# Altivar 212

## Variable speed drives for asynchronous motors

## Modbus communication manual

09/2012

Schneider Electric

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

# Table of Contents

# Safety Information

## Important Information

**NOTICE**

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety message that follow this symbol to avoid possible injury or death.

## ⚠ DANGER

**DANGER** indicates an imminently hazardous situation, which, if not avoided, **will result** in death or serious injury.

## ⚠ WARNING

**WARNING** indicates a potentially hazardous situation, which, if not avoided, **can result** in death, serious injury or equipment damage.

## ⚠ CAUTION

**CAUTION** indicates a potentially hazardous situation, which, if not avoided, **can result** in injury or equipment damage.
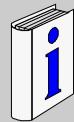
## CAUTION

**CAUTION,** used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result** in equipment damage.

**PLEASE NOTE**

The word "drive" as used in this manual refers to the controller portion of the adjustable speed drive as defined by NEC.

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

# About the Book

## At a Glance

**Document Scope**

The purpose of this document is to show you how to configure the Altivar 212 to use Modbus for monitoring and control.

**NOTE:** Read and understand this document and all related documents (see below) before installing, operating, or maintaining your ATV212.

**Validity Note**

This documentation is valid for the Altivar 212 Modbus fieldbus.

**Related Documents**

| Title of Documentation | Reference Number |
|---|---|
| ATV212 Quick Start | S1A53825 |
| ATV212 Installation manual | S1A53832 |
| ATV212 Programming manual | S1A53838 |
| ATV212 BACnet manual | S1A53845 |
| ATV212 Metasys N2 manual | S1A53846 |
| ATV212 Apogée FLN P1 manual | S1A53847 |
| ATV212 LonWorks manual | S1A53848 |
| ATV212 other option manuals: see www.schneider-electric.com | |

You can download the latest versions of these technical publications and other technical information from our website at www.schneider-electric.com.

**Product Related Information**

> ## ⚠ DANGER
>
> **UNINTENDED EQUIPMENT OPERATION**
> - Read and understand this manual before installing or operating the Altivar 212 drive.
> - Any changes made to the parameter settings must be performed by qualified personnel.
>
> **Failure to follow these instructions will result in death or serious injury.**

## ⚠⚠ DANGER

**HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH**
- Read and understand this manual before installing or operating the drive. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.
- The user is responsible for compliance with all international and national electrical code requirements with respect to grounding of all equipment.
- Many parts of this drive, including the printed circuit boards, operate at the line voltage. DO NOT TOUCH. Use only electrically insulated tools.
- DO NOT touch unshielded components or terminal strip screw connections with voltage present.
- DO NOT short across terminals PA/+ and PC/– or across the DC bus capacitors.
- Before servicing the drive:
  - Disconnect all power, including external control power that may be present.
  - Place a "DO NOT TURN ON" label on all power disconnects.
  - Lock all power disconnects in the open position.
  - WAIT 15 MINUTES to allow the DC bus capacitors to discharge.
  - Measure the voltage of the DC bus between the PA/+ and PC/– terminals to ensure that the voltage is less than 42 Vdc.
  - If the DC bus capacitors do not discharge completely, contact your local Schneider Electric representative. Do not repair or operate the drive
- Install and close all covers before applying power or starting and stopping the drive.

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

## ⚠ WARNING

**DAMAGE DRIVE EQUIPMENT**
Do not operate or install any drive or drive accessory that appears damaged.
**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

## ⚠ WARNING

**LOSS OF CONTROL**
- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop.
- 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 (1).

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

(1) 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 ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems."

# Introduction

**1**

Data exchanges give access to all Altivar 212 functions:

- Control (start, stop, reset, setpoint),
- Monitoring (status, current, voltage, thermal state...),
- Diagnostics (alarms),
- Settings,
- Configuration.

The communication port has an RJ45 and an open style connector for the connection to the network. At the physical layer, it supports 2-wire RS485 and transmission speed at 9600 or 19200 bps.

4 Modbus functions are available:

- 3 (16#03) Read Holding Registers
- 6 (16#06) Write Single Register
- 16 (16#10) Write Multiple Registers
- 43/14 (16#2B/0E) Read Device Identification

Function 3 has a restricted implementation:

- with length 1 it permits to read any parameter of the drive, one by one, see page 33.
- with lengths 1 to 5 it permits to read a particular block of 1 to 5 indirect parameters. These 5 parameters can be configured through the operation panel to relevant monitoring parameters, see page 34.

Function 16 has a restricted implementation:

- with length 1 it permits to write any writable parameter of the drive, one by one, see page 37.
- with length 1 to 2 it permits to write a particular block of 1 to 2 indirect parameters. These 2 parameters can be configured through the operation panel to relevant control parameters, see page 38.

# Hardware setup
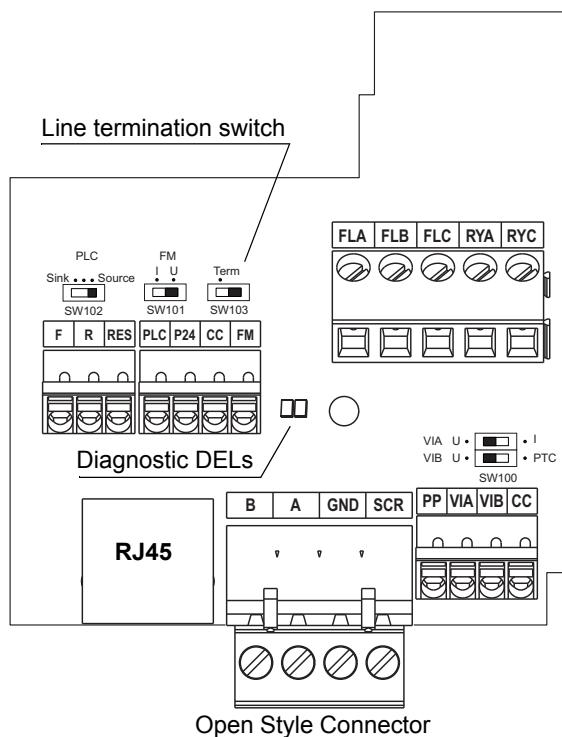
<div style="text-align:right">**2**</div>

**What's in this Chapter?**

This chapter contains the following topics:

**Pin out of the Open Style Modbus connector**

| Open Style Connector (screwcage plug style) | |
|---|---|
| **B** | + |
| **A** | – |
| **GND** | Common |
| **SCR** | Shield |

**Note:** It is possible to connect two wires inside one cage in order to be compliant to daisy chain requirements.

**Cross section:**
0.2 - 2.5 mm² / AWG 24-12

**Tightening torque:**
0.5-0.6 Nm / 4.4-5.3 lb/In.

Line termination switch

Diagnostic DELs

RJ45

Open Style Connector

---

## ⚠ DANGER

**UNINTENDED EQUIPMENT OPERATION**
- Modify only the setting of the switches when the product is switched off.
- Do not change the setting of the SW102 unless your system is wired for SINK logic.

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

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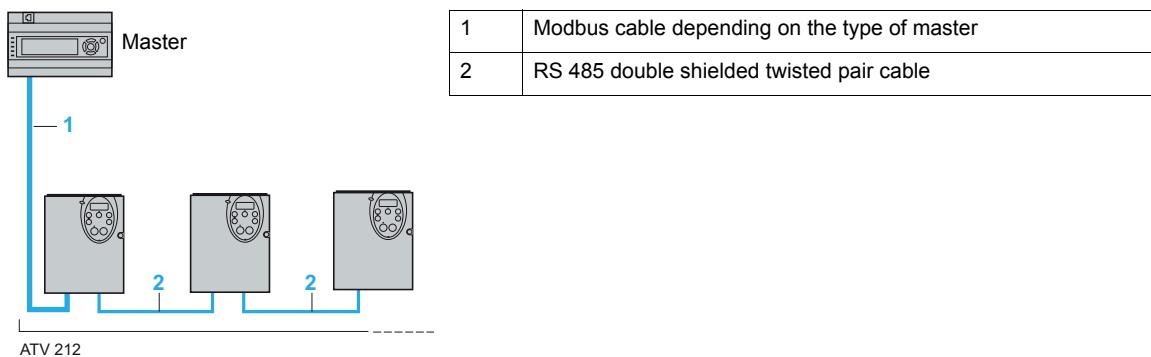
## ⚠ CAUTION

**RISK OF BODY INJURY**
Use a screwdriver to change the position of the switches.

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

## Connection via Open Style wiring system



| 1 | Modbus cable depending on the type of master |
|---|---|
| 2 | RS 485 double shielded twisted pair cable |
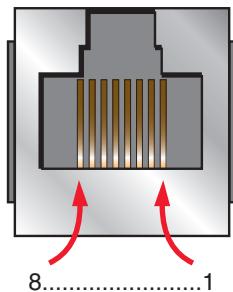
## Open Style Reference

Modbus serial link connection is carried out using RS 485 double shielded twisted pair cables, supplied without connector (reference: TSX CSA 100). Maximum length is 100 m (328 ft). The ATV212 drive includes a line termination as standard. Set switch SW103 to Term to connect the internal 120 $\Omega$ termination resistor.

## Pin out of the RJ45 Modbus connector

View from underneath    The following table describes the pin out of the ATV212 RJ45 connector.



8.........................1

| Pin | Signal |
|-----|--------|
| 1 | Not connected |
| 2 | Common (common of the signal and power supply) |
| 3 | Not connected |
| 4 | D1 (Modbus name) or B (EIA / TIA485 name) |
| 5 | D0 (Modbus name) or A (EIA / TIA485 name) |
| 6 | Not connected |
| 7 | VP, 10 Vdc (supply for RS232/RS485 converter or graphic display option) |
| 8 | Common (common of the signal and power supply) |
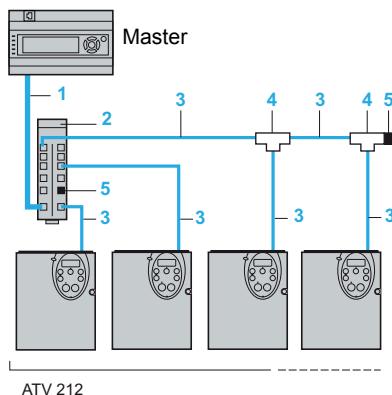
## ⚠ CAUTION

**RISK OF DAMAGE TO THE DRIVE**
Use wiring cables or taps that connect only signals D0, D1 and common.
**Failure to follow this instruction can result in injury or equipment damage.**

## Connection via RJ45 wiring system



| 1 | Modbus cable depending on the type of master |
|---|---|
| 2 | Modbus splitter box |
| 3 | Modbus drop cables |
| 4 | Modbus T-junction box |
| 5 | Line terminators |

### Description

RJ45 is factory set to connect the graphic display option.

Use the open style connector to connect the drive to Modbus fieldbus.

Using RJ45 to connect Modbus fieldbus is still possible but requires to modify parameter [Com channel choice] $F\,8\,0\,7$ value. Set $F\,8\,0\,7$ to $0$ [RJ45].

## RJ45 Reference

### Connection accessories

| Description | | Reference |
|---|---|---|
| Modbus splitter block | 10 RJ45 connectors and 1 screw terminal | LU9 GC3 |
| Modbus T-junction boxes | With integrated cable (0.3 m) | VW3 A8 306 TF03 |
| | With integrated cable (1 m) | VW3 A8 306 TF10 |
| Line terminators | For RJ45 connector | R = 120 Ω, C = 1 nF | VW3 A8 306 RC |
| | | R = 150 Ω | VW3 A8 306 R |

### Connecting cables

| Description | Length m | Connectors | Reference |
|---|---|---|---|
| Cables for Modbus bus | 3 | 1 RJ45 connector and 1 stripped end | VW3 A8 306 D30 |
| | 0.3 | 2 RJ45 connectors | VW3 A8 306 R03 |
| | 1 | 2 RJ45 connectors | VW3 A8 306 R10 |
| | 3 | 2 RJ45 connectors | VW3 A8 306 R30 |
| RS 485 double shielded twisted pair cables | 100 | Supplied without connector | TSX CSA 100 |
| | 200 | Supplied without connector | TSX CSA 200 |
| | 500 | Supplied without connector | TSX CSA 500 |

| Type of master | Master interface | Modbus connection accessories for RJ45 wiring system | |
|---|---|---|---|
| | | Description | Reference |
| Twido PLC | Adaptor or mini-DIN RS485 interface module | 3 m cable fitted with a mini-DIN connector and an RJ45 connector | TWD XCA RJ030 |
| | Adaptor or screw terminal RS485 interface module | 3 m cable fitted with an RJ45 connector and stripped at the other end | VW3 A8 306 D30 |
| TSX Premium PLC | TSX SCY 11601 or TSX SCY 21601 module (SUB-D 25 socket) | Cable fitted with a SUB-D 25 connector and stripped at the other end (for connection to the screw terminals of the LU9GC3 splitter block) | TSX SCY CM 6030 |
| | PCMCIA card (TSX SCP114) | Stripped cable | TSX SCP CM 4030 |

| Ethernet bridge (TSX ETG 100) | Screw terminal RS485 | 3 m cable fitted with an RJ45 connector and stripped at the other end | VW3 A8 306 D30 |
|---|---|---|---|
| Serial port PC | Male SUB-D 9 RS232 serial port PC | RS232/RS485 converter and<br>3 m cable fitted with an RJ45 connector and stripped at the other end (for connection to the screw terminals of the LU9GC3 splitter block) | TSX SCA 72 and VW3 A8 306 D30 |
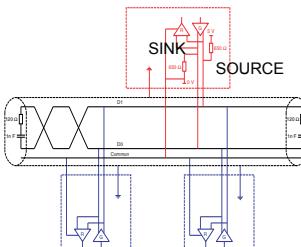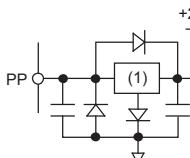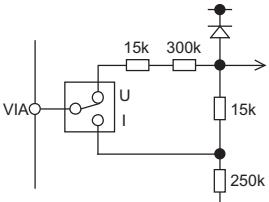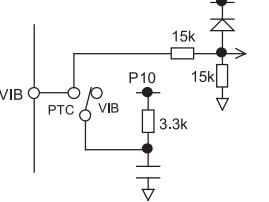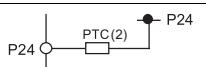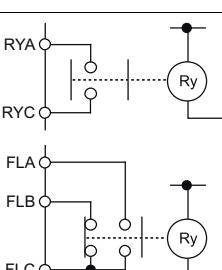
## Protection Against Interference

- Use the Schneider Electric cable with 2 pairs of shielded twisted conductors (reference: TSXCSA100, TSXCSA200, TSXCSA500).
- Keep the Modbus cable separated from the power cables (30 cm (11.8 in.) minimum).
- Make any crossovers of the Modbus cable and the power cables at right-angles, if necessary.
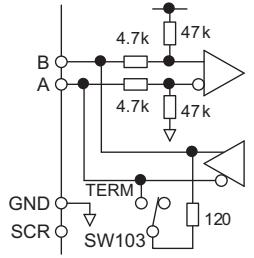
For more information, please refer to the TSX DG KBL E manual: "Electromagnetic compatibility of industrial networks and fieldbuses".

