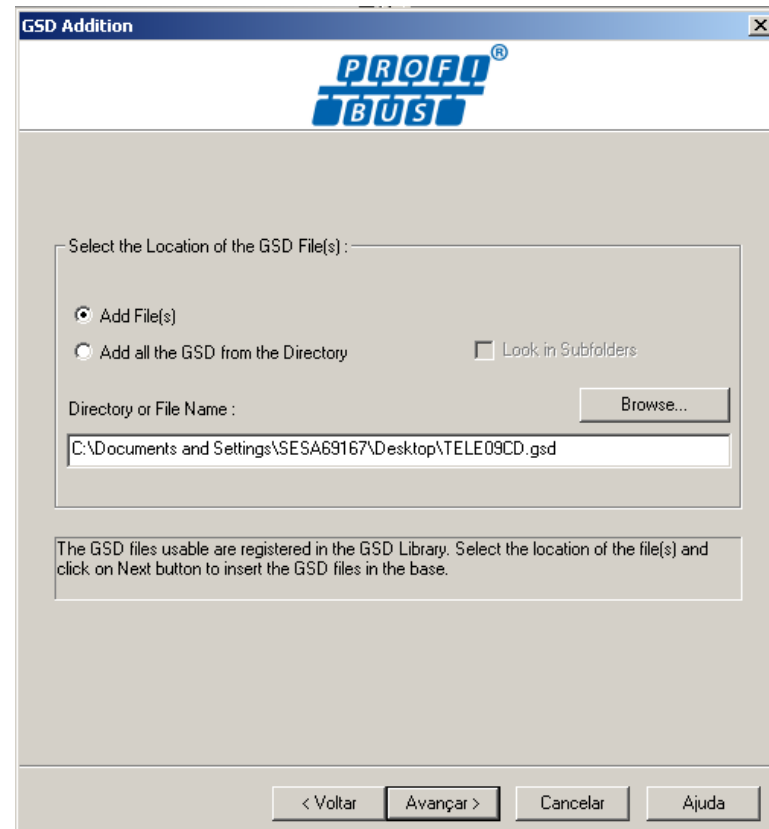
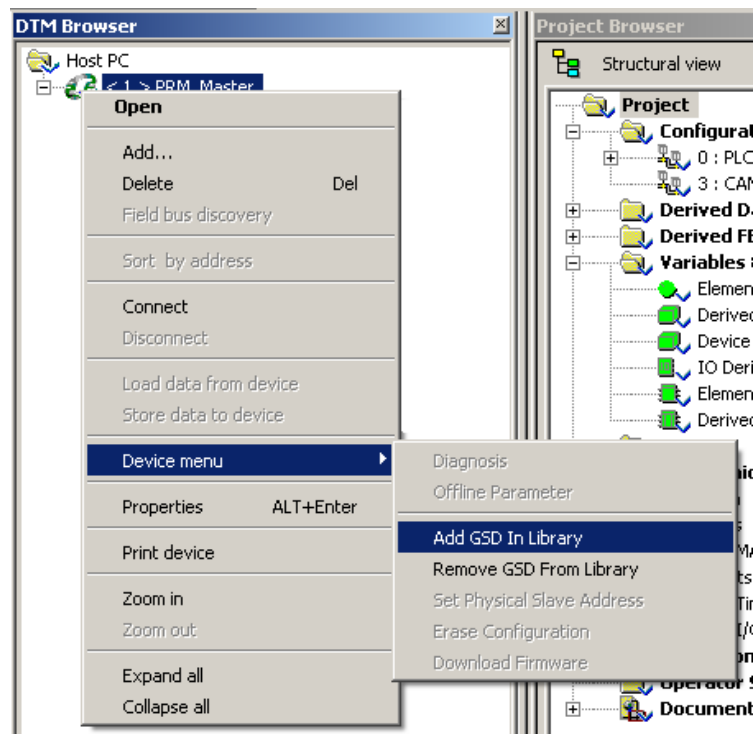
Note:

All modifications to parameters nMA1 ... nMA8 or nCA1 ... nCA8 must be made with the motor stopped.
The master PLC program should be updated to take account of this modification.

UnityPro

- Configuração PRM (Profibus Remote Master):

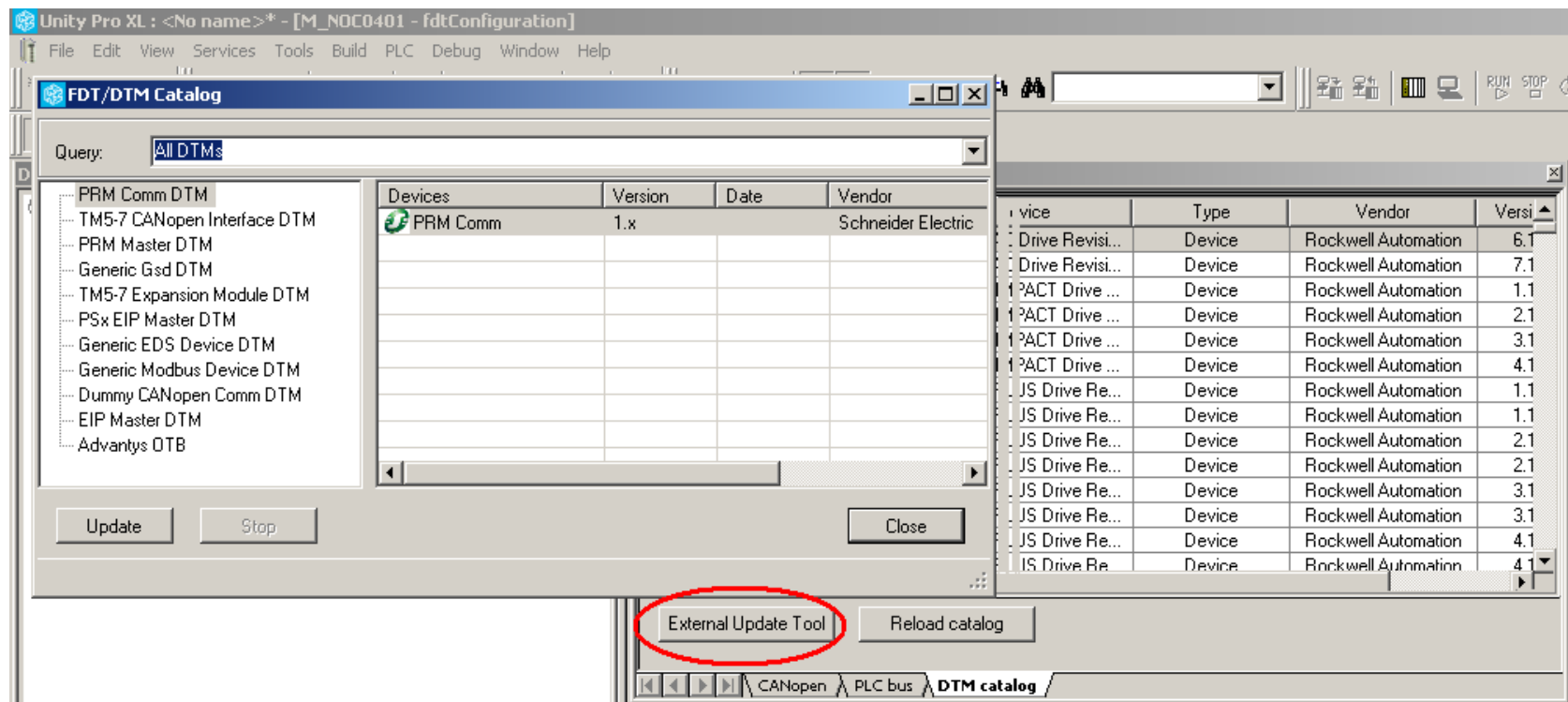
Acrescentar o arquivo GSD do dispositivo escravo Profibus DPV1 através do DTM Browser:



UnityPro

- Configuração PRM (Profibus Remote Master):

Após inserir o novo GSD na biblioteca, em **External Update Tool**, atualiza-se a biblioteca com os arquivos GSD para Profibus DP-V1:

