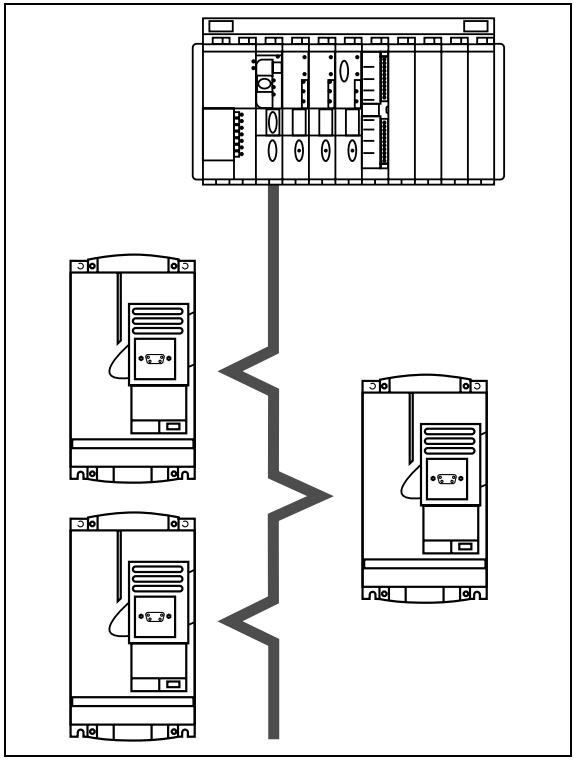
VVDED397058US R8/01
August 2001
Raleigh, NC, USA

Instruction Bulletin

ALTIVAR® 58 Adjustable Speed Drive Controllers

Register Access Guide for Communication Networks

Retain for future use.



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SQUARE D

GENERAL OVERVIEW

About This Manual

This manual specifies the names, types, and descriptions of the software registers available in the ALTIVAR® 58 (ATV58) adjustable speed drive controller. It also describes the ATV58 drive controller communication principles and the accessing rules and guidelines. This manual is meant to be a reference document for use with all communication options available in the ATV58 drive controller family.

The registers enable communication between the network and the drive controller. Using these registers, the drive controller can:

- Receive data messages
- Respond to data messages
- Transmit drive controller status information.

For example, these data exchanges allow the network to access such ATV58 functions as:

- Drive controller adjustment parameters
- Start/stop commands and speed control
- Status monitoring
- Diagnostics

⚠ 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 this instruction 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 ICS7.1 (latest edition), “Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems.”

Using This Manual

This manual is for use only by qualified personnel. It requires knowledge of:

- Communication network programming
- Communication protocols

This manual includes information about software registers only. It does **not** cover:

- Installing hardware option cards
- Using a communication link to the drive controller
- Configuring application-specific protocols
- Drive controller theory of operation and adjustments
- System troubleshooting

These topics are covered in the instruction bulletin for the drive controller or option card. For complete descriptions of the parameters listed in this document, refer to the keypad display instruction bulletin:

- VVDED397047US (latest revision)
- VVDED399094US (latest revision) for Type FVC

NETWORK PERFORMANCE

Cable Routing Practices

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

Avoid areas of high temperature, moisture, vibration, or other mechanical stress. Secure the cable where necessary to prevent its weight and the weight of other cables from pulling or twisting the cable. Use cable ducts, raceways, or other structures to protect the cable. These structures should be used for signal wiring paths and should not contain power wiring.

Avoid sources of electrical interference that can induce noise into the cable. Use the maximum practicable separation from such sources.

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

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

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

- Use metallic conduit for drive controller wiring. Do not run control network and power wiring in the same conduit.
- Separate non-metallic conduits or cable trays used to carry power wiring from metallic conduit carrying low-level control network wiring by at least 12 in. (305 mm).
- Separate metallic conduits carrying power wiring or low-level control network wiring by at least 3 in. (80 mm).
- Cross the metallic conduits and non-metallic conduits at right angles whenever power and control network wiring cross.
- Attenuate conducted emissions from the drive controller to the line in some installations to prevent interference with telecommunication, radio, and sensitive electronic equipment. Such instances may require attenuating filters. Consult the ATV58 catalog, document number 8806CT9901, for selection and application of these filters.

Optimizing Network Performance

- When structuring the information exchange requirements for a network, consider the speed of the communication required to implement the application properly. Use the communication method which best matches the speed requirements of the information exchange. Communicate information only when required by the application. Minimize network traffic by design. For example, when controlling a simple process requiring only a few control functions, send only the necessary registers. This minimizes network traffic and maintains best overall network speed.
- For better network security, keep drive controllers and their associated control devices on the same local network. As far as possible, minimize or eliminate the need for control wiring to cross repeaters.
- Use distributed control where possible. The ALTIVAR 58 drive controller has a large number of application functions which can be used in conjunction with network communications. Where possible, use these functions to allow local control by the drive controller while using the network to communicate supervisory information. This minimizes the information exchange burden on the network and the controlling device.
- Understand the failure possibilities of the designed network. Provide control redundancies and contingencies appropriate for the intended application.
- Follow the cable routing practices described on page 7. Improperly installed network wiring can cause noisy or intermittent data transmission with resulting loss of network speed and deterioration of security.

Communication Loss Detection and Time Out Disable

⚠ WARNING

LOSS OF CONTROL

Provide alternate control paths (Start, Stop, and Speed):

- When disabling communication loss detection.
- When motor control is required while a communication fault exists.

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

Setting CMI (word W402) bit 14 to 1 disables communication loss detection. As a result, loss of communication will not cause the drive controller to generate a fault. The drive controller will continue to follow the last valid command it received over the network.

*NOTE: **Do not** use this function during normal network operation. This function is intended for use during start-up and troubleshooting. The system designer must provide alternate control paths for starting, stopping, and controlling the motor.*

Maintaining Communication

After communication has been established, the drive controller must receive a communication request (read or write) within the time window specified for the communication card being used. Otherwise, the drive controller will generate a communication fault. Depending on the communication card, the communication time-out period may be programmable. *A communication request **must not** be issued before the previous request has been completed; otherwise, the drive controller's memory can overflow, resulting in a communication fault.*

If a communication fault is generated, the response of the controller depends on the user-programmed selections made during communication card installation and setup.

CONTROL MODES

Hand/Off/Auto (HOA) Switch Functionality

⚠ WARNING

LOSS OF CONTROL

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

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

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

When the control switch is in the auto position, *all **local run and start commands** to the drive controller must be **removed**.* During power-up, the ATV58 drive controller defaults to local control. (See “Local and Remote Control” on page 11.) After the drive controller recovers from a power up sequence (including such unplanned events as an AC line power disturbance), it immediately responds to any local controls that are active before the communication network has initialized and assumed control. *This can result in unintended equipment operation if local run and start commands are present.*

When the control switch is in the hand or off position, *the drive controller must be placed into the **forced local mode**.* While it is possible to stop the drive controller in the remote mode by activating one of the local stop commands (such as the keypad display stop button), commands sent over the network can restart the drive controller if it is not in forced local mode. See “Forced Local” on page 12.

Refer to Figures 1 and 2 for assistance in designing Hand/Off/Auto control. For the run reverse and forced local functions, select any unused logic inputs on the main control board. Assign a logic input to the run reverse function only if appropriate for the application.

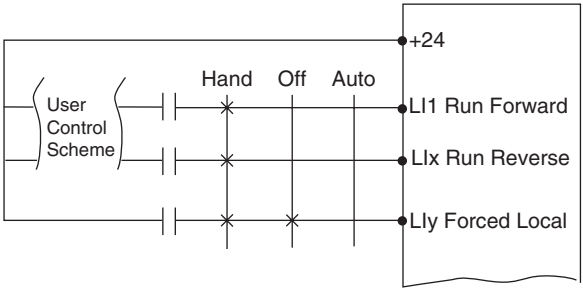

Figure 1: Example of Two-Wire Control

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

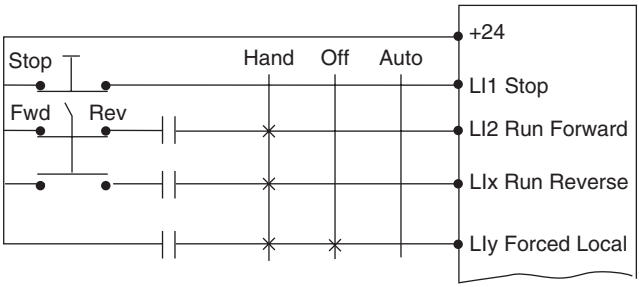

Figure 2: Example of Three-Wire Control

Local and Remote Control

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

Local Control

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

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

See the latest revision of the appropriate keypad display manual, VVDED397047US or VVDED399094US, for more details on how to select between the two modes of local control.

Remote Control

In remote (auto) control:

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

Forced Local

Switching between local and remote control is achieved by a switch wired to a logic input on the controller terminal block as illustrated in Figures 1 and 2 on page 11. The logic input must be assigned to the function, forced local.

When the logic input assigned to forced local is active (high), control of the drive controller is assigned to the selected local (hand) mode. In this case, command requests by the network are refused. Command parameters can be monitored. To determine whether access to other parameters is read/write or read only, refer to the instruction bulletin supplied with the communication option.

⚠ WARNING

UNINTENDED EQUIPMENT ACTION

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

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

When the logic input assigned to forced local is inactive (low), control of the drive controller is transferred to the network if it is wired as shown in Figures 1 or 2 on page 11. The only local (hand) controls that are still monitored by the drive controller include the logic input assigned to Forced Local and any input assigned to a drive stop function. Examples include the stop button on the keypad display, logic input one (LI1) which is assigned to the function STOP if the ATV58 drive controller is configured for 3-wire control, and any logic input assigned to the functions freewheel stop, DC injection braking, and fast stop. See the latest revision of the appropriate keypad display manual, VVDED397047US or VVDED399094US, for more details.

Stop Commands

Stop requests activated by the terminals are always acknowledged, regardless of whether the control mode is local or remote. Refer to Table 1. Stop requests activated by the keypad display are acknowledged unless disabled by setting parameter code PST (word W8) to 0.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Disabling the stop key on the keypad display will prevent the drive controller from stopping when this stop key is pressed. An external stop command must be installed to stop the motor.

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

Table 1: Stop Requests

Type of Stop Command	Resulting DRIVECOM state	To restore control of the ATV58 drive controller using the fieldbus
Freewheel stop	Ready to Switch ON	1. Set the terminal strip logic input assigned to the freewheel stop function to 1. 2. Perform the transitions required to return the drive controller to “Run” status.
Fast stop	