## Description of terminals

| Terminal symbol | Function | Electrical specifications | Internal circuits |
|---|---|---|---|
| F | Multifunctional programmable logic input.<br>It has forward rotation function in default setting.<br>ON: forward rotation drive<br>OFF: slowdown and stop | Input for voltage-free contact 24 Vdc, 5 mA or less.<br>SINK/SOURCE can be selected with SW102. |  |
| R | Multifunctional programmable logic input.<br>It has Preset speed command input 1 in default setting. | | |
| RES | Multifunctional programmable logic input.<br>It has Fault Reset in default setting | | |
| PP | Voltage supply for reference potentiometer. | Voltage: 10 Vdc<br>Max current: 10 mA<br>Protected against short circuits. |  |
| VIA | Switch-configurable voltage or current analog input using SW100.<br>It has speed setpoint function in the default setting. (0 to 50 Hz frequency with 0 to 10 Vdc in voltage or with 0 to 20 mA in current input). In addition,This analog input is also configurable as a logic input. | Voltage: 10 Vdc<br>Internal impedance: 30 k$\Omega$<br>Current: 0 - 20 mA |  |
| VIB | Multifunction programmable analog input.<br>It has speed setpoint function in the default setting (0 to 50 Hz frequency with 0 to 10 Vdc input). In addition, this terminal can be used as PTC (2) input by setting switch SW100 and the parameters [Mot PTC selection] $F645$ and [PTC resistor value] $F646$. | Voltage: 10 Vdc<br>Internal impedance: 30 k$\Omega$ |  |
| CC | Control circuit equipotential terminal | - | |
| PLC | This terminal is only active when the switch (SINK-SOURCE) is on PLC position. It allow to manage external sink or source with static outputs. PLC shall be connected to 0V (CC terminal) or +24V according to the type of outputs | Max. voltage: 50 Vdc | |
| P24 | 24 Vdc power supply output | Voltage: 24 Vdc, 50 mA |  |
| FM | Switch-configurable voltage or current analog output using SW101. | Voltage analog output: 0...10 Vdc<br>Minimum load impedance: 470 $\Omega$<br>Current analog output: 0...20 mA<br>Maximum load impedance: 550 $\Omega$ | |
| FLA<br>FLB<br>FLC<br>RYA<br>RYC | Multifunctional programmable relay contact outputs.<br>Default setting is set to detect the activation of the drive protection function.<br>Contact across FLA-FLC is closed and FLB-FLC is open during normal operation. RYA -RYC is open. | Voltage: 30 Vdc, 0.5 A<br>250 Vac, 1A<br>(cos $\varphi$ = 1)<br>Voltage: 250 Vac, 0.5A<br>(cos $\varphi$ = 0.4) |  |

(1) Voltage conversion
(2) PTC (Positive Temperature Coefficient): Resettable thermal fuse resistor for over current protection.

| B<br>A<br>GND | BACnet open style connector | RS485 transmission data, reception data. |  |
|---|---|---|---|
| SCR | BACnet communication shield terminal.<br>This terminal is not connected to other circuits in the board.<br>Ground this terminal in a location separated from the ground of the power line. | | |

# Configuration

**3**

**What's in this Chapter?**

This chapter contains the following topics:

The settings of communication-related parameters can be changed from the operation panel or from Modbus (PLC, computer or controller) or from graphic display option.

Note that there are two types of parameters: parameters whose settings take effect immediately after the setting and parameters whose settings do not take effect until the drive is turned back on or reset. In the table below, these 2 types are mentioned in the column "valid" by "After setting" and "After power cycle".

# Configuration of the communication parameters

## Access to the parameters

All parameters are accessible in the [COMMUNICATION MENU] $\digamma\varepsilon\varpi\varpi$ submenu of [PROGRAMMING MENU] Programming mode.

| ⚠ DANGER |
|---|
| **UNINTENDED EQUIPMENT OPERATION**<br>Refer to «Serial communication parameters» in the Altivar 212 Programming manual, for more information on how to set these serial communication parameters.<br>**Failure to follow these instructions will result in death or serious injury.** |

## Description

| Parameters | Modbus address | Adjustment range | Default setting | Valid after |
|---|---|---|---|---|
| [Mdb RJ45 baud] (F800)<br>Communication Modbus RJ45 Baud rate | 2048<br>16#800 | 0 [9600 bps]<br>1 [19200 bps] | 1 | Power cycle |
| [Mdb RJ45 parity] (F801)<br>Communication Modbus RJ45 Parity | 2049<br>16#801 | 0 [No] (No parity)<br>1 [Even] (Even parity)<br>2 [Odd] (Odd parity) | 1 | Power cycle |
| [Modbus address] (F802)<br>This address is used whatever the port used. | 2050<br>16#802 | 0 ... 247 | 1 | Setting |
| [Com. time out] (F803)<br>Communication time out | 2051<br>16#803 | 0 or<br>1 ... 100 seconds | 3 | Setting |
| [Com channel choice] (F807)<br>Communication channel choice | 2055<br>16#807 | 0 [RJ45]<br>1 [Open style] | 1 | Setting |
| [Mdb network baud] (F820)<br>Modbus network baud rate | 2080<br>16#820 | 0 [9600 bps]<br>1 [19200 bps] | 1 | Power cycle |
| [Mdb network parity] (F821)<br>Modbus network parity | 2081<br>16#821 | 0 [No] (No parity)<br>1 [Even] (Even parity)<br>2 [Odd] (Odd parity) | 1 | Power cycle |
| [Network protocol] (F829)<br>Communication Network protocol selection | 2089<br>16#829 | 1 ... 5<br>1 [Mdb RTU] | 1 | Power cycle |

**Notes:**

- Baud rate and parity bit should be uniform inside the same network.
- Modbus address should not be duplicate inside the same network.
- Stop bit isn't configurable. ATV212 Tx is 2 stop bit, Rx is 1 or 2 stop bits. This permits a good comunication with Master in 1 and 2 stop bits.
- F800 and F801 parameters are used to define the baudrate and parity of RJ45 port.
- F820 and F821 parameters are used to define the baudrate and parity of Open style connector port.
- F802 and F803 parameters are used to define the modbus address and communication time out for both ports (RJ45 et Open style connector). Set F802 between 1 to 247 (address 0 is not active).
- F807 parameter enables to select the communication command channel: RJ45 or Open style connector. The port not set as the communication command channel may be used for monitoring purposes to check that the setting change on F807 was effectively taken into account.

## Configuration of the control source

The Altivar 212 can receive commands and setpoint from the Modbus network or from the terminals (F, R, RES, VIA, VIB). In the default configuration, both commands and setpoint come from the terminals.

The LOC/REM key of the operation panel is available to switch the control to the operation panel. The inputs F, R or RES can be configured to switch the control from the Modbus network to the terminals.

Different usual possibilities are described in the chapters below:

- Control from the Modbus network,
- Control from the terminals, monitoring from the Modbus network,
- Control from the Modbus network or the terminals, switched via Modbus,
- Command from the Modbus network, setpoint from the Modbus network or the terminals switched to by a logic input.

Refer to these examples.

### Control by the Modbus network

The commands and the setpoint come from the Modbus network. The signals wired on the terminals are ignored. The LOC/REM key is valid.
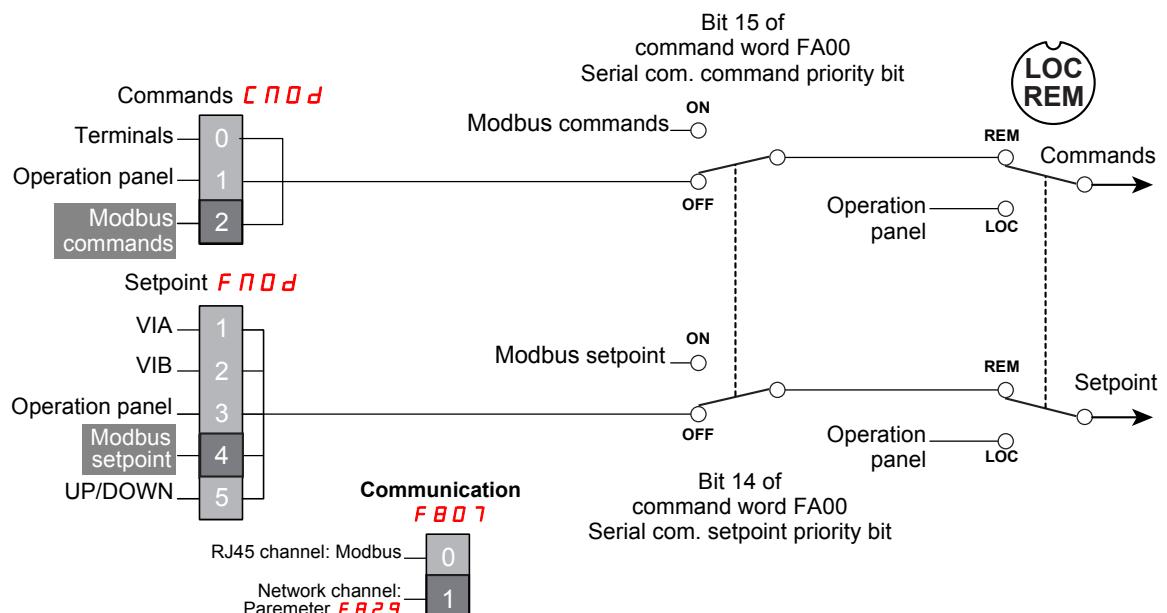
Below is the list of parameters that must be configured.

#### Access to the parameters

| Parameters | Location |
|---|---|
| [Command mode sel] (*C N O d*)<br>[Frequency mode sel] (*F N O d*) | [PROGRAMMING MENU] Programming mode |
| Other parameters | [COMMUNICATION MENU] *C O N* submenu of [PROGRAMMING MENU] Programming mode. |

#### Description

| Parameters | Modbus address | Setting | Default setting | Valid after |
|---|---|---|---|---|
| [Command mode sel] (*C N O d*)<br>Remote mode start/stop control | 3<br>16#3 | *2* [Communication]<br>Serial communication | 0 | Setting |
| [Frequency mode sel] (*F N O d*)<br>Remote mode primary speed reference source | 4<br>16#4 | *4* [Serial com ref.]<br>Serial communication | 1 | Setting |
| [Com channel choice] (*F 8 O 7*)<br>Communication channel selection | 2055<br>16#807 | *0* [RJ45] or<br>*1* [Open style] | 1 | Setting |
| [Network protocol] (*F 8 2 9*)<br>Communication Network protocol selection | 2089<br>16#829 | *1* [Modbus-RTU protocol] | 1 | Power cycle |

**Control by the terminals, monitoring by the Modbus network**

The commands and the setpoint come from the terminals.

The Altivar 212 is monitored via the Modbus network.