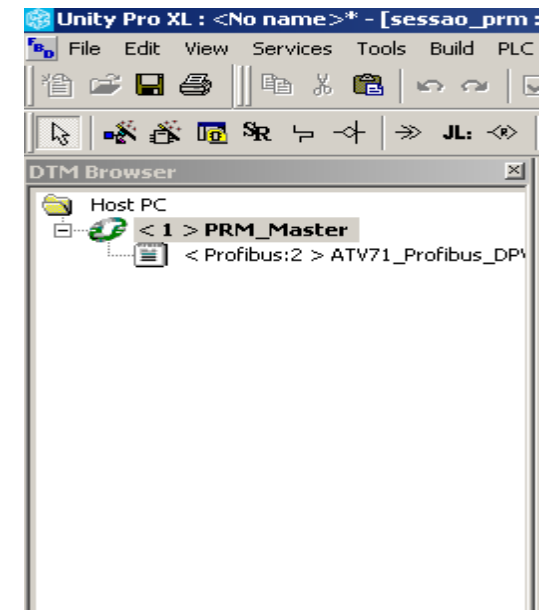
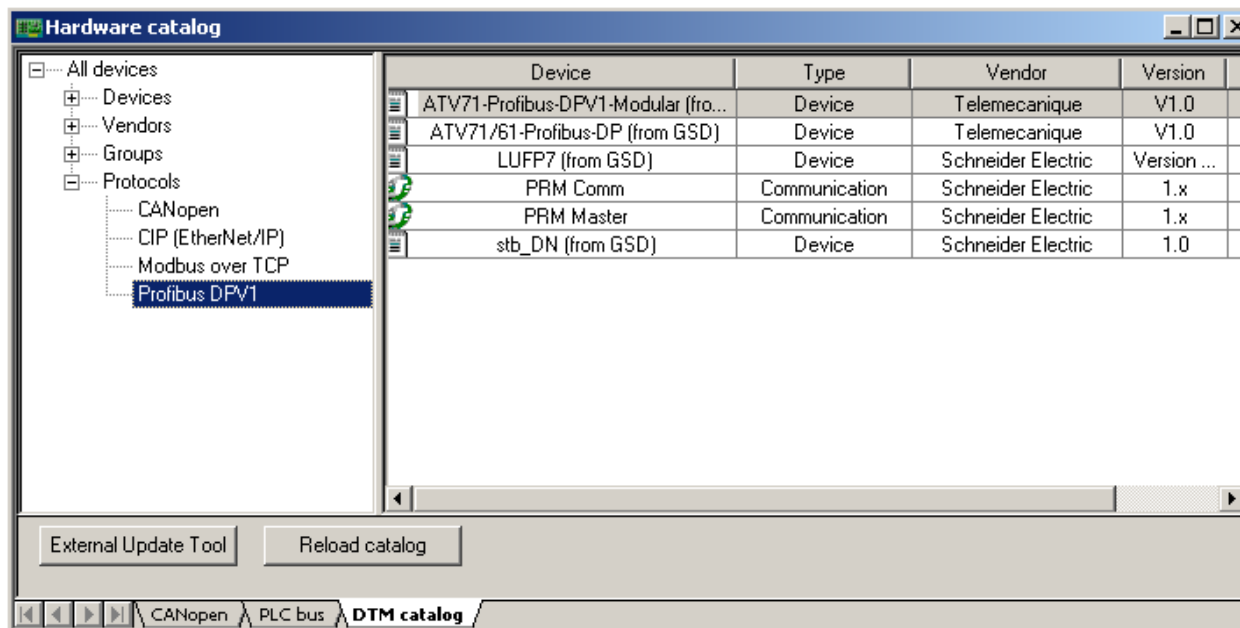


Em seguida, deve-se realizar o **Reload Catalog** para ter disponível o arquivo inserido na biblioteca.

UnityPro

- Configuração PRM (Profibus Remote Master):

Acrescentar o arquivo GSD do dispositivo escravo Profibus DPV1 através do DTM Browser:



UnityPro

- Configuração PRM (Profibus Remote Master):

Variáveis criadas para o dispositivo escravo e para o módulo PRM:

The screenshot displays the UnityPro software interface. On the left, the 'Project Browser' shows a hierarchical tree structure. Under 'Derived FB Types', there is a 'PRM_MGT_M' section. Under 'Variables & FB instances', there are 'Elementary Variables', 'Derived Variables', 'Device DDT Variables', 'IO Derived Variables', 'Elementary FB Instances', and 'Derived FB Instances'. The 'Communication' section includes 'Networks' and 'CONEXAO_PRM'. The 'Program' section includes 'Tasks', 'MAST', 'Sections', 'sessao_prm', and 'SR Sections'. The 'Events' section includes 'Timer Events' and 'I/O Events'. The 'Animation Tables' section includes 'Table'.

On the right, the 'Variables' table is displayed. It has columns for Name, Type, Addr..., Value, and Comment. The table lists the following variables:

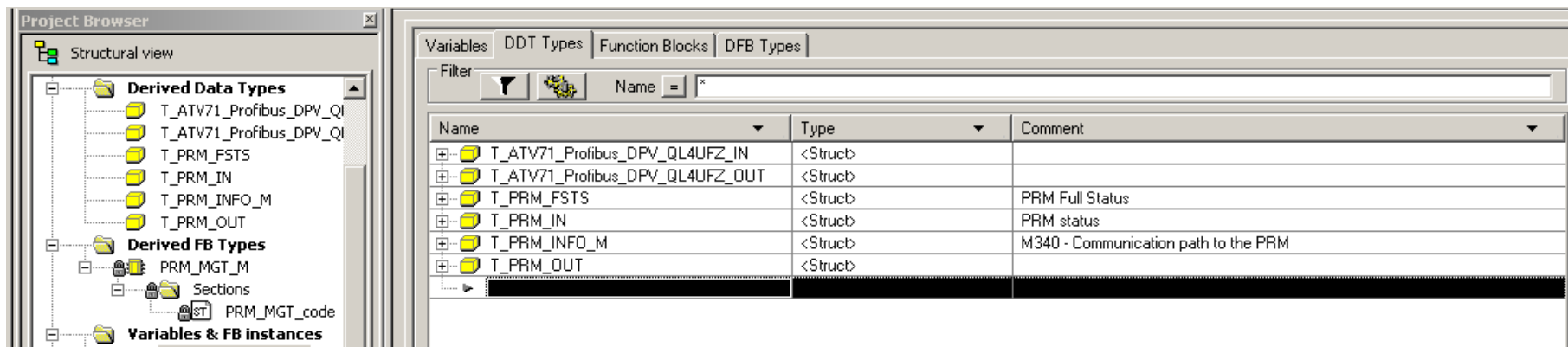
Name	Type	Addr...	Value	Comment
ATV71_Profibus_DPV_QL4UFZ_IN	T_ATV71_Profibus_DPV_QL4UFZ_IN	%MW226		
ATV71_Profibus_DPV_QL4UFZ_OUT	T_ATV71_Profibus_DPV_QL4UFZ_OUT	%MW302		
master_info_prm	T_PRM_INFO_M			
prm_error	BOOL			
prm_full_status	T_PRM_FSTS			
PRM_Master_IN	T_PRM_IN	%MW200		
PRM_Master_OUT	T_PRM_OUT	%MW300		
prm_stop_mode	BOOL			
read_completed_valid	BOOL			
req_fsts	BOOL			
retry_restart	BOOL			
start_in_progress_busy	BOOL			

The bottom of the interface shows a status bar with icons for PLC bus, Table, sessao_prm, PRM_Mast..., and Data Editor.

UnityPro

- Configuração PRM (Profibus Remote Master):

Variáveis estruturadas da configuração da rede Profibus DPV1 através do DTM Browser:



The screenshot displays the UnityPro DTM Browser interface. On the left, the 'Project Browser' shows a 'Structural view' with a tree of 'Derived Data Types' and 'Derived FB Types'. The 'Derived Data Types' include T_ATV71_Profibus_DPV_QI, T_ATV71_Profibus_DPV_QI, T_PRM_FSTS, T_PRM_IN, T_PRM_INFO_M, and T_PRM_OUT. The 'Derived FB Types' include PRM_MGT_M, Sections, and PRM_MGT_code. The 'Variables & FB instances' section is also visible. On the right, the 'Variables' tab is active, showing a table of variables. The table has columns for Name, Type, and Comment. The variables listed are T_ATV71_Profibus_DPV_QI4UFZ_IN, T_ATV71_Profibus_DPV_QI4UFZ_OUT, T_PRM_FSTS, T_PRM_IN, T_PRM_INFO_M, and T_PRM_OUT. The types are all '<Struct>'. The comments are 'PRM Full Status', 'PRM status', and 'M340 - Communication path to the PRM'.

