VVDED398008US
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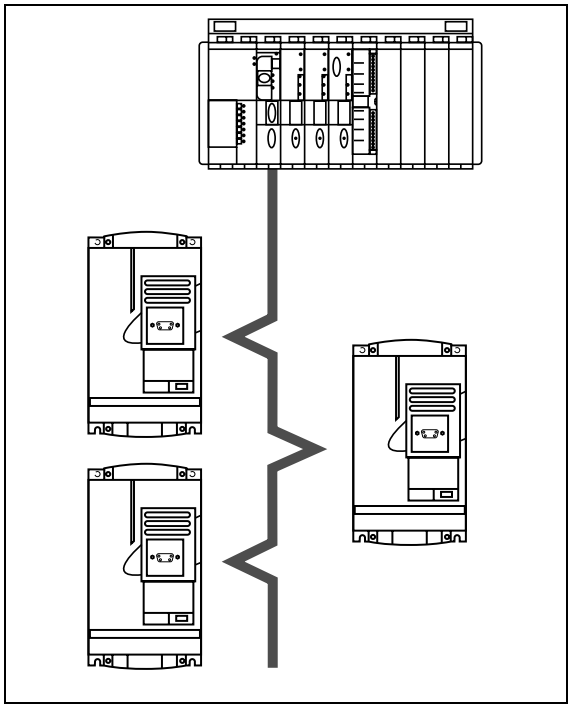
Raleigh, NC, USA

Instruction Bulletin

ALTIVAR® 58 Adjustable Speed Drive Controllers

PROFIBUS® DP Communication Option VW3A58307U



Telemecanique

SQUARE D

⚠ DANGER

HAZARDOUS VOLTAGE

- Read and understand this bulletin in its entirety before installing or operating ALTIVAR 58 drive controllers. Installation, adjustment, repair, and maintenance of the drive controllers must be performed by qualified personnel.
- Disconnect all power including external control power that may be present before servicing the drive controller. WAIT THREE MINUTES for the DC bus capacitors to discharge. Then follow the DC bus voltage measurement procedure on page 8 to verify that the DC voltage is less than 45 V. The drive controller LEDs are not accurate indicators of the absence of DC bus voltage.
- DO NOT short across DC bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Install and close all covers before applying power or starting and stopping the drive controller.
- User is responsible for conforming to all applicable code requirements with respect to grounding all equipment.
- Many parts in this drive controller, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.

Before servicing the drive controller:

- Disconnect all power.
- Place a “DO NOT TURN ON” label on the drive controller disconnect.
- Lock disconnect in open position.

Electrical shock will result in death or serious injury.

SECTION 1—HARDWARE SETUP

INTRODUCTION

The VW3A58307U communication card is used to connect an ALTIVAR® 58 (ATV58) drive controller to a PROFIBUS® DP network.

The communication card is shipped with a configuration diskette containing a GSD file that provides ATV58 PROFIBUS DP configuration parameters for the PLC and drive controller initialization.

The communication card has a 9-pin SUB-D receptacle for connection to the PROFIBUS DP network through a connection cable.

To build a PROFIBUS DP network, you must supply the following:

- One of the following user interface options to set the address of the drive controller (available from Square D):
  - — Keypad Display; VW3A58101U
  - — PC software and cable; VW3A8104 and VW3A8106
- Network connection cable, see page 12. The cable length depends on your installation.

The ATV58 drive controller can receive and respond to data messages. This data exchange enables the PROFIBUS DP network to access ATV58 functions such as:

- Remote loading of configuration parameters
- Command and control
- Monitoring
- Diagnostics

⚠ WARNING

LOSS OF CONTROL

- The control scheme designer must consider the potential failure modes of control paths.
- Certain critical control functions provide a means to achieve a safe state during and after a path failure.[1]
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.[2]

Failure to follow this instruction can result in death, serious injury, or equipment damage.

1. Examples of critical control functions are emergency stop and overtravel stop.
2. For additional information, refer to NEMA ICS 1.1 (latest edition), “Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control” and to NEMA ICS7.1 (latest edition), “Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems.”

REVISION LEVEL

This is the first release of this manual. The information contained in it is based on ATV58 firmware version V3.1 IE13 or greater.

ADDITIONAL DOCUMENTATION

For more information about drive controller functions and operation, refer to the Installation Guide, VVDED397048US, supplied with your controller and the Keypad Display manual, VVDED397047US.

For register description and address locations, refer to the ATV58 Register Access Guide for Communication Networks, VVDED397058US.

RECEIVING, PRELIMINARY INSPECTION, AND STORAGE

After receiving the VW3A58307U communication card:

- Ensure that the catalog number printed on the box label is the same as that on the packing slip and the corresponding purchase order. Contact your local Square D representative if there are any errors.

CAUTION

STATIC SENSITIVE COMPONENTS

Circuit boards can be damaged by static electricity. Observe the electrostatic precautions below when handling circuit boards or testing components.

Failure to follow this instruction can result in equipment damage.

- Observe the following precautions for handling static-sensitive components while removing the card and the diskette from its packaging for inspection:
  - — Keep static-producing material (plastic, upholstery, carpeting, etc.) out of the immediate work area.
  - — Avoid touching exposed conductors and component leads with skin or clothing.
- If any damage is found, notify the carrier and your local Square D representative. Do not install a damaged card.
- To store the option card, replace it in its original package (including the anti-static bag) and store it at –40 to 185 °F (–40 to 85 °C).
- If the diskette is misplaced, the ATV58 GSD file can be found in the Square D internet technical library (see www.SquareD.com) under AC drives, or by searching for “GSD”.

BUS VOLTAGE MEASUREMENT PROCEDURE

Before installing the VW3A58307U communication card, measure the bus voltage as described in this section.

⚠ DANGER

HAZARDOUS VOLTAGE

- Read and understand the bus voltage measurement procedure before performing the procedure. Measurement of bus capacitor voltage must be performed by qualified personnel.
- Do not short across DC bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Many parts in this drive controller, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.

Electrical shock will result in death or serious injury.

The DC bus voltage level is determined by monitoring the (+) and (–) measurement points. Their locations vary by drive controller model number as listed in Table 1 and shown in Figure 1. The drive controller model number is listed on the nameplate.

Table 1: (+) and (–) Measurement Points

Drive Controller ATV58••••••	(+) Measurement Point		(–) Measurement Point	
	Terminal Block or Connector	Terminal Designation	Terminal Block or Connector	Terminal Designation
U09M2• and U18M2•	J2	(+)	J2	(–)
U29M2• to D12M2•	J2	PA	J18	7
U18N4• to D23N4•				
D16M2• to D46M2•	J2	(+)	J2	(–)
D28N4• to D79N4•				

To measure the DC bus capacitor voltage:

1. Disconnect all power from the drive controller including external control power that may be present on the control board and the option board terminals.
2. Wait 3 minutes for the DC bus capacitors to discharge.

The J18 connector is in the upper left hand corner of the main control board behind the flexible shield. Use a thin probe to access the connector pin.

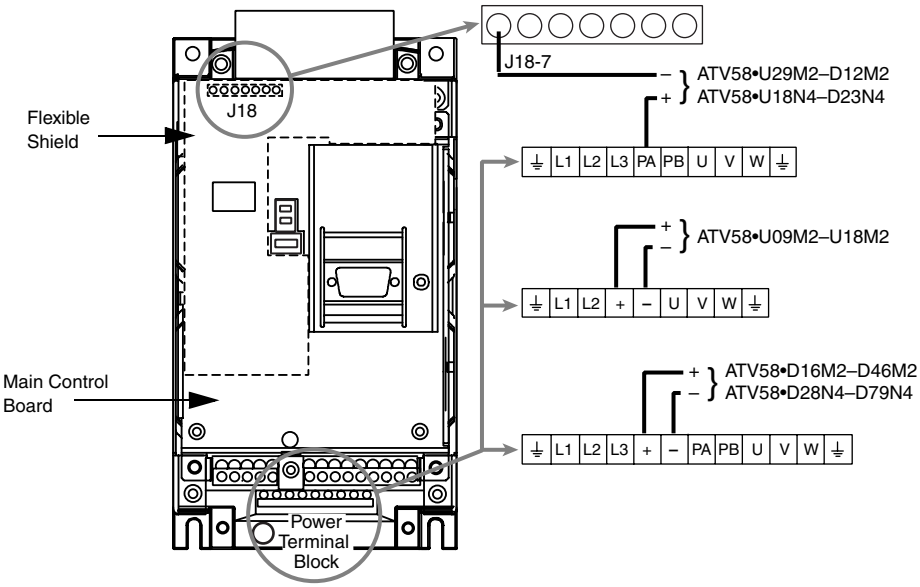


Figure 1: DC Bus Voltage Measurement Point Locations (ATV58HU09M2 shown)

3. Read the model number of the drive controller from the nameplate and identify the corresponding (+) and (–) measurement points from Table 1 and Figure 1.
4. Open the door or cover of the drive controller.
5. Set the voltmeter to the 1000 Vdc scale. Measure the voltage between the (+) and (–) measurement points identified in step 3. Verify that the DC bus voltage has discharged below 45 V before servicing the drive controller.
6. If the DC bus capacitors will not discharge below 45 V, contact your local Square D representative. **Do not operate the drive controller.**
7. Replace all doors or covers after servicing the drive controller.

