Instruction Bulletin
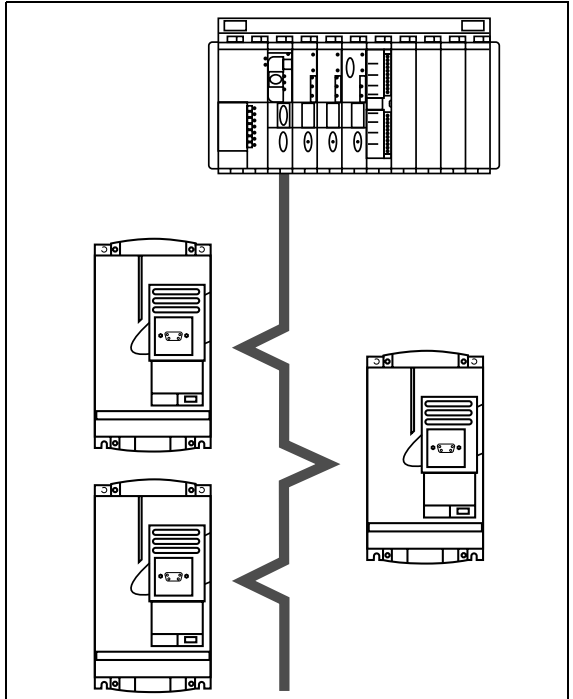
ALTIVAR® 58 Adjustable Speed Drive Controllers

Interbus-S Communication Card User's Guide

Retain for Future Use.

![Telemecanique logo] **Telemecanique**   ![Square D logo] **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 3 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 Interbus-S VW3A58304EU communication card is used to connect an ALTIVAR 58® drive controller to an Interbus-S network. A 24 Vdc external power supply must be provided by the customer.

Data exchanges enable all functions of the ALTIVAR 58 drive controller:

- Function configuration
- Remote downloading of settings
- Control and supervision
- Monitoring
- Diagnostics

The card manages the Interbus-S communication protocol. The card has two 9-pin SUB-D connectors, one male and one female, used for daisy-chaining the Interbus-S network (1 "IN" and 1 "OUT" port). The connection cable for the Interbus-S network must be ordered separately. The card also has screw terminal connections for the external 24 Vdc power supply (22 Vdc minimum to 25 Vdc maximum, 200 mA minimum) which must be ordered separately.

A Hand/Off/Auto operator must be installed as illustrated on page 30, see Table 1 for operators.

Table 1:   Hand/Off/Auto Operators

Description	Part No.	Operator	
		22 mm	30 mm
Selector switch	ZB4BD3	1	—
	KS42B	—	1
Collar	ZB4BZ009	1	—
Contact block	ZBE1026P	1	—
	ZBE1016P	2	—
	KA32	—	1
	KA33	—	1

The drive controller controls processes using a communication network with the "Drivecom 21" profile. All ALTIVAR 58 internal registers are accessed through exchanges via message handling services using the Peripheral Communication Protocol (PCP) standard.

<table>
<tr><td colspan="2" align="center">⚠ **WARNING**</td></tr>
</table>

> ⚠ **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 initial release of this manual. The information contained in this document is based on ATV58 firmware version V2.1 or greater.

ADDITIONAL DOCUMENTATION

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

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

INSPECTING THE OPTION CARD

After receiving the VW3A58304EU communication option card:

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

- Observe the following precautions for handling static sensitive components as the card is removed 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.

• 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).

BUS VOLTAGE MEASUREMENT PROCEDURE

Before installing the Interbus-S communication card in the ALTIVAR 58 drive controller, 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 location varies by drive controller model number as listed in Table 2 and shown in Figure 1. The drive controller model number is listed on its nameplate.

Table 2:   (+) 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 U18N4 to D23N4	J2	PA	J18	7
D16M2• to D46M2• D28N4• to D79N4•	J2	(+)	J2	(–)

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.

3. Read the model number of the drive controller from the nameplate and identify the corresponding (+) and (–) measurement points from Table 2 and Figure 1 (on page 5).

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.

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.
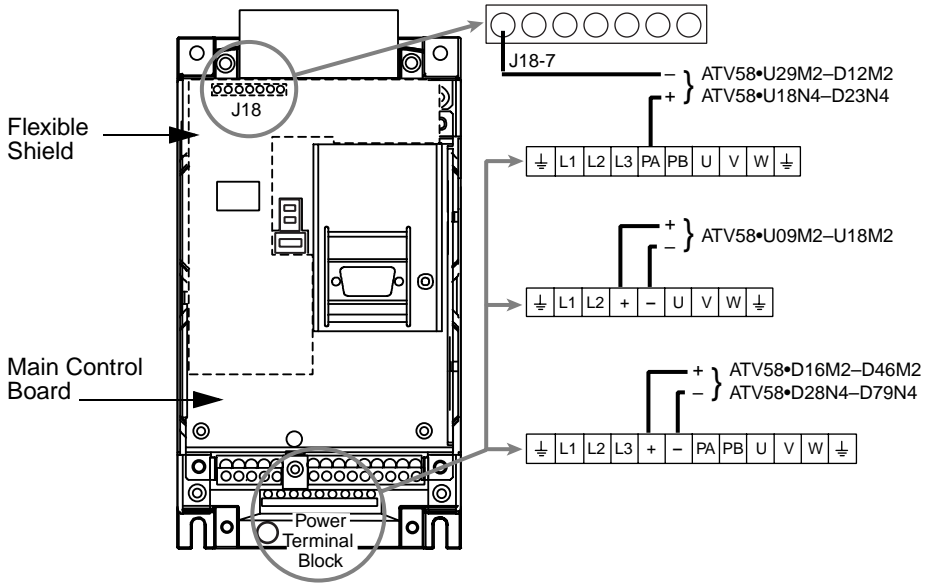