The LOC/REM key is valid.
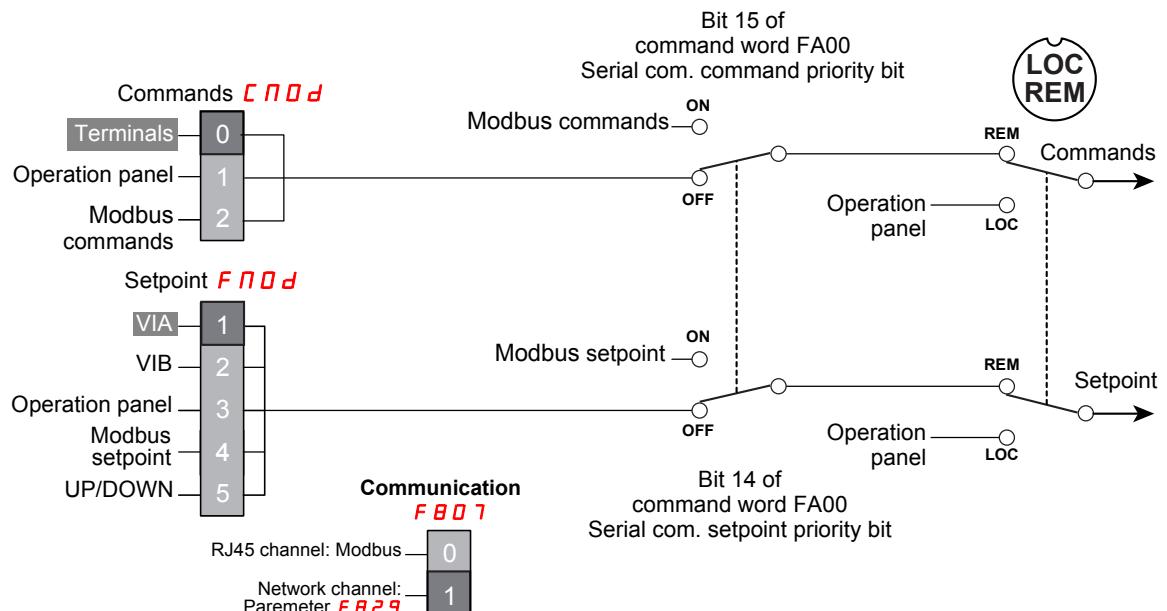
Below is the list of parameters that must be configured.

**Access to the parameters**

| Parameters | Location |
|---|---|
| [Command mode sel] (C П O d)<br>[Frequency mode sel] (F П O d) | [PROGRAMMING MENU] Programming mode |
| [Com channel choice] (F 8 O 7) | [COMMUNICATION MENU] C O П submenu of<br>[PROGRAMMING MENU] Programming mode. |

**Description**

| Parameters | Modbus address | Setting | Default setting | Valid after |
|---|---|---|---|---|
| [Command mode sel] (C П O d)<br>Remote mode start/stop control | 3<br>16#3 | O [Logic inputs]<br>Control terminal logic inputs | 0 | Setting |
| [Frequency mode sel] (F П O d)<br>Remote mode primary speed reference source | 4<br>16#4 | I [Ref source VIA]<br>The source of the drive's<br>speed reference is VIA. | 1 | Setting |
| [Com channel choice] (F 8 O 7)<br>Communication channel selection | 2055<br>16#807 | O [RJ45] or<br>I [Open style] | 1 | Setting |

**Control by the Modbus network or the terminals, switched via Modbus**

The commands come from the terminals if bit 15 of the command word [Command from serial communication] (*F A 0 0*) is "OFF" (value 0).

The commands come from the Modbus network if bit 15 of the command word (*F A 0 0*) is "enabled" (value 1).

The setpoint comes from the terminals if bit 14 of the command word (*F A 0 0*) is "OFF" (value 0).

The setpoint comes from the Modbus network if bit 14 of the command word (*F A 0 0*) is "enabled" (value 1).

The LOC/REM key is valid.

Below is the list of parameters that must be configured.

**Access to the parameters**

| Parameters | Location |
|---|---|
| [Command mode sel] (*C M O d*)<br>[Frequency mode sel] (*F M O d*) | [PROGRAMMING MENU] Programming mode |
| [Com channel choice] (*F 8 0 7*) | [COMMUNICATION MENU] *C O M* submenu of<br>[PROGRAMMING MENU] Programming mode. |

**Description**

| Parameters | Modbus address | Setting | Default setting | Valid after |
|---|---|---|---|---|
| [Command mode sel] (*C M O d*)<br>Remote mode start/stop control | 3<br>16#3 | *0* [Logic inputs]<br>Control terminal logic inputs | 0 | Setting |
| [Frequency mode sel] (*F M O d*)<br>Remote mode primary speed reference source | 4<br>16#4 | *1* [Ref source VIA]<br>The source of the drive's speed reference is VIA. | 1 | Setting |
| [Com channel choice] (*F 8 0 7*)<br>Selection of Communication channel: via RJ45 or Open style connector port | 2055<br>16#807 | *0* [RJ45] or<br>*1* [Open style] | 1 | Setting |

**Control by the Modbus network or the terminals switched to by a logic input**

The commands and the setpoint come from the Modbus network if logic input R is OFF.

The commands and the setpoint come from the terminals if logic input R is ON.

The function *48* [Forced local] is assigned to the logic input R, *F 112* = *48*.
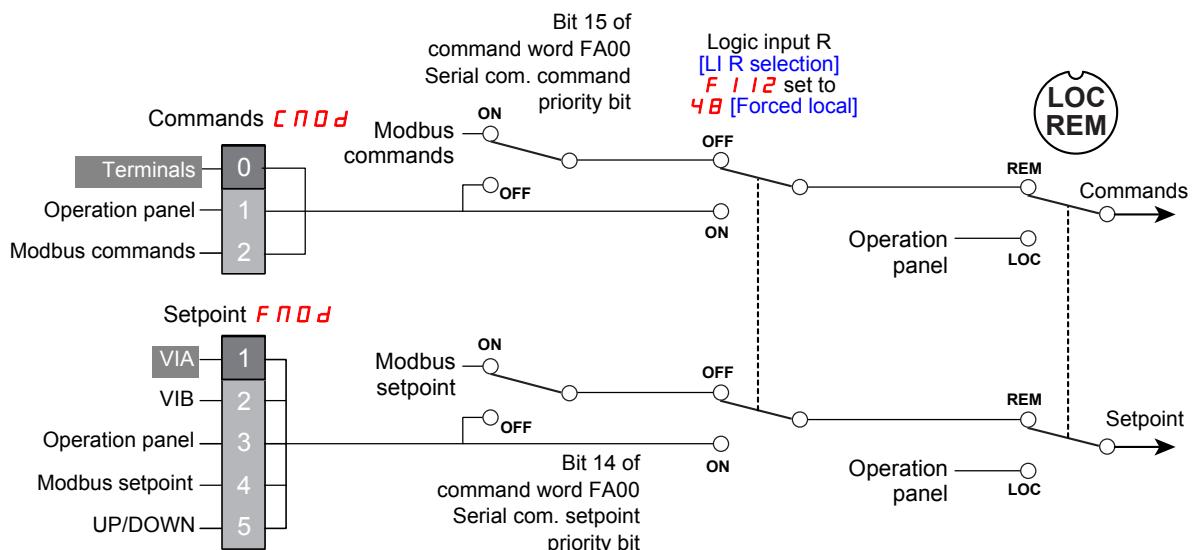
The LOC/REM key is valid.

Below is the list of parameters that must be configured.

**Access to the parameters**

| Parameters | Location |
|---|---|
| [Command mode sel] (*C П D d*)<br>[Frequency mode sel] (*F П D d*) | [PROGRAMMING MENU] Programming mode |
| [Com channel choice] (*F 112*) | [I/O MENU] *I D* submenu of [PROGRAMMING MENU] Programming mode. |
| [Com channel choice] (*F 8 D 7*) | [COMMUNICATION MENU] *C D П* submenu<br>of [PROGRAMMING MENU] Programming mode. |

**Description**

| Parameters | Modbus address | Setting | Default setting | Valid after |
|---|---|---|---|---|
| [Command mode sel] (*C П D d*)<br>Remote mode start/stop control | 3<br>16#3 | *D* [Logic inputs]<br>Control terminal logic inputs | 0 | Setting |
| [Frequency mode sel] (*F П D d*)<br>Remote mode primary speed reference source | 4<br>16#4 | *I* [Ref source VIA]<br>The source of the drive's speed reference is VIA. | 1 | Setting |
| [LI R selection] (*F 112*)<br>R logic input function | 274<br>16#112 | *48* [Forced local]: configured to<br>Forced switching from remote to local control | 6 | Setting |
| [Com channel choice] (*F 8 D 7*)<br>Selection of Communication channel: via RJ45 or Open style connector port | 2055<br>16#807 | *D* [RJ45] or<br>*I* [Open style] | 1 | Setting |

**Command by the Modbus network, setpoint by the Modbus network or the terminals switched to by a logic input**

The commands come from the Modbus network.

The setpoint comes from the Modbus network if logic input R is OFF.

The setpoint comes from the terminals if logic input R is ON.

The function *3 8* [Frequency source] is assigned to the logic input R, *F 1 12* = *3 8*.

The LOC/REM key is valid.

Below is the list of parameters that must be configured.

**Access to the parameters**

| Parameters | Location |
|---|---|
| [Command mode sel] (*C N O d*)<br>[Frequency mode sel] (*F N O d*) | [PROGRAMMING MENU] Programming mode |
| [Com channel choice] (*F 1 12*) | [I/O MENU] *I O* submenu of [PROGRAMMING MENU] Programming mode. |
| [Remote spd ref 2] (*F 2 O 7*) | [EXTENDED MENU] *F - - -* submenu of [PROGRAMMING MENU] Programming mode. |
| [Com channel choice] (*F 8 O 7*) | [COMMUNICATION MENU] *C O N* submenu of [PROGRAMMING MENU] Programming mode. |

**Description**

| Parameters | Modbus address | Setting | Default setting | Valid after |
|---|---|---|---|---|
| [Command mode sel] (*C N O d*)<br>Remote mode start/stop control | 3<br>16#3 | *2* [Communication]<br>Serial communication | 0 | Setting |
| [Frequency mode sel] (*F N O d*)<br>Remote mode primary speed reference source | 4<br>16#4 | *4* [Serial com ref.]<br>Serial communication | 1 | Setting |
| [LI R selection] (*F 1 12*)<br>R logic input function | 274<br>16#112 | *3 8* [Frequency source]<br>Configured to Frequency reference source switching | 6 | Setting |
| [Remote spd ref 2] (*F 2 O 7*)<br>Remote mode secondary speed reference source that may override the source selected by *F N O d* | 519<br>16#207 | *1* [VIA]: VIA | 2 | Setting |
| [Com channel choice] (*F 8 O 7*)<br>Selection of Communication channel: via RJ45 or Open style connector port | 2055<br>16#807 | *0* [RJ45] or<br>*1* [Open style] | 1 | Setting |

**Commands** *CMOd*

Terminals 0
Operation panel 1
Modbus commands 2

Modbus commands ON / OFF

Bit 15 of command word FA00 Serial com. command priority bit

LOC REM

REM

LOC
Operation panel

Command

**Setpoint** *FMOd*

VIA 1
VIB 2
Operation panel 3
Modbus setpoint 4
UP/DOWN 5

Bit 14 of command word FA00 Serial com. setpoint priority bit

Modbus setpoint ON / OFF

Logic input R [LI R selection] *F112* set to *38* [Frequency source] or *F200* [Auto/man speed ref]

OFF
ON

REM
LOC
Operation panel

Setpoint

**Setpoint** *F207*

VIA 1
VIB 2
Operation panel 3
Modbus setpoint 4
UP/DOWN 5

Modbus setpoint ON

Bit 14 of command word FA00 Serial com. setpoint priority bit

OFF

*F807* [Com channel choice]

RJ45 channel: Modbus 0
Network channel: 1

parameter *F829* [Network protocol]

**Complete control diagram**

Commands *CMOd*

Terminals 0
Operation panel 1
Modbus commands 2

Modbus commands ON / OFF

Bit 15 of command word FA00 Serial com. command priority bit

Logic input F, R or RES *F111* ... *F113* configured to *48* [Forced local]

REM
LOC

LOC REM

REM
LOC
Operation panel

Commands

Setpoint *FMOd*

VIA 1
VIB 2
Operation panel 3
Modbus setpoint 4
UP/DOWN 5

Modbus setpoint ON / OFF

Bit 14 of command word FA00 Serial com. setpoint priority bit

Logic input F, R or RES *F111* ... *F113* configured to *38* [Frequency source]

OFF
ON

REM
LOC

REM
LOC
Operation panel

Setpoint

Setpoint *F207*

VIA 1
VIB 2
Operation panel 3
Modbus setpoint 4
UP/DOWN 5

Modbus setpoint ON

Bit 14 of command word FA00 Serial com. setpoint priority bit

OFF

*F807* [Com channel choice]

RJ45 channel: Modbus 0
Network channel: 1

parameter *F829* [Network protocol]

# Configuration of the indirect blocks

## Configuration

These parameters configure the Modbus functions "Read indirect block (3)", page 34 and "Write indirect block (16)", page 38.

### Access to the parameters

All parameters are accessible in the [COMMUNICATION MENU] *C O M* submenu of [PROGRAMMING MENU] Programming mode.

### Description

| Parameters | Modbus address | Adjustment range | Default setting | Valid after |
|---|---|---|---|---|
| [Block write data 1] (*F B 7 0*) | 2160<br>16#870 | *0* [No select]: No selection<br>*1* [Command word 1]<br>*2* [Command word 2]<br>*3* [Frequency Setpoint]<br>*4* [Relay command]: Ouput data on the terminal board<br>*5* [FM command]: Analog output for communication<br>*6* [Speed Setpoint] | 0 | Power cycle |
| [Block write data 2] (*F B 7 1*) | 2161<br>16#871 | | | |
| [Block read data 1] (*F B 7 5*) | 2165<br>16#875 | *0* [No select]: No selection<br>*1* [Status info]<br>*2* [Freq. out]: Output frequency<br>*3* [Motor current]: Ouput current<br>*4* [Ouput volt]: Ouput voltage<br>*5* [Alarm info]: Alarm information<br>*6* [PID feedback value]<br>*7* [Input term. mon]: Input terminal board monitor<br>*8* [Out term. mon]: Output terminal board monitor<br>*9* [VIA monitor]: VIA terminal board monitor<br>*10* [VIB monitor]: VIB terminal board monitor<br>*11* [Mot speed mon.]: Ouput motor speed monitor | 0 | Power cycle |
| [Block read data 2] (*F B 7 6*) | 2166<br>16#876 | | | |
| [Block read data 3] (*F B 7 7*) | 2167<br>16#877 | | | |
| [Block read data 4] (*F B 7 8*) | 2168<br>16#878 | | | |
| [Block read data 5] (*F B 7 9*) | 2169<br>16#879 | | | |

# Configuration of the communication interruption

## Configure the Modbus time out

A communication detected fault (*E r r 5* and *E r r 8*) is triggered if the Altivar 212 does not receive any valid Modbus requests at its address within a predefined time period (time out) set in the [Com. time out] (*F 8 0 3*) parameter. The timer starts when the communication has been established for the first time (valid frame, drive address matches). Any Modbus request function is taken into account to reactivated the timer (read, write and identification).