Name	Type	Comment
T_ATV71_Profibus_DPV_QI4UFZ_IN	<Struct>	
T_ATV71_Profibus_DPV_QI4UFZ_OUT	<Struct>	
T_PRM_FSTS	<Struct>	PRM Full Status
T_PRM_IN	<Struct>	PRM status
T_PRM_INFO_M	<Struct>	M340 - Communication path to the PRM
T_PRM_OUT	<Struct>	

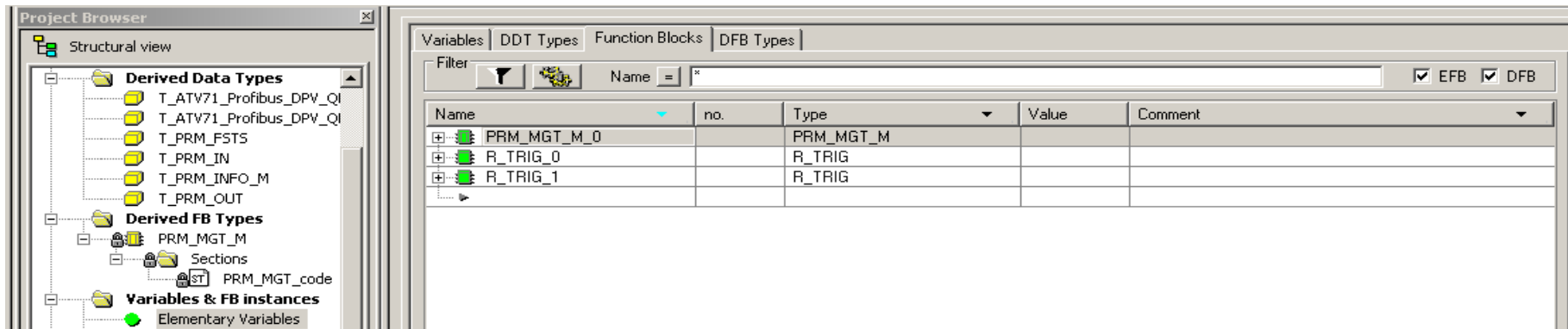
As variáveis estruturadas (*DDT Types*) e as sessões de programa de gerenciamento da comunicação (*Derived FB Types*) para utilização do módulo PRM são geradas a partir do término da configuração da rede Profibus DPV1 no **DTM Browser** e após realizar o **Build** da aplicação.

Em seguida, realiza-se a configuração do I/O Scanning, onde na configuração são exigidas as quantidade de registros de entrada e saída para a comunicação de maneira transparente com o escravo em Profibus DPV1.

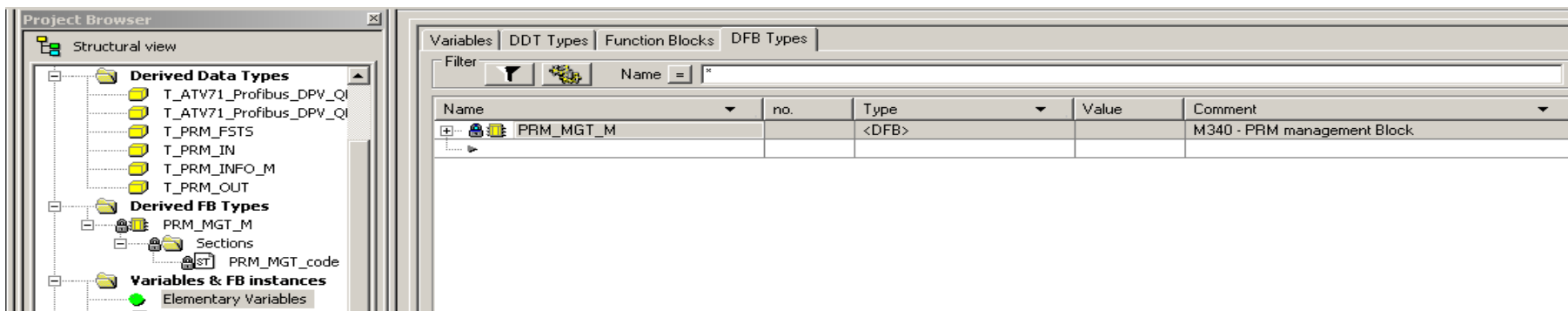
UnityPro

- Configuração PRM (Profibus Remote Master):

Function Blocks criados para sessão de programa para o funcionamento do módulo PRM:



DFB Types para o funcionamento do módulo PRM:



UnityPro

- Configuração PRM (Profibus Remote Master):

Aponta-se o endereço IP do módulo PRM e reserva-se os registros para leitura e escrita no escravo Profibus DPV1 (RD Master Object e WR Master Object):

The screenshot displays the UnityPro configuration interface. On the left, the Project Browser shows a tree structure with categories like Derived Data Types, Derived FB Types, Variables & FB instances, Motion, and Communication. The main window is divided into several sections. At the top, there are fields for Model Family (NOE 0100.2, NOE 0110.2), Module Address (Rack: 0, Module: 1, Channel: 0), and Module IP Address (IP Address: 10.161.47.94, Subnetwork Mask: 255.255.255.0, Gateway Address: 0.0.0.0). Below these are Module Utilities (YES, NO, NO, NO) and a list of services (IO Scanning, Global Data, Address Server, NTP). The bottom section is titled 'IO Scanning' and contains tabs for IP Configuration, Messaging, IO Scanning, Global Data, SNMP, Address Server, NTP, and Bandwidth. The IO Scanning tab is active, showing Master %MW zones and a table of scanned peripherals.

	IP address	Device Name	Unit ID	Slave Syntax	Health Timeout (ms)	Repetitive rate (ms)	RD Master Object	RD Ref Slave	RD length	Last value (Input)	VR Master Object	VR Ref Slave	VR length
1	10.161.47.59	PRM_Master	255	Index	1500	280	%Mw200	0	28	Set to 0	%Mw300	4096	4
2													
3													
4													
5													
6													

UnityPro

- Configuração PRM (Profibus Remote Master):

Configuração do PRM_Master para comunicação em Profibus DPV1:

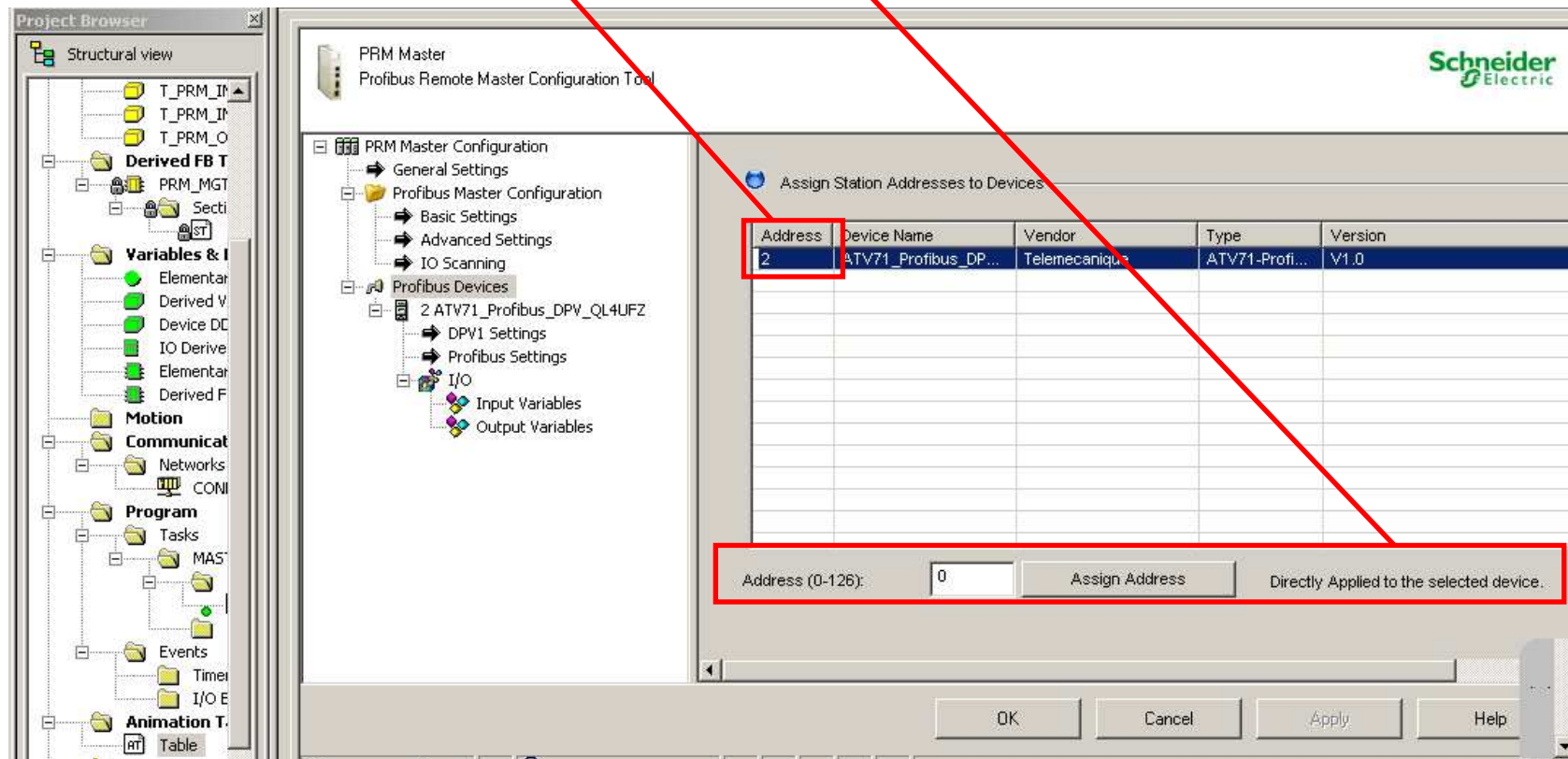
The screenshot shows the 'Property' dialog box for configuring a PRM_Master. It features three dropdown menus at the top: 'Device Type' set to 'DTM', 'DTM Protocol' set to 'Profibus DP/V1', and 'DTM Name' set to 'PRM_Master'. Below these is a 'Data Exchange Required' section with two input fields: 'Input words' set to '28' and 'Output words' set to '4'. At the bottom are four buttons: 'OK', 'Launch No Tool', 'Update', and 'Close'.