Figure 1:   DC Bus Voltage Measurement Point Locations (ATV58HU09M2 shown)

INSTALLATION

To install the Interbus-S communication card in the ALTIVAR 58 drive controller, perform the following steps.

1. Verify that DC bus voltage is not present. See "Bus Voltage Measurement Procedure" on page 3.

2. Place the 50/60 Hz switch in the position corresponding to the motor as indicated in the drive controller user's manual.

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. Close the flexible protective cover back over the option card.

6. Replace all doors or covers when installation is complete.

7. Affix the supplied self-adhesive label ④ on the cover of the drive controller above the existing power and fault label.
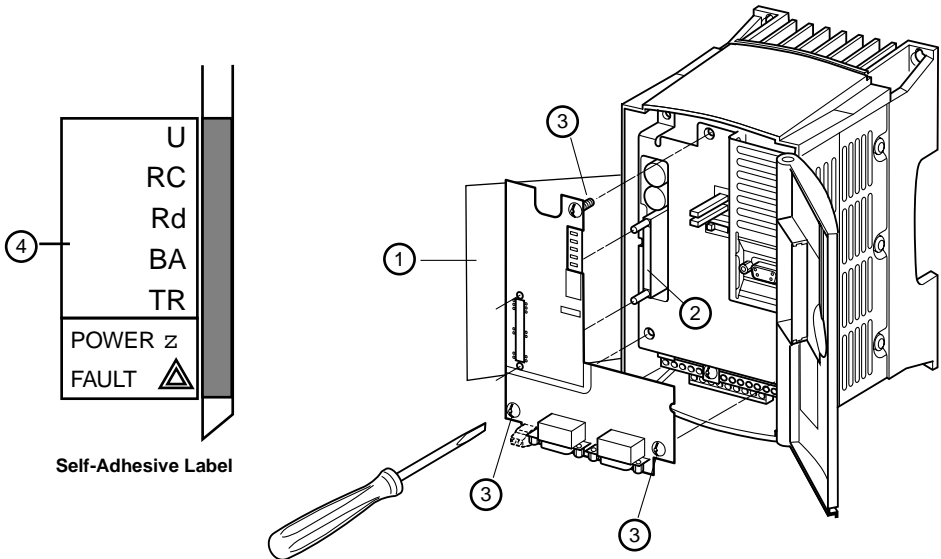
Self-Adhesive Label

Figure 2:   Installing the Communication Card

LED STATES

Figure 3 shows the LEDs on the Interbus-S communication card and the label on the drive controller door. These LEDs are visible through the window of the ALTIVAR 58 cover. Table 3 describes what the state of the LEDs indicate and provides advice for corrective action.

Table 3:   What Status LEDs Indicate

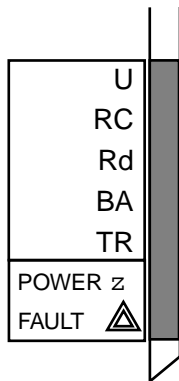| LED	Color	Meaning	Corrective Action
U	Green	When On, the card is energized. When off, no power supply is connected or reset is required.	If Off, check that the unit is energized.
RC	Green	When On, the bus remote input is correctly connected.	If Off, check the connection.
Rd	Red	When On, the bus remote input is not correctly connected.	If On, check the connection.
BA	Green	When On, the card is transmitting data (time-out = 640 ms).	If Off, check that the PLC initializes the bus correctly.
TR	Green	When flashing, there is a message on the bus.	If Off, check that the communication link is initialized.

Figure 3:   LEDs on the Interbus-S Communication Card

CONNECTIONS

24 Vdc supply (22 V minimum to 25 maximum), 200 mA minimum

Ground the external 24 Vdc supply to the same ground as the drive chassis.
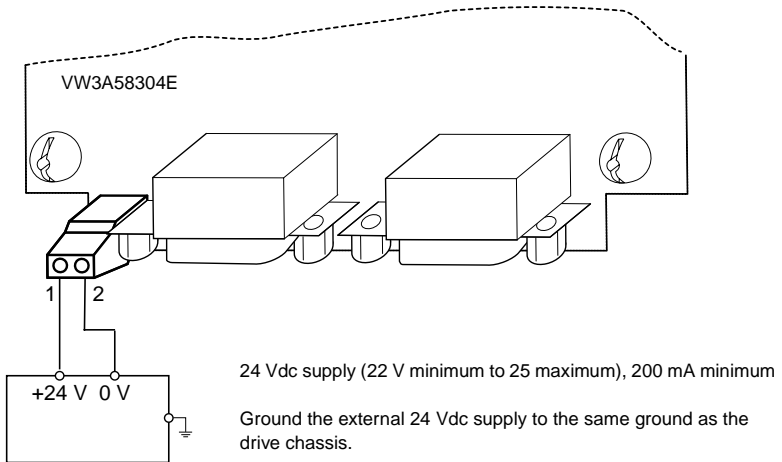
Figure 4:   External Power Supply for VW3A58304EU Card

The transmission interface is electrically isolated from the drive controller in accordance with standard RS-485. It is available on a 9-pin SUB-D connection.