### Access to the parameter

This parameter is accessible in the [COMMUNICATION MENU] *C O П* submenu of [PROGRAMMING MENU] Programming mode.

### Description

| Parameter | Modbus address | Setting | Unit | Default setting | Valid after |
|---|---|---|---|---|---|
| [Com. time out] (*F 8 0 3*) Communication time out | 2051 16#803 | *0*: Communication detection disabled *1* ... *1 0 0*: 1 to 100 seconds | s | 3 | Setting |

---

### ⚠ WARNING
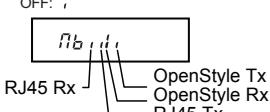
**LOSS OF CONTROL**
- If *F 8 0 3* is set to 0, communication control will be inhibited.
- For safety reasons, inhibiting the communication interruption detection should be restricted to the debug phase or to special applications.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---
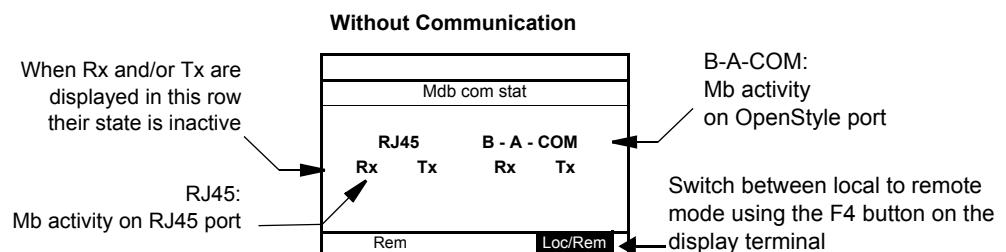
## Monitoring the Modbus communication status

Modbus communication status are displayed in Monitoring mode. This parameter enables to check the modbus communication on RJ45 and OpenStyle port.

### On the embedded display terminal

| Display example | Display on graphic display option | Description |
|---|---|---|
| *П b ı ı ı* | [Mdb com stat] Modbus communication status | ON: *ı* OFF: *ı*  RJ45 Rx — *П b ı ı ı* — OpenStyle Tx / OpenStyle Rx / RJ45 Tx |

### On the graphic display terminal

**Without Communication**



When Rx and/or Tx are displayed in this row their state is inactive

RJ45: Mb activity on RJ45 port

B-A-COM: Mb activity on OpenStyle port

Switch between local to remote mode using the F4 button on the display terminal

**Example: With Communication on RJ45 port**

**Configure the drive behaviour**

The drive trips in *Err5* [Com RJ45 fault] or *Err8* [Network error fault] if the communication was established and the card no longer receives messages from the network.

The response of the drive in the event of a BACnet communication interruption can be configured by the parameter [Com. fault setting] *FBS1*.

**Access to the parameter**

This parameter is accessible in the [COMMUNICATION MENU] *COM* submenu of [PROGRAMMING MENU] Programming mode.

**Description**

| Parameter | Modbus address | Setting | Default setting | Valid after |
|-----------|----------------|---------|-----------------|-------------|
| [Com. fault setting] (*FBS1*) Communication detected fault setting | 2129 16#851 | *0* [Ramp stp (F/Cmod)] *1* [No active] *2* [Ramp stop] *3* [Freewheel] *4* [Err5 or Err8] | 4 | Setting |

| ⚠ WARNING |
|-----------|
| **LOSS OF CONTROL** |
| If *FBS1* is set to *1*, communication control will be inhibited. |
| For safety reasons, inhibiting the communication interruption detection should be restricted to the debug phase or to special application. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

| ⚠ WARNING |
|-----------|
| **LOSS OF CONTROL** |
| Know and understand the setting of parameter *FBS1*. This parameter controls the behavior of the drive in the event of a network communication loss. If the value of *FBS1* is *0*, *1*, *2*, or *3*, the drive will not trip on an *Err8*. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

# Modbus services

**4**

**What's in this Chapter?**

This chapter contains the following topics:

## Principle of the Modbus protocol
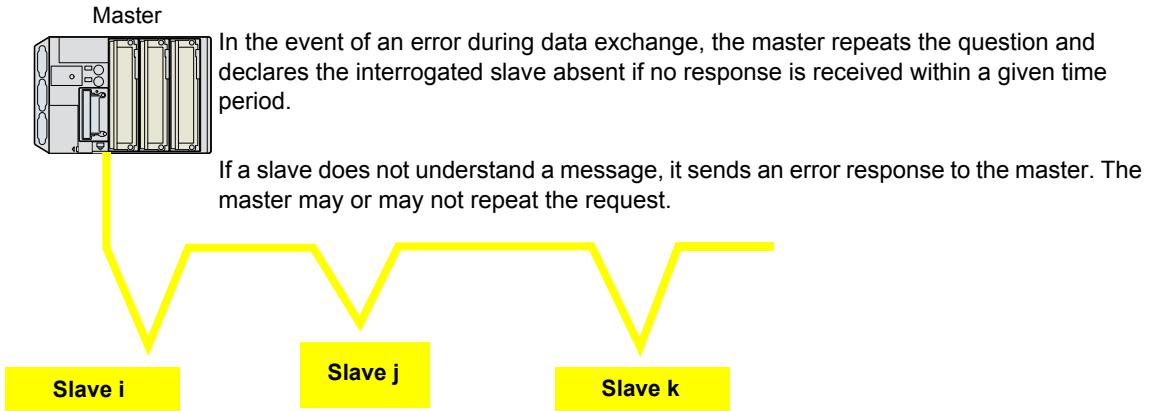
The Modbus protocol is a master-slave protocol.

Only one device can transmit on the line at any one time.

The master manages the exchanges and only it can take the initiative.

It interrogates each of the slaves in succession.
No slave can send a message unless it is invited to do so.

Master

In the event of an error during data exchange, the master repeats the question and declares the interrogated slave absent if no response is received within a given time period.

If a slave does not understand a message, it sends an error response to the master. The master may or may not repeat the request.

Slave i

Slave j

Slave k

Two types of dialog are possible between master and slaves:

- The master sends a request to a slave and waits for it to respond. The request contains the slave address (1 ... 247).
- Broadcast: the master sends a request to all slaves. Slaves do not answer. The value of the slave address is 0.

Direct slave-to-slave communications are not possible.

For slave-to-slave communication, the master's application software must therefore be designed to interrogate one slave and send back data received to the other slave.

## RTU mode

ATV212 supports RTU mode.

The Modbus RTU frame contains no message header byte, nor end of message bytes.
It is defined as follows:

| Slave address | Function code | Data | CRC16 |
|---|---|---|---|

The data is transmitted in binary code.

CRC16: Cyclic redundancy check parameter.

The end of the frame is detected on a silence greater than or equal to 3 characters.

The master must not introduce a space of more than 3.5 characters in a frame; otherwise the drive may recognize it as a start of new frame.

## Modbus functions available

The following table indicates which Modbus functions are managed by the Altivar 212 and specifies their limits.

The "read" and "write" functions are defined from the point of view of the master.

| Code | Function name | Size of data | Altivar 212 function name | Broadcast |
|---|---|---|---|---|
| 3 = 16#03 | Read Holding Registers | 1 object | Read one word | Yes |
| | | 1 ... 5 objects | Read indirect block | Yes |
| 6 = 16#06 | Write Single Register | 1 objects | | Yes |
| 16 = 16#10 | Write Multiple Registers | 1 object | Write one word | Yes |
| | | 2 objects | Write indirect block | Yes |
| 43/14 = 16#2B/0E | Read Device Identification | 3 objects | | No |

## Read one word (03)

### Function 3, quantity = 1

One word function permits to read one parameter value. All parameter of the Altivar 212 can be read.

Request:

| Slave no. | Function code | Starting address | | Quantity of registers (fixed) | | CRC16 | |
|---|---|---|---|---|---|---|---|
| | 03 | Hi | Lo | 00 | 01 | Lo | Hi |
| 1 byte | 1 byte | 2 bytes | | 2 bytes | | 2 bytes | |

Response:

| Slave no. | Function code | Byte count | Register value | | CRC16 | |
|---|---|---|---|---|---|---|
| | 03 | | Hi | Lo | Lo | Hi |
| 1 byte | 1 byte | 1 byte | 2 bytes | | 2 bytes | |

Error response:

| Slave no. | Function code | Exception code | CRC16 | |
|---|---|---|---|---|
| | 83 | | Lo | Hi |
| 1 byte | 1 byte | 1 byte | 1 byte | 1 byte |

**Example:** Read [Output frequency] (F d 0 0) on Altivar 212 at slave address 1

Request:

| 01 | 03 | FD 00 | 00 01 | B5 A6 |
|---|---|---|---|---|

Response:

| 01 | 03 | 02 | 17 70 | B6 50 |
|---|---|---|---|---|

**Example:** Invalid read of 2 words

Request:

| 01 | 03 | FD 00 | 00 02 | F5 A7 |
|---|---|---|---|---|

Error response:

| 01 | 83 | 03 | 01 31 |
|---|---|---|---|

# Read indirect block (3)

## Function 3, quantity = 1 ... 5

The Read indirect block function permits to read 1 to 5 parameters. These parameters can be chosen by parameters F875 ... F879 (refer to "Configuration of the indirect blocks", page

## Access to the parameter

This parameter is accessible in the [COMMUNICATION MENU] *C o M* submenu of [PROGRAMMING MENU] Programming mode.

## Description

| Parameters | Modbus address | Adjustment range | Default setting | Valid after |
|---|---|---|---|---|
| [Block read data 1] (*F 8 7 5*) | 2165 16#875 | *0* [No select]: No selection | | |
| [Block read data 2] (*F 8 7 6*) | 2166 16#876 | *1* [Status info] | | |
| [Block read data 3] (*F 8 7 7*) | 2167 16#877 | *2* [Freq. out]: Output frequency *3* [Motor current]: Ouput current *4* [Ouput volt]: Ouput voltage *5* [Alarm info]: Alarm information *6* [PID feedback value] | 0 | Power cycle |
| [Block read data 4] (*F 8 7 8*) | 2168 16#878 | *7* [Input term. mon]: Input terminal board monitor *8* [Out term. mon]: Output terminal board monitor *9* [VIA monitor]: VIA terminal board monitor | | |
| [Block read data 5] (*F 8 7 9*) | 2169 16#879 | *10* [VIB monitor]: VIB terminal board monitor *11* [Mot speed mon.]: Ouput motor speed monitor | | |

Request:

| Slave no. | Function code 03 | Starting address | | Quantity of registers | | CRC16 | |
|---|---|---|---|---|---|---|---|
| | | Hi 18 (fixed) | Lo 75 (fixed) | Hi 00 | Lo 02 to 05 | Lo | Hi |
| 1 byte | 1 byte | 2 bytes | | 2 bytes | | 2 bytes | |

Response:

| Slave no. | Function code 03 | Byte count | First register value | | ------- | Last register value | | CRC16 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Hi | Lo | | Hi | Lo | Lo | Hi |
| 1 byte | 1 byte | 1 byte | 2 bytes | | | 2 bytes | | 2 bytes | |

Error response:

| Slave no. | Function code 83 | Exception code | CRC16 | |
|---|---|---|---|---|
| | | | Lo | Hi |
| 1 byte | 1 byte | 1 byte | 1 byte | |

**Example**: Read indirect block in an drive with slave address 1.

Configuration parameters:

[Block read data 1] (*F 8 7 5*) = *1*: [drive Status] (*F d 0 1*)

[Block read data 2] (*F 8 7 6*) = *2*: [Output frequency] (*F d 0 0*)

[Block read data 3] (*F 8 7 7*) = *3*: [Output current] (*F E 0 3*)

[Block read data 4] (*F 8 7 8*) = *4*: [Output voltage] (*F E 0 5*)

[Block read data 5] (*F 8 7 9*) = *5*: [Alarm code] (*F C 9 1*)

- Read indirect block of 5 parameters:

| Request: | 01 | 03 | 18 75 | 00 05 | 92 B3 | | | |
|---|---|---|---|---|---|---|---|---|

| Response: | 01 | 03 | 0A | 64 04 | 17 70 | 00 00 | 26 FB | 00 80 | 1E 29 |
|---|---|---|---|---|---|---|---|---|---|

- Read indirect block of 2 parameters:

Request:

| 01 | 03 | 18 75 | 00 02 | D3 71 |
|----|----|-------|-------|-------|

Response:

| 01 | 03 | 04 | 64 04 | 17 70 | AA D6 |
|----|----|----|-------|-------|-------|

- Error response on invalid starting address:

Request:

| 01 | 03 | 18 76 | 00 02 | 23 71 |
|----|----|-------|-------|-------|

Response:

| 01 | 83 | 03 | 01 31 |
|----|----|----|-------|

- Error response on invalid quantity of registers:

Request:

| 01 | 03 | 18 75 | 00 06 | D2 B2 |
|----|----|-------|-------|-------|

Response:

| 01 | 83 | 03 | 01 31 |
|----|----|----|-------|

**Note:** Reading values of parameters F875 to F879. Value of parameter F87● can be read by reading the address 187●.
Example for parameter F875:
0875: parameter assignment
1875: parameter value

## Write Single Register (6)

The Write Single Register function permits to write value of one parameter. Not all Altivar 212 parameters can be written.

