Altivar 212

Variable speed drives
for asynchronous motors

BACnet communication manual

04/2017

Schneider Electric

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

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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
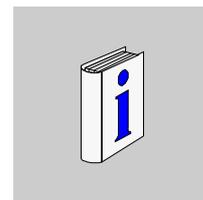
At a Glance

Document Scope

The purpose of this document is to show you how to configure the Altivar 212 to use BACnet 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 BACnet fieldbus.

Related Documents

Title of Documentation	Reference Number
ATV212 Quick Start	S1A53825
ATV212 Installation manual	S1A53832
ATV212 Programming manual	S1A53838
ATV212 Modbus manual	S1A53844
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**
> - Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation and who have received safety training to recognize and avoid hazards involved are authorized to work on and with this drive system. Installation, adjustment, repair and maintenance must be performed by qualified personnel.
> - The system integrator is responsible for compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of all equipment.
> - Many components of the product, including the printed circuit boards, operate with mains voltage. Do not touch. Use only electrically insulated tools.
> - Do not touch unshielded components or terminals with voltage present.
> - Motors can generate voltage when the shaft is rotated. Prior to performing any type of work on the drive system, block the motor shaft to prevent rotation.
> - AC voltage can couple voltage to unused conductors in the motor cable. Insulate both ends of unused conductors of the motor cable.
> - Do not short across the DC bus terminals or the DC bus capacitors or the braking resistor terminals.
> - Before performing work on the drive system:
>   - Disconnect all power, including external control power that may be present.
>   - Place a "Do Not Turn On" label on all power switches.
>   - Lock all power switches in the open position.
>   - Wait 15 minutes to allow the DC bus capacitors to discharge. The DC bus LED is not an indicator of the absence of DC bus voltage that can exceed 800 Vdc.
> - Measure the voltage on the DC bus between the DC bus terminals (PA/+ and PC/-) using a properly rated voltmeter to verify that the voltage is <42 Vdc.
>   - If the DC bus capacitors do not discharge properly, contact your local Schneider Electric representative. Do not repair or operate the product.
> - Install and close all covers before applying voltage.
> **Failure to follow these instructions will result in death or serious injury.**

Drive systems may perform unexpected movements because of incorrect wiring, incorrect settings, incorrect data or other errors.

> ## ⚠ WARNING
>
> **UNANTICIPATED EQUIPMENT OPERATION**
> Do not operate or install any drive or drive accessory that appears damaged.
> - Carefully install the wiring in accordance with the EMC requirements.
> - Do not operate the product with unknown or unsuitable settings or data.
> - Perform a comprehensive commissioning test.
> **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Damaged products or accessories may cause electric shock or unanticipated equipment operation.

> ## ⚠⚠ DANGER
>
> **ELECTRIC SHOCK OR UNANTICIPATED EQUIPMENT OPERATION**
> Do not use damaged products or accessories.
> **Failure to follow these instructions will result in death or serious injury.**

Contact your local Schneider Electric sales office if you detect any damage whatsoever.

> **⚠ WARNING**
>
> **LOSS OF CONTROL**
> - The designer of any control scheme must consider the potential failure modes of control paths and, for 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, overtravel stop, power outage and restart.
> - 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.
> - Observe all accident prevention regulations and local safety guidelines (1).
> - Each implementation of the product must be individually and thoroughly tested for proper operation before being placed into service.
>
> **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

(1) For USA: 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.

> **NOTICE**
>
> **DESTRUCTION DUE TO INCORRECT MAINS VOLTAGE**
> Before switching on and configuring the product, verify that it is approved for the mains voltage.
> **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

This equipment has been designed to operate outside of any hazardous location. Only install this equipment in zones known to be free of a hazardous atmosphere

> **⚠ DANGER**
>
> **POTENTIAL FOR EXPLOSION**
> Install and use this equipment in non-hazardous locations only.
> **Failure to follow these instructions will result in death or serious injury.**

Machines, controllers, and related equipment are usually integrated into networks. Unauthorized persons and malware may gain access to the machine as well as to other devices on the network/fieldbus of the machine and connected networks via insufficiently secure access to software and networks.

> **⚠ WARNING**
>
> **UNAUTHORIZED ACCESS TO THE MACHINE VIA SOFTWARE AND NETWORKS**
> - In your hazard and risk analysis, consider all hazards that result from access to and operation on the network/fieldbus and develop an appropriate cyber security concept.
> - Verify that the hardware infrastructure and the software infrastructure into which the machine is integrated as well as all organizational measures and rules covering access to this infrastructure consider the results of the hazard and risk analysis and are implemented according to best practices and standards covering IT security and cyber security (such as: ISO/IEC 27000 series, Common Criteria for Information Technology Security Evaluation, ISO/IEC 15408, IEC 62351, ISA/IEC 62443, NIST Cybersecurity Framework, Information Security Forum - Standard of Good Practice for Information Security).
> - Verify the effectiveness of your IT security and cyber security systems using appropriate, proven methods.
>
> **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Introduction

1

Data exchanges give access to all Altivar 212 functions:

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

The integrated display terminal and the graphic display option can be used to access numerous functions for communication configuration and diagnostics.

Hardware

2

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Hardware description	12
Use of open Style Connector	12
Description of terminals	13

Hardware description

Open Style Connector
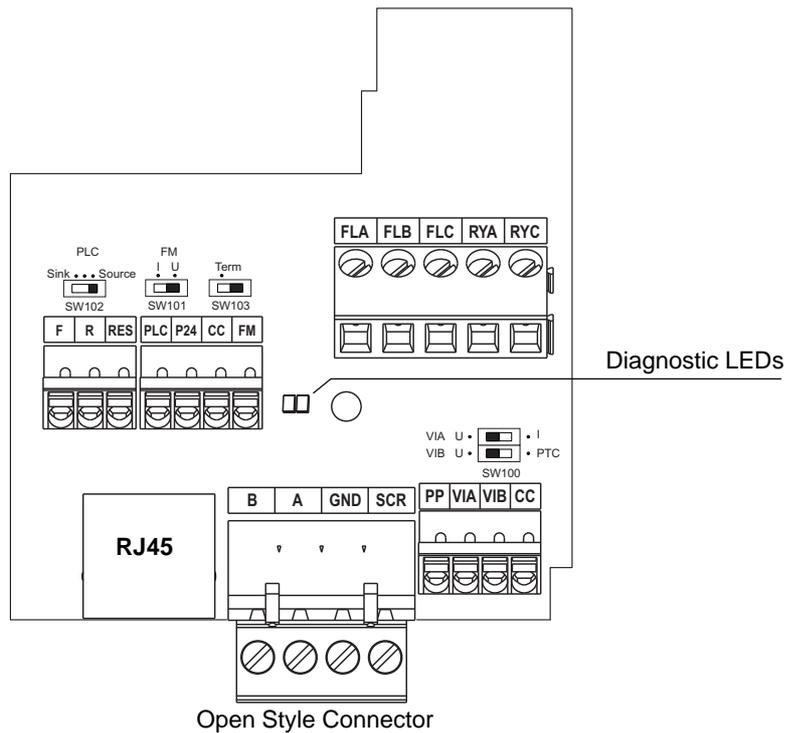
Use of open Style Connector

Use the open style connector to connect the drive to BACnet fieldbus. Full connection details are given in the Connecting to the bus section page .

⚠ WARNING
UNANTICIPATED 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 can result in death, serious injury, or equipment damage.