Table 4:   Male 9-pin SUB-D Connector Pin (Input) on the Card

Pin	Signal	Pin	Signal	Pin	Signal
1	DO1	4	No Connection	7	DI1/
2	DI1	5	No Connection	8	No Connection
3	GNDI	6	DO1/	9	No Connection

Male   Female

Figure 5:   Male and Female 9-pin SUB-D Connections
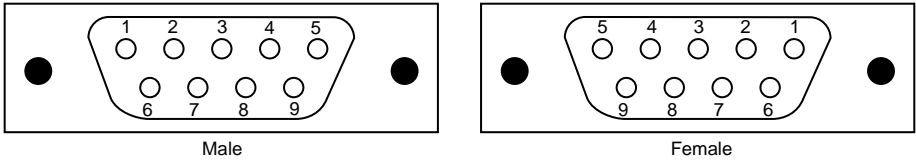
Table 5:   Female 9-pin SUB-D Connector Pin (Output) on the Card

Pin	Signal	Pin	Signal	Pin	Signal
1	DO2	4	No Connection	7	DI2/
2	DI2	5	VCCO	8	No Connection
3	GNDO	6	DO2/	9	RBST

Standard RS-485 Bus

Use the following recommendations to construct a standard RS-485 bus:

- Use the Phoenix Contact cable (reference IBS RCBxxxM, where xxx = length of cable in meters).
- Maximum length of line: 42,640 ft (13,000 m).
- Maximum length of drop cable: 1,312 ft (400 m).
- Do not connect more than 256 devices to one bus.
- When routing cable, keep the bus away from the power cables (at least 12 in [30.5 cm]), and make any crossovers at right angles.

Cable Routing Practices

When wiring the ATV58 drive controllers to an Interbus-S network, follow all wiring practices required by national and local electrical codes.

When routing 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 for protecting the cable. These structures should be used for signal wiring paths and should not contain 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
  - radios and televisions
  - 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 metallic conduit carrying low-level control 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 (80 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 ATV58 catalog for selection and application of these filters.

Connection Example

Figure 6 provides an example of ALTIVAR 58 drive controllers connected to an RS-485 bus. Note that the network has a ring topology and that transmission speed is 500 Kbits/s.
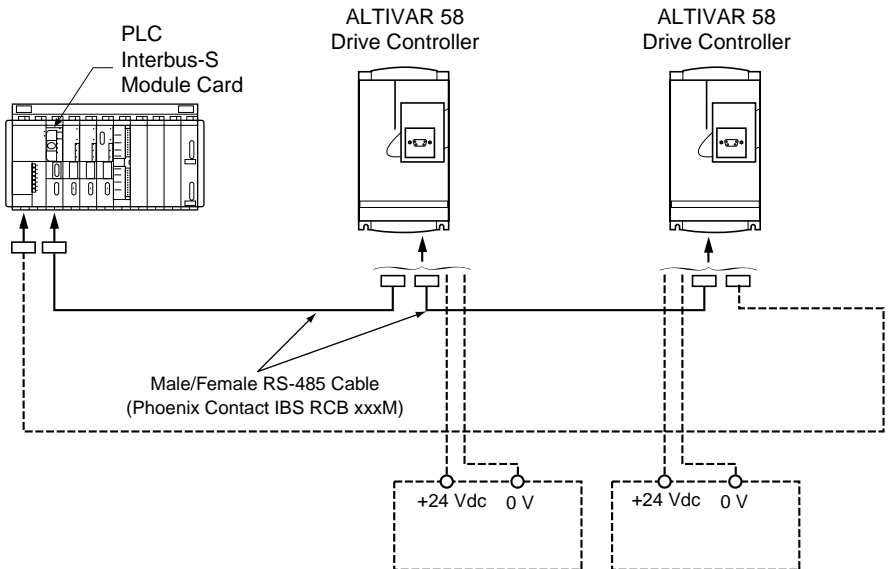

Figure 6: Connection Example

NOTES

SECTION 2—SOFTWARE SETUP

PARAMETER CONFIGURATION

Apply 24 Vdc to the Interbus-S communication card before powering up the ATV58 drive controller. When first powered-up, the ALTIVAR 58 drive controller automatically recognizes the Interbus-S communication card. The card provides access to the configuration 8—COMMUNICATION menu from the keypad display (VW3A58101), handheld programming terminal (VW3A58102U), or PC software (VW3A8104). (Cable VW3A8106 is required to connect the PC to an ATV58 drive controller.)

To configure the Interbus-S communication card, select the 8—COMMUNICATION menu and access the configuration parameter, AdrC.

Parameter AdrC may be set to 0 or 1.