⚠ DANGER

HAZARDOUS VOLTAGE

Before working on the drive controller:

- Disconnect all power supplying this equipment.
- Place a “DO NOT TURN ON” label on the disconnect supplying the drive controller.
- Lock the disconnect in open position.

Electrical shock will result in death or serious injury.

CARD INSTALLATION

To install the PROFIBUS DP VW3A58307U communication card, consult Figure 2 and perform the following steps:

1. Verify that DC bus voltage is not present. See “Bus Voltage Measurement Procedure” on page 8.
2. Place the 50/60 Hz switch in the position corresponding to the motor as indicated in the drive controller user’s manual, VVDED397048US.
3. Open the flexible protective cover ① over the option card connector.
4. Mount the option card on the control card support by plugging it into the connector ②. Secure it with the three screws ③ provided.
5. Connect the network cable to the 9-pin connector on the card ④.
6. Replace all doors or covers when the installation is complete.
7. Affix the supplied self-adhesive label ⑤ on the cover of the drive controller, above the existing POWER and FAULT labels. This aligns the label with the two LEDs on the communication card. For information on LED indications refer to “LED Diagnostics” on page 27.

NOTE: Installing the card will reset drive controller programming to factory defualts.

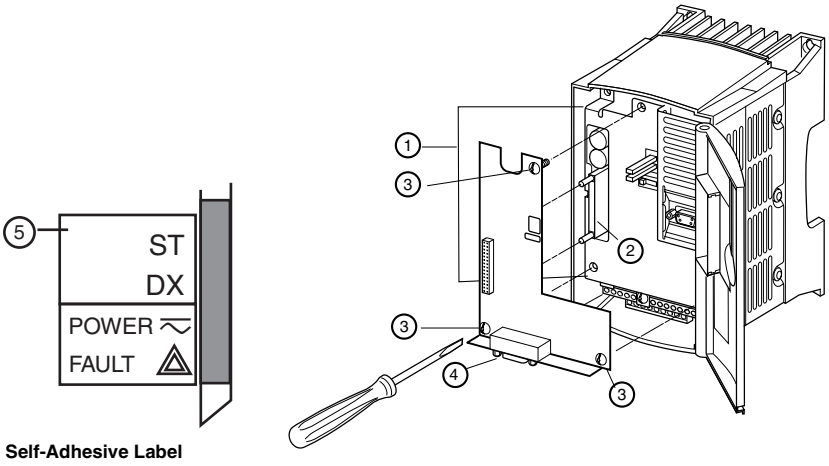


Figure 2: Installing the Card in the ALTIVAR 58 Controller

CONNECTION TO THE PROFIBUS DP NETWORK

SUB-D Connector Pin Configuration

The transmission interface is electrically isolated from the drive controller in accordance with standard RS-485. It is a 9-pin SUB-D receptacle. Table 2 provides the pin configuration.

Table 2: SUB-D Connector Pin Configuration

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

Figure 3 shows the pin layout of the 9-pin SUB-D connector, viewed from the bottom of the PROFIBUS DP card when installed in the drive controller.

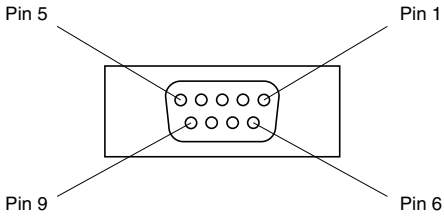


Figure 3: 9-Pin SUB-D Connector on the Communication Card

Connection to the Standard RS-485 Network

PROFIBUS DP cables are offered by several manufacturers; follow the recommendations provided by the manufacturers' PLC documentation.

Observe national and local electrical codes and the following guidelines when making the network connection:

- Select the speed from a range between 9.6 Kbit/s and 1.5 Mbit/s. This selection, which is made when the network starts, is valid for all network modes.
- The maximum length of the cable is inversely proportional to the speed:

Speed (Kbit/s)		9.6	19.2	93.75	187.5	500	1500
Max. cable length	(m)	1200	1200	1200	1000	400	200
	(ft)	3936	3936	3936	3280	1312	656

NOTE: Repeaters can be used to achieve greater distances.

- Attach an active terminator, not supplied, to each end of the cable. Many cable manufacturers have field-installable terminators for their cables. Active terminators are powered by the network power supply, see Figure 4 on page 13 for a connection example.

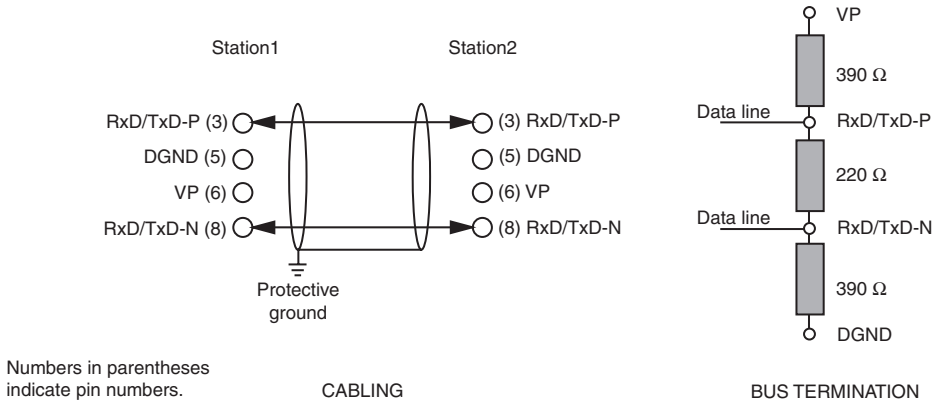


Figure 4: Cabling and Bus Termination

- Do not connect more than 32 devices per cable segment without a repeater or more than 127 devices with a repeater.
- For multidrop cable, use shielded cable with one or two pairs of twisted conductors. Use the cable recommended for each multidrop network system shown.
- Connect cable shielding as recommended by the cable and PLC manufacturers.
- An example of connecting to a standard RS-485 network is shown in Figure 5.

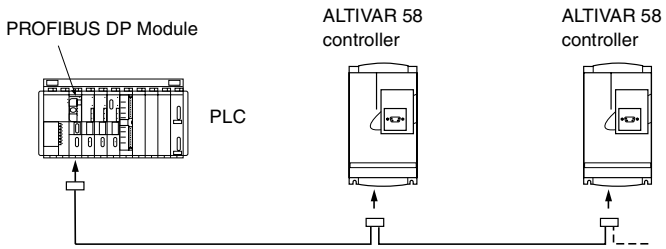


Figure 5: RS-485 Connection Example

CABLE ROUTING PRACTICES

When wiring the ATV58 drive controllers to a PROFIBUS DP network, follow all applicable wiring practices required by national and local electrical codes.

When routing the cable:

- Avoid areas of high temperature, moisture, vibration, or other mechanical stress.
- Secure the cable where necessary to prevent its weight and the weight of other cables from pulling or twisting the cable.
- Use cable ducts, raceways, or other structures to protect the cable. These structures should be used for signal wiring paths and should not be used for power wiring.
- Avoid sources of electrical interference that can induce noise into the cable. Use the maximum practicable separation from such sources.

When planning cable routing within a building, follow these guidelines:

- Maintain a minimum separation of 3.3 ft. (1 m) from the following equipment:
  - — air conditioners and large blowers
  - — elevators and escalators
  - — radio and television sets
  - — intercom and security systems
  - — fluorescent, incandescent, and neon lighting fixtures
- Maintain a minimum separation of 10 ft. (3 m) from the following equipment:
  - — power wiring
  - — transformers
  - — generators
  - — alternators

When wiring in electrical equipment rooms or large electrical equipment line-ups, observe the following guidelines for cable segregation and separation of circuits:

- Use metallic conduit for drive controller wiring. Do not run control network and power wiring in the same conduit.
- Separate non-metallic conduits or cable trays used to carry power wiring from the metallic conduit carrying low-level network wiring by at least 12 in. (305 mm).
- Separate metallic conduits carrying power wiring or low-level control network wiring by at least 3 in. (76 mm).
- Cross the metallic conduits and non-metallic conduits at right angles whenever power and control network wiring cross.
- Attenuate conducted emissions from the drive controller to the line in some installations to prevent interference with telecommunication, radio, and sensitive electronic equipment. Such instances may require attenuating filters. Consult the ALTIVAR 58 AC drives catalog, 8806CT9901, for selection and application of these filters.

SECTION 2—SOFTWARE SETUP

CONFIGURATION OF COMMUNICATION FUNCTIONS

Initial Power-Up

The PROFIBUS DP card is automatically recognized by the ATV58 drive controller on initial power-up. The card gives access to the 8—COMMUNICATION menu from the keypad display or the PC software.