Description of terminals

Terminal symbol	Function	Electrical specifications	Internal circuits
F	Multifunctional programmable logic input. It has forward rotation function in default setting. ON: forward rotation drive OFF: slowdown and stop	Input for voltage-free contact 24 Vdc, 5 mA or less. SINK/SOURCE can be selected with SW102.	
R	Multifunctional programmable logic input. It has Preset speed command input 1 in default setting.		
RES	Multifunctional programmable logic input. It has Fault Reset in default setting		
PP	Voltage supply for reference potentiometer.	Voltage: 10 Vdc Max current: 10 mA Protected against short circuits.	
VIA	Switch-configurable voltage or current analog input using SW100. 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 Internal impedance: 30 kΩ Current: 0 - 20 mA	
VIB	Multifunction programmable analog input. 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 Internal impedance: 30 kΩ	
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 Minimum load impedance: 470 Ω Current analog output: 0...20 mA Maximum load impedance: 550 Ω	
FLA FLB FLC RYA RYC	Multifunctional programmable relay contact outputs. Default setting is set to detect the activation of the drive protection function. Contact across FLA-FLC is closed and FLB-FLC is open during normal operation. RYA -RYC is open.	Voltage: 30 Vdc, 0.5 A 250 Vac, 1A (cos φ = 1) Voltage: 250 Vac, 0.5A (cos φ = 0.4)	

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

Terminal symbol	Function	Electrical specifications	Internal circuits
B A GND	BACnet open style connector	RS485 transmission data, reception data.	
SCR	BACnet communication shield terminal. This terminal is not connected to other circuits in the board. Ground this terminal in a location separated from the ground of the power line.		

Connecting to the bus

3

What's in this Chapter?

This chapter contains the following topics:

Cable routing practices

Recommendations for wiring the drive to the BACnet network

Connections	2 wires differential
Maximum devices per segment	32
Maximal cable length	1200 m (3937 ft) For this cable length, baud rate is 19200 bit/s

Install a line terminator at both ends of the line.

Note: A terminating resistor is built into the product and can be enabled or disabled via the SW103 switch.

When wiring Altivar 212 drives to a BACnet network, observe the following guidelines:

- Avoid areas of high temperature, moisture, vibration, or other mechanical stress.
- Secure the cable where necessary to prevent its weight and the weight of other cables from pulling or twisting the cable.
- Use cable ducts, raceways, or other structures to protect the cable. Route the power cables apart from these structures.
- 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 1 m (3.3 ft) 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 3 m (9.8 ft) from the following equipment:
    - line and motor 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 wiring. Route control, network and power wiring in separate conduits.
- Separate non-metallic conduits or cable trays carrying power wiring from metallic conduit carrying low-level control network wiring by at least 305 mm (12 in.).
- Separate metallic conduits carrying power wiring or low-level control network wiring by at least 76 mm (3 in.).
- Whenever power and control wiring cross, the metallic conduits and non-metallic conduits or trays will cross at right angles.
- If necessary, use filters to attenuate conducted emissions from the drive to the line to help prevent interference with telecommunication, radio, and sensitive electronic equipment. Consult the Altivar catalog for selection and application of these filters.

Connector pinout

Observe the following recommendations for wiring the terminals:

- Connections: 2-wire differential, common, and shield
- Maximum devices per segment: 32
- Maximum cable length: 1200 m (3637 ft)
- Line terminators: install line terminators at both ends of the line

Refer to the following figure for the pinout of the network terminal. When wiring the terminal:

1. Strip the cable sheath back approximately 10 mm (0.40 in.).

2. Use a flat blade screwdriver with a 0.6 mm (0.02 in.) thick and 3.5 mm (0.14 in.) wide blade for making the connections to the terminals.

3. Use a torque wrench to tighten the terminals to 0.5 to 0.6 N•m (4.4 to 5.3 lb-in.).
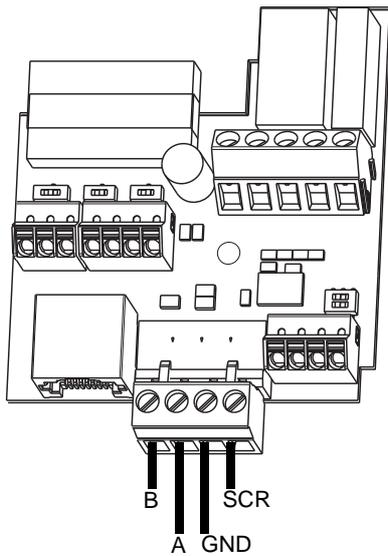
Contact	Signal
B	+
A	-
GND	Common
SCR	Shield

Configuration

4

What's in this Chapter?

This chapter contains the following topics:

Communication parameters

Access to the parameters

Parameters	Location
[Command mode sel] (*C П o d*) [Frequency mode sel] (*F П o d*)	[PROGRAMMING MENU] Programming mode
[Remote spd ref 2] (*F 2 0 7*) [Mot. poles (comm.)] (*F 8 5 6*)	[EXTENDED MENU] *F - - -* submenu of [PROGRAMMING MENU] Programming mode.
Other parameters	[COMMUNICATION MENU] *C o П* submenu of [PROGRAMMING MENU] Programming mode.

Configuration

Configure the following parameters. Select BACnet communication protocol by setting [Network protocol] (*F 8 2 9*) to *4* [BACnet].

These parameters can only be modified when the motor is stopped.

Modifications will be taken into account by the drive after power cycled.

⚠ WARNING

UNANTICIPATED EQUIPMENT OPERATION
Refer to «Serial communication parameters» in the Altivar 212 Programming manual, for more information on how to set these serial communication parameters.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Parameters	Possible values	Default value
[Command mode sel] (*C П o d*) Remote mode start/stop control source	*0* [Logic inputs]: Control terminal logic input *1* [HMI]: Graphic display terminal *2* [Communication]: Serial communication	*0*
[Frequency mode sel] (*F П o d*) Remote mode primary speed reference source	*1* [Ref source VIA]: VIA *2* [Ref source VIB]: VIB *3* [HMI reference]: Graphic display terminal *4* [Serial com ref.]: Serial communication *5* [+/- Speed]: +/- speed from external contact	*1*
[Remote spd ref 2] (*F 2 0 7*) Remote mode secondary speed reference source	*1* [VIA] *2* [VIB] *3* [HMI]: Graphic display terminal *4* [Communication].: Serial communication *5* [+/- Speed]: +/- speed from external contact	*2*
[Com channel choice] (*F 8 0 7*) Communication channel choice	*0* [RJ45] *1* [Open style]	*1*
[Network protocol] (*F 8 2 9*) Communication protocol	*1* [Mdb RTU]: Modbus® RTU protocol *2* [Metasys N2]: Metasys® N2 protocol *3* [Apogee P1]: APOGEE® FLN P1 protocol *4* [BACnet]: BACnet protocol *5* [Lonworks]: Lonworks protocol	*1*
[Mot. poles (comm.)] (*F 8 5 6*) Set the motor pole number.This parameter is for calculation of min-1 unit motor speed of BACnet data	*1* [2 poles] *5* [10 poles] *2* [4 poles] *6* [12 poles] *3* [6 poles] *7* [14 poles] *4* [8 poles] *8* [16 poles]	*2*
[Network adress] (*F 8 9 0*) Address	Setting range: 0 to 127	*0*

Parameters	Possible values	Default value
[Network baud rate] (*F 8 9 1*) Network Baud rate As soon as the drive detects the good bit rate this value will take the good value according to the speed.	*1* [1]: 9600 bps *4* [4]: 76800 bps *2* [2]: 19200 bps *5* [5]: Auto *3* [3]: 38400 bps Other communication parameters are fixed: 8 bit, no parity, 1 stop	*5*
[Network time out] (*F 8 9 2*) Network communication detected error trip time	Setting range: 20 to 600 (2 to 60 s)	*1 0 0*
[Instance number H] (*F 8 9 3*) [Instance number L] (*F 8 9 4*) Detail of the instance number edition on the local HMI	Device instance number: 0 to 4194303 (1) Setting range: F893: 0 to 4194 F894: 0 to 999	*0* *0* to *4 1 9 4* *0* to *9 9 9*

(1) Sometimes also named BACnet device ID.