- When set to 0, the drive controller is independent from the bus. In this state, the Interbus-S card exchanges process data and messages with the bus, but does not send them to the drive controller. This status can be verified by a STATUS service. The "logical status" parameter in the reply is equal to 2 (L_STAT_NBR_SVC_LIMIT).

- When the parameter is set to 1, the Interbus-S card sends process data and messages from the bus to the drive controller. *This state represents normal operation and can also be verified by a STATUS service.* The "logical status" parameter in the reply is equal to 0 (L_STAT_COMM_READY).

Set the value of the AdrC parameter to 1 to enable transmission of data from the bus to the drive controller. This allows the card to perform modifications within the drive controller without interference from the bus or interruption of communication.

NOTE: If parameter PrO equals "INTERBUS-S," this indicates that the card has been recognized.

See Figure 7 for reference and observe the following guidelines:

- Using the Phoenix Contact IBS CMD G4 software, the Interbus-S module in the logic controller must be configured to recognize the Interbus-S communication card in the ALTIVAR 58 drive controller.

- The communication bus cables (in and out) must be connected to the communication card in the ALTIVAR 58 drive controller.

- The PLC program must be written in accordance with the predefined configuration (Drivecom Profile 21) to access the drive controller. The card is considered to be a standard I/O interface.
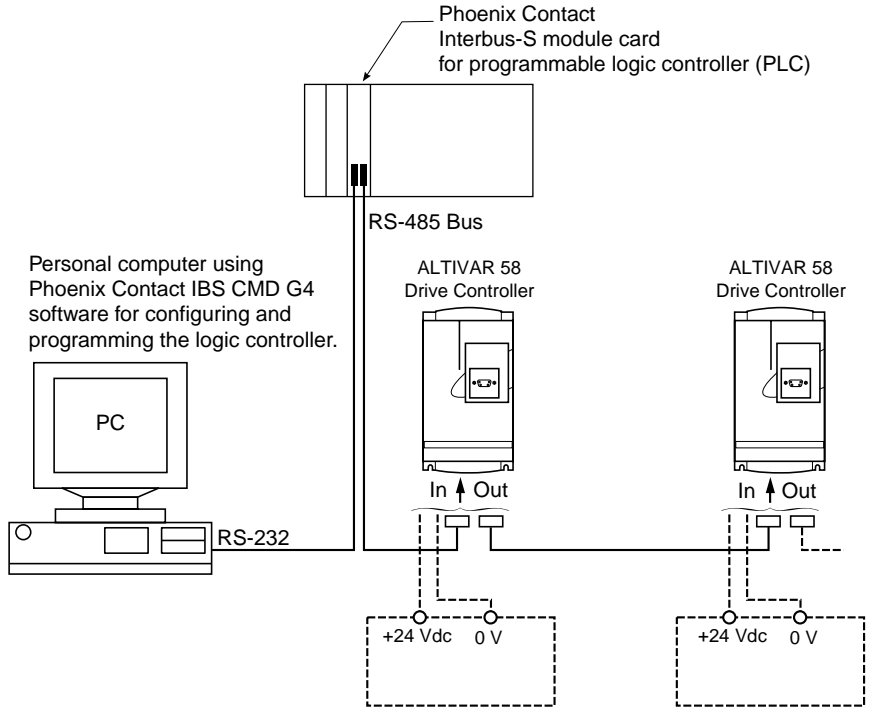

Figure 7:   Network Diagram

SETUP WITH IBS PC SOFTWARE

To assist users familiar with **Phoenix Contact IBS CMD G4 > V4.3** software (English version), this section describes the setup procedures for the ALTIVAR 58 drive controller.

Device Description for ALTIVAR 58 Drive Controllers

Table 6: Device Description

	Device Number	Automatic
	Group Number	—
	Station Number	—
	Device Name	ALTIVAR 58 Profile 21 (RB)
	Manufacturer Name	Schneider Electric
	Device Type	ALTIVAR 58
	Order Number	Undefined
	Ident Code	227 (decimal)
	Profile Number	21 (hex)
	Process Data	32 bits
	Parameter Channel	1 word
	CR	Automatic
Interface Type	Incoming Interface (IN1)	Remote
	Outgoing Interface (OUT1)	Remote
Icon		Drivecom 227
Parameter Channel	Message Lengths	Transmit: 128 Receive: 128
	Supported Parameter Channel Services	Read code: 80 30 00 Write Get-OD (long format)

Configuration of the Read Again Function

An ATV58 drive controller can be inserted into a project using the automatic read function for the bus configuration: Read Again. This function automatically recognizes the ATV58 as a drive controller which conforms to the Drivecom Profile 21 (RemoteBus) with identification code 227.

To configure this function:

1. Right-click on the icon.
2. In the menu which appears, choose Description.

3. Click on the Parameter Channel button and change the Message Lengths Transmit and Receive parameters to 128 bytes.

4. Add the Get-OD service to the Supported Parameter Channel Services list.

Configuration of the Edit/Insert Function

An ATV58 drive controller can be inserted into a project using the Edit/Insert with Device Description function.

To edit or insert devices:

The Schneider Automation (ASA) *.mbd catalog is located in the C:\IBSCMD\BIN directory and the icons specific to Schneider devices are located in the C:\IBSCMD\PICTURE directory.