Configuration

Select the 8-COMMUNICATION menu to access parameter AdrC. The value of this parameter is the address of the drive controller on the network. The AdrC parameter can only be configured at start-up. Until the parameter is configured, the red LED flashes slowly. To set the drive controller address, enter a value from 1 to 126. Changes to the address during operation are ignored

NOTE: The PROFIBUS DP card with software version V1.1 IE01 provides access to other parameters in the 8-COMMUNICATION menu. Only the AdrC parameter is to be configured. Do not modify other parameters.

CONNECTING TO THE NETWORK

Complete the following network connections:

- Configure the PROFIBUS DP communication module in the PLC and connect it to the communication bus.
- Use a PC equipped with PROFIBUS DP PLC configuration software to set up the PLC and PROFIBUS DP module.

Figure 6 on page 18 provides an example of a typical connection.

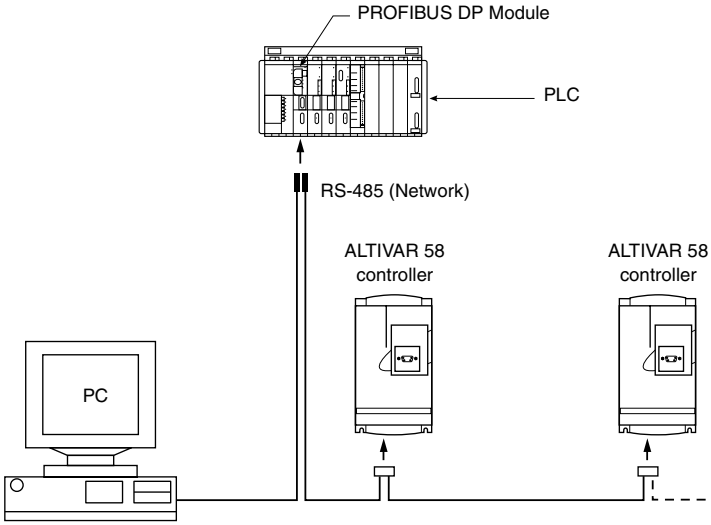


Figure 6: Example of the Network Connection

LOADING THE ATV58 GSD FILE

The PROFIBUS DP card is supplied with a diskette containing the ATV58 GSD, which contains all the data necessary to configure a PROFIBUS DP master device on a network containing ATV58 drive controllers and the ATV58 PROFIBUS DP configuration parameters. The PLC uses this file during initialization. Table 3 shows the contents of the file.

Table 3: Contents of the ATV58 GSD File

Description	Value
#Profibus_DP	
GSD_Revision	= 1
;	
Vendor_Name	= “Telemecanique”
Model_Name	= “ATV58-Profibus-DP”
Revision	= “V1.0”
Ident_Number	= 0x00B9
Protocol_Ident	= 0
Station_Type	= 0
FMS_supp	= 0

Table 3: Contents of the ATV58 GSD File (Continued)

Description	Value
Hardware_Release	= “Revision —”
Software_Release	= “V1.1”
;	
9.6_supp	= 1
19.2_supp	= 1
93.75_supp	= 1
187.5_supp	= 1
500_supp	= 1
1.5M_supp	= 1
3M_supp	= 0
6M_supp	= 0
12M_supp	= 0
;	
MaxTsdr_9.6	= 60
MaxTsdr_19.2	= 60
MaxTsdr_93.75	= 60
MaxTsdr_187.5	= 60
MaxTsdr_500	= 100
MaxTsdr_1.5M	= 150
MaxTsdr_3M	= 250
MaxTsdr_6M	= 450
MaxTsdr_12M	= 800
;	
Redundancy	= 0
Repeater_Ctrl_Sig	= 2
24V_Pins	= 0
Implementation_Type	= “SPC3”
;	
Freeze_Mode_supp	= 1
Sync_Mode_supp	= 1
Auto_Baud_supp	= 1
Set_Slave_Add_supp	= 0
Min_Slave_Intervall	= 1
;	
Modular_Station	= 0
Modul_Offset	= 0
;	

Table 3: Contents of the ATV58 GSD File (Continued)

Description	Value
Fail_Safe	= 0
Slave_Family	= 9
Max_Diag_Data_Len	= 7
;	
Module	= “V00B9” 0xf3,0x79
EndModule	

PROFIBUS DP PROTOCOL

Data is exchanged according to the master-slave principle. Only a master can initiate communication. The slaves behave like servers, replying to requests from the master. Several masters can co-exist on the same network. In this case, the I/O of the slaves can be read by all masters. However, only one master can write outputs. The number of data items exchanged is defined during configuration.

The PROFIBUS DP protocol supports two kinds of data exchanges:

- cyclic for I/O data
- aperiodic for parameter setting, configuration, and diagnostics

Both aperiodic and cyclic exchanges are handled by the same exchange frame. The first eight bytes of the frame are for aperiodic exchange and the rest are for cyclic exchanges.

The register references mentioned in the following two sections refer to the PLC examples in “Quantum PLC Configuration Using CONCEPT™ Software” on page 33 and “Premium PLC Configuration Using PL7 PRO™ Software” on page 38.

Cyclic Data

Cyclic data contains fixed I/O register addresses and is continually updated. Quantum PLC registers 400005–400007 and Premium PLC registers %QW1.0.4–%QW1.0.6 contain cyclic output data. This data allows access to the command register (CMDD), the speed reference register (LFRD), and the internal control register (CMI). These registers are used to control the most basic drive controller functions such as starting/stopping, forward/reverse, and speed reference control.

Quantum PLC registers 300005–300014 and Premium PLC registers %IW1.0.4–%IW1.0.13 contain cyclic input data. These registers supply drive controller status information. Drive controller register information is

found in the *Register Access Guide for Communication Networks*, bulletin VVDED397058US.

An example of cyclic data exchanges follows:

- Writing 8002h (32770d) in register 400005 (Quantum PLCs) or %QW1.0.4 (Premium PLCs) (CMDD) starts the drive controller.
- Writing 0900 in register 400006 (Quantum PLCs) or %QW1.0.5 (Premium PLCs) (LFRD) commands the drive controller to run at 900 rpm.
- Writing 9002h (36866d) in register 400005 or %QW1.0.4 stops the drive controller.
- Reading registers 300005–300014 (Quantum PLCs) or %IW1.0.4–%IW1.0.13 (Premium PLCs) obtains drive controller status information.

Aperiodic Data

Aperiodic data allows read/write access to a user-specified register address. It allows you to access variables other than the predefined cyclic data. Quantum PLC registers 400001–400004 and Premium PLC registers %QW1.0–%QW1.0.3 contain the information used for aperiodic output data transfers. Quantum PLC registers 300001–300004 and Premium PLC registers %IW1.0–%IW1.0.3 contain input information acquired by aperiodic transfers. Drive controller register information is found in the *Register Access Guide for Communication Networks*, bulletin VVDED397058US.

An example of accessing aperiodic data follows:

- Write 252d (00FCh) in register 400001 (Quantum PLCs) or %QW1.0 (Premium PLCs). This corresponds to the address value for the acceleration rate parameter, ACC.
- Write 0057h in register 400002 (Quantum PLCs) or %QW1.0.1 (Premium PLCs) to write a value into the acceleration rate parameter, ACC.
- Write 32d (20h) in register 400004 (Quantum PLCs) or %QW1.0.3 (Premium PLCs). This corresponds to a value of 3.2 seconds.
- Confirmation can be found in registers 300001–300004 (Quantum PLCs) or %IW1.0–%IW1.0.3 (Premium PLCs), which echoes output data such that 00FCh, 0057h, 0000h, and 0020h show up in PLC input registers 300001–300004 (Quantum PLCs) or %IW1.0–%IW1.0.3 (Premium PLCs) respectively if the transaction is successful.

Exchange Format

Output Data

For output data (write mode), the frame format corresponds to a Type 2 PPO (Parameter-Process Data Object) containing a Byte-String of twenty-eight 8-bit bytes.

The information contained in the string is summarized below:

1	2	3	4	5	6	7	8	9	10	11	12	13	14
PKW—Address/Request Code/Value Zone								PZD1		PZD2		PZD3	
PKE			R/W	PWE				CMDD		LFRD		CMI	
Address		Request Code		Value									

15	16	17	18	19	20	21	22	23	24	25	26	27	28
PZD4		PZD5		PZD6		PZD7		PZD8		PZD9		PZD10	
Not Used		Not Used		Not Used		Not Used		Not Used		Not Used		Not Used	

where:

- PKW (Parameter Kennung Wert): parameter–logical address–value
- PKE (Parameter Kennung): parameter–logical address
- R/W (Read/Write):
  - — ‘R’ (ASCII code 52): read request
  - — ‘W’ (ASCII code 57): write request
- PWE (Parameter Wert): value of the parameter whose address is in PKE
- PZD (Prozessdaten): process data

The first eight bytes (PKW) are used to contain the request to write or read the aperiodic data. The read or write request is coded in ASCII in byte 4 of the PPO. The twenty remaining bytes contain the cyclic data, of which fourteen bytes are insignificant and not used.