4 digit display	*F 8 9 3* *F 8 9 4* *0 2 3 5* *0 0 4 5* Instance number	Example: 0235045 is the value for the instance number. On the local HMI *F 8 9 3* will receive the value of *0 2 3 5* and *F 8 9 4* will receive *0 0 4 5*.

Parameters	Possible values	Default value
[Max master] (*F 8 9 5*) Max Master device address on the MS/TP subnet.	Setting range: 0 to 127	*1 2 7*
[Max info frames] (*F 8 9 6*) Max information frames. Defines max. number of frames that can be sent before passing token to next equipment.	Setting range: 0 to 100	*1*
[FA15] (*F A 1 5*) **Communication counter** Displays the total number of frames received by the drive since the last power ON. These values can be monitored by panel (monitor mode).	Range: 0 to 999	*0*
[FA16] (*F A 1 6*) **Normal communication counter** Displays the total number of bad frames received by the drive since the last power ON. These values can be monitored by panel (monitor mode).	Range: 0 to 999	*0*

Command and speed reference channels

$\mathcal{C} \Pi_{\mathcal{O}} \mathcal{d}$ and $\mathcal{F} \Pi_{\mathcal{O}} \mathcal{d}$ drive parameters are used to set the channel for command and speed reference (first source).

$\mathcal{F} \mathcal{2} \mathcal{0} \mathcal{7}$ drive parameter is used to set the second source of speed reference. Switching between source 1 and 2 is done by $\mathcal{F} \mathcal{2} \mathcal{0} \mathcal{0}$ parameter or logical input when set to this function.

$\mathcal{F} \mathcal{8} \mathcal{0} \mathcal{7}$ sets the communication channel (RJ45 or Open Style network connector)
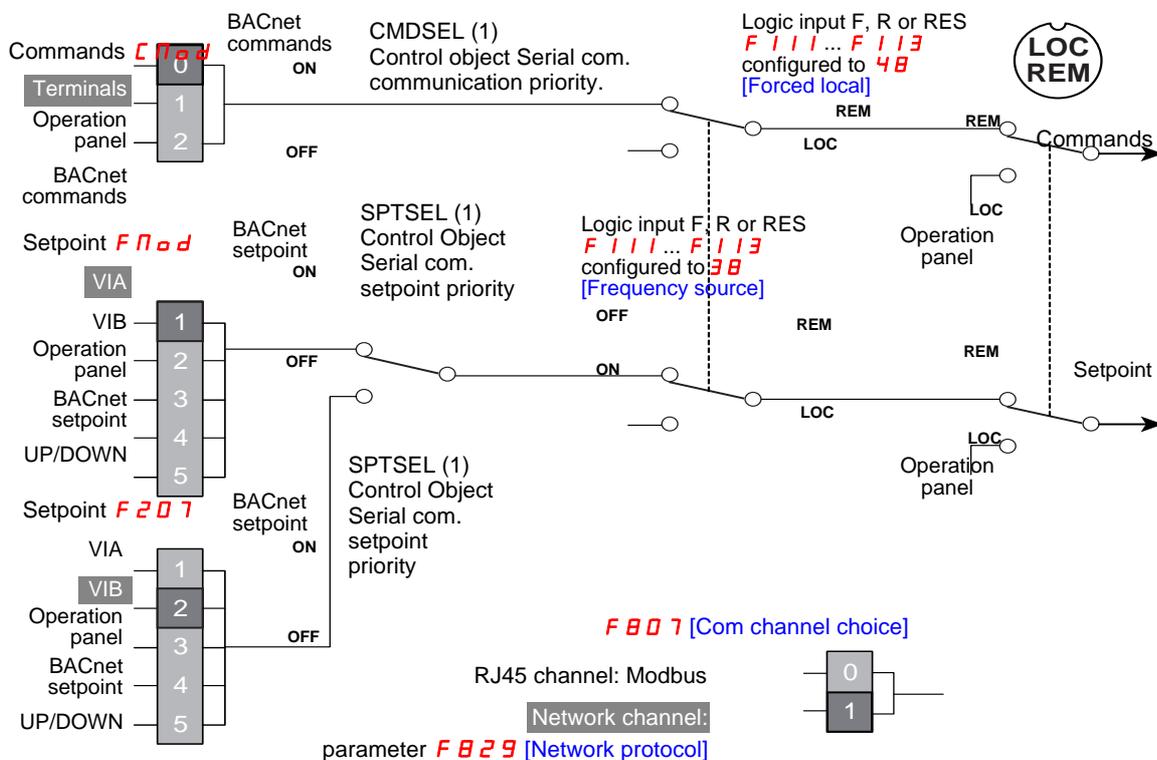
(1) For more information, please refer to Control objects page 32.

Configuration of the control

The drive can be controlled (command and speed reference) by the BACnet network as well as by many other canals:

- I/O,
- Terminal (Local terminal, Graphic Keypad),
- RJ45 communication (Modbus).

The following figure shows the configuration for the command canal (Cmd SetPoint) and speed reference canal (Speed SetPoint)

The ATV212 can receive commands and speed setpoint from the BACnet network or from the terminals (F, R, RES, VIA, VIB).
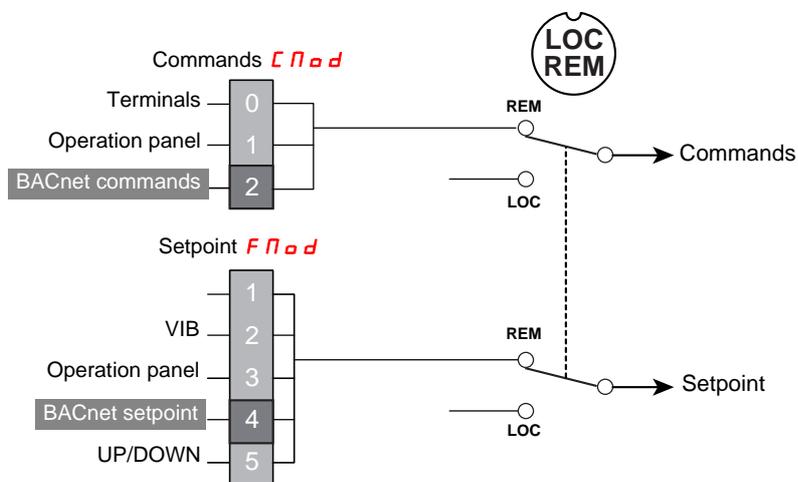
The LOC/REM key of the drive HMI is available to switch the control to the HMI.