Request and response:

| Slave no. | Function code 06 | Register address | | Register value | | CRC16 | |
|---|---|---|---|---|---|---|---|
| | | Hi | Lo | Hi | Lo | Lo | Hi |
| 1 byte | 1 byte | 2 bytes | | 2 bytes | | 2 bytes | |

Error response:

| Slave no. | 86 | Exception code | CRC16 | |
|---|---|---|---|---|
| | | | Lo | Hi |
| 1 byte | 1 byte | 1 byte | 1 byte | |

**Example:** Write value 60 Hz to the parameter [Frequency reference from serial comm.] (F A O 1) in Altivar 212 slave 1.

Request and response:

| 01 | 06 | FA01 | 1770 | E6C6 |
|---|---|---|---|---|

**Example:** Error response due to invalid register address.

Request:

| 01 | 06 | FFFF | 0000 | 89EE |
|---|---|---|---|---|

Error response:

| 01 | 86 | 02 | C3A1 |
|---|---|---|---|

# Write multiple registers (16)

**Function 16 = 16#10, quantity =1**

This function code is used to write a block of contiguous registers (1 to approx. 120 registers). Read only parameters can't be written.

Request:

| Slave no. | Function code | Starting address | Quantity of register | | Byte count | First register value | ------- | CRC16 |
|-----------|---------------|------------------|-------------|-------------|------------|----------------------|---------|-------|
| | 10 | | 00 (fixed) | 01 (fixed) | 02 (fixed) | | | |
| 1 byte | 1 byte | 2 bytes | 2 bytes | | 1 byte | 2 bytes | | 2 bytes |

Response:

| Slave no. | Function code 10 | Starting address | Quantity of register | | CRC16 |
|-----------|------------------|------------------|-------------|-------------|-------|
| | | | 00 (fixed) | 01 (fixed) | |
| 1 byte | 1 byte | 2 bytes | 2 bytes | | 2 bytes |

Error response:

| Slave no. | Function code 90 | Exception code | CRC16 |
|-----------|------------------|----------------|-------|
| 1 byte | 1 byte | 1 byte | 2 bytes |

Refer to "Error response", page 41.

Example: Write value 60Hz in the parameter [Frequency reference from serial comm.] ( F A O 1 ) in Altivar 212 slave 1.

Request:

| 01 | 10 | FA 01 | 00 01 | 02 | 17 70 | F3 9A |
|----|----|-------|-------|----|-------|-------|

Response:

| 01 | 10 | FA 01 | 00 01 | 60 D1 |
|----|----|-------|-------|-------|

## Write indirect block (16)

Function 16 = 16#10, quantity = 2

The Write indirect block function permits to write 2 parameters. These parameters can be chosen by parameters [Block write data 1] (*F B 7 0*) and [Block write data 2] (*F B 7 1*) (refer to "Configuration of the indirect blocks", page 27).

### Access to the parameter

This parameter is accessible in the [COMMUNICATION MENU] *C O N* submenu of [PROGRAMMING MENU] Programming mode.

### Description

| Parameters | Modbus address | Adjustment range | Default setting | Valid after |
|---|---|---|---|---|
| [Block write data 1] (*F B 7 0*) | 2160 16#870 | *0* [No select]: No selection<br>*1* [Command word 1]<br>*2* [Command word 2]<br>*3* [Frequency Setpoint]<br>*4* [Relay command]: Ouput data on the terminal board<br>*5* [FM command]: Analog output for communication<br>*6* [Speed Setpoint] | 0 | Power cycle |
| [Block write data 2] (*F B 7 1*) | 2161 16#871 | | | |

Request:

| Slave no. | Function code | Starting address | | Quantity of register | | Byte count | First register value | ------- | CRC16 |
|---|---|---|---|---|---|---|---|---|---|
| 10 | | 18 (fixed) | 70 (fixed) | 00 (fixed) | 02 (fixed) | 04 (fixed) | | | |
| 1 byte | 1 byte | 2 bytes | | 2 bytes | | 1 byte | 2 bytes | | 2 bytes |

Response:

| Slave no. | Function code 10 | Starting address | | Quantity of register | | CRC16 |
|---|---|---|---|---|---|---|
| | | 18 (fixed) | 70 (fixed) | 00 (fixed) | 02 (fixed) | |
| 1 byte | 1 byte | 2 bytes | | 2 bytes | | 2 bytes |

Error response:

| Slave no. | Function code 90 | Exception code | CRC16 |
|---|---|---|---|
| 1 byte | 1 byte | 1 byte | 2 bytes |

Refer to "Error response", page 41.

**Example:** Write value 60Hz in the parameter [Frequency Command] (*F A 0 1*) and run forward command in Altivar 212 slave 1.

Configuration:

[Block write data 1] (*F B 7 0*) = *1*: [Command word 1] (*F A 0 0*)

[Block write data 2] (*F B 7 1*) = *3*: [Frequency reference from serial comm.] (*F A 0 1*)

- The Altivar 212 accepts the request:

| Request: | 01 | 10 | 18 70 | 00 02 | 04 | C4 00 | 17 70 | 6D AF |
|---|---|---|---|---|---|---|---|---|

| Response: | 01 | 10 | 18 70 | 00 02 | 43 B3 |
|---|---|---|---|---|---|

- The Altivar 212 rejects the request because it is busy or *F B 7 0* is 0:

| Request: | 01 | 10 | 18 70 | 00 02 | 04 | C4 00 | 17 70 | 6D AF |
|---|---|---|---|---|---|---|---|---|

| Response: | 01 | 90 | 04 | 4D C3 |
|---|---|---|---|

- The Altivar 212 rejects the request because of an invalid starting address:

| Request: | 01 | 10 | 18 71 | 00 02 | 04 | C4 00 | 17 70 | AC 63 |
|----------|----|----|-------|-------|----|-------|-------|-------|

| Response: | 01 | 90 | 03 | 0C 01 |
|-----------|----|----|----|-------|

- The Altivar 212 rejects the request because of an invalid quantity of registers:

| Request: | 01 | 10 | 18 70 | 00 03 | 04 | C4 00 | 17 70 | 6C 7E |
|----------|----|----|-------|-------|----|-------|-------|-------|

| Response: | 01 | 90 | 03 | 0C 01 |
|-----------|----|----|----|-------|

- · The Altivar 212 rejects the request because of an invalid byte count:

| Request: | 01 | 10 | 18 70 | 00 02 | 03 | C4 00 | 17 70 | D8 6F |
|----------|----|----|-------|-------|----|-------|-------|-------|

| Response: | 01 | 90 | 03 | 0C 01 |
|-----------|----|----|----|-------|

**Note:** Reading values of parameters F870 and F871. Value of parameter F87● can be read by reading the address 187●.
Example for parameter F870:
0870: parameter assignment
1870: parameter value

## Read Device Identification (43/14)

Function 43/14 = 16#2B/0E

Request:

| Slave no. | Function code | MEI type | Read Device Id code | Object Id | CRC16 | |
|---|---|---|---|---|---|---|
| | 2B | 0E | 01 ... 03 | 00 | Lo | Hi |
| 1 byte | 1 byte | 1 byte | 1 byte | 1 byte | 2 bytes | |

Response:

| Slave no. | Function code | MEI type | Read Device Id code | Conformity level | ------- |
|---|---|---|---|---|---|
| | 2B | 0E | 01 ... 03 | 01 | |
| 1 byte | 1 byte | 1 byte | 1 byte | 1 byte | |

| ------- | More follows | Next object Id | Number of objects | ------- |
|---|---|---|---|---|
| | 00 | 00 | 03 | |
| | 1 byte | 1 byte | 1 byte | |

| ------- | Id of object no. 1 | Length of object no. 1 | Value of object no. 1 | ------- |
|---|---|---|---|---|
| | 00 | 0D | "Télémécanique" | |
| | 1 byte | 1 byte | 13 bytes | |

| ------- | Id of object no. 2 | Length of object no. 2 | Value of object no. 2 | ------- |
|---|---|---|---|---|
| | 01 | 0D | "ATV212H075M3X" | |
| | 1 byte | 1 byte | 13 bytes | |

| ------- | Id of object no. 3 | Length of object no. 3 | Value of object no. 3 | ------- |
|---|---|---|---|---|
| | 02 | 04 | "0182" | |
| | 1 byte | 1 byte | 4 bytes | |

| ------- | CRC16 | |
|---|---|---|
| | Lo | Hi |
| | 1 byte | 1 byte |

The total response size given in this example equals 46 bytes.

The response contains the following four objects:

- Object no. 1: Manufacturer name (always "Télémécanique", i.e., 13 bytes).
- Object no. 2: Device catalog number (ASCII string; for example: "ATV212H075M3X", i.e., 13 bytes).
  The length of this object varies according to drive type. Use the "Length of object no. 2" field to determine the length.
- Object no. 3: Control version, in "MMmm" format where "MM" represents the major revision and "mm" the minor revision (4-byte ASCII string; *for example:* "0182" for version 1.82).

Error response:

| Slave no. | Function code AB | Exception code | CRC16 | |
|---|---|---|---|---|
| | | | Lo | Hi |
| 1 byte | 1 byte | 1 byte | 1 byte | 1 byte |

Refer to "Error response", page 41.

# Error response

An error response is returned by the Altivar 212 when it is unable to perform the request.

Format of an error response:

| Slave no. | Function code | Exception code | CRC16 | |
|---|---|---|---|---|
| | | | Lo | Hi |
| 1 byte | 1 byte | 1 byte | 2 bytes | |

**Function code:** request code + H'80.

**Exception code:**

| Exception Code | Description |
|---|---|
| 01 | Unknown function:<br>The function code received in the query is not an allowable action for the drive.<br>- The function is not supported by the drive error.<br>- Function code 43 but MEI Type not equal: to 14. |
| 02 | Illegal data address:The data address received in the query is not an allowable address for the drive.<br>- Modbus address is not supported.<br>- Request to write a read only parameter. |
| 03 | Illegal data value:<br>A value contained in the query data field is not an allowable value for the drive.<br>- Data range not allowed.<br>- Fixed data not allowed.<br>- Function code 43 and MEI Type 14 but invalid Read Device ID Code (Read Dev ID code > 3). |
| 04 | Unable to execute:<br>The request commands an operation that the Altivar 212 is not able to execute due to another task or condition.<br>- Request to write in a parameter that cannot be changed during running.<br>- Request to write during executing "tyP" (return to factory setting ...).<br>- Interruption occurs during writing data. |

# Parameter list

**5**

**What's in this Chapter?**

This chapter contains the following topics:

# Referring to the Altivar 212 programming manual

**General**

Parameters are decribed in the Altivar 212 programming manual.

For communication purposes, the section "Table of parameter and data" references Modbus address, unit, range... The table below is an abstract, just for example.

Additionnal parameter, not listed in the Altivar 212 programming manual, are described in the present section.

| Submenu or parameter description | Modbus address | Setting | Unit | Default setting |
|---|---|---|---|---|
| [5 LAST PARAM CHANGE] (*AUH*) History function | | Operation panels parameters in groups of five in the reverse order to that in which their settings were changed (possible to edit). | - | - |
| [Quick menu] (*AUF*) Wizard function | | The *AUF* submenu provides ready access to the ten basic parameters commonly used in programming the drive. In many cases, programming the ATV212 drive is complete when these 10 parameters and motor parameters have been properly set. | - | - |
| [Auto ramp] (*AU1*) Automatic acceleration/ deceleration | 0 16#0 | *0* [Disabled]: Manual *1* [Enable]: [Acceleration time 1] (*ACC*) and [Deceleration time 1] (*dEC*) *2* [ACC only]: [Acceleration time 1] (*ACC*) only | - | 1 |
| [Acceleration time 1] (*ACC*) Slope of the acceleration ramp and the time it takes for the output frequency of the drive to increase from 0 Hz to the setting of [Max frequency] (*FH*) | 9 16#9 | 0.0 to 3200 | s | According to drive model |

- "Modbus address" identifies the parameter for communication.
  In Modbus protocol, it is also called "register address" or "Parameter address".

- "Adjusment range" or "Range" means the data cannot be written outside the range.
  The data is expressed in the decimal notation. For writing the data through the communication function, take the minimum setting unit into consideration, and use hexadecimal notation.

- "Minimum setting unit" is the unit of a single data.
  For example, the "Minimum setting unit" of [Acceleration time 1] (*ACC*) is 0.1. 1 corresponds to 0.1s. For setting the *ACC* to 10 seconds, transmit 16#03E8 by communication [10÷0.01=1000=16#03E8].

## List of control parameters

These parameters are only in the RAM and not in the EEPROM, they return to initial values when the power is turned off, after the drive has been reseted, or when factory setting is done.