Within the first eight bytes, the first two bytes (PKE) contain the logical address of the aperiodic data parameter coded in eleven bits (0 to 10). Setting the 15th bit of this word to 1 authorizes the card to perform the request cyclicly. Otherwise, with the 15th bit set to 0 and provided the request is identical (PKE unchanged), the card processes it just once.

Table 4 provides the definition of the cyclic control variables (bytes 9–14):

Table 4: Cyclic Control (Output) Variables

Designation	ATV58 Variable Address	Description
CMDD	601	DRIVECOM command register
LFRD	603	Online speed reference (in rpm)
CMI	402	Internal command register

Input Data

For input data (read mode), the frame format corresponds to a Type 5 PPO (Parameter-Process Data Object) containing a Byte-String of twenty-eight 8-bit bytes.

The information contained in the string is summarized below:

1	2	3	4	5	6	7	8	9	10	11	12	13	14
PKW								PZD1		PZD2		PZD3	
PKE			R/W/N	PWE				ETAD		FRHD		RFRD	
Address		Request Code		Value									

15	16	17	18	19	20	21	22	23	24	25	26	27	28
PZD4		PZD5		PZD6		PZD7		PZD8		PZD9		PZD10	
FRH		RFR		LCR		ULN		THR		THD		LFT	

where:

- PKW (Parameter Kennung Wert): parameter–logical address–value
- PKE (Parameter Kennung): parameter–logical address
- R/W/N (Read/Write/Negative response):
  - — ‘R’ (ASCII code 52): read request
  - — ‘W’ (ASCII code 57): write request
  - — ‘N’ (ASCII code 4E): negative response
- PWE (Parameter Wert): value of the parameter whose address is in PKE or an error code if negative response (byte 8) with 0 indicating incorrect address and 1 indicating write access is refused
- PZD (Prozessdaten): process data

Table 5 provides the definition of the variables in cyclic read mode:

Table 5: Cyclic Read Mode (Input) Variables

Designation	ATV58 Variable Address	Description
ETAD	602	Status word
FRHD	604	Signed ramp output (rpm)
RFRD	605	Motor speed
FRH	450	Frequency reference
RFR	451	Output frequency
LCR	453	Motor current
ULN	454	Supply voltage
THR	455	Motor thermal state
THD	456	Drive controller thermal state
LFT	457	Last fault

Exchange Examples

The following is an example of an aperiodic write operation using PKW zone, in which the acceleration time [address 252] is being changed to 10 seconds:

Address		Request		Value				CMDD		LFRD		CMI		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	etc.
00	FC	00	57	00	00	00	64	08	0F	04	B0	00	00	etc.

Address 252

Write Request

Acceleration = 10 s (100 x 0.1 s)
(100 dec = 64 hex)

Command for Reverse Motor Direction

Reference 1200 rpm 1200 dec. = 4B0 hex.

No Action

A positive response to this write request returns identical values in the first eight bytes (aperiodic, PKW, section) of the returned frame.

A negative response to this write operation is shown below:

1	2	3	4	5	6	7	8	
00	FC	00	4E	00	00	00	0/1	etc.

Negative Response

0 = Incorrect address
1 = Access in write mode refused

Communication Initialization Exchanges

These exchanges enable the master to set parameters as well as configure and diagnose slave devices.

Parameters

At start-up, the master sends parameter-setting data to the slaves to identify and specify the exchange method. The data length is seven bytes, containing the information shown in Table 6.

Table 6: Parameter Setting Data

Byte No.	Designation	Value	Meaning
0	Status	xx	Service configuration
1	WD_Fact_1	10	Watchdog factor 1, 2
2	WD_Fact_2	10	"time out" time = 10 ms x WD_Fact_1 x WD_Fact_2
3	MinTSDR	20	Minimum time before transmission of slave response (expressed in bits)
4	Ident_Number_High	00	ATV58 controller identification number
5	Ident_Number_Low	B9	ATV58 controller identification number
6	Group_Ident	00	ATV58 controller group number

Configuration

After setting the parameters, the master sends a configuration frame containing the length of the input and output data drawn from the ATV58 GSD file. The card is preset to twenty-eight output bytes and twenty-eight input bytes. The length of the configuration data is two bytes and defines the PPO format as shown in Table 7:

Table 7: Configuration Data

Byte No.	Designation	Value	Meaning
0	conf_len_inp_out	F3	PKW format: 4 consistent words, accessible as inputs or outputs
1	conf_len_inp_out	79	PZD format: 10 consistent words, accessible as inputs or outputs

Diagnostics

To check the state of the slave, the master sends diagnostic frames. The length of the response provided by the PROFIBUS DP card is six bytes and contains the information in Table 8.

Table 8: Diagnostic Frames

Byte No.	Designation	Value	Meaning
0	Station_status_1	00	See Table 9.
1	Station_status_2	0C	See Table 10.
2	Station_status_3	00	See Table 11 on page 27.
3	Diag.Master_Add	xx	Address of master which configured the slave
4	Ident_Number_High	00	ATV58 controller iidentification number
5	Ident_Number_Low	B9	ATV58 controller iidentification number

The status bytes shown in Table 8 are described in the following tables:

Table 9: Station_status_1

Bit No.	Designation	Description
0	Diag.Station_non_existent	Set to 1 by the master
1	Diag.Station_Not_Ready	Slave not ready for exchange of data items
2	Diag.cfg_Fault	The configuration data items are different
3	Diag.Ext_diag	If equal to 1, data items are present
4	Diag.not_supported	The slave does not support the function
5	Diag.Invalid_Slave_Response	Always 0
6	Diag.prm_fault	Error in the parameter-setting data
7	Diag.master_lock	Slave parameters set by another master

Table 10: Station_status_2

Bit No.	Designation	Description
0	Diag.Prm_Req	Request for parameters
1	Diag.Stat_diag	Static diagnostic
2	—	1
3	Diag.WD_on	Indication that “Watchdog” is enabled
4	Diag.Freeze_Mode	Indication of Freeze control
5	Diag.Sync_Mode	Indication of Sync control
6	reserved	
7	Diag.Deactivated	Set to 1 by the master as long as the slave is inactive

Table 11: Station_status_3

Bit No.	Designation	Description
0–6	reserved	
7	Diag.Ext_diag_Overflow	—

LED DIAGNOSTICS

The communication card has two LEDs:

- A green LED labeled DX (data exchange) that indicates the state of the PROFIBUS DP communication link
- A red LED labeled ST (status) that indicates the state of the PROFIBUS DP card.

Table 12 shows the various states of the LEDs and what each state indicates. Suggested corrective actions are also provided.

Table 12: LED Status Indications

LED	State	What is Indicated	Corrective Action
Red (ST)	Off	The card parameters are correctly set and it is correctly configured by the master.	None required.
	Slowly Flashing (500 ms)	The card is in the Idle state awaiting configuration.	Enter a value from 1 to 126 for parameter AdrC in the 8—COMMUNICATION menu.
	Quickly Flashing (100 ms)	The card is in the Wait_Prm or Wait_Cfg mode.	Check the connection to the PROFIBUS DP network, start the PLC, and, if the drive controller has a CnF fault, reset it.
	On	The card is in ILF fault.	Check the connection between the PROFIBUS DP card and the drive controller.
Green (DX)	Off	No communication on the network, no data exchanges.	Check the connection to the PROFIBUS DP network, and start the PLC.
	On	The card is in the “data exchange” mode and data exchanges are operating correctly.	None required.

NETWORK CONFIGURATION USING A QUANTUM OR PREMIUM PLC AND HILSCHER SYCON-PB/GS SOFTWARE

A PROFIBUS DP configuration software tool is available from Schneider Automation for use with Schneider Electric PROFIBUS DP master modules:

- part number 140CRP81100 for Quantum PLCs
- part number TSXPBY100 for Premium PLCs

The SyCon software (part number is TLXLFBCM) allows you to create an exportable configuration (*.cnf) file, which is downloaded to the host PLC to control a PROFIBUS DP network. This configuration file sets the module addresses.

The SyCon program sets each device address on the PROFIBUS DP network and loads the ATV58 GSD file, supplied on a floppy disk with the ATV58 PROFIBUS DP communication card. Figures 7 through 15 on pages 29–37 show a configuration example using the SyCon program as the configuration tool.

Initial Network Setup Using SyCon Software

1. Open the SyCon System Configuration program.
2. From the menu bar:
   a. Select **File**>**New**.
   b. Select **File**>**Copy GSD**. In the Open dialog box browse to the disk supplied with the ATV58 PROFIBUS DP communication card, and select \Profibus\GSD\Tele00b9.GSD. Click the **Open** button.
3. From the menu bar select **Insert**>**Master**. Click near the left-hand vertical bar on the SyCon screen to indicate where to place the master on the network.