Input F, R, RES can be configured to switch the control from the BACnet to the terminals.

Control by the BACnet

Commands and setpoint come from the BACnet network.

The LOC/REM key is active.

Control by terminals, monitoring by the BACnet network

Commands and setpoint come from the terminals.The drive is monitored by the BACnet network.The LOC/REM key is active.

(1) For more information, please refer to Control objects page .

Access to the parameters

Parameters $C\Pi od$ and $F\Pi od$ are accessible in the [PROGRAMMING MENU] Programming mode.

Parameter description	Setting
[Command mode sel] ($C\Pi od$) Remote mode start/stop control source	*0* [Logic inputs]: Control terminal logic input
[Frequency mode sel] ($F\Pi od$) Remote mode primary speed reference source	*1* [Ref source VIA]: VIA

Control by the BACnet network or the terminals switch by a logic input

The commands and the setpoint come from the BACnet network if logic input R is OFF.
The commands and the setpoint come from the terminals if logic input R is ON.
The function 4 8 [Forced local] is assigned to the logic input R.

The LOC/REM key is valid.
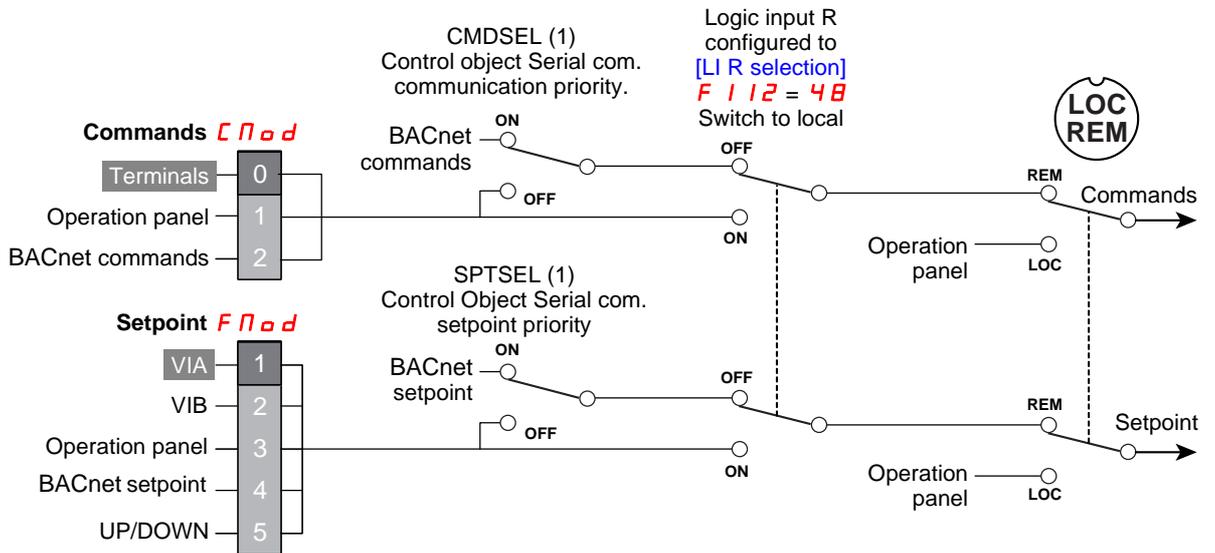

(1) For more information, please refer to Control objects page .

Access to the parameters

Parameters C П o d and F П o d are accessible in the [PROGRAMMING MENU] Programming mode. Parameter
F 1 1 2 is accessible in the [COMMUNICATION MENU] C o П submenu of [PROGRAMMING MENU] Programming mode.

Parameter description	Setting
[Command mode sel] (C П o d) Remote mode start/stop control source	0 [Logic inputs]: Control terminal logic input
[Frequency mode sel] (F П o d) Remote mode primary speed reference source	1 [Ref source VIA]: VIA
[LI R selection] (F 1 1 2) R Logic Input Function	4 8 [Forced local]: Forced switching from remote to local control

Command by the BACnet network, setpoint by the BACnet network or the terminals switch by a logic input

The commands always come from the BACnet network.
The setpoint comes from the BACnet network if logic input R is OFF.
The setpoint comes from the terminals if logic input R is ON.
The function ヨ゙ [Frequency source] is assigned to the logic input R.

The LOC/REM key is valid.

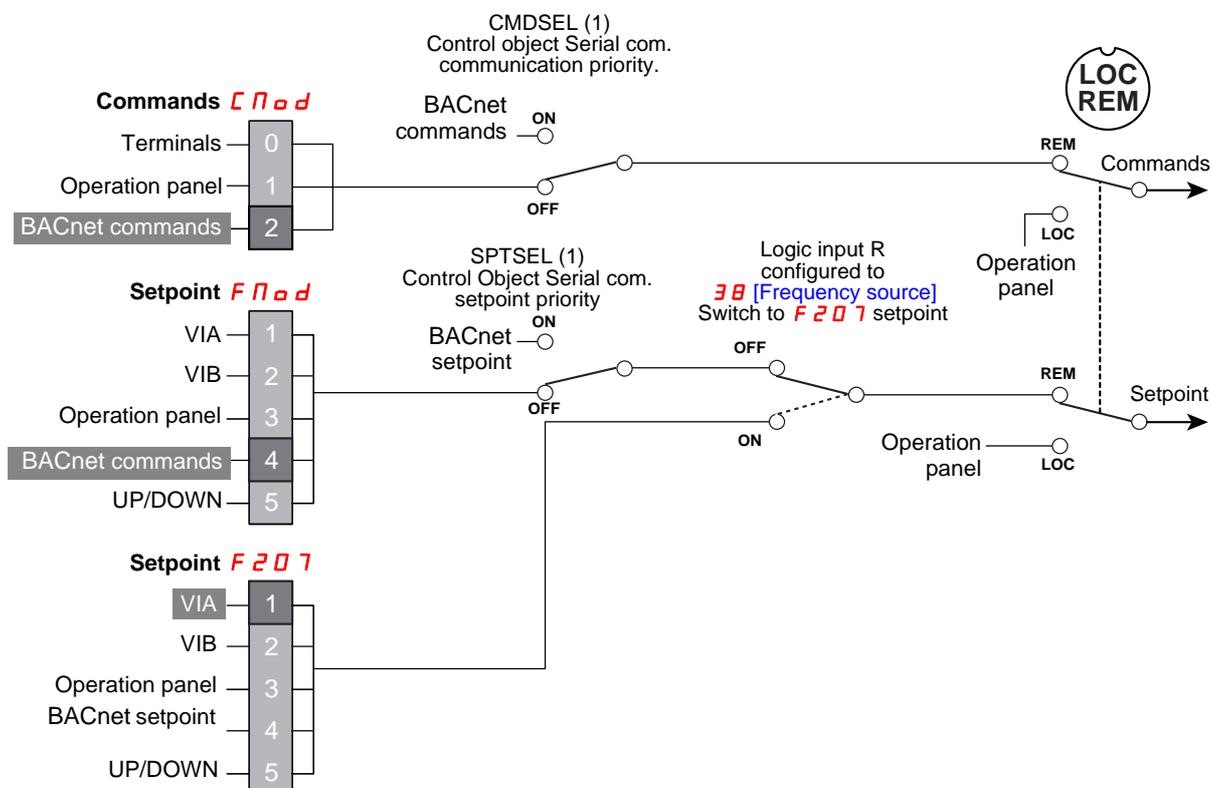(1) For more information, please refer to Control objects page 32.