A quantidade de registros estipulada pelo Data Exchange Required é a quantidade de registros de entrada e saída para comunicação com o escravo em Profibus DPV1 que deve ser acrescentada nos campos RD Ref Length e WR Length no I/O Scanning.

UnityPro

- Configuração PRM (Profibus Remote Master):

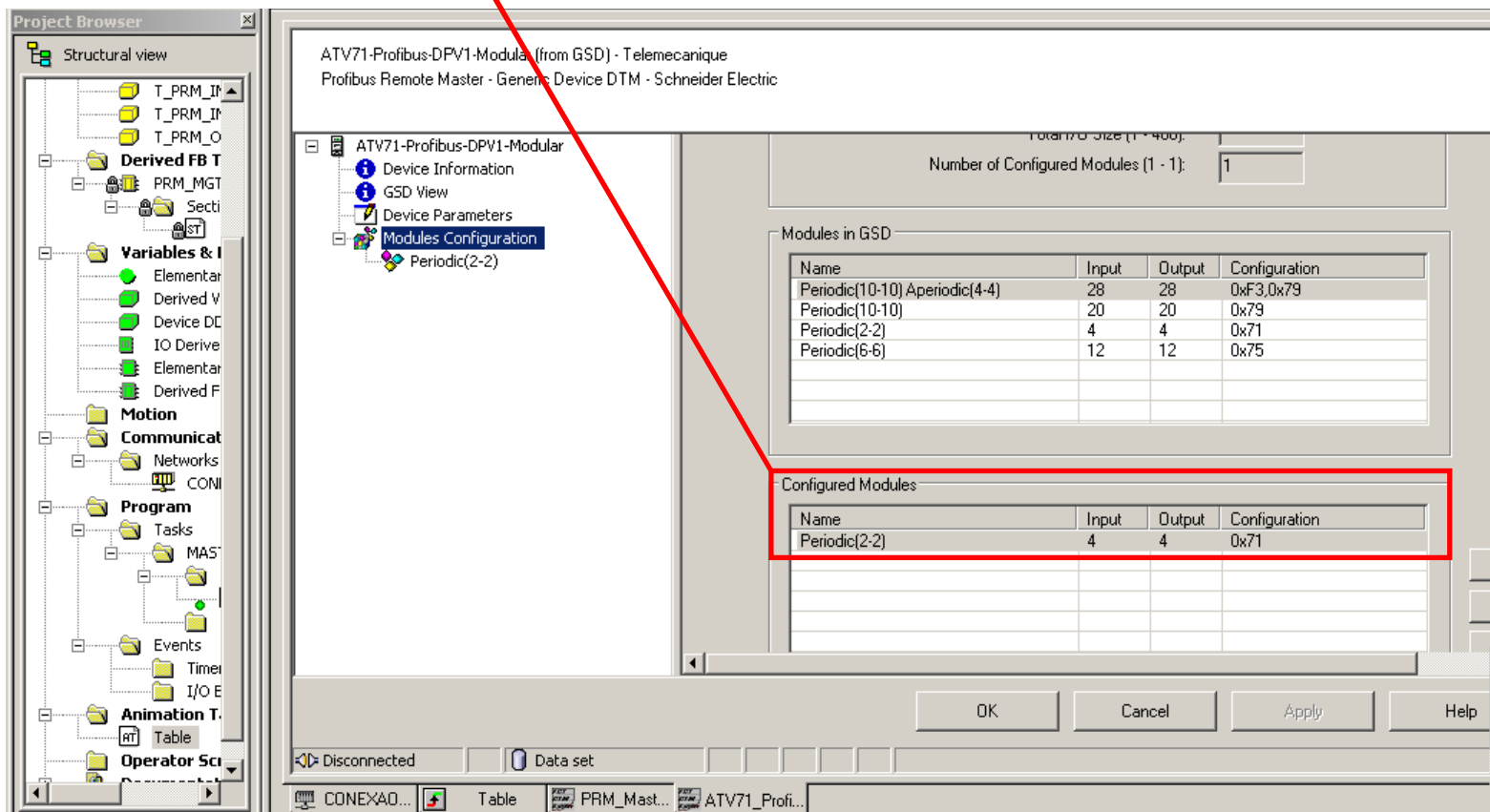
Definição do endereço escravo Profibus DPV1



UnityPro

- Configuração PRM (Profibus Remote Master):

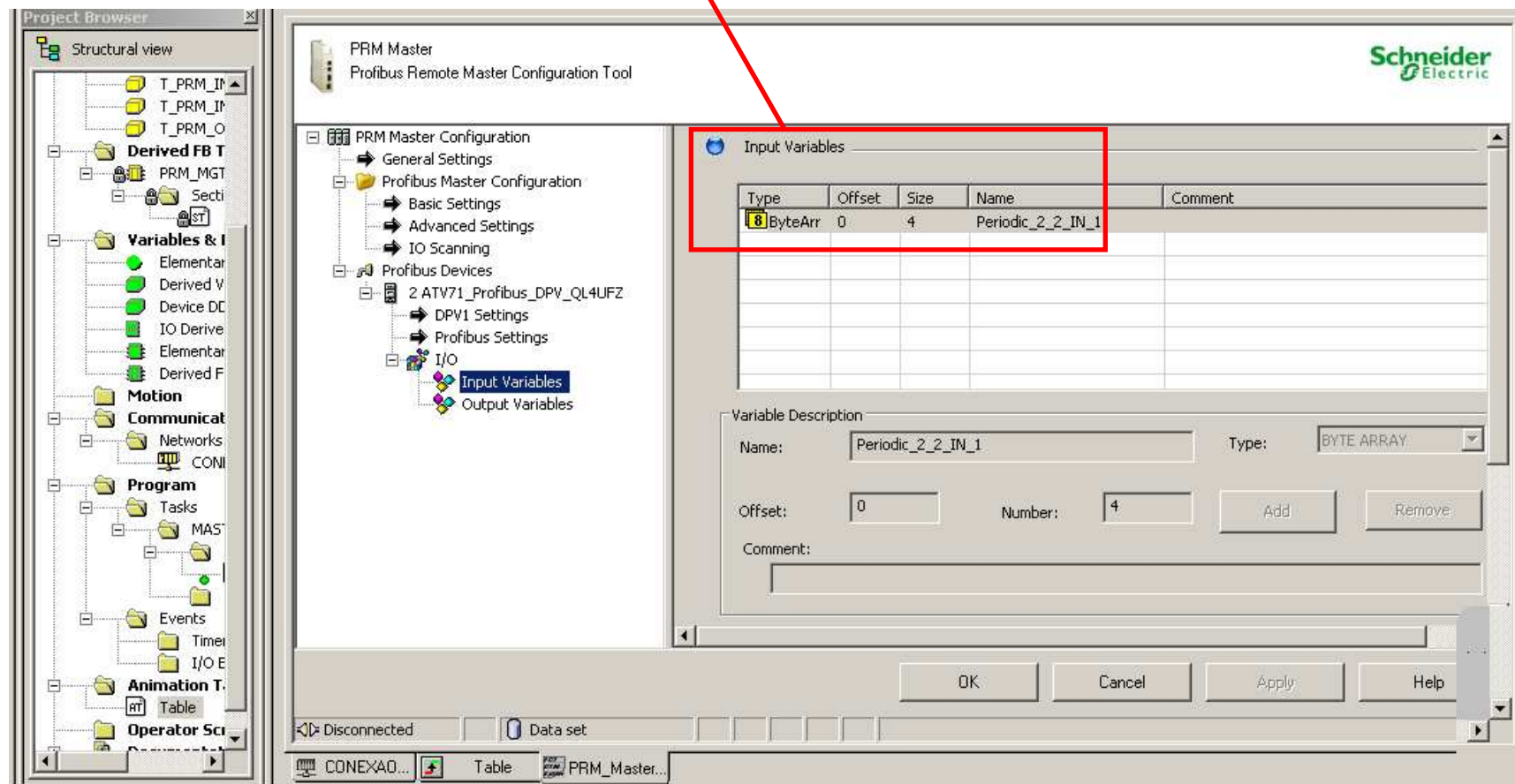
Definição da quantidade de registros periódicos que comunicação diretamente com o escravo (4 bytes de entrada e 4 bytes de saída)