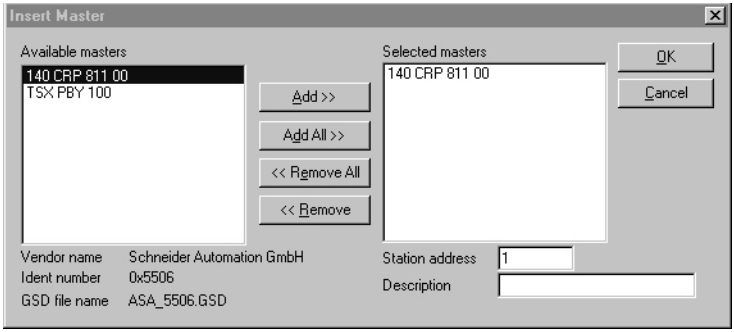


Figure 7: Selecting a Master Module for the Network

4. In the Insert Master dialog box's left-hand column highlight the desired master module. Click **Add**. Click **OK**.

To rename the master module:

1. From the menu bar select **Settings**>**Master Configuration** (or double-click the master graphic on the SyCon screen).

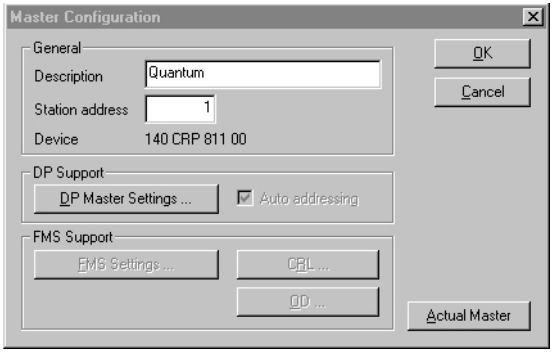


Figure 8: Master Configuration Dialog Box

2. In the Master Configuration dialog box type a description of the master (no spaces are allowed). Click **OK**.

To add a slave module:

1. From the menu bar select **Insert**>**Slave** and click near the vertical bar on the SyCon screen to place the slave on the network.

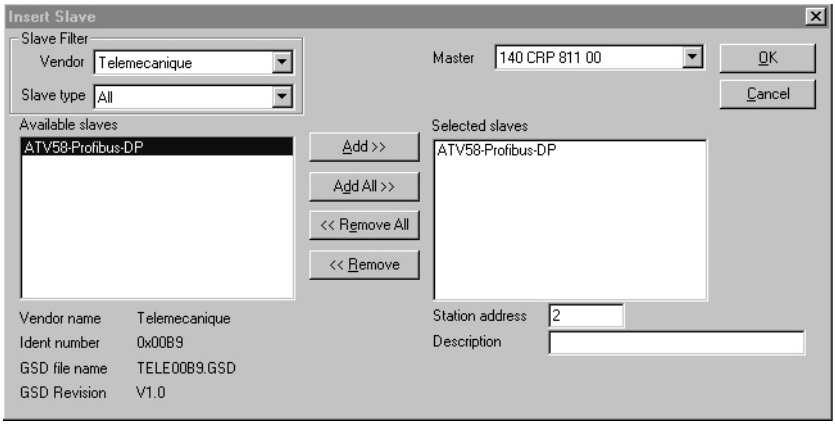


Figure 9: Insert Slave (Module) Dialog Box

2. In the Insert Slave dialog box's left-hand column highlight ATV-Profibus-DP. Click **Add**. Click **OK**.

To configure the slave module:

1. From the menu bar select **Settings**>**Slave Configuration** (or double-click the slave graphic on the SyCon screen). If desired, enter a description.

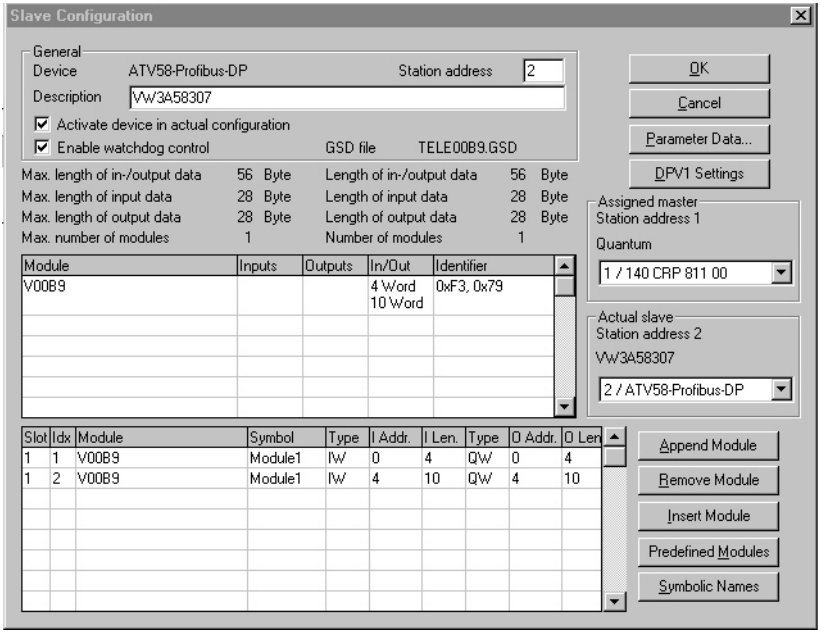


Figure 10: Slave Configuration Dialog Box

2. In the Slave Configuration dialog box click the **Append Module** button to configure the slave. Click **OK**.

The SyCon screen will show a PROFIBUS DP network similar to Figure 11 on page 32.

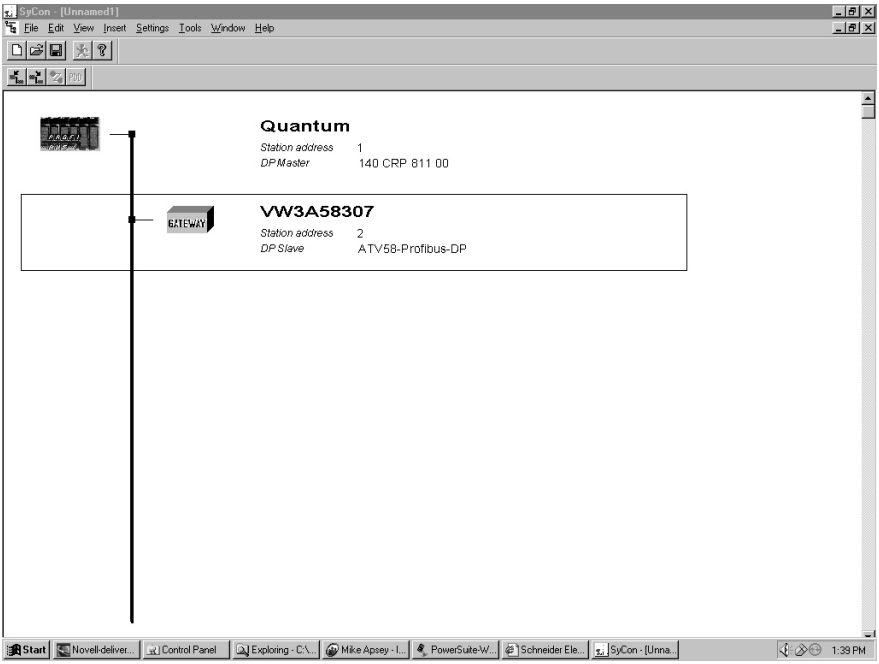


Figure 11: Two-Module Network on SyCon Software

Creating the exportable configuration file from SyCon:

1. Select the master module on the SyCon screen. Select **File**>**Save As**.
2. Name the file and click **Save**.
3. From the menu bar select **File**>**Export**>**ASCII**. Assign the “filename”.cnf from step 2 and click **Save**.

This completes the SyCon configuration. Close the program if desired.

QUANTUM PLC CONFIGURATION USING CONCEPT™ SOFTWARE

This section provides a configuration example using MODICON® CONCEPT™ programming software to configure the PLC layout when using a PROFIBUS DP network.

To create a new CONCEPT software project incorporating a PROFIBUS DP module:

1. Open the CONCEPT software. From the menu bar select **File**>**New Project**. To save the file select **File**>**Save** project as.
2. From the menu bar select **Project**>**Configurator**.
3. In the PLC Configuration window (Figure 12):
   a. Double-click in the PLC area to select the processor type. In the PLC Selection dialog box highlight the part number of the CPU to be used. Set the IEC Runtime to Enabled. Click **OK**.
   b. To select PROFIBUS DP double-click the Config Extensions area. In the Configuration Extensions dialog box enter the number of PROFIBUS DP modules to be configured in the rack (bottom of the right-hand column). Click **OK**.