Access to the parameters

Parameters *C П o d* and *F П o d* are accessible in the [PROGRAMMING MENU] Programming mode. Parameter *F 1 1 2* is accessible in the [COMMUNICATION MENU] *C o П* submenu of [PROGRAMMING MENU] Programming mode. Parameter *2 0 7* is accessible in the [COMMUNICATION MENU] *C o П* submenu of [PROGRAMMING MENU] Programming mode

Parameter description	Setting
[Command mode sel] (*C П o d*) Remote mode start/stop control source	*2* [Communication]: Serial communication
[Frequency mode sel] (*F П o d*) Remote mode primary speed reference source	*4* [Serial com ref].: Serial communication
[LI R selection] (*F 1 1 2*) R Logic Input Function	*3 8* [Frequency source]: Frequency reference source switching
[Remote spd ref 2] (*F 2 0 7*) Defines the remote mode secondary speed reference source	*1* [VIA]: VIA
[Com channel choice] (*F 8 0 7*) Communication channel choice	*1* [Open style]: Command via open style port

Setpoint by the BACnet network, switching commands to terminals by logic input

The commands and the setpoint come from the BACnet network if logic input R is OFF.
The commands come from the BACnet network if logic input R is OFF.
The commands come from the terminals if logic input R is ON.
The setpoint comes from the BACnet network.
The function 4 B [Forced local] is assigned to the logic input R.

The LOC/REM key is valid.

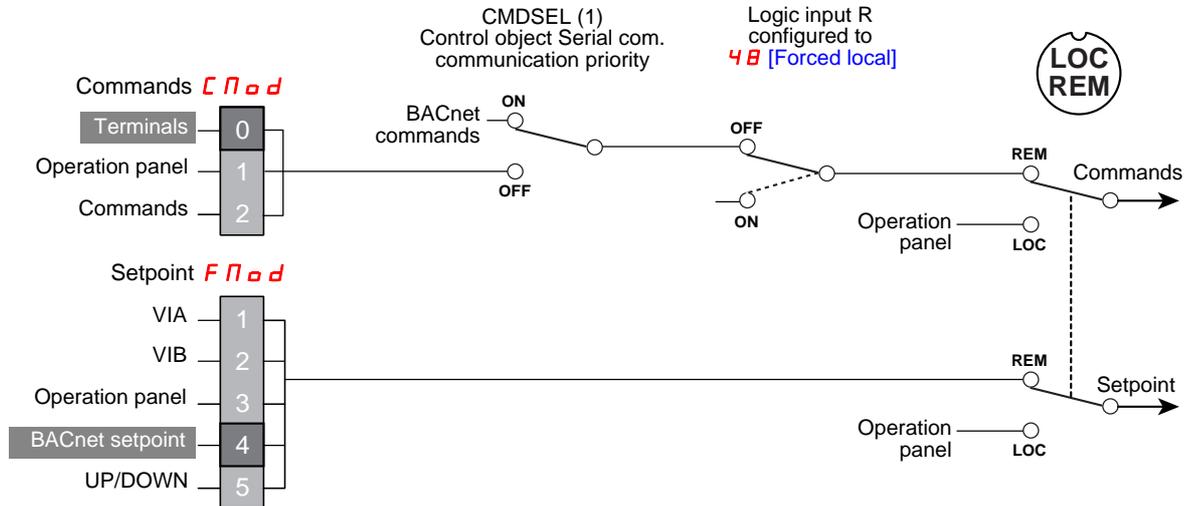(1) For more information, please refer to Control objects page 32.

Access to the parameters

Parameters C Π o d and F Π o d are accessible in the [PROGRAMMING MENU] Programming mode.
Parameter F I I 2 is accessible in the [COMMUNICATION MENU] C o Π submenu of [PROGRAMMING MENU] Programming mode.

Parameter description	Setting
[Command mode sel] (C Π o d) Remote mode start/stop control source	0 [Logic inputs]: Control terminal logic input
[Frequency mode sel] (F Π o d) Remote mode primary speed reference source	4 [Serial com ref.]: Serial communication
[LI R selection] (F I I 2) R Logic Input Function	4 B [Forced local]: Forced switching from remote to local control

Configuring the behaviour on communication interruption

BACnet communication interruption

(1) For more information, please refer to Control objects page 32.

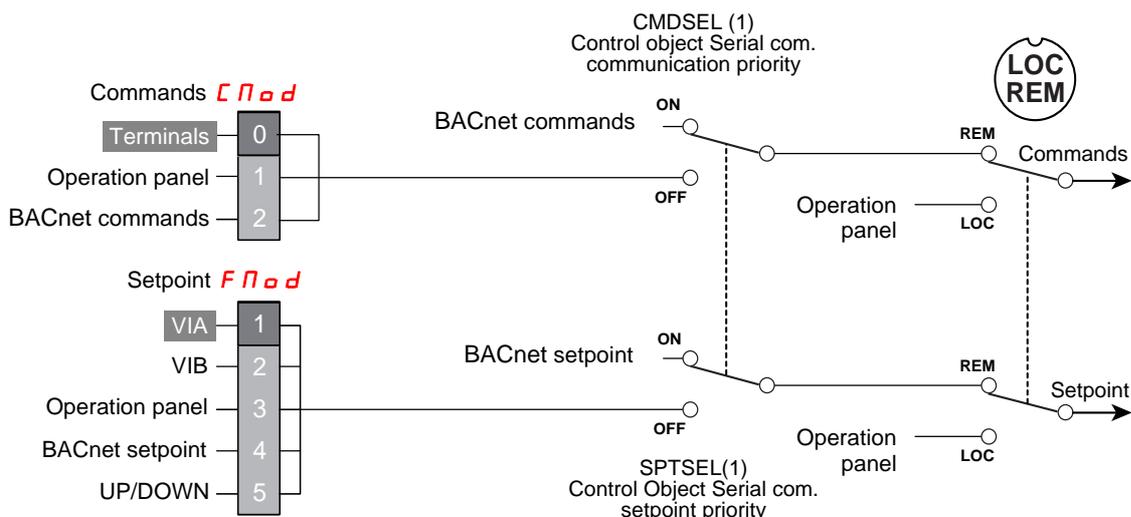### Access to the parameters

Parameters *C Π o d* and *F Π o d* are accessible in the [PROGRAMMING MENU] Programming mode.
Parameter *F B S 1* is accessible in the [COMMUNICATION MENU] *C o Π* submenu of [PROGRAMMING MENU] Programming mode.

Configuration

If you want the drive to switch to terminal control in case of BACnet communication interruption, configure:

Parameter description	Setting
[Command mode sel] (*C Π o d*) Remote mode start/stop control source	*0* [Logic inputs]: Control terminal logic input
[Frequency mode sel] (*F Π o d*) Remote mode primary speed reference source	*1* [Ref source VIA]: VIA
[Com. fault setting] (*F B S 1*) Drive behavior after a communication interruption	*0* [Ramp stp (F/Cmod)]: Communication release

Network objects

5

What's in this Chapter?

This chapter contains the following topics:

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Control objects	32

Drive Object

The following table summarizes the objects supported in their respective instance.