If you have the Schneider catalog and icons file, make the following screen selections:

— Data Source: Other, External_Device_Database
— Group: SE and Search button
— Output: Type ALTIVAR 58, OK

If you do not have the Schneider catalog and icons file, make the following screen selections:

— Data Source: Internal Database
— Group: Drivecom and Search button
— Output: Type Profile 21 (RB), OK

The bookmark for the description appears. Click on Parameter Channel, change the Message Lengths Transmit and Receive parameters to 128 bytes and add the Get-OD service to the Supported Parameter Channel Services list.

After you have edited all the devices you wish to add to the project, the next step depends on whether or not the PLC controller board contains parameter memory.

• If it does, click on Parameterization Memory and Save. The board must have been previously formatted using Format.

• If it does not have parameter memory, right-click on the Controller Board icon, then Parameterization, Execute.

The CMD software switches to Online operating status in both cases following successful parameterization. In Monitoring operating status the drive controller can be controlled using Drivecom Monitor and Digital Process Data Monitor.

- If you are already in Monitoring operating status, and return to sending messages to the drive controller, the communication link is already established and it is not necessary to send an INITIATE service message.
- If you wish to access the ATV58 drive controller via message handling before switching to Monitoring operating status, right-click on the Controller Board icon, then Control, Other... and select messages, beginning with an INITIATE service message.

For more details on using the IBS CMD G4 software, refer to the Phoenix Contact user's manual (reference: IBS CMD SWT G4 UM E) or contact your local Phoenix Supplier.

INTERBUS-S PROTOCOL

Principle

Interbus-S is a communication protocol which creates a hierarchical structure consisting of one master and one or more slave devices. It is used to interrogate one or more intelligent slaves from the master. A multidrop link connects the master and the slaves.

The master manages the exchanges and has sole responsibility for them. The master repeats the interrogation when an incorrect exchange occurs and declares the interrogated slave absent when there is no reply within the allotted time. No slave may transmit a message without having been interrogated.

Interbus-S protocol uses two types of data exchange between master and slave:

- periodic exchange
- exchanges via message handling.

Periodic Exchange

The Interbus-S card supports two input periodic words and two output periodic words which are assigned to the parameters shown in Table 7 on page 18.

Table 7:   Periodic Exchange Parameters

Periodic Type	Index	Meaning
Input	0x6041 0x6044	Status word (StatusWord) Motor speed (SpeedActValue)
Output	0x6040 0x6042	Control word (ControlWord) Speed reference (SpeedSetP)

Exchanges via Message Handling

The maximum message length is 128 bytes. Message handling services conform to the Peripheral Communication Protocol (PCP) standard for communication services. This is without an error check.

In order to send messages to both output periodic words (6040h and 6042h) ProcDatEnab must be set to zero. This disables the periodic data exchange. If the periodic data exchange is not disabled the next periodic data exchange overwrites the message data.

NOTE: All messages pass through all of the slaves on the network, but slave-to-slave communication is not possible.

The variables exchanged via message handling are described in the ATV58 Register Access Guide for Communication Networks, VVDED397058US. To command and control the speed of the drive controller, the command variables in Tables 14 (page 23) and 15 (page 26) must be used. Interbus-S protocol assigns the control register and the speed setpoint to the output periodic words by default. Message handling must therefore not be used to transmit these commands, as they will be immediately replaced by the next exchange of periodics.

Accessible Data

The two following types of objects can be accessed:

• User objects (Index 0x5FE0 to 0x5FFF)
• Drivecom objects (Index 0x6000 to 0x6049)

Control and Supervision

Interbus-S protocol is used to control exchanges.

If an invalid message is sent to the slave device, it transmits an exception response to the master device. The master then decides whether to repeat the exchange or not.

Supported Services

The PCP communication services supported by the card are as follows:

Initiate	:	Initializes the communication link.
Abort	:	Aborts the communication link.
Status	:	Provides status on the drive controller and communication links.
Get-OV	:	Reads an object description.
Identify	:	Identifies the card.
Read	:	Reads a parameter.
Write	:	Writes a parameter.

A description of these services and data which the network master may use is given in the list of communication links below.

Communication Link (KBL)

The Interbus-S card only supports one communication link between a device (server) and the bus master.

Parameter Settings for an ATV58 Communication Link

A communication link defines the data which can be exchanged between two devices by means of the services and transmission/reception buffers. Both devices must know which services are supported and the length of the buffers.

The structure of the Interbus-S card communication link is shown in Table 8.

Table 8:   ATV58 Communication Link Parameter Settings

Communication reference	2
Maximum length of buffer in transmission mode (low priority)	128
Maximum length of buffer in transmission mode (high priority)	0
Maximum length of buffer in reception mode (low priority)	128
Maximum length of buffer in reception mode (high priority)	0
Supported services (client)	00 00 00 (hex)
Supported services (server)	80 30 00 (hex)
Maximum number of parallel services	1

Initiate

This is used to establish communication on the bus and authorize transmission of other services. Initiate parameters are shown in Table 9.

Table 9:   Initiate Parameter Settings

Object dictionary version	10
Profile number	21 (hex)
Supported access rights	True
Password	0
Supported group access rights	0

NOTE: Sending an INITIATE message when the communication link is already established will stop the communication (equivalent to sending an ABORT message).