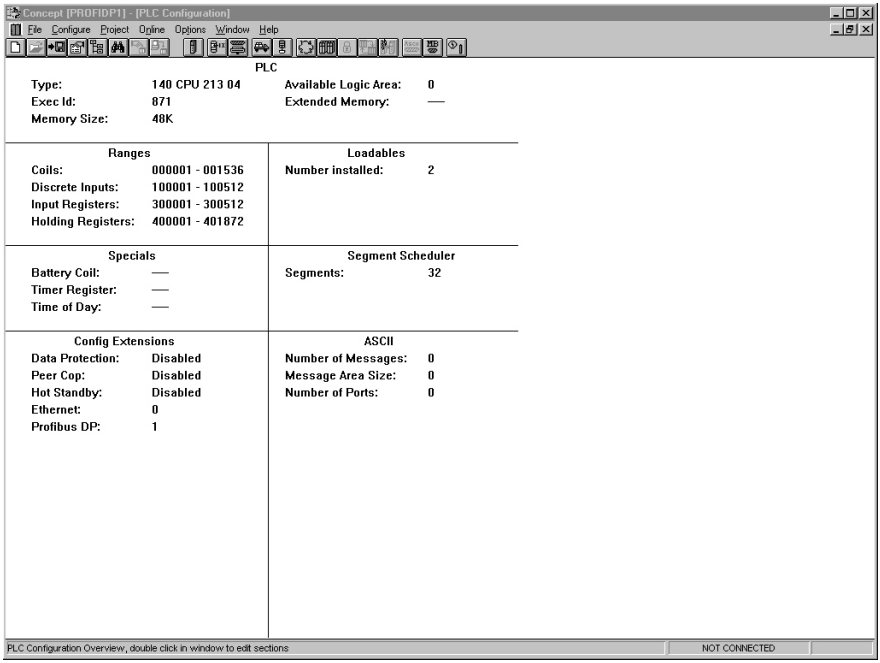


Figure 12: PLC Configuration Window

To configure all the modules in a Quantum PLC rack:

1. From the menu bar select **Configure**>**I/O Map**.
2. In the I/O Map dialog box click the box in the Edit column that corresponds to the network containing PROFIBUS DP modules to be configured.

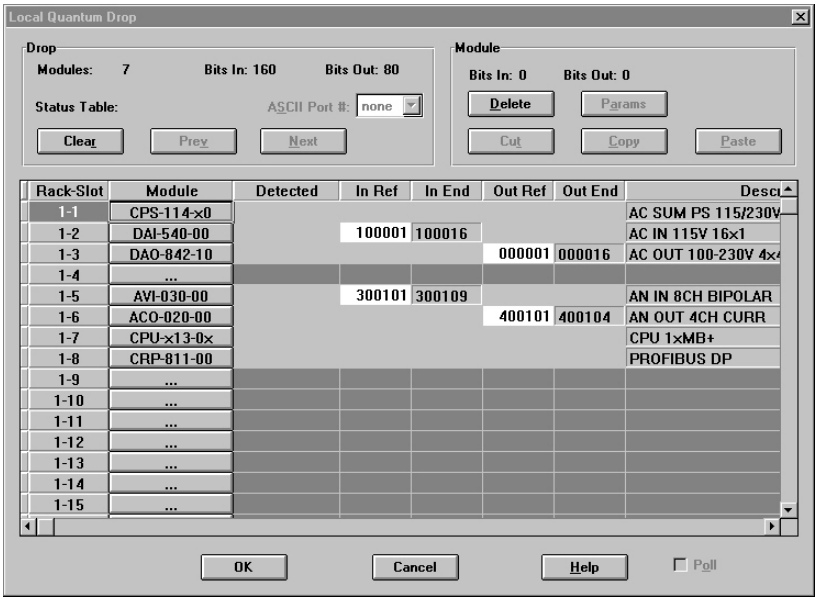


Figure 13: Local Quantum Drop Dialog Box

3. In the Local Quantum Drop dialog box, click on the button in the Module column corresponding to the appropriate Rack-Slot. This opens the I/O Module Selection dialog box.
4. In the I/O Module Selection dialog box, double-click on the desired module for that rack-slot location (or click the desired module and click **OK**). In this case, select CRP-811-00 (PROFIBUS DP module). Click **OK**.
5. Click the **Params** button in the Module area of the Local Quantum Drop dialog box.
6. A dialog box called CRP-811-00 (Profibus DP) should appear. Click the **Import** button in the Master area. In the Select Source File dialog box browse to the *.cnf file previously generated by the SyCon configuration program, see page 32. Highlight the filename. Click **OK**. Click **OK** again.

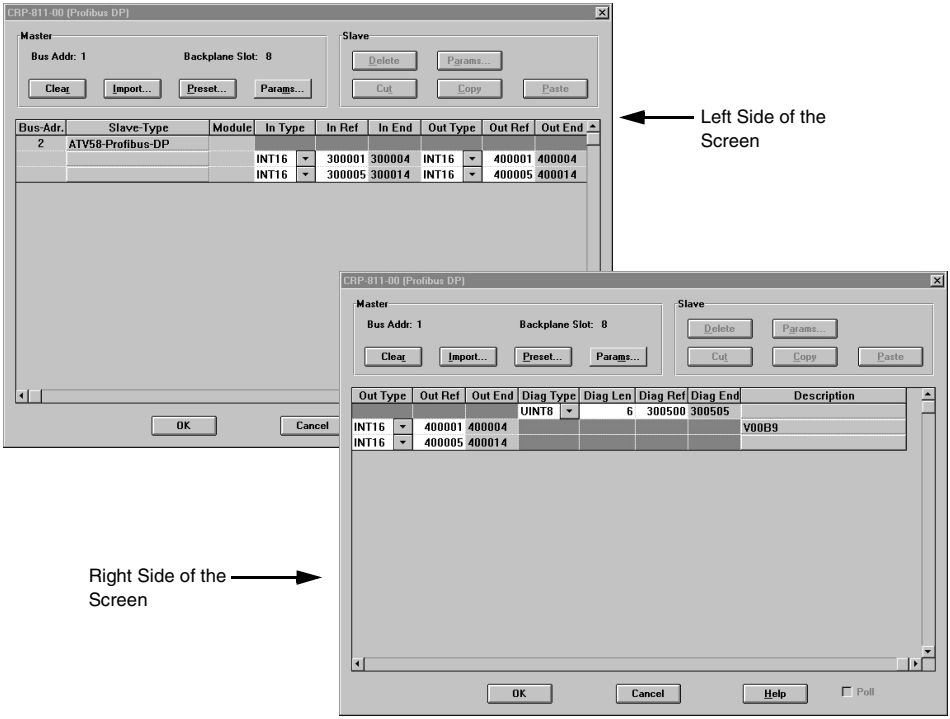
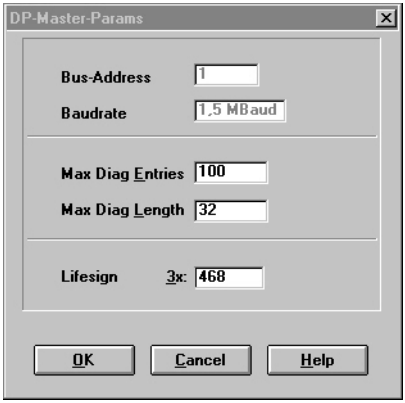


Figure 14: Assigning Registers for PROFIBUS DP Parameters

7. In the CRP-811-00 (Profibus DP) dialog box:
   - — Set both In Type and both Out Type rows to INT16 (this formats input data and output data into 16-bit integer).
   - — Enter 300001 into the first IN REF row and 300005 to the second IN REF row (this formats the register placement for input data).
   - — Enter 400001 into the first OUT REF row and 400005 to the second OUT REF row (this formats the register placement for output data).
   - — Set Diag Type to UNIT8 (this formats the data into 8-bit words).
   - — Enter 300500 into Diag Ref (this formats the register placement for diagnostic data).

8. Select the Params button in the Master area. The following dialog box should appear:



NOTE: The Lifesign register (300468) is an indicator for active PROFIBUS DP communications.

Figure 15: DP-Master-Params Screen

9. Select **OK** to accept the values in step 7.
10. Select **OK** to accept the values in the CRP-811-00 (Profibus DP) dialog box.
11. Select **OK** to accept the drop configuration in the Local Quantum Drop dialog box.
12. Select **OK** to accept the I/O map.
13. Select **OK** to accept the I/O map update notification.
14. From the menu bar select **File**>**Save**.

At this point the rack is configured and ready to download to the Quantum CPU.

PREMIUM PLC CONFIGURATION USING PL7 PRO™ SOFTWARE

This section provides a configuration example using PL7 PRO programming software to configure the PLC layout for connection to a PROFIBUS DP network.

To create a new PL7 PRO software application incorporating a PROFIBUS DP module:

1. Open the PL7 PRO software.
2. From the menu bar select **File**>**New**. Choose the PLC type (TSX Micro or TSX Premium), the processor type, and the memory card type. Click **OK**.
3. To save the file, select **File**>**Save As...**.
4. From the menu bar select **Tools**>**Configuration**.
5. Double-click on an unused rack slot to add a module. The Add Module dialog box will appear. Under Family, highlight Communication. Under Module highlight TSX PBY 100 PROFIBUS DP MODULE. Click **OK**. (See Figure 16.)