Property	Object Type						
	Device	**Binary Input**	**Binary Output**	**Binary Value**	**Analog Input**	**Analog Output**	**Analog Value**
Object_Identifier	●	●	●	●	●	●	●
Object_Name	●	●	●	●	●	●	●
Object_Type	●	●	●	●	●	●	●
System_Status	●	-	-	-	-	-	-
Vendor_Name	●	-	-	-	-	-	-
Vendor_ID	●	-	-	-	-	-	-
Model_Name	●	-	-	-	-	-	-
Firmware_Revision	●	-	-	-	-	-	-
Application_Software_Version	●	-	-	-	-	-	-
Protocol_Version	●	-	-	-	-	-	-
Protocol_Revision	●	-	-	-	-	-	-
Protocol_Service_Supported	●	-	-	-	-	-	-
Protocol_Object_Type_Supported	●	-	-	-	-	-	-
Object_List	●	-	-	-	-	-	-
Max_APDU_Lenght_Supported	●	-	-	-	-	-	-
Segmentation_Supported	●	-	-	-	-	-	-
APDU_TimeOut	●	-	-	-	-	-	-
Number_of_APDU_Retries	●	-	-	-	-	-	-
Max_Master	●	-	-	-	-	-	-
Max_Info_Frame	●	-	-	-	-	-	-
Address_Binding	●	-	-	-	-	-	-
DataBase_Revision	●	-	-	-	-	-	-
Profil_Name	●	-	-	-	-	-	-
Present_Value	-	●	●	●	●	●	●
Status_Flags	-	●	●	●	●	●	●
Prop_Event_State	-	●	●	●	●	●	●
Out_Of_Service	-	●	●	●	●	●	●
Units	-	-	-	-	-	●	●
Priority_Array	-	-	●	●	-	●	●
Relinquish_Default	-	-	●	●	-	●	●
Polarity	-	●	●		-	-	-
Active_Text	-	●	●	●	-	-	-
Inactive_Text	-	●	●	●	-	-	-

Binary input object instance

ID	Object Name	Description	Access
Binary input #0	RO 1 ACT	Status of relay FL	R
Binary input #1	RO 2 ACT	Status of relay RY	R
Binary input #6	DI 1 ACT	Value of F	R
Binary input #7	DI 2 ACT	Value of R	R
Binary input #8	DI 3 ACT	Value of RES	R

Binary output object instance

ID	Object Name	Description	Access	Note
Binary Output #0	RO1 CMD	FL relay out accessible if not assigned	C	*F132* = *38* or *39*
Binary Output #1	RO2 CMD	RY relay out accessible if not assigned	C	*F130* = *40* or *41*

Analog input object instance

ID	Object name	Description	Access	Note
Analog Input #0	ANALOG INPUT 1	VIA analogue	R	0-100% (100%=1023)
Analog Input #1	ANALOG INPUT 2	VIB analogue	R	0-100% (100%=1023)
Analog Input #2	ANALOG OUTPUT 1 ACT	FM actual value	R	0-100% (100%=1023) [*FMSL* =18]

Analog output object instance

ID	Object name	Description	Access	
Analog Output #0	ANALOG OUTPUT 1	Analogue output	C	0-100% (100%=1023) [*FMSL* =18]

Control objects

This chapter described Control objects that can be accessed by BACnet services. There are described by data type:

- Binary Values,
- Analog Values.

Binary Value Objects Instance

ID	Object Name	Description	Access
#0	RUN/STOP ACT	Indicates the drive status	R
#1	FWD/REV ACT	Indicates the motor rotation's direction	R
#2	FAULT ACT	Indicates the drive's fault status	R
#4	HAND/AUTO ACT	Indicates if the drive is locally controlled or not.	R
#6	MAINT REQ	Maintenance required	R
#7	DRIVE READY	The VSD is ready and waits a start command.	R
#8	AT SETPOINT	The VSD has reached the target speed	R
#10	RUN/STOP CMD	Commands a drive start	C
#11	FWD/REV CMD	Commands a motor direction's change	C
#14	FAULT RESET	Clear the detected fault by resetting the drive	C
#15	MBOX READ	Command to read parameter	W
#16	MBOX WRITE	Command to write parameter	W
#18	SP1PRESET	Preset speed operation frequencies 1	C
#19	SP2PRESET	Preset speed operation frequencies 2	C
#20	SP3PRESET	Preset speed operation frequencies 3	C
#21	STPSEL	Frequency priority selection	C
#22	CMDSEL	Command priority selection	C
#23	DAMPER FB	Damper feedback	W

R = Read-only, W=Writable, C=Commandable. Commandable values support the priority arrays and relinquish defaults

Analog Value Objects Instance

ID	Object Name	Description	Access	Unit
#0	OUTPUT SPEED	Output speed	R	rpm
#1	OUTPUT FREQ	Output frequency	R	Hz
#2	DC BUS VOLT	DC bus voltage	R	V
#3	OUTPUT VOLT	Motor voltage	R	V
#4	CURRENT	Motor current	R	A
#5	TORQUE	Motor Torque	R	%
#6	POWER	Motor Power	R	%
#7	DRIVE TEMP	Drive Thermal State	R	%
#8	KWH (R)	Writing a value enables reset of the energy counter	RW	kWH
#10	PRC PID FBCK	PID regulator feedback	R	%
#14	RUN TIME	Operating time	R	H
#16	INPUT REF 1	Speed reference from Bus	C	%
#18	LAST FLT	Error code	R	---
#19	PREV FLT 1	Previous detected fault (occurred before LASTFLT)	R	---
#20	PREV FLT 2	Previous detected fault (occurred before PREVFLT1)	R	---
#23	ACCEL1 TIME	Acceleration time	W	s
#24	DECEL1 TIME	Deceleration time	W	s
#25	MBOX PARAM	Parameter number	W	---
#26	MBOX DATA	Parameter value	W	---

R = Read-only, W=Writable, C=Commandable. Commandable values support the priority arrays and relinquish defaults.

Communication feedback (DAMPER FB)