Abort

This is used to stop communication on the bus.

Status

This is used to show the device status. It is composed of three types of data as shown in Table 10.

Table 10:   Types of Status Data

Data	Possible Values	Meaning
Logical Status	0 2 4	Communication Status: Ready to communicate Limited number of services Not ready to communicate
Physical Status	0 2	Drive Controller Status: Drive Controller ready Drive Controller not ready
Local Details	—	bytes 1 and 2: drive controller fault register 3rd byte: not used. See Table 11 below.

Table 11:   Word 483 Display Register

Word	Code	Description	Possible Values or Range
W483 or 0x5FE8/34	DF1	Register of active faults no. 1 (no fault if the bits = 0)	Bit 0 = 1: Incorrect calibration constants (INF) Bit 1 = 1: Unknown drive controller rating (INF) Bit 2 = 1: Unknown or incompatible option (INF) Bit 3 = 1: HD (ASIC) initialization incorrect (INF) Bit 4 = 1: EEPROM control board fault (EEF) Bit 5 = 1: EEPROM power board fault (EEF) Bit 6 = 1: Incorrect configuration (CFF) Bit 7 = 1: Invalid configuration (CFI) Bit 8 = 1: Normal communication link fault (SLF) Bit 9 = 1: Fast communication link fault (ILF) Bit 10 = 1: Fast communication "NET" fault (CNF) Bit 11 = 1: External fault via normal serial link (EPF) Bit 12 = 1: External fault via fast serial link (EPF) Bit 13 = 1: Motor short circuit fault (SCF) Bit 14 = 1: Precharge relay closure too long (CRF) Bit 15 = 1: Precharge relay command cut-off (CRF)

Get-OV

This is used to display how the parameters listed in Tables 8 and 9 on pages 19 and 20 are setup.

Identify

This is used to identify the device, and is comprised of three types of data as shown in Table 12.

Table 12:   Types of Identify Data

Name of Device Manufacturer	Schneider Electric
Name of Model	ATV58••••••
Device Version Number	Example: V1.0

Read/Write

This is used to read or write the value of a drive controller or Drivecom object via its index and sub-index. The ATV58 Register Access Guide for Communication Networks, VVDED397058US provides information for making the connection between the index/sub-index and the drive controller or Drivecom object details.

Table 13 shows the errors that can be detected during read or write operations.

Table 13:   Read/Write Errors

Error Class	Error Code	Additional Code	Meaning
6	7	0	Nonexistent parameter.
6	6	0	Request to write an object which can be accessed in Read-Only mode.
5	3	0	Request to write a parameter in local forcing.
8	0	0	No response.

SECTION 3—CONTROLLING AND MONITORING THE ATV58 DRIVE CONTROLLER

DRIVECOM PROFILE

The Interbus-S communication card conforms to the Drivecom profile 21 and supports the parameters shown in Table 14.

Table 14: Drivecom Parameters

Index (Hex)	Sub-Index	Parameter Name	Access Rights [1]	No. of Elements	Length (Bytes)	Type of Data [2]	Type of Structure [3]
0x6002	0	ProcDatEnab (Enabling of Periodics)	Ra/W	1	1	SIMPLE	BS
0x603F	0	ErrorCode (Error Code)	Ra	2	2	SIMPLE	BS
0x6040	0	Controlword (Control Word)	Ra/W	2	2	SIMPLE	BS
0x6041	0	Statusword (Status Word)	Ra	2	2	SIMPLE	BS
0x6042	0	SpeedSetP (Speed Reference in rpm)	Ra/W	1	2	SIMPLE	I16
0x6043	0	SpeedRef (Reference Speed in rpm)	Ra	1	2	SIMPLE	I16
0x6044	0	SpeedActV (Output Speed in rpm)	Ra	1	2	SIMPLE	I16
0x6046	1	SpdMinMax (Minimum Speed in rpm)	Ra/W	2	8	ARRAY	U32
	2	SpdMinMax (Maximum Speed in rpm)	Ra/W	2	8	ARRAY	U32
0x6048	1	SpeedAcc (Frequency ramp is rpm)	Ra/W	2	6	RECORD	RAMP
	2	SpeedAcc (Ramp time in seconds)	Ra/W	2	6	RECORD	RAMP
0x6049	1	SpeedDec (Frequency ramp is rpm)	Ra/W	2	6	RECORD	RAMP
	2	SpeedDec (Ramp time in seconds)	Ra/W	2	6	RECORD	RAMP

1.   Ra = Access in Read mode. W = Access in Write mode.

2.   SIMPLE = Simple variable addressing is addressing a variable by index or index+sub-index (= 0).
ARRAY = Array variable addressing is addressing the entire array by index+sub-index (= 0) or addressing part of the array by index+sub-index (= 1 or 2).
RECORD = Record variable addressing is addressing a recorded element by index+sub-index (= 0) or addressing a recorded element by index+sub-index (= 1 or 2).