UnityPro

- Configuração PRM (Profibus Remote Master):

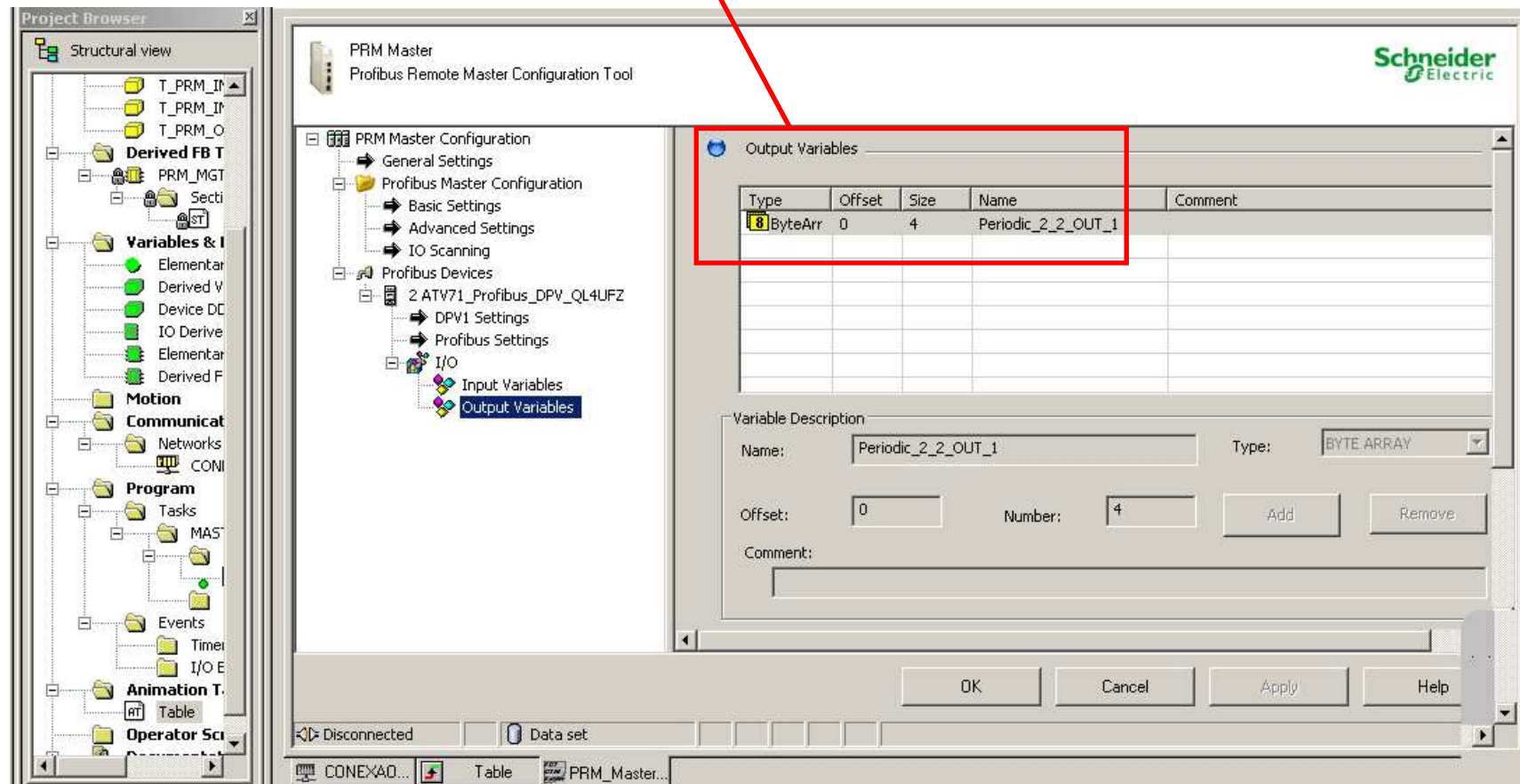
Variáveis de entrada: 4 bytes = 2 words (conforme arquivo GSD inserido no DTM Browser)



UnityPro

- Configuração PRM (Profibus Remote Master):

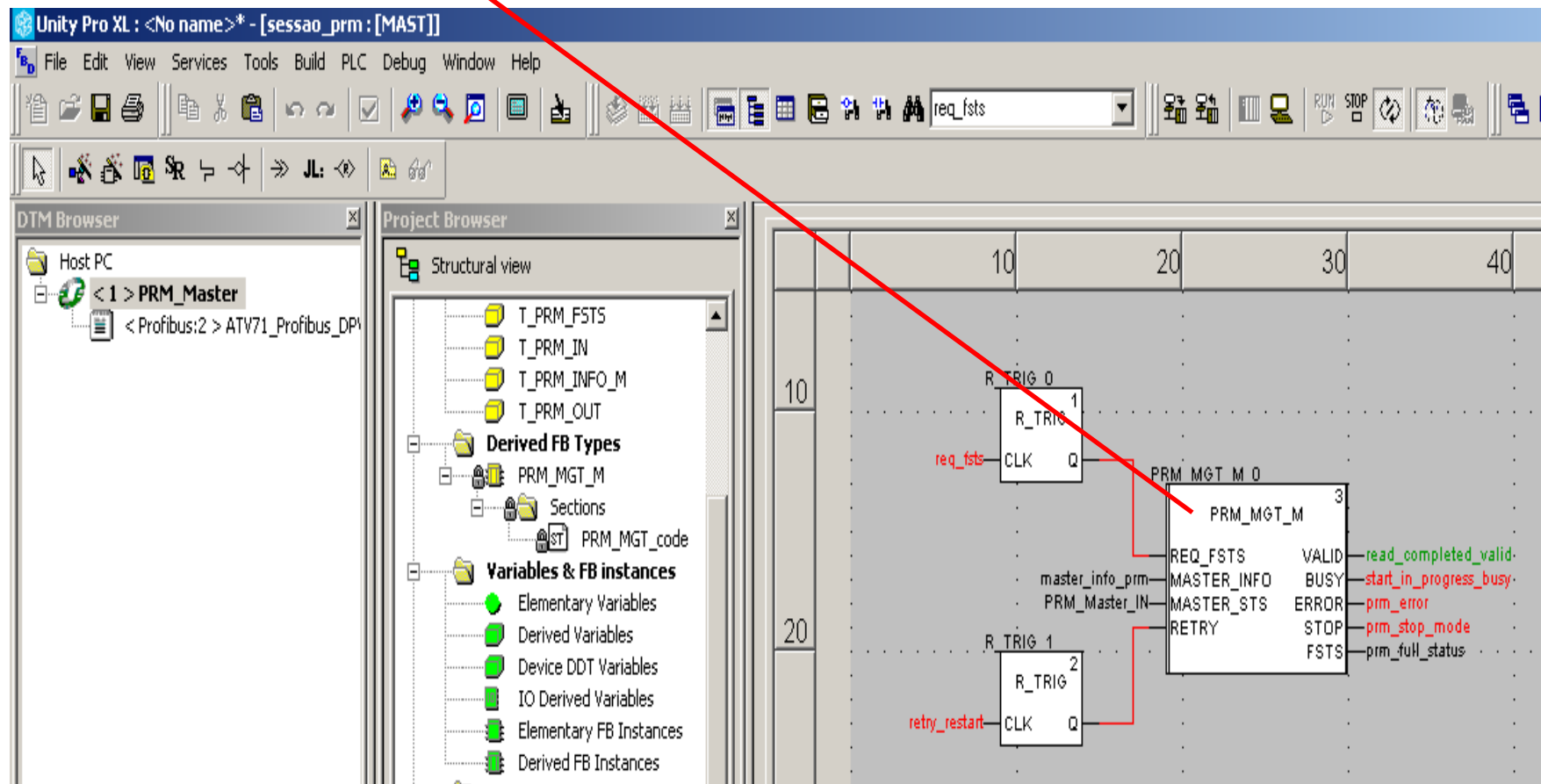
Variáveis de entrada: 4 bytes = 2 words (conforme arquivo GSD inserido no DTM Browser)