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.
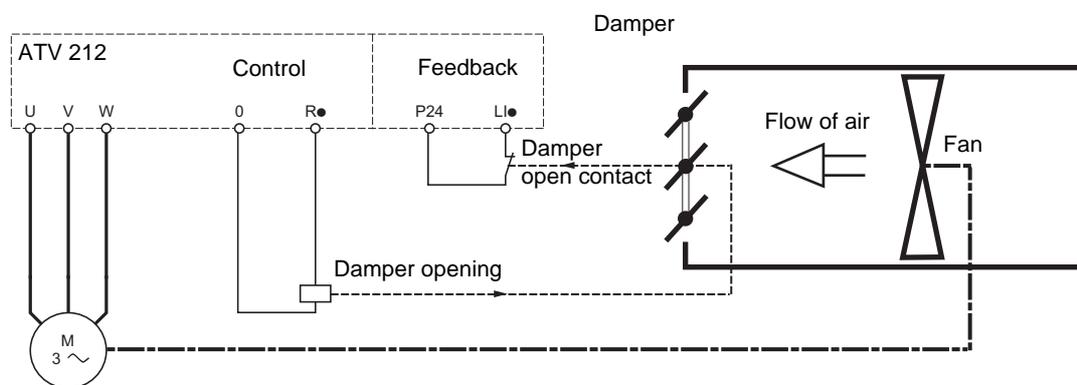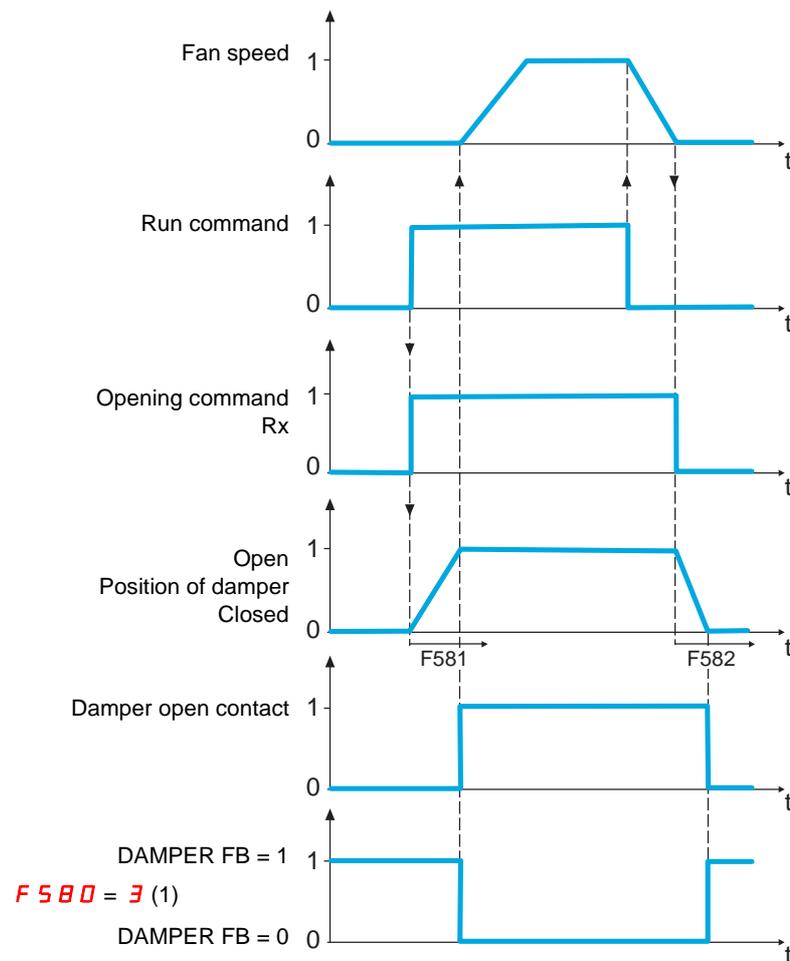
(1) [Com channel choice] F B O 7 must be set to I [Open style] to manage the damper feedback on BACnet network. DAMPER FB can only be active when [Damper fdb type] F 5 B O is set to 3 [Com. LIL set] or 4 [Com. LIH set].

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

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

Network Services

6

What's in this Chapter?

This chapter contains the following topics:

List of services

- Drive I/O.
- Control.
- Parameters access.
- Identification.

	Drive I/O		Control		Parameters access		Identification	
	BACnet service (*BIBB*)	Objects type	BACnet service (*BIBB*)	Objects Type	BACnet service (*BIBB*)	Objects type	BACnet service (*BIBB*)	Objects type
BACnet Environment	ReadProperty (DS-RP-B) ReadProperty Multiple (DS-RPM-B) WriteProperty (DS-WP-B) WriteProperty Multiple (DS-WPM-B)	BI, BO (1), AI, AO	ReadProperty (DS-RP-B) ReadProperty Multiple (DS-WPM-B) WriteProperty (DS-WP-B) WriteProperty Multiple (DS-WPM-B)	BV, AV.	ReadProperty (DS-RP-B) ReadProperty Multiple (DS-RPM-B) WriteProperty (DS-WP-B) WriteProperty Multiple (DS-WPM-B)	BV, AV.	ReadProperty (DS-RP-B) ReadProperty Multiple (DS-RPM-B) WriteProperty (DS-WP-B) WriteProperty Multiple (DS-WPM-B)	Device Object
					Reinitialize Device (DM-RD-B)	NA		
Drive's Environment	Access to all drive's wired I/Os.		Controls the drive in normal operation.		Enables Drive's parameters access		Delivers information Relative to the drive	

(1) If complies with operating mode

List of available BACnet services.

BACnet Service	BIBB	Family	Drive requested action
ReadProperty	(DS-RP-B)	Data Sharing	Provides the current value of one of its object property
WriteProperty	(DS-WP-B)	Data Sharing	Modifies the current value of one of its object property
WriteMultipleProperty	(DS-WPM-B)*	Data Sharing	Write several properties of several objects
ReadMultipleProperty	(DS-RPM-B)*	Data Sharing	Read several properties of several objects
Who-Is	(DM-DDB-B)	Device and Network Management	The drive provides information about its attributes and responds to requests to identify itself.
I-Am	(DM-DDB-B)	Device and Network Management	
Who-Has	(DM-DOB-B)	Device and Network Management	The drive provides address information about its objects upon request.
I-Have	(DM-DOB-B)	Device and Network Management	
DeviceCommunication Control	(DM-DCC-B)	Device and Network Management	The drive responds to communication control exercised by the external device.
ReinitializeDevice	(DM-RD-B)*	Device and Network Management	The drive performs reinitialisation requests from the A device

Access to the VSD objects collection.

To control the VSD the external application must modify the present values of binary and analog objects. To do this, the external controller must use the following services:

- `ReadProperty, WriteProperty, ReadPropertyMultiple, WritePropertyMultiple.`

These services allow to read or to write the properties of all the objects. From the list of objects refer to the Programming manual and to the Communication parameters manual.

Additional functions

Besides the services of "datasharing" the communication card provides the following functions.

Full parameters access.

By the use of indirect access, it is possible to read or write any of the internal parameters of the VSD.

This functionality is assured by these four objects:

MBOX DATA, MBOX PARAM, MBOX READ, MBOX WRITE.

- Reading

Write the logic address of the parameter to the present value property of the object MBOX PARAM.

Set present value property of the object MBOX READ to "read".

The current value of the parameter can be read in the present value property of MBOX DATA.

- Writing a parameter

Write the logic address of the parameter to the present value property of the object MBOX PARAM.

Write the new value in the present value property of the object MBOX DATA.

Set present value property of the object MBOX WRITE to "write".

Note: MBOX READ and MBOX WRITE automatically return back to inactive once command sent. Always return 0 when read.

Identification

Information relative to the VSD are stored in a unique object: ATV212 (Device object type). The following list of properties describes the content of this object. The type of these properties is character string.