**Commands from serial communication**

| Parameter description | Modbus address | Range | Min. setting unit | Initial value | Write during operation | EEPROM |
|---|---|---|---|---|---|---|
| Command word 1 (*F A O O*) from serial communication | 64000 16#FA00 | 0 to 65535 | - | 0 | Yes | None |
| Command word 2 (*F A 2 O*) from serial communication | 64032 16#FA20 | 0 to 65535 | - | 0 | Yes | None |

**Setpoints from serial communication**

| Parameter description | Modbus address | Range | Min. setting unit | Initial value | Write during operation | EEPROM |
|---|---|---|---|---|---|---|
| Frequency reference from serial comm. (*F A O 1*) | 64001 16#FA01 | 0 to Max. frequency (FH) | 0.01 Hz | 0 | Yes | None |
| Speed reference from network (*F A 1 3*) | 64019 16#FA13 | 0 to 24000 | 1 min $^{-1}$ (1 rpm) | 0 | Yes | None |

**Outputs control from serial communication**

| Parameter description | Modbus address | Range | Min. setting unit | Initial value | Write during operation | EEPROM |
|---|---|---|---|---|---|---|
| Terminal output data from comm. (*F A 5 O*) | 64080 16#FA50 | 0 to 255 | 0 | 0 | Yes | None |
| Analog output data from comm. (*F A 5 1*) | 64081 16#FA51 | 0 to 1023 (10-bit resolution) | 0 | 0 | Yes | None |

# List of monitoring parameters

**General**

Monitoring parameters are read only.

**Status**

| Parameter description | Modbus address |
|---|---|
| Status word (F d 0 1) | 64769  16#FD01 |
| Status word 2 (F d 4 2) | 64834  16#FD42 |
| Status word 3 (F d 4 9) | 64841  16#FD49 |
| Status word at last trip (F E 0 1) | 65025  16#FE01 |
| Status word 2 at last trip (F E 4 2) | 65090  16#FE42 |
| Status word 3 at last trip (F E 4 9) | 65097  16#FE49 |
| Command mode status (F E 4 5) | 65093  16#FE45 |
| Setpoint mode status (F E 4 6) | 65094  16#FE46 |

**Frequency and speed**

| Parameter | Modbus address | Unit | Description |
|---|---|---|---|
| Output frequency (F d 0 0) | 64768  16#FD00 | 0.01 Hz | Current value |
| Output frequency at last trip (F E 0 0) | 65024  16#FE00 | 0.01 Hz | Value before trip |
| Frequency reference before ramp (F E 0 2) | 65026  16#FE02 | 0.01 Hz | Value before trip (before PI and speed ramp) |
| Frequency reference after ramp (F E 1 5) | 65045  16#FE15 | 0.01 Hz | Value before trip (after PI and speed ramp) |
| Estimated speed (F E 1 6) | 65046  16#FE16 | 0.01 Hz | Value before trip |
| PID feedback value (F E 2 2) | 65058  16#FE22 | 0.01 Hz | Value before trip |
| Output speed (F E 9 0) | 65168  16#FE90 | 1 min-1 | - |

**Current and torque**

| Parameter | Modbus address | Unit | Description |
|---|---|---|---|
| Output current (F E 0 3) | 65027  16#FE03 | 0.01% | - |
| Torque (F E 1 8) | 65048  16#FE18 | 0.01% | - |
| Torque current (F E 2 0) | 65056  16#FE20 | 0.01% | Value before trip |
| Exciting current (F E 2 1) | 65057  16#FE21 | 0.01% | Value before trip |

**Voltage**

| Parameter | Modbus address | Unit | Description |
|---|---|---|---|
| Voltage at DC bus (F E 0 4) | 65028  16#FE04 | 0.01% | - |
| Output voltage (F E 0 5) | 65029  16#FE05 | 0.01% | Value before trip |

**Power and energy**

| Parameter | Modbus address | Unit | Description |
|---|---|---|---|
| Input power (F E 2 9) | 65065  16#FE29 | 0.01 kW | Value before trip |
| Output power (F E 3 0) | 65072  16#FE30 | 0.01 kW | Value before trip |
| Input energy (F E 7 6) | 65142  16#FE76 | 1 Wh | - |
| Output energys (F E 7 7) | 65143  16#FE77 | 1 Wh | - |

**Maintenance**

| Parameter | Modbus address | Unit | Description |
|---|---|---|---|
| Motor load (F E 2 6) | 65062  16#FE26 | 1% | Value before trip |
| Inverter load (F E 2 7) | 65063  16#FE27 | 1% | Value before trip |
| Cumulative run time (F E 1 4) | 65044  16#FE14 | 0.01 h | - |
| Cumulative power on time (F E 8 0) | 65152  16#FE80 | 0.01 h | - |

**I/O values**

| Parameter | Modbus address | Description |
|---|---|---|
| Digital inputs status F d 0 6 | 64774 16#Fd06 | Current value |
| Digital outputs status F d 0 7 | 64775 16#Fd07 | Current value |
| Digital inputs status at last trip F E 0 6 | 65030 16#FE06 | Value before trip |
| Digital outputs status at last trip F E 0 7 | 65030 16#FE07 | Value before trip |
| Analog input VIA value F E 3 5 | 65077 16#FE35 | - |
| Analog input VIB value F E 3 6 | 65078 16#FE36 | - |

**Trip and alarm codes**

| Parameter | Modbus address | Description |
|---|---|---|
| Trip code F C 9 0 | 64656 16#FC90 | - |
| Alarm code F C 9 1 | 64657 16#FC91 | - |
| Alarm of run F E 7 9 | 65145 16#FE79 | - |
| Latest trip code F E 1 0 | 65040 16#FE10 | - |
| 2nd previous trip code F E 1 1 | 65041 16#FE11 | - |
| 3rd previous trip code F E 1 2 | 65042 16#FE12 | - |
| 4th previous trip code F E 1 3 | 65043 16#FE13 | - |

# Commands

## Command word (*FA00*)

| Bit | Specifications | 0 | 1 | Remarks |
|---|---|---|---|---|
| 0 | Preset speed operation 1 | 000:preset speed operation disabled | | |
| 1 | Preset speed operation 2 | 001:preset speed 1<br>010:preset speed 2 | | |
| 2 | Preset speed operation 3 | 011:preset speed 3<br>100:preset speed 4<br>101:preset speed 5<br>110:preset speed 6<br>111:preset speed 7 | | |
| 3 | - | Reserved | | Do not set to "1". |
| 4 | Motor selection (1 or 2)<br>(THR 2 selection) | Motor 1<br>(THR 1) | Motor 2<br>(THR2) | THR1 : PT=set value, uL, ub, tHr<br>THR2 : PT=0, F170, F172, F173 |
| 5 | PI control | Normal operation | PI OFF | |
| 6 | Acceleration/deceleration pattern selection (1 or 2) (AD2 selection) | Acceleration/deceleration pattern 1 (AD1) | Acceleration/deceleration pattern 2 (AD2) | AD1 : ACC, DEC<br>AD2 : F500, F501 |
| 7 | DC braking | No braking | Forced DC braking | |
| 8 | - | - | - | |
| 9 | Forward/reverse run selection | Forward selection | Reverse selection | |
| 10 | Run/stop | Stop | Run | |
| 11 | Coast stop command | No stop | Coast stop | |
| 12 | Emergency stop | No stop | Emergency stop | "*E*" trip |
| 13 | Drive reset in fault state | No reset | Reset | |
| 14 | Setpoint priority selection | Disabled | Enabled | Enabled regardless of the setting of FMOD |
| 15 | Command priority selection | Disabled | Enabled | Enabled regardless of the setting of CMOD |

Commands and setpoint can be enabled through communication irrespective of settings of the command mode (*CMOd*) and setpoint mode (*FMOd*).

Refer to "Configuration of the control source", page .

Once the command word (*FA00*) is set to enable communication command priority and frequency priority, both priorities will be enabled unless OFF is set, power is turned off or is reset, or factory setting (*tYP*) is selected.

Emergency stop, RY terminal output hold and OUT terminal output hold are enabled even though communication command priority is not set.

If the command word (*FA00*) is enabled and the "Preset speed operation is used (bits 0, 1 or 2 set to "1"), the analog setpoint is disabled, the velocity is controlled by preset speeds through the communication, irrespective of the setpoint selection.

**Examples:**

Run forward (*C П O d* and *F П O d* configured to serial communication)

FA00 = 16# 0400

Run reverse (*C П O d* and *F П O d* configured to serial communication)

FA00 = 16# 0600

Run forward, commands and setpoint from Modbus (irrespective of *C П O d* and *F П O d*)

FA00 = 16# C400

Run reverse, commands and setpoint from Modbus (irrespective of *C П O d* and *F П O d*)

FA00 = 16# C600

## Command word 2 (*F A 2 O*)

| Bit | Function | 0 | 1 | Note |
|---|---|---|---|---|
| 0 | Reserved | - | - | - |
| 1 | Energy reset | No reset | Reset | Input energy (FE76) Output energy (FE77) |
| 2 to 11 | Reserved | - | - | Do not set to "1" |
| 12 | Over-current stall level change | OC stall 1 | OC stall 2 | OC1 (F601), OC2 (F185) |
| 13 to 15 | Reserved | - | - | Do not set to "1" |

**Energy reset (bit 1):**

This command is enabled regardless of the command priority selection (bit 15 of common word (*F A O O*)).

It is necessary to reset it after the command is performed.

**Over-current stall level change (bit 12):**

This command word is enabled only when the communication command is enabled. Set Bit 15 of the Command word (*F A O O*) to "1" [enabled].

This command word will be disabled is set (value 0), power is turned off or is reset, or factory setting [Parameter reset] (*t Y P*) is selected.

## Setpoints

**Frequency setpoint (** *F A O 1* **)**

Frequency setpoint from Modbus

Unit: 0.01 Hz

Range: 0 to [Maximum frequency] (*F H*)

This setpoint is enabled by setting *4* [serial communication] to the setpoint selection parameter (*F N O d*) or setting to *1* [enabled] setpoint priority selection (Bit 14 of Command word (*F A O O*)).

Once enabled, this setpoint selection is enabled till disabled ("0") is set in the setpoint priority selection (bit 14 of the command word (*F A O O*)), power is turned off or is reset, or factory setting (*t Y P*) is selected.

**Example:** Frequency setpoint 80Hz

80Hz = 80 ÷ 0.01 = 8000 = 16# 1F40

| | | | | | |
|---|---|---|---|---|---|
| Request: | 01 | 06 | FA  01 | 1F  40 | B5  A6 |

| | | | | | |
|---|---|---|---|---|---|
| Response: | 01 | 06 | FA  01 | 1F  40 | B5  A6 |

**Speed setpoint (** *F A 1 3* **)**

Speed setpoint from Modbus

Unit: min-1 (rpm)

Range: 0 ... 24 000  min-1
With this setpoint, it is possible to control the drive with rpm instead of Hz.

This reference is converted into Frequency Setpoint using "Number of motor poles" (*F 8 5 6*).

# Status

**Status word (F E 0 1  F d 0 1)**

Status immediately before the occurrence of a trip: [Communication Number] (F E 0 1)

Current status: [Communication Number] (F d 0 1)

| Bit | Specifications | 0 | 1 | Remarks |
|---|---|---|---|---|
| 0 | FL state | Not active | Active | |
| 1 | Drive state | Not tripped | Tripped | Trip statuses include rtry and trip retention status. |
| 2 | Alarm | No alarm | Alarm issued | |
| 3 | MOFF | Normal | MOFF | Main circuit undervoltage alarm. |
| 4 | Motor section (1 or 2) (THR 2 selection) | Motor 1 (THR 1) | Motor 2 (THR 2) | THR1: PT=set value, uL, ub, Thr<br>THR2: PT=0, F170, F172, F173 |
| 5 | PI control OFF | PI control permitted | PI control prohibited | |
| 6 | Acceleration/deceleration pattern selection (1 or 2) | Acceleration/deceleration pattern 1 (AD 1) | Acceleration/deceleration pattern 2 (AD 2) | AD1: ACC, DEC,<br>AD2: F500, F501 |
| 7 | DC braking | OFF | Forced DC braking | |
| 8 | Reserved | - | - | |
| 9 | Forward/reverse run | Forward run | Reverse run | |
| 10 | Run/stop | Stop | Run | |
| 11 | Coast stop (ST=OFF) | ST=ON | ST=OFF | |
| 12 | Emergency stop | Not emergency stop status | Emergency stop status | |
| 13 | Standby ST=ON | Start-up process | Standby | Standby: Initialization completed, not detected fault stop status, not alarm stop status (MOFF, LL forced stop or forced stop due to a momentary power OFF), ST=ON, and RUN=ON |
| 14 | Standby | Start-up process | Standby | Standby: Initialization completed, not detected fault stop status, and not alarm stop status (MOFF, LL forced stop or forced stop due to a momentary power OFF) |
| 15 | Local/Remote status | Remote | Local | Command is "FA08" |

**Status word 2 (F E 4 2   F d 4 2)**

Status 2 immediately before the occurrence of a trip: Communication Number FE42

Current status 2: Communication Number FD42

| Bit | Function | 0 | 1 | Remarks |
|---|---|---|---|---|
| 0 | Reserved | - | - | |
| 1 | Electric Power Counting (FE76,FE77) status | Counting | Resetting | |
| 2 to 7 | Reserved | - | - | |
| 8 | Acceleration/deceleration pattern selection1 | Acc/Dec 1 | Acc/Dec 2 | |
| 9 to 11 | Reserved | - | - | |
| 12 | Over-current stall level change | OC stall 1 | OC stall 2 | OC1: F601, OC2: F185 |
| 13 to 15 | Reserved | - | - | |