UnityPro

- Configuração PRM (Profibus Remote Master):

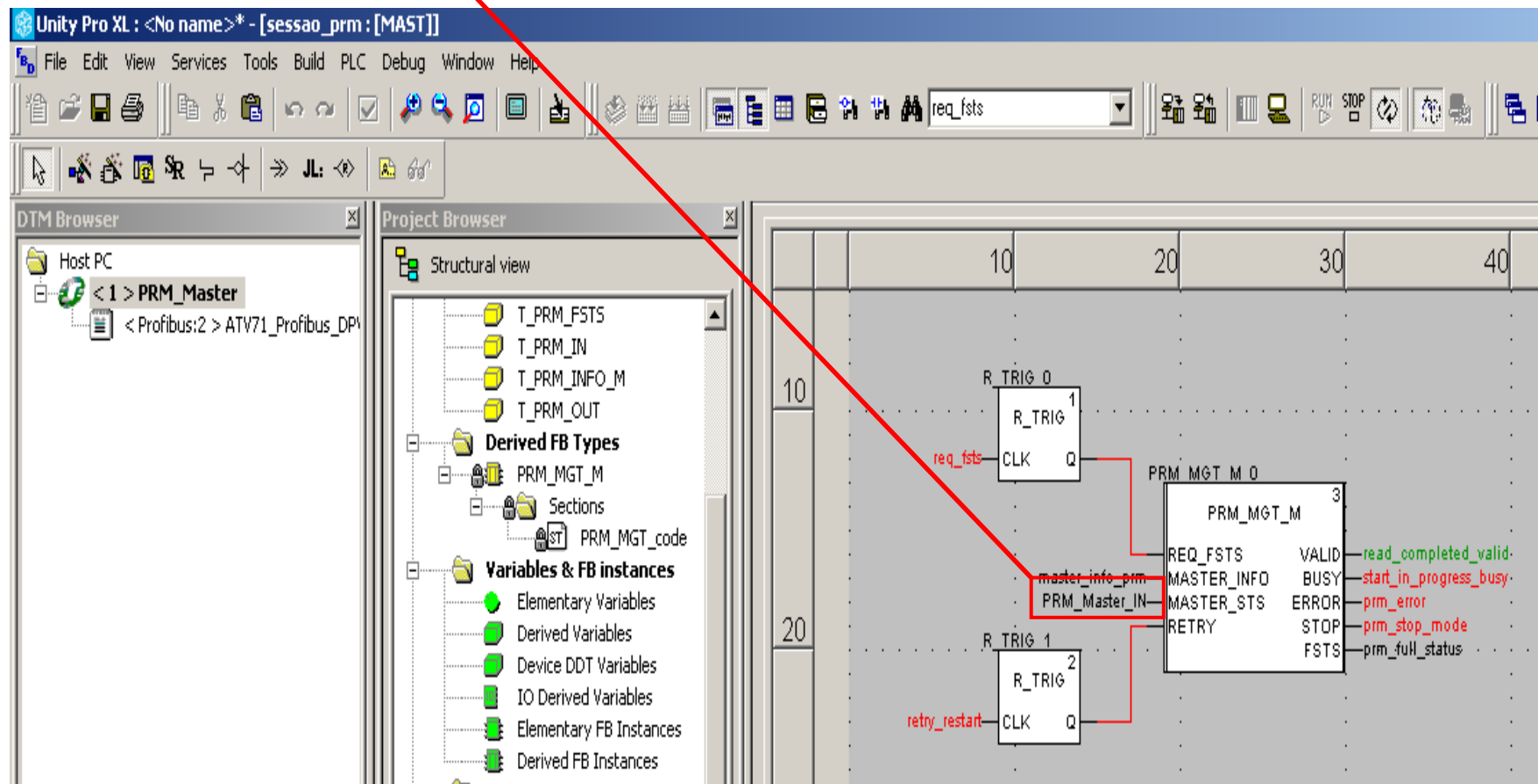
Utilizar o bloco **PRM_MGT_M** para gerenciamento da utilização do módulo Profibus.



UnityPro

- Configuração PRM (Profibus Remote Master):

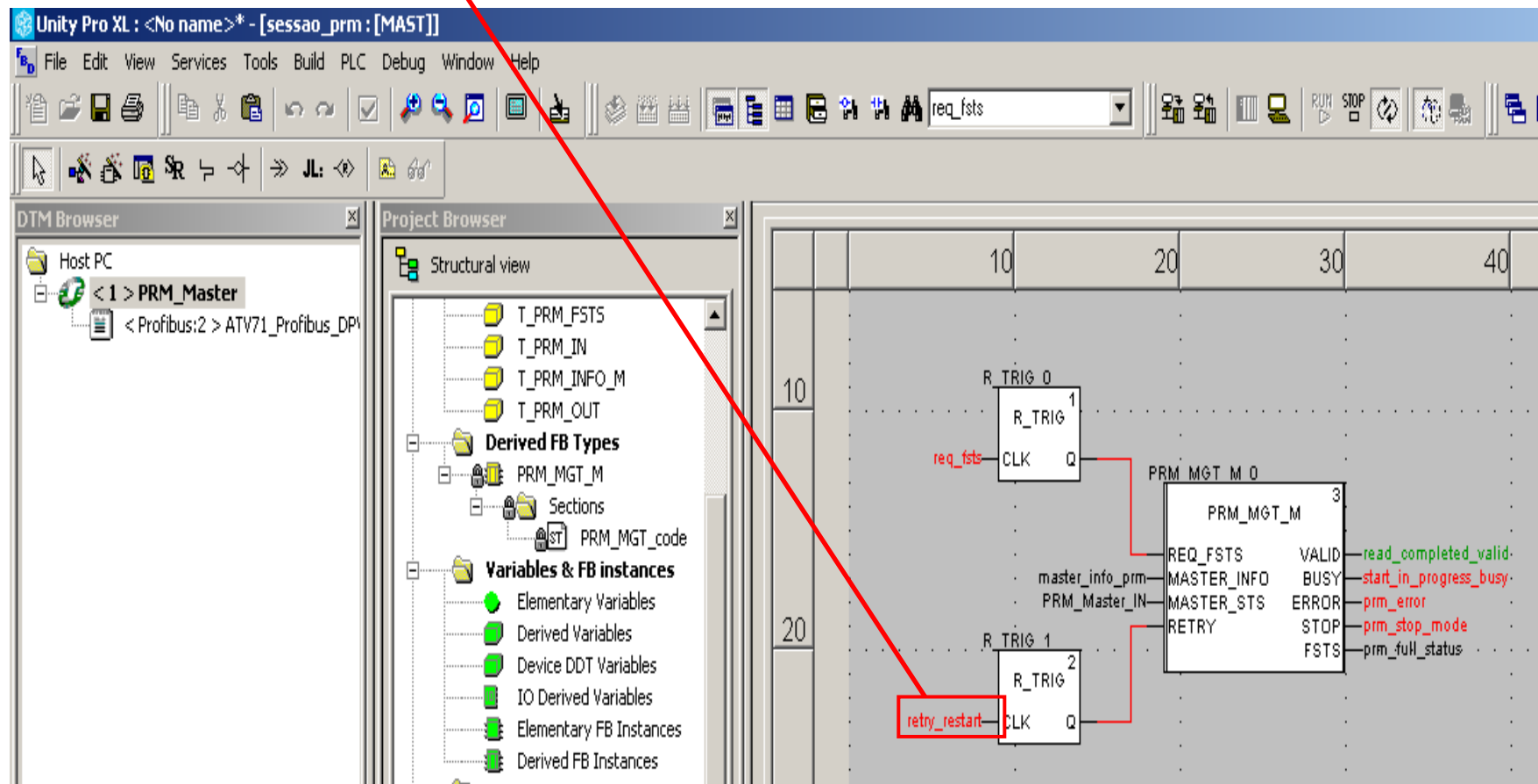
Utilizar o bloco **PRM_Master_IN** conforme criado pelo DTM Browser em **MASTER_STS**