3.   BS = Byte String; I16 = Integer 16; U16 = Unsigned 16; U32 = Unsigned 32; RAMP = Ramp (Index 21H)

DRIVECOM STANDARD ADAPTED TO THE ATV58 DRIVE CONTROLLER

The ATV58 control process using the communication options conforms to the DRIVECOM standard state chart. The DRIVECOM standard state chart, the DRIVECOM standard, and the bypass for the DRIVECOM standard are explained in the ATV58 Register Access Guide for Communication Networks, VVDED397058US.

Communication Fault Detection

⚠ **WARNING**
LOSS OF CONTROL
Provide alternate control paths (Start, Stop, and Speed):
• When disabling communication loss detection.
• When motor control is required while a communication fault exists.
Failure to follow this instruction can result in death, serious injury, or equipment damage.

Setting CMI (word W402) bit 14 to 1 disables communication loss detection. As a result, loss of communication does not cause the drive controller to generate a fault. The drive controller continues its present operation. Alternate control paths must be provided for starting, stopping, and controlling the motor. No control commands are received during loss of communication.

Controlling the Drive Controller—State Machine

The following Word designations can be used to initiate communication to verify proper connection.

"Controlword"   :   6040h
"Statusword"   :   6041h

Enabling Periodic Data

"ProcDatEnab" : 6002h

The assignment of periodic data to the drive controller is enabled by the default factory setting. Setting 6002h to 1 enables the periodic data. Setting 6002h to 0 disables the periodic data.
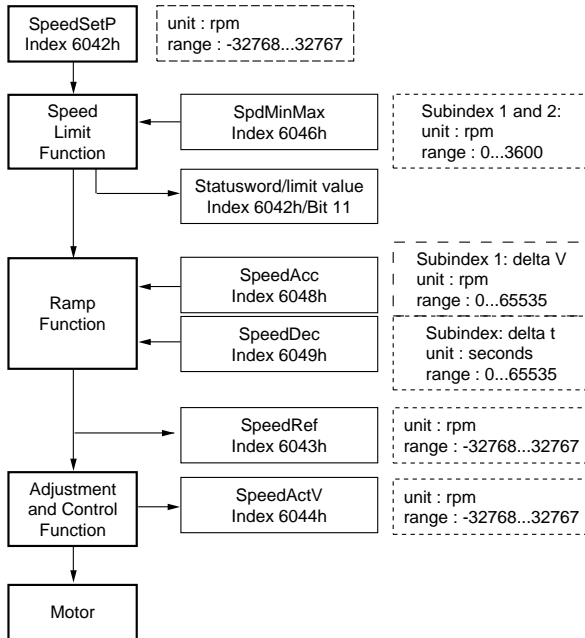
Speed Function

Figure 8:   Speed Function

Maintaining Communication

After communication has been established, the drive controller must receive a communication request (read or write) every seven seconds or the drive controller generates a communication fault. Also, a communication request must not be issued before the previous request has been completed or the communication requests can cause the drive controller's memory to overflow, resulting in a communication fault.

If an Interbus-S communication fault is generated, the fault will prevent starting the controlled motor until the fault is cleared. Cycling power will clear the fault.

Table 15:   DRIVECOM Parameters

Word	Code	Units	Parameter Name and Description	Possible Values or Range
W600 or 16#603F	ERRD		ErrorCode Fault Code Read/Write	16#0 = NOF: No fault 16#1000 = CRF: Load relay fault or = OLF: Motor overload (calculation or PTC probes) or = SOF: Overspeed 16#2310 = OCF: Overcurrent (prolonged ICL) 16#2320 = SCF: Motor short-circuit (phase/earth) 16#3110 = OSF: Line supply overvoltage 16#3120 = USF: Line supply undervoltage (> 200 ms) 16#3130 = PHF: Line supply phase loss (> 1s) 16#3310 = OBF: DC bus overvoltage or = OPF: Motor phase loss 16#4210 = OHF: Drive overheating 16#4310 = OTF: Motor overheating (PTC probes) 16#5520 = EEF: EEPROM memory fault 16#6100 = INF: Internal fault 16#6300 = CFF: Configuration incorrect (on initialization) or = CFI: Configuration invalid (if writing a configuration) 16#7300 = ANF: Load veering or = LFF: Loss of 4–20 mA signal or = TSF: PTC probes fault 16#7310 = SPF: Speed feedback cut-off 16#7510 = SLF: Serial link fault (cut-off) 16#7520 = ILF: Fast serial link fault (cut-off) or = CNF: Fast serial link communication fault 16#9000 = EPF: External fault

Table 15: DRIVECOM Parameters (Continued)