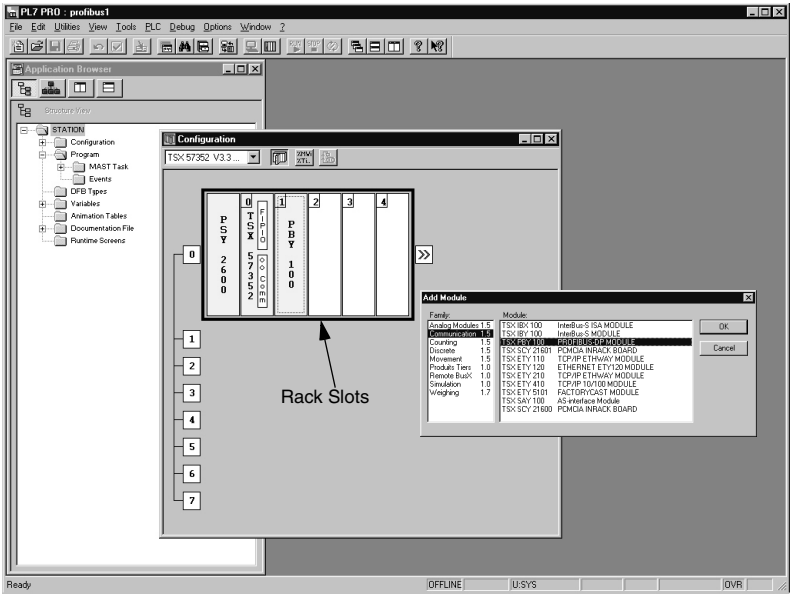


Figure 16: Adding a PROFIBUS DP Module to the Rack Configuration

To configure the PROFIBUS DP module:

1. Double-click the PBY 100 Module graphic, or from the menu bar select **Utilities**>**Open Module**.
2. Create a *.cnf file using the Hilscher SyCon-PB/GS software. Do this by:
   — clicking on the Hilscher icon in the PROFIBUS-DP Tool box in the TSX PBY 100 dialog box or
   — launching it from the Start menu in your operating system
   (See the instructions on pages 28–32 for *.cnf creation instructions.)
3. In the TSX PBY 100 dialog box's PROFIBUS-DP Configuration File box click on the **Load CNF** button and browse to the file or enter the path to the *.cnf file directly.

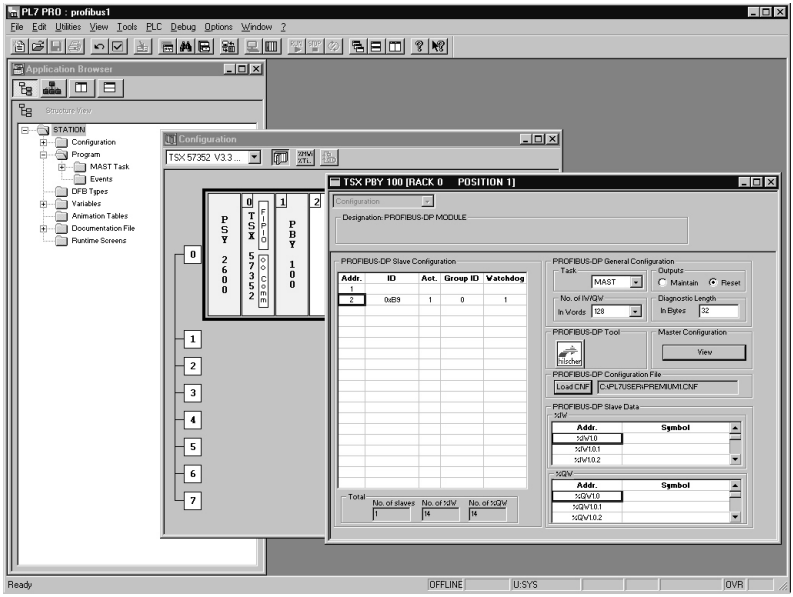


Figure 17: TSX PBY 100 Dialog Box

4. Close the TSX PBY 100 dialog box. A dialog box will ask you "Confirm current configuration?" Click **Yes**.
5. Right-click on the Configuration dialog box. Select **Confirm....** When prompted to confirm global reconfiguration, click **OK**.
6. Save the application, then download it to the PLC to begin operation.

CREATING ANIMATION TABLES IN BOTH CONCEPT AND PL7 PRO SOFTWARE

An animation table is a tool that allows you to actively view register information as it changes. Both CONCEPT and PL7 PRO software offer this tool.

Using CONCEPT Software

The table illustrated in Figure 18 on page 41 was generated using the Reference Data Editor function in CONCEPT software. To animate the Reference Data Editor template, open it up and select **Online**>**Animate**. The network must be in Connected mode and the PLC in Run mode to examine the data as it is exchanged with the drive controller via PROFIBUS DP communications.

Refer to Figure 18 and Tables 13 and 14 on page 43 for assistance with data management and register descriptions. There are fourteen input data registers (300001–300014) and seven output data registers (400001–400007).

In this example, register 300468 is mapped as a communication “health” register. Toggling of the three right-most bits indicates active communication with the ALTIVAR 58 drive controller.

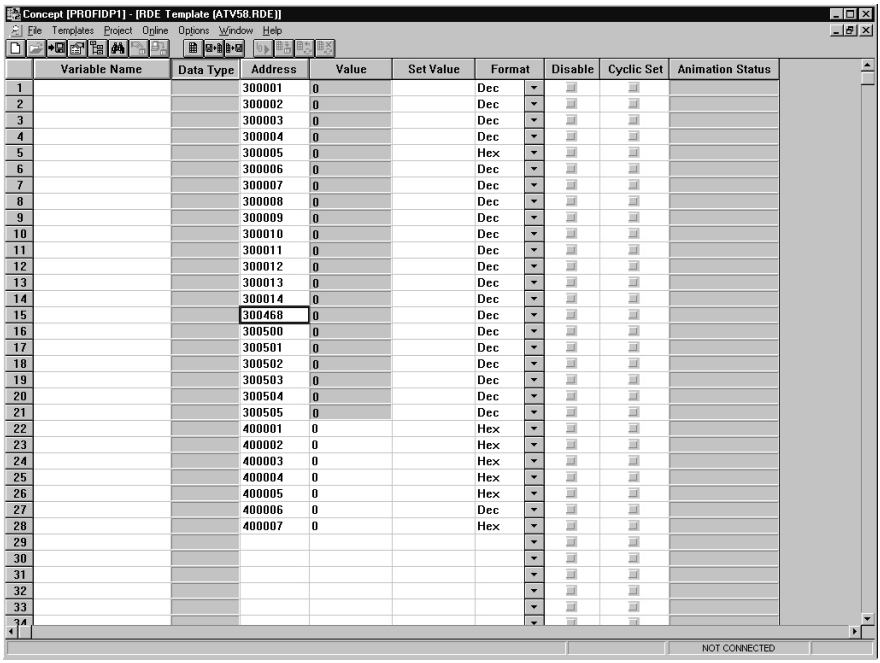


Figure 18: Reference Data Editor—Table Setup for a PROFIBUS DP Network

Using PL7 PRO Software

To create an animation table for viewing register activity using the PL7 PRO program:

1. With the application open and the Application Browser dialog box shown in Structure View, highlight Animation Tables. From the menu bar select **Edit**>**Create** (or right-click on **Animation Tables**, then select **Create...**).
2. In the entry bar for the Table, type “%IW1.0–14” for the input word addresses, then press Enter to place the 14 available input register addresses into the table.
3. Select the next available address cell in the Address column and type “%QW1.0–14” for the output word addresses, then press Enter to place the 14 available output words into the table.

4. To confirm the table select **Edit**>**Confirm** and in the Confirm As dialog box name the table and click **OK**.

   Figure 19 shows the Animation table setup.

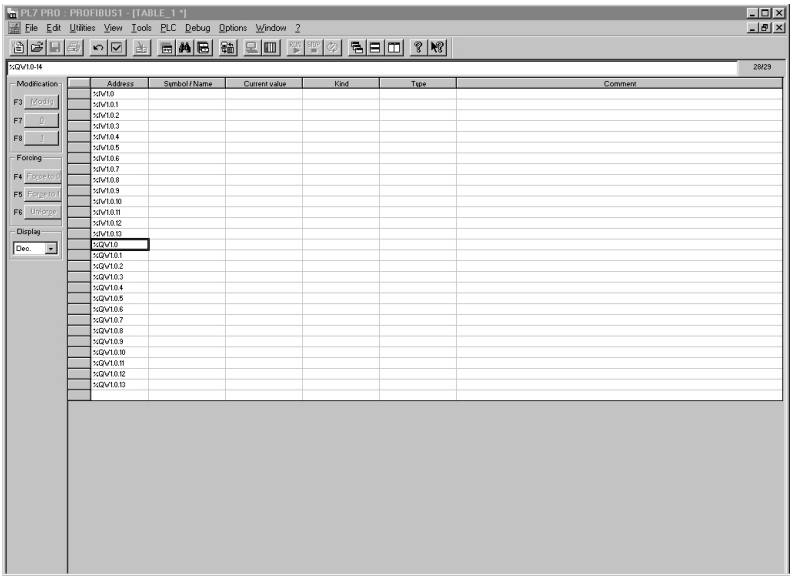


Figure 19: Animation Table Example

To view the Animation table:

1. With the PLC connected and running, open the Animation table.
2. From the menu bar select **Utilities**>**Animate** to view the table as register information is updated.