**Status word 3 (F E 4 9   F d 4 9)**

Status 3 immediately before the occurrence of a trip: Communication Number FE49

Current status 3: Communication Number FD49

| Bit | Function | 0 | 1 | Remarks |
|---|---|---|---|---|
| 0 | RY terminal output hold | OFF | Holding | |
| 1 to 11 | Reserved | - | - | |
| 12 | RCH | OFF | ON | F102 |
| 13 | RCHF | OFF | ON | F101, F102 |
| 14 and 15 | Reserved | - | - | |

**Command mode status (F E 4 5)**

This parameter monitors the source of the commands.

| Data | Function |
|---|---|
| 0 | Terminal board |
| 1 | Operation panel |
| 2 | Serial communication |

**Setpoint mode status (F E 4 6)**

This parameter monitors the source of the setpoint.

| Data | Function |
|---|---|
| 0 | - |
| 1 | VIA |
| 2 | VIB |
| 3 | Operation panel |
| 4 | Serial communications |
| 5 | TB up down frequency |
| 6 | - |
| 255 | Preset speed operation |

# Trip and alarm codes

## Alarm code (*FC 91*)

| Bit | Specifications | 0 | 1 | Remarks (Code operation paneled on the panel) |
|-----|----------------|---|---|-----------------------------------------------|
| 0 | Overcurrent | Normal | Alarming | "C" blinking |
| 1 | Drive overload | Normal | Alarming | "L " blinking |
| 2 | Motor overload | Normal | Alarming | "L" blinking |
| 3 | Overheat | Normal | Alarming | "H" blinking |
| 4 | Overvoltage | Normal | Alarming | "P" blinking |
| 5 | Main circuit undervoltage | Normal | Alarming | |
| 6 | Reserved | - | - | - |
| 7 | Undercurrent | Normal | Alarming | - |
| 8 | Over-torque | Normal | Alarming | - |
| 9 | Reserved | - | - | - |
| 10 | Cumulative operation hours reached | Normal | Alarming | - |
| 11 | Reserved | - | - | - |
| 12 | Reserved | - | - | - |
| 13 | Main circuit undervoltage alarm same as MS-relay status | Normal | Alarming | "MOFF" blinking |
| 14 | At the time of the instant blackout, Forced deceleration/stop | - | Decelerating, stopping | Related: F256 setting |
| 15 | An automatic stop during the lower limit frequency continuance | - | Decelerating, stopping | Related: F302 setting |

## Alarm of run time (*FE 79*)

| Bit | Specifications | 0 | 1 | Remarks |
|-----|----------------|---|---|---------|
| 0 | Fan life | Normal | Alarming | - |
| 1 | Circuit board life | Normal | Alarming | - |
| 2 | Main-circuit capacitor life | Normal | Alarming | - |
| 3 | User set | Normal | Alarming | - |
| 4-15 | Reserved | - | - | - |

**Trip code (current status: F C 9 0, historic records: F E 1 0 to F E 1 3)**

| Code | Value (hexadecimal number) | Value (decimal number) | Description |
|---|---|---|---|
| Π E r r | 0 | 0 | [No error] |
| O C 1 | 1 | 1 | [Over-current during acceleration] |
| O C 2 | 2 | 2 | [Over-current during deceleration] |
| O C 3 | 3 | 3 | [Over-current during constant speed operation] |
| O C L | 4 | 4 | [Over-current in load at startup] |
| O C A | 5 | 5 | [Short circuit in arm] |
| E P H 1 | 8 | 8 | [Input phase failure] |
| E P H O | 9 | 9 | [Output phase failure] |
| O P 1 | A | 10 | [Overvoltage during acceleration] |
| O P 2 | B | 11 | [Overvoltage during deceleration] |
| O P 3 | C | 12 | [Overvoltage during constant speed operation] |
| O L 1 | D | 13 | [Over-LOAD in inverter] |
| O L 2 | E | 14 | [Over-LOAD in motor] |
| O H | 10 | 16 | [Overheat trip] |
| E | 11 | 17 | [Emergency stop] |
| E E P 1 | 12 | 18 | [EEPROM fault 1] (writing operation) |
| E E P 2 | 13 | 19 | [EEPROM fault 2] (reading operation) |
| E E P 3 | 14 | 20 | [EEPROM fault 3] (other) |
| E r r 1 | - | - | [Speed ref alarm] |
| E r r 2 | 15 | 21 | [RAM fault] |
| E r r 3 | 16 | 22 | [ROM fault] |
| E r r 4 | 17 | 23 | [CPU fault] |
| E r r 5 | 18 | 24 | [Communication error trip] |
| E r r 7 | 1A | 26 | [Current detector fault] |
| E r r 8 | 1B | 27 | [Optional circuit board type error] |
| E r r 9 | 1C | 28 | [Graphic keypad communication error] |
| U C | 1D | 29 | [Small-current trip] |
| U P 1 | 1E | 30 | [Trip due to undervoltage in main circuit] |
| O t | 20 | 32 | [Over-torque trip] |
| E F 2 | 22 | 34 | [Ground fault trip] (hardware detection) |
| O C 1 P | 25 | 37 | [Overcurrent flowing in element during acceleration] |
| O C 2 P | 26 | 38 | [Overcurrent flowing in element during deceleration] |
| O C 3 P | 27 | 39 | [Overcurrent flowing in element during operation] |
| E t Y P | 29 | 41 | [Inverter type error] |
| O H 2 | 2E | 46 | [External thermal input] |
| S O U t | 2F | 47 | [VIA cable break] |
| E - 1 8 | 32 | 50 | [Break in an analog signal cable] |
| E - 1 9 | 33 | 51 | [CPU fault] |
| E - 2 0 | 34 | 52 | [Excess torque boost] |
| E - 2 1 | 35 | 53 | [CPU fault] |
| E t n 1 | 54 | 84 | [Auto-tuning error] |
| F d 1 | 48 | 72 | [Closed damper 1 fault] |
| F d 2 | 49 | 73 | [Closed damper 2 fault] |
| C F 1 2 | - | - | [Download transfer fault] |

## Monitoring and control of I/O from communication

The digital inputs, digital outputs, analog input and output signals of the drives can be controlled by communication.

### Digital inputs status (F d 0 6, F E 0 6)

Digital inputs status immediately before the occurrence of a trip: [Status of input terminal block] (F E 0 6)

Current digital inputs status: [Status of input terminal block] (F d 0 6)

In case "0: No assignment function" is selected in function selection, drive operations will not be affected even when terminals are turned

on and off. Therefore, the terminals can be used as input terminals for customer's own use.

The input terminal function selection parameter is used to select a function for each input terminal.

| Bit | Terminal name | Function (parameter title) | 0 | 1 |
|---|---|---|---|---|
| 0 | F | [LI F selection] (F 1 1 1) | OFF | ON |
| 1 | R | [LI R selection] (F 1 1 2) | OFF | ON |
| 2 | RES | [LI RES selection] (F 1 1 3) | OFF | ON |
| 3 to 6 | Reserved | - | - | - |
| 7 | VIA (1) | [VIA LI selection] (F 1 1 8) | OFF | ON |
| 8 to 15 | Reserved | - | | |

(1): It is valid only when it is selected as contact input by [VIA Input Function] (F 1 0 9).

**Example:** When both F and RES terminals are ON: F E 0 6 = 16#0005

|  | BIT 15 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | BIT 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

FE06:

| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | 0 | | | | 0 | | | | 5 | | | |

### Digital outputs status (F d 0 7, F E 0 7)

Digital outputs status immediately before the occurrence of a trip: [Status of output terminal block] (F E 0 7)

Current digital outputs status current status: [Status of output terminal block] (F d 0 7)

The output terminal function selection parameter is used to select a function for each output terminal.

| Bit | Terminal name (extended) | Function (parameter title) | 0 | 1 |
|---|---|---|---|---|
| 0 | RY | Output terminal selection1 (F 1 3 0) | OFF | ON |
| 1 | Reserved | - | - | - |
| 2 | FL | Output terminal selection3 (F 1 3 2) | OFF | ON |
| 3 to 15 | Reserved | - | - | - |

**Example:** When both the RY and FL terminals are ON: F E 0 7 = 16#0005

F E 0 7:

| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | 0 | | | | 0 | | | | 5 | | | |

**Analog inputs values (** *F E 3 5* **,** *F E 3 6* **)**

[Analog input VIA value] (*F E 3 5*)

[Analog input VIB value] (*F E 3 6*)

Data: 10bit resolution (Data range 0 to 1023)

**Digital outputs command (** *F A 5 0* **)**

The digital outputs (relays) of the drive can be controlled directly by communication.

Before controlling them, select Function Number *3 8* or *3 9* in Output terminal function selection ([FL Relay Function] (*F 1 3 2*)) and select Function Number *4 0* or *4 1* in Output terminal function selection ([RY Relay Function 1] (*F 1 3 0*) ,[RY Relay Function 2] (*F 1 3 7*)).

| Bit | Output Terminal Function | 0 | 1 |
|---|---|---|---|
| 0 | Relay FL (*F 1 3 2*) | OFF | ON |
| 1 | Relay RY (*F 1 3 0* and *F 1 3 7*) | OFF | ON |
| 2 to 15 | Reserved | - | - |

**Example:** Controlling only relay RY by communication

Set *4 0* [Ser. data relay RY] in *F 1 3 0* in advance.
Set "0002H" in FA50 to turn relay RY on.

**Analog outputs command (** *F A 5 1* **)**
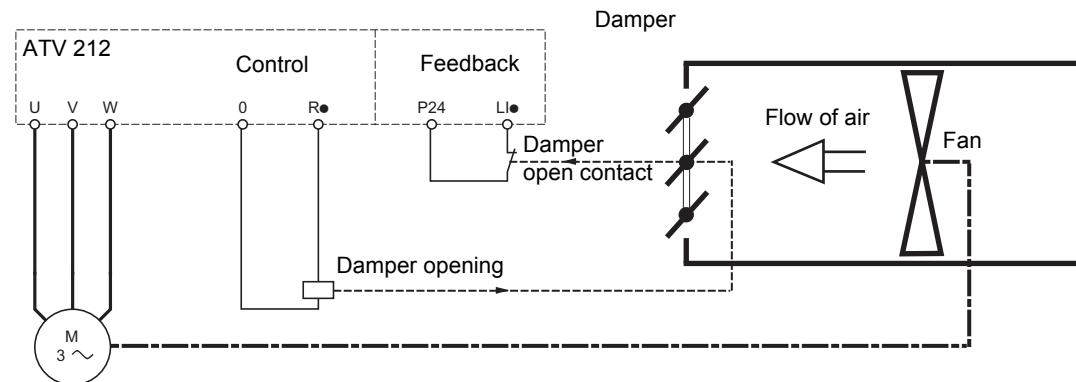
The analog output FM on the drive can be controlled directly by communication.
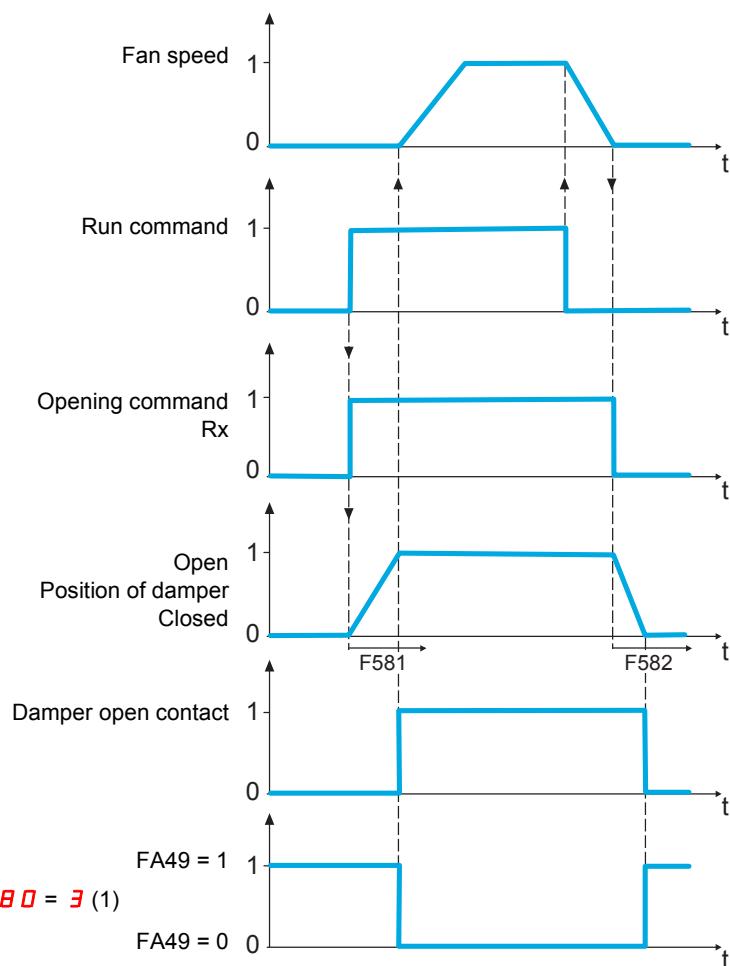
Select *1 8* [Com data] in [AO funct. selection] (*F M S L*) parameter before controlling them.
The data adjustment range is 0 to 1023 (10bit resolution). Refer to "Meter Setting and adjustment" in the ATV 212 programming manual for complete information.