Word	Code	Units	Parameter Name and Description	Possible Values or Range
W601 or 16#6040	CMDD		Control Word DRIVECOM control register (Same as parameter "CMD") Read/Write Parameter reinitialized at the end of the "time-out" unless bit 14 of CMI is set to 1 (W402 or 16#5FE7/3)	Bit 0: Switch on Bit 1: Disable voltage Bit 2: Quick stop Bit 3: Enable operation Bit 4 to 6: Set to 0 Bit 7: Fault reset Bit 8 to 10: Set to 0 Bit 11 = 0: Forward direction command Bit 11 = 1: Reverse direction command Bit 12 = 0: No action Bit 12 = 1: Stop on ramp command Bit 13 = 0: No action Bit 13 = 1: Injection stop command Bit 14 = 0: No action Bit 14 = 1: Fast stop command Bit 15: Set to 0
W602 or 16#6041	ETAD		Status Word DRIVECOM status register (Same as parameter "ETA") Read only	Bit 0: Ready to switch on Bit 1: Switched on Bit 2: Operation enabled Bit 3 = 0: Fault absent Bit 3 = 1: Malfunction, fault present (FAI) Bit 4: Voltage disabled Bit 5: Quick stop Bit 6: Switch on disabled Bit 7 = 0: Alarm absent Bit 7 = 1: Alarm present Bit 8: Reserved Bit 9 = 0: Forced local mode in progress (FLO) Bit 9 = 1: Line control, i.e. using the bus or connector port (Forced local mode absent) Bit 10 = 0: Reference not reached (transient state) Bit 10 = 1: Reference reached (steady state) Bit 11 = 0: LFRD reference normal Bit 11 = 1: LFRD reference exceeded (< LSP or > HSP). Caution: LFRD is expressed in rpm, LSP and HSP in Hz Bit 12 and 13: Reserved Bit 14 = 0: No stop from keypad STOP key Bit 14 = 1: Stop from keypad STOP key Bit 15 = 0: Forward rotation (output frequency) Bit 15 = 1: Reverse rotation (output frequency)
W603 or 16#6042	LFRD	1 rpm	Nominal Speed Speed reference (Reference not peak limited) Read/Write	-32768 to 32767

Table 15:   DRIVECOM Parameters (Continued)

Word	Code	Units	Parameter Name and Description	Possible Values or Range
W604 or 16#6043	FRHD	1 rpm	Speed Reference Value Signed ramp output Read only	
W605 or 16#6044	RFRD	1 rpm	Actual Speed Motor Speed Read only	
W606 or 16#6046/1	SMIL	1 rpm	Speed Min Max Amount Low speed, equivalent to LSP (W251), but in rpm Read/Write	0 to HSP in rpm
W607	SMIH		Reserved	0
W608 or 16#6046/2	SMAL	1 rpm	Speed Min Max Amount High speed, equivalent to HSP (W250), but in rpm Read/Write	LSP to TFR
W609	SMAH		Reserved	0
W610 or 16#6048/1	SPAL	1 rpm	Speed Acceleration Speed for calculation of acceleration ramp Read/Write	1 to 65535
W611	SPAH		Reserved	0
W612 or 16#6048/2	SPAT	1 s	Speed Acceleration Time for calculation of acceleration ramp: Time required to go from 0 to SPAL (W610) Read/Write	0 to 65535
W613 or 16#6049/1	SPDL	1 rpm	Speed Deceleration Speed for calculation of deceleration ramp Read/Write	1 to 65535
W614	SPDH		Reserved	0
W615 or 16#6049/2	SPDT	1 s	Speed Deceleration Time for calculation of deceleration ramp: Time required to go from SPDL (W613) to 0 Read/Write	0 to 65535

CONTROL MODES

Hand/Off/Auto (HOA) Switch Functionality

⚠ **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. (See "Local and Remote Control" on page 30.) 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 Interbus-S 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 remote 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 31.

Refer to Figures 9 and 10 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.
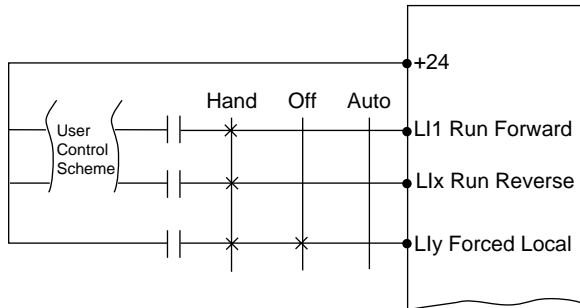
Figure 9:   Example of 2-Wire Control

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.
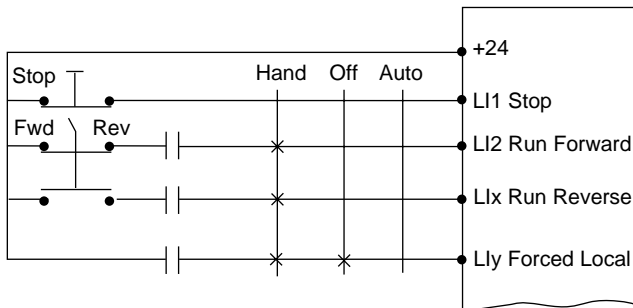
Figure 10: Example of 3-Wire Control

Local and Remote Control

The ATV58 drive controller can be commanded in local and remote control modes.

Local Control

In local (hand) control, the drive controller is controlled by either:

- Operators such as push buttons, switches, and a speed potentiometer that are wired to the drive controller terminal block
- The keypad display buttons

See the latest revision of keypad display manual VVDED397047US for more details on how to select between the two modes of local control.

Remote Control

In remote (auto) control:

- The drive controller is controlled by the serial communication network.
- The speed reference and the start/stop control cannot come from separate sources.

Forced Local

Switching between local and remote control is achieved by a switch wired to a logic input on the controller terminal block as illustrated in Figures 9 and 10 on page 30. 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/write 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 logic input is not active (low), all control of the drive is transferred to the network if wired as shown in Figures 9 or 10. 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

- 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.

T

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