ATV 212 Device Object	Properties
Object_Identifier	Instance of the device (parameter F893-F894)
Object_Name	"ATV212_XXX" **NOTE:** XXX correspond to the value entered on [Network adress] (*F890*) parameter. For example, if F890 = 1, the Object_Name will be "ATV212_001".
Object_Type	"Device"
System_Status	0 (operational)
Vendor_Name	"Schneider Electric"
Vendor ID	"10"
Model_Name	"ATV212XXXXXX"
Firmware_Revision	MMI firmware version "Vx.y"
Application_Software_Version	CTRL firmware version "Vx.y"
Protocol_Version	1
Protocol_Revision	6
Protocol_Service_Supported	Bit string: {FFFFFFFF FFFFTFTT TTFFTFFF FFFFFFFF FTTFFFFF} bit12: ReadProperty = TRUE bit14: ReadPropertyMultiple = TRUE bit15: WriteProperty = TRUE bit16: WritePropertyMultiple = TRUE bit17: DeviceCommunicationControl = TRUE bit20: ReinitializeDevice = TRUE bit33: Who-Has = TRUE bit34: Who-Is = TRUE

ATV 212 Device Object	Properties
Protocol_Object_Type_Supported	Bit string: {TTTTTTFF TFFFFFFF FFFFFFFF FFFFFFF} bit0: ANALOG-INPUT = TRUE bit1: ANALOG-OUTPUT = TRUE bit2: ANALOG-VALUE = TRUE bit3: BINARY-INPUT = TRUE bit4: BINARY-OUTPUT = TRUE bit5: BINARY-VALUE = TRUE bit8: DEVICE = TRUE
Object_List	Object list (49 objects)
Max_APDU_Lenght_Supported	480
Segmentation_Supported	3
APDU_TimeOut	60000 ms
Number_Of_APDU_Retries	0
Address_Binding	Always empty
DataBase_Revision	1
Max_Master	Parameter F895
Max_Info_Frame	Parameter F896
Profile_Name	"10-ATV-212"

Note: Only Max_Master property can be modified through Device Object.

Reinitialize device

The ReinitializeDevice BACnet service will be used to instruct the drive to reinitialize the communication link. This service requires two parameters. Reinitialize state parameter:

- COLDSTART: Resets the BACnet Communication stack, it can be used to restart the communication.
- WARMSTART: Behaviour is identical to the COLDSTART.

Diagnostics

What's in this Chapter?

This chapter contains the following topics:

Communication detected faults

General

The drive trips in $E\,r\,r\,5$ [Com RJ45 fault] or $E\,r\,r\,8$ [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] $F\,B\,S\,I$.

Access to the parameters

Parameter $F\,B\,S\,I$ is accessible in the [COMMUNICATION MENU] $C\,o\,\Pi$ submenu of [PROGRAMMING MENU] Programming mode.

Behaviour on detected fault

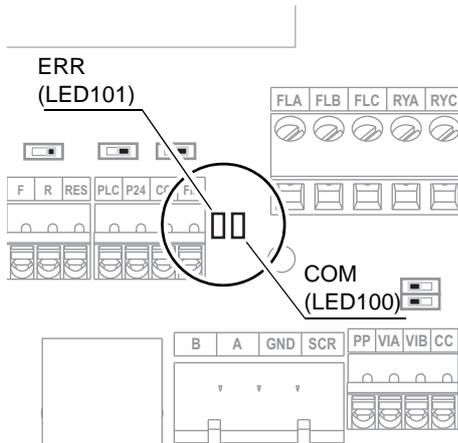| Parameter description	Possible value	Default value
[Com. fault setting] ($F\,B\,S\,I$) Drive behavior after a communication interruption	0 [Ramp stp (F/Cmod)]: Communication release. Drive ramps to a stop. Serial control is relinquished to sources defined by [Command mode sel] ($C\,\Pi\,o\,d$) and [Frequency mode sel] ($F\,\Pi\,o\,d$) I [No active]: No action. Last commanded operation continues. 2 [Ramp stop]: Deceleration stop. Drive ramps to a stop. Serial control is maintained. 3 [Freewheel]: Drive removes power from the motor which coasts to a stop. Serial control is maintained. 4 [Err5 or Err8]: Drive ramps to a stop. An $E\,r\,r\,5$ [Com RJ45 fault] or $E\,r\,r\,8$ [Network error fault] is displayed.	4

⚠ WARNING

LOSS OF CONTROL

If this parameter is set to 1, fieldbus module communication monitoring is disabled.

- Only use this setting after a thorough risk assessment in compliance with all regulations and standards that apply to the device and to the application.
- Only use this setting for tests during commissioning.
- Verify that communication monitoring has been re-enabled before completing the commissioning procedure and performing the final commissioning test.

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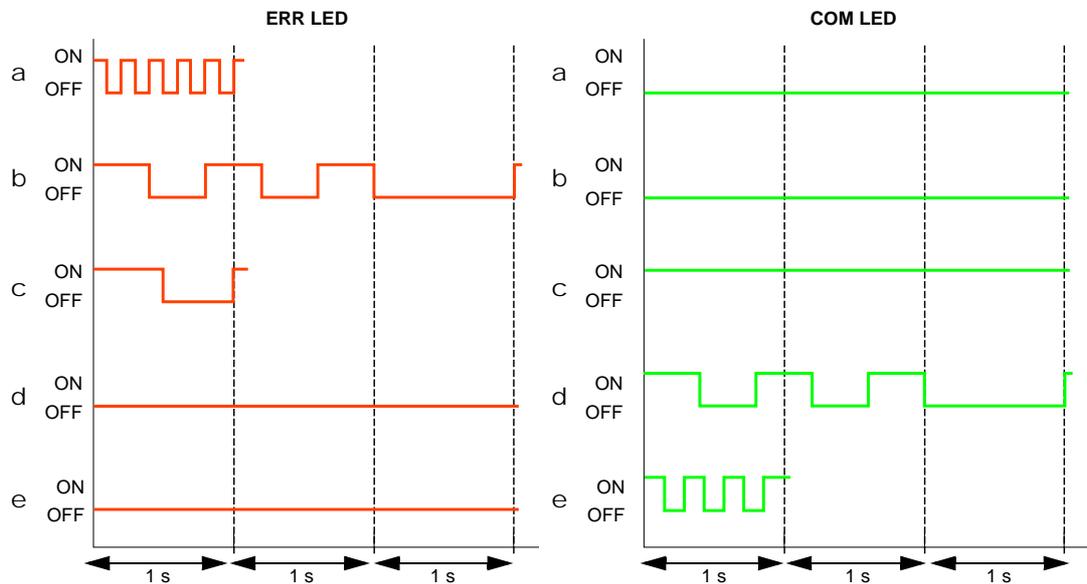

LED indicators

Location

ERR
(LED101)

FLA | FLB | FLC | RYA | RYC

F | R | RES | PLC | P24 | C

COM
(LED100)

B | A | GND | SCR | PP | VIA | VIB | CC

Description

The product has two LEDs, ERR red LED and COM green LED.

ERR LED

COM LED

Functions

State	ERR: Red LED	COM: Green LED	Comment
a	Flashing 5 times in 1 second	OFF	Invalid message received
b	Flashing 3 times in 2 second, OFF for 1 second	OFF	Communication loss detected
c	ON 0.5 s, OFF 0.5 s	ON	Invalid configuration detected
d	OFF	Flashing 3 times in 2 second, OFF for 1 second	Waiting for auto baudrate detection
e	OFF	Flashing Intermittent	Valid message received for this node

Detected fault possible causes and remedies

State	ERR: Red LED	COM: Green LED	Possible causes	Remedies
-	OFF	OFF	Drive not operating or turned off	Check the power supply.
a	Flashing 5 times per secondé	OFF	Internal communication error	• Check the environment (electromagnetic compatibility). • Check the card/drive connection. • Inspect or repair the drive.
b	Flashing, 3 times in 2 seconds, off for 1 second	OFF	ATV212 has not received valid message within time-out period.	• Check the environment (electromagnetic compatibility). • Check the wiring. • Check that the master is communicating within the time out period (= 10 s).
c	Flashing, ON 0.5 second OFF 0.5 second	ON	Invalid configuration detected	• Check the internal communication parameters
e	OFF	Flashing intermittent	Green LED will flash whenever valid message is received.	NA