**Communication feedback (** *F A 4 9* **)**

Damper function. This function applies to the ventilation ducts. The aim is to control the opening of the duct (shutter device called a "damper") when the fan starts up.

**Damper opening command**

The opening command can be assigned to a relay via the *F 1 3 0* or *F 1 3 2* parameters to the function [Damper] 68 or [Inv. damper] 69. The damper is closed automatically when there is no longer an opening command.

**Damper opening feedback**

Opening is controlled by a bit or a logic input that can be assigned via the *F 1 1 1* or *F 1 1 2* or *F 1 1 3* parameters to the function 73. The corresponding logic input or bit can be configured via the parameter [Damper fdb type] *F 5 8 0*.

When there is an inconsistency, the drive goes on a [Damper fault 1] *F d 1* if the damper does not open and on a [Damper fault 2] *F d 2* if it does not close.

The parameter [Time open damper] *F 5 8 1* can be used to delay tripping on an opening fault when a run command is sent and the parameter [Time close damper] *F 5 8 2* delays the closing fault when a stop command is sent.

(1) [Com channel choice] $F\ B\ D\ 7$ must be set to $D$ [RJ45] to manage the damper feedback on RJ45 port or set to $I$ [Open style] to manage the damper feedback on Open Style port.

FA49 can only be active when [Damper fdb type] $F\ 5\ B\ D$ is set to $3$ [Com. LIL set] or $4$ [Com. LIH set].

[Com. LIL set]: Serial link to communication bit selected by $F\ B\ D\ 7$ and active at level 0 (shunt).

[Com. LIH set]: Serial link to communication bit selected by $F\ B\ D\ 7$ and active at level 1 (open).

## Identification

**drive model code ( $F\,B\,0\,5$ )**

| Model | Voltage Power Rating | Code (FB05) | Class (FB72:bit8) |
|---|---|---|---|
| ATV212H075M3X | 3ph 200/240V 0.75kW | 4 | 0 |
| ATV212HU15M3X | 3ph 200/240V 1.5kW | 6 | 0 |
| ATV212HU22M3X | 3ph 200/240V 2.2kW | 7 | 0 |
| ATV212HU30M3X | 3ph 200/240V 3kW | 8 | 0 |
| ATV212HU40M3X | 3ph 200/240V 3.7kW / 4kW | 9 | 0 |
| ATV212HU55M3X | 3ph 200/240V 5.5kW | 10 | 0 |
| ATV212HU75M3X | 3ph 200/240V 7.5kW | 11 | 0 |
| ATV212HD11M3X | 3ph 200/240V 11kW | 108 | 0 |
| ATV212HD15M3X | 3ph 200/240V 15kW | 109 | 0 |
| ATV212HD18M3X | 3ph 200/240V 18.5kW | 110 | 0 |
| ATV212HD22M3X | 3ph 200/240V 22kW | 111 | 0 |
| ATV212HD30M3X | 3ph 200/240V 30kW | 112 | 0 |
| ATV212H075N4 | 3ph 380/480V 0.75kW | 36 | 0 |
| ATV212HU15N4 | 3ph 380/480V 1.5kW | 38 | 0 |
| ATV212HU22N4 | 3ph 380/480V 2.2kW | 39 | 0 |
| ATV212HU30N4 | 3ph 380/480V 3.0kW | 40 | 0 |
| ATV212HU40N4 | 3ph 380/480V 3.7/4 kW | 41 | 0 |
| ATV212HU55N4 | 3ph 380/480V 5.5kW | 42 | 0 |
| ATV212HU75N4 | 3ph 380/480V 7.5kW | 43 | 0 |
| ATV212HD11N4 | 3ph 380/480V 11kW | 44 | 0 |
| ATV212HD15N4 | 3ph 380/480V 15kW | 45 | 0 |
| ATV212HD18N4 | 3ph 380/480V 18.5kW | 46 | 0 |
| ATV212HD22N4S | 3ph 380/480V 22kW | 32 | 0 |
| ATV212HD22N4 | 3ph 380/480V 22kW | 47 | 0 |
| ATV212HD30N4 | 3ph 380/480V 30kW | 48 | 0 |
| ATV212HD37N4 | 3ph 380/480V 37kW | 49 | 0 |
| ATV212HD45N4 | 3ph 380/480V 45kW | 50 | 0 |
| ATV212HD55N4 | 3ph 380/480V 55kW | 51 | 0 |
| ATV212HD75N4 | 3ph 380/480V 75kW | 52 | 0 |
| ATV212W075N4 | 3ph 380/480V 0.75kW IP55 | 0136 | 0 |
| ATV212WU15N4 | 3ph 380/480V 1.5kW IP55 | 0138 | 0 |
| ATV212WU22N4 | 3ph 380/480V 2.2kW IP55 | 0139 | 0 |
| ATV212WU30N4 | 3ph 380/480V 3.0kW IP55 | 0140 | 0 |
| ATV212WU40N4 | 3ph 380/480V 3.7/4 kW IP55 | 0141 | 0 |
| ATV212WU55N4 | 3ph 380/480V 5.5kW IP55 | 0142 | 0 |
| ATV212WU75N4 | 3ph 380/480V 7.5kW IP55 | 0143 | 0 |
| ATV212WD11N4 | 3ph 380/480V 11kW IP55 | 0144 | 0 |
| ATV212WD15N4 | 3ph 380/480V 15kW IP55 | 0145 | 0 |
| ATV212WD18N4 | 3ph 380/480V 18.5kW IP55 | 0146 | 0 |
| ATV212WD22N4S | 3ph 380/480V 22kW IP55 | 32 | 0 |
| ATV212WD22N4 | 3ph 380/480V 22kW IP55 | 0147 | 0 |
| ATV212WD30N4 | 3ph 380/480V 30kW IP55 | 0148 | 0 |

| Model | Voltage Power Rating | Code (FB05) | Class (FB72:bit8) |
|---|---|---|---|
| ATV212WD37N4 | 3ph 380/480V 37kW IP55 | 0149 | 0 |
| ATV212WD45N4 | 3ph 380/480V 45kW IP55 | 0150 | 0 |
| ATV212WD55N4 | 3ph 380/480V 55kW IP55 | 0151 | 0 |
| ATV212WD75N4 | 3ph 380/480V 75kW IP55 | 0152 | 0 |
| ATV212W075N4C | 3ph 380/480V 0.75kW IP55+ClassB | 136 | 1 |
| ATV212WU15N4C | 3ph 380/480V 1.5kW IP55+ClassB | 138 | 1 |
| ATV212WU22N4C | 3ph 380/480V 2.2kW IP55+ClassB | 139 | 1 |
| ATV212WU30N4C | 3ph 380/480V 3.0kW IP55+ClassB | 140 | 1 |
| ATV212WU40N4C | 3ph 380/480V 3.7/4 kW IP55+ClassB | 141 | 1 |
| ATV212WU55N4C | 3ph 380/480V 5.5kW IP55+ClassB | 142 | 1 |
| ATV212WU75N4C | 3ph 380/480V 7.5kW IP55+ClassB | 143 | 1 |
| ATV212WD11N4C | 3ph 380/480V 11kW IP55+ClassB | 144 | 1 |
| ATV212WD15N4C | 3ph 380/480V 15kW IP55+ClassB | 145 | 1 |
| ATV212WD18N4C | 3ph 380/480V 18.5kW IP55+ClassB | 146 | 1 |
| ATV212WD22N4C | 3ph 380/480V 22kW IP55+ClassB | 147 | 1 |
| ATV212WD30N4C | 3ph 380/480V 30kW IP55+ClassB | 148 | 1 |
| ATV212WD37N4C | 3ph 380/480V 37kW IP55 | 149 | 1 |
| ATV212WD45N4C | 3ph 380/480V 45kW IP55 | 150 | 1 |
| ATV212WD55N4C | 3ph 380/480V 55kW IP55 | 151 | 1 |
| ATV212WD75N4C | 3ph 380/480V 75kW IP55 | 152 | 1 |

# Appendix

**What's in this Chapter?**

This chapter contains the following topics:

| Topic | Page |
|---|---|
| RS485 standard | 62 |
| Modbus 2-wire standard schematic | 62 |

## RS485 standard

The RS485 standard (ANSI/TIA/EIA-485-A-1998) allows variants of certain characteristics:

- Polarization
- Line termination
- Distribution of a reference potential
- Number of slaves
- Length of bus
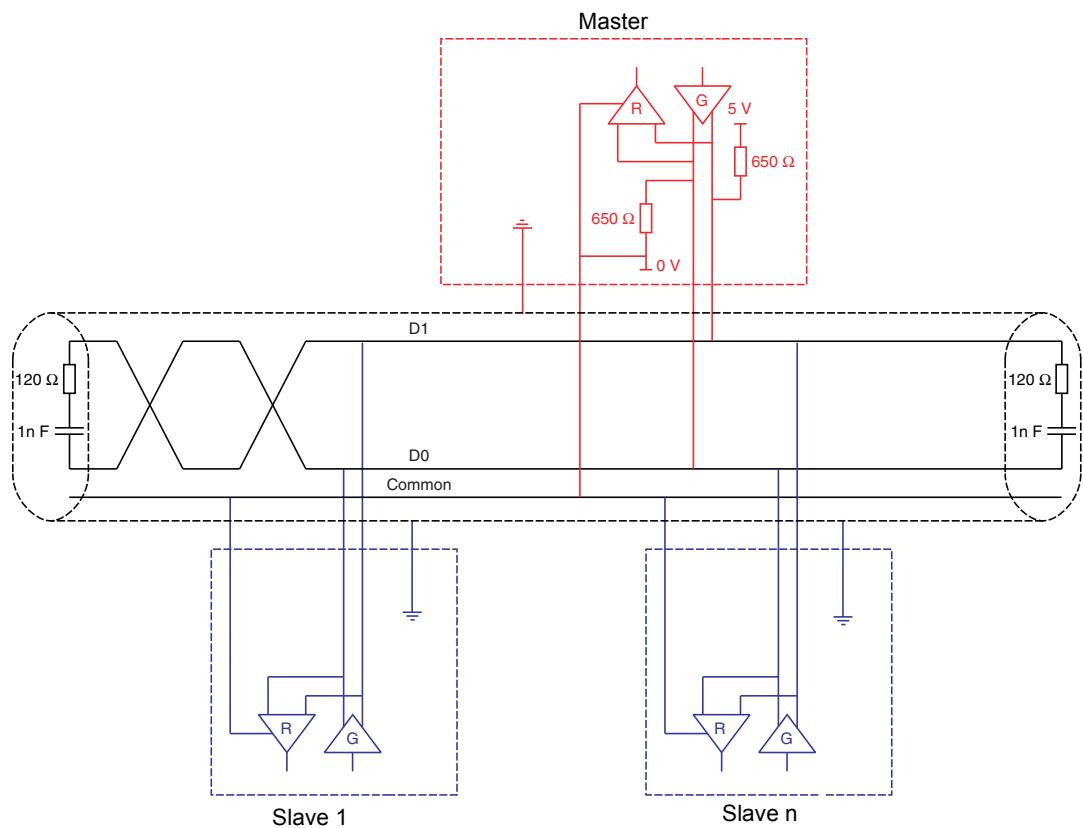
It does not specify the connector type or pinout.

The Modbus specification published on www.modbus.org in 2002 contains precise details of these characteristics. They are also summarized in the next sections (Modbus 2-wire and 4-wire standard schematics). The latest generation Schneider Electric devices conform to this specification.

## Modbus 2-wire standard schematic

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

**Schematic diagram**

# Migration

**7**

## What's in this Chapter?

This chapter contains the following topics:

## Migration ATV21 - ATV212

### General

The ATV212 is compatible with the ATV21

Migration Modbus ATV21 to ATV212: When controlling ATV21 using Modbus RJ45, parameter [Network protocol] (*F 8 2 9*) should be set to 1.

With ATV212, parameter *F 8 2 9* should also be set to *1* and parameter [Com channel choice] (*F 8 0 7*) set to [RJ45] (*0*). Factory setting is [Network] (*1*).

Settings of other communication parameters described in the programming manual remain the same as on ATV21.

A configuration transfer from ATV21 to ATV212 is possible.

**For example:**

You can upload a configuration from an ATV21 via PC Soft (and selected the drive Type : ATV21) and download it into ATV212.

After a transfer from ATV21 to ATV212, the new parameters stay at their factory setting:

[Damper fdb type] (*F 5 8 0*), [Time open Damper] (*F 5 8 1*), [Time close Damper] (*F 5 8 2*) ,[Damper flt behavior] (*F 5 8 3*),[Forced fire control] (*F 6 5 0*), [Forced fire function] (*F 6 5 9*), [Com channel choice] (*F 8 0 7*), [Mdb network baud] (*F 8 2 0*), [Mdb network parity] (*F 8 2 1*) and [LL for ov.cur. prev.] (*F 3 9 0*).

The download configuration is not allowed if the drive is running.

In case of an interruption of download configuration transfer to the drive and detected fault, the *C F 1 2* is set. This detected fault code keeps also present even after power off of the drive.

To reset the download transfer detected fault code *C F 1 2*:

- Make a new successful transfer
- Make a factory setting on the drive (using *t y P* parameter)

At the end of download transfer, the drive cannot run if a logic input configured to a function is active. To use the function and run the motor, it's necessary to disable and enable the logic input.

### Commissioning

Compatible loader tool with ATV21

- PC Soft V1.0 and higher

Compatible loader tools with ATV212:

- PC Soft V1.06 and higher,
- Multi-Loader V3.11 and higher,
- SoMoveMobile V2.2 and higher,