The table illustrated in Figure 19 was generated using the Animation Table function in PL7 PRO software. Refer to Figure 19 and Tables 13 and 14 for assistance with data management and register descriptions. There are fourteen input data registers (%IW1.0–%IW1.0.13) and seven output data registers (%QW1.0–%QW1.0.6).

Table 13: Output Data (Commands to the ATV58 Controller)

Register Number		Byte	Command
Quantum PLC	Premium PLC		
400001	%QW1.0	Bytes 1 and 2	PKE
400002	%QW1.0.1	Bytes 3 and 4	R/W Request
400003	%QW1.0.2	Bytes 5 and 6	PWE
400004	%QW1.0.3	Bytes 7 and 8	PWE
400005	%QW1.0.4	Bytes 9 and 10	CMDD
400006	%QW1.0.5	Bytes 11 and 12	LFRD
400007	%QW1.0.6	Bytes 13 and 14	CMI
400008–4000014	%QW1.0.7–%QW1.0.13	Not Used	

Table 14: Input Data (Information from the ATV58 Controller)

Register Number		Byte	Command
Quantum PLC	Premium PLC		
300001	%IW1.0	Bytes 1 and 2	PKE
300002	%IW1.0.1	Bytes 3 and 4	R/W/N Response
300003	%IW1.0.2	Bytes 5 and 6	PWE
300004	%IW1.0.3	Bytes 7 and 8	PWE
300005	%IW1.0.4	Bytes 9 and 10	ETAD
300006	%IW1.0.5	Bytes 11 and 12	FRHD
300007	%IW1.0.6	Bytes 13 and 14	RFRD
300008	%IW1.0.7	Bytes 15 and 16	FRH
300009	%IW1.0.8	Bytes 17 and 18	RFR
300010	%IW1.0.9	Bytes 19 and 20	LCR
300011	%IW1.0.10	Bytes 21 and 22	ULN
300012	%IW1.0.11	Bytes 23 and 24	THR
300013	%IW1.0.12	Bytes 25 and 26	THD
300014	%IW1.0.13	Bytes 27 and 28	LFT

CONTROL MODES

The ATV58 drive controller can be controlled as follows:

- through hard-wired I/O points on the control terminal strip (local control mode)
- through a keypad display module or computer with ATV58 PC software connected to the drive controller's built-in RS-485 MODBUS serial port (local control mode)
- through a PLC or other controller connected to the fast serial link via a communication card (serial link mode)

NOTE: The operator keypad display takes priority over the terminals.

In serial link mode the speed reference and the start/stop control cannot come from separate sources. That is, it is not possible to have the speed reference sent across the serial link and the start/stop control from the terminal strip.

For details on how to select between the two modes of local (hand) control see the latest revision of the keypad display manual, VVDED397047US.

When the communication network has control of the drive controller, the setpoints and commands are controlled via the network and cannot be modified by the terminals, the keypad display, or any device connected to the RS-485 MODBUS serial port. To command the drive controller by the terminals or the keypad display, forced local must be enabled.

⚠ WARNING

UNINTENDED EQUIPMENT ACTION

When in serial link mode, all terminal inputs are ignored except digital inputs configured as stop functions.

Failure to consider the implications of unanticipated operations can result in death, serious injury, or equipment damage.

Forced Local

Switching between local control mode and serial link mode is achieved by a switch wired to a logic input on the controller terminal block as illustrated in Figures 20 and 21 on page 47. The logic input must be assigned to the function forced local.

When the logic input assigned to forced local is active (high), all control of the drive controller is assigned to the selected local (hand) control mode. In this case, command requests by the network are refused. Command parameters can be monitored. All other parameters can be read accessed.

⚠ WARNING

UNINTENDED EQUIPMENT ACTION

When in forced local mode, all commands from the communication ports are ignored.

Failure to consider the implications of unanticipated operation can result in death, serious injury, or equipment damage.

When the forced local logic input is not active (low), all control of the drive is transferred to the network if wired as shown in Figures 20 or 21. The only local (hand) controls that are still monitored by the drive controller include the logic input assigned to forced local and any input assigned to a drive stop function. Examples include:

- the stop button on the keypad display module
- logic input one (LI1) which is assigned to the function STOP if the ATV58 drive controller is configured for 3-wire control
- any logic input assigned to the functions freewheel stop, DC injection braking, and fast stop.

See the keypad display manual, VVDED397047US (latest revision), for more details.

Hand/Off/Auto (HOA)

⚠ WARNING

LOSS OF CONTROL

The user must provide a Hand/Off/Auto switch with the following functionality:

- In the Hand position, forced local mode must be enabled.
- In the Off position, all run terminal inputs must be disabled via open circuit, and forced local mode must be enabled.
- In the Auto position, the run terminal inputs must be disabled via open circuit, and forced local mode must be disabled.

Failure to follow these instructions can result in death or serious injury.

When the control switch is in the auto position, *all **local run and start commands** to the drive controller must be **removed**.* During power-up, the ATV58 drive controller defaults to local control mode. (See “Control Modes” on page 44.) After the drive controller recovers from a power up sequence (including such unplanned events as an AC line power disturbance), it immediately responds to any local controls that are active before the Profbus DP communication board has initialized and assumed control. *This can result in unintended equipment operation.*

When the control switch is in the hand or off position, *the drive controller must be placed into the **forced local mode** .* While it is possible to stop the drive controller in the serial link mode by activating one of the local stop commands (such as the keypad display stop button), commands sent over the network can restart the drive controller if it is not in forced local mode. See “Forced Local” on page 44.

Refer to Figures 20 and 21 on page 47 for assistance in designing Hand/Off/Auto control. For the run reverse and forced local functions, select any unused logic inputs on the main control board. Assign a logic input to the run reverse function only if appropriate for the application.

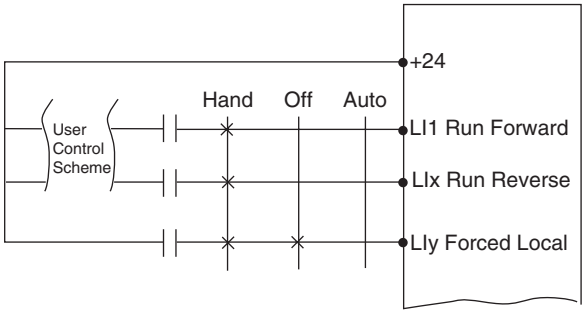


Figure 20: Example 2-Wire Control

NOTE: When the HOA switch is in the auto position, removing the local run forward or run reverse commands does not stop the drive controller.

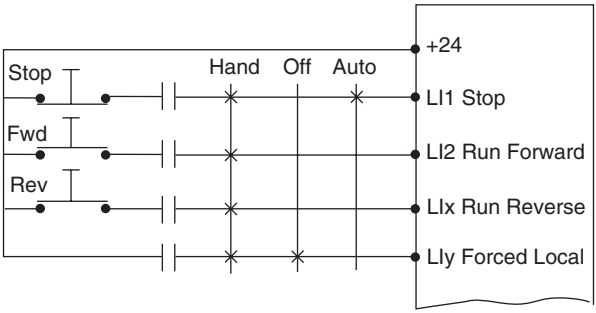


Figure 21: Example 3-Wire Control

NOTE: When the HOA switch is in the auto position, removing the local run forward or run reverse commands does not stop the drive controller.

Communication Fault Monitoring

Word 402, bit 14 of command register CMI is used to inhibit communication fault responses. If bit 14 = 1, the drive controller ignores communication errors from the serial link. This function is intended for use during troubleshooting and start-up. **Do not use this function during normal network operation.**

⚠ WARNING

UNINTENDED EQUIPMENT ACTION

Loss of communication will not cause the drive controller to fault when bit 14 of Word 402 is set to 1.

Failure to consider implications of unanticipated operations can result in death, serious injury, or equipment damage.

Protection of Adjustment and Configuration Access

A configuration semaphore has not been provided in order to ensure read-only access to the configuration and adjustment parameters. Any processing unit can access the configuration and adjustment parameters.

Access Protection by Forced Local

Writing of Command registers is blocked when the controller is in forced local mode.

Numerics

A

B

C

D

E

F

G

H

I

L

M

P

R

S

T

U

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