UnityPro

- Configuração PRM (Profibus Remote Master):

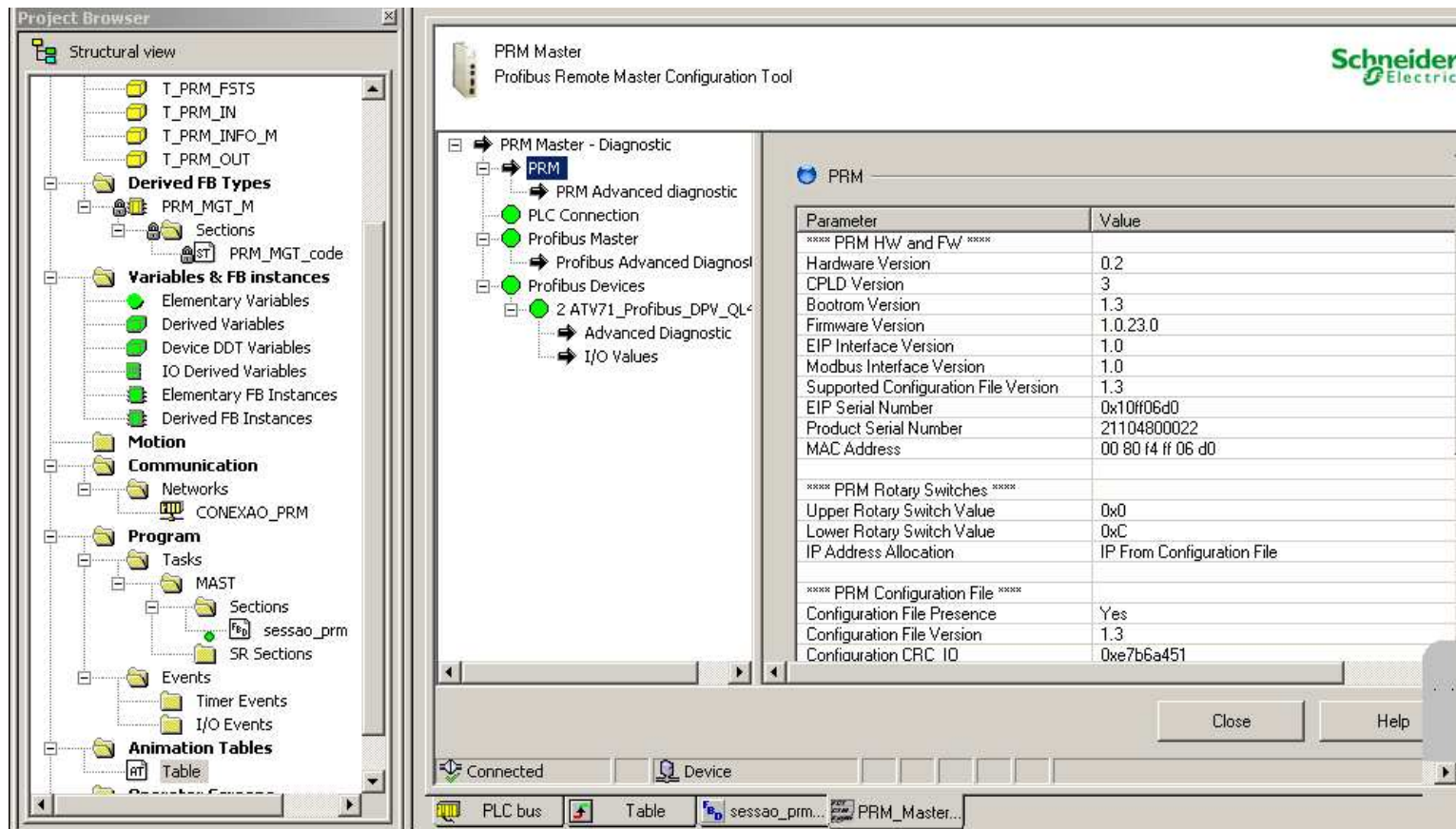
Habilita e envia o módulo para modo RUN.



UnityPro

- Configuração PRM (Profibus Remote Master):

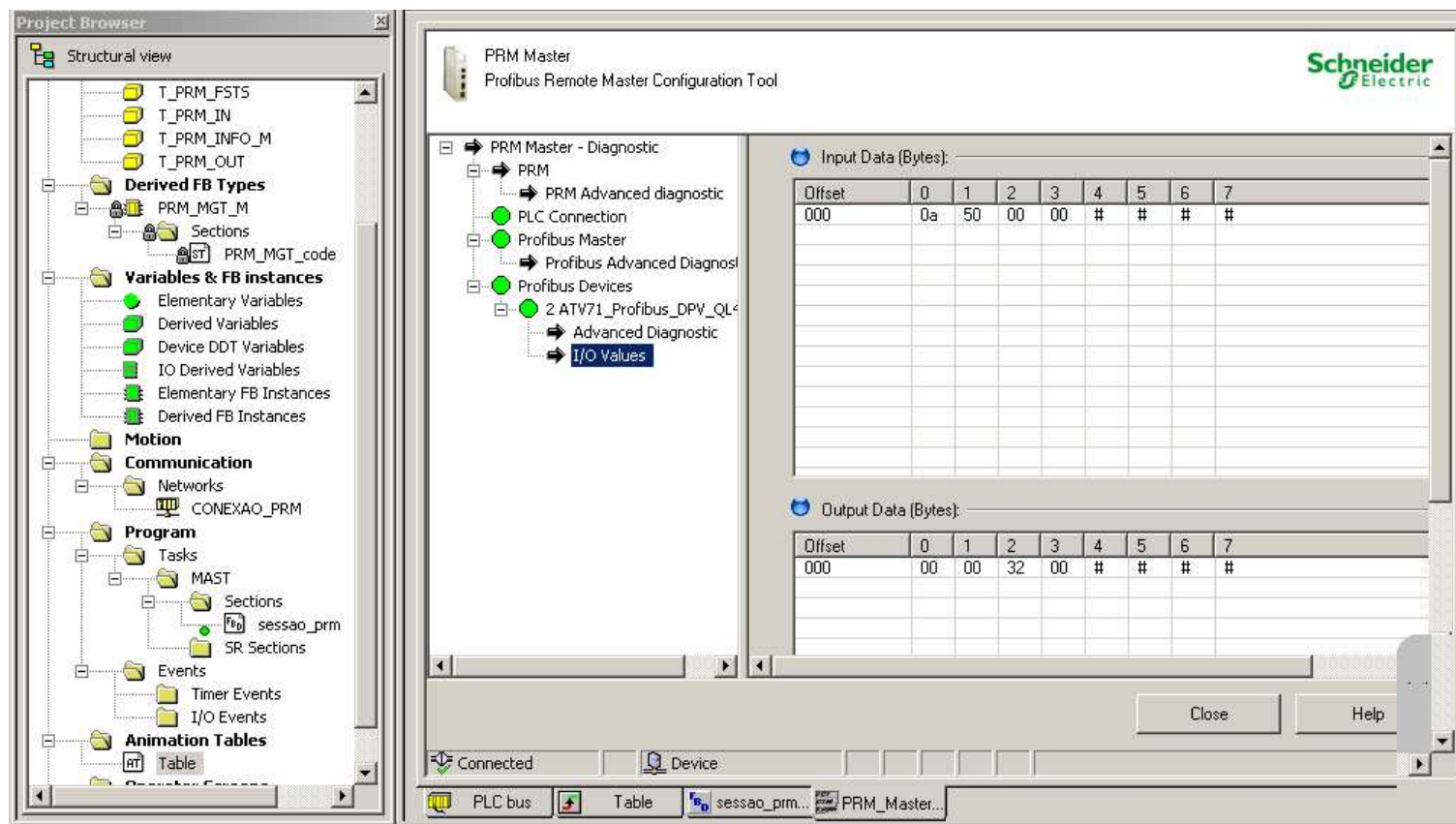
Modo On-Line obtendo os diagnósticos:



Parameter	Value
***** PRM HW and FW *****	
Hardware Version	0.2
CPLD Version	3
Bootrom Version	1.3
Firmware Version	1.0.23.0
EIP Interface Version	1.0
Modbus Interface Version	1.0
Supported Configuration File Version	1.3
EIP Serial Number	0x10ff06d0
Product Serial Number	21104800022
MAC Address	00 80 14 ff 06 d0
***** PRM Rotary Switches *****	
Upper Rotary Switch Value	0x0
Lower Rotary Switch Value	0xC
IP Address Allocation	IP From Configuration File
***** PRM Configuration File *****	
Configuration File Presence	Yes
Configuration File Version	1.3
Configuration CRC IO	0xe7b6a451

- **Configuração PRM (Profibus Remote Master):**

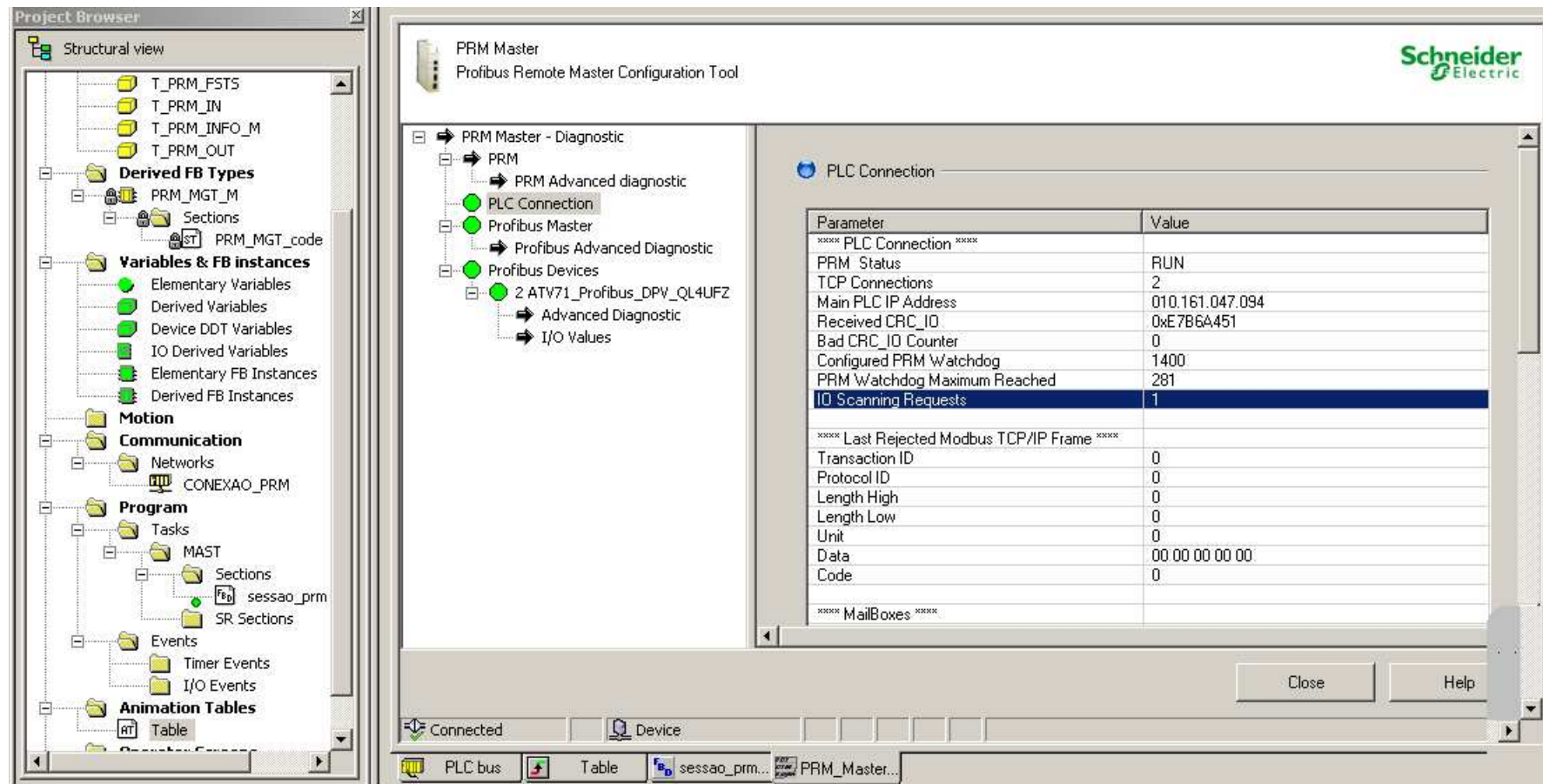
Modo On-Line obtendo os diagnósticos:



UnityPro

- Configuração PRM (Profibus Remote Master):

Modo On-Line obtendo os diagnósticos:



The screenshot displays the Schneider Electric UnityPro software interface, specifically the PRM Master configuration tool. The interface is divided into several panes:

- Project Browser (Left):** Shows a tree view of the project structure, including folders for T_PRM_FST5, T_PRM_IN, T_PRM_INFO_M, T_PRM_OUT, Derived FB Types, PRM_MGT_M, Sections, PRM_MGT_code, Variables & FB instances, Motion, Communication, Networks, Program, Tasks, MAST, Sessions, SR Sections, Events, Timer Events, I/O Events, and Animation Tables.
- PRM Master - Diagnostic (Main Area):** Displays a tree view of the diagnostic components, including PRM, PRM Advanced diagnostic, PLC Connection, Profibus Master, Profibus Advanced Diagnostic, Profibus Devices, 2 ATV71_Profibus_DPV_QL4UFZ, Advanced Diagnostic, and I/O Values.
- PLC Connection Table (Right):** A table showing the status and values of the PLC connection parameters. The table has two columns: Parameter and Value.

Parameter	Value
***** PLC Connection *****	
PRM Status	RUN
TCP Connections	2
Main PLC IP Address	010.161.047.094
Received CRC_IO	0xE7B6A451
Bad CRC_IO Counter	0
Configured PRM Watchdog	1400
PRM Watchdog Maximum Reached	281
IO Scanning Requests	1
***** Last Rejected Modbus TCP/IP Frame *****	
Transaction ID	0
Protocol ID	0
Length High	0
Length Low	0
Unit	0
Data	00 00 00 00 00
Code	0
***** MailBoxes *****	

The bottom status bar shows the connection status as "Connected" and the device as "Device". The taskbar at the bottom includes buttons for "Connected", "Device", "PLC bus", "Table", "sessao_prm...", and "PRM_Master...".

UnityPro

- Configuração PRM (Profibus Remote Master):

Modo On-Line – Animation Tables:

The Animation Tables window displays the following data:

Name	Value	T	Com
ATV71_Profibus_DPV_QL4UFZ_IN		T_ATV...	
Periodic_2_2_IN_1		ARRAY...	
Periodic_2_2_IN_1[0]	16#0A	BYTE	
Periodic_2_2_IN_1[1]	16#37	BYTE	
Periodic_2_2_IN_1[2]	5	BYTE	
Periodic_2_2_IN_1[3]	249	BYTE	
ATV71_Profibus_DPV_QL4UFZ_OUT		T_ATV...	
Periodic_2_2_OUT_1		ARRAY...	
Periodic_2_2_OUT_1[0]	0	BYTE	
Periodic_2_2_OUT_1[1]	15	BYTE	
Periodic_2_2_OUT_1[2]	50	BYTE	
Periodic_2_2_OUT_1[3]	0	BYTE	
master_info_prm		T_PRM...	
prm_full_status		T_PRM...	
PRM_Master_IN		T_PRM...	
PRM_Master_OUT		T_PRM...	

Callouts:

- ETA (LSB) points to the value 16#37 in the Periodic_2_2_IN_1[1] row.
- CMD points to the value 15 in the Periodic_2_2_OUT_1[1] row.
- Target velocity points to the value 50 in the Periodic_2_2_OUT_1[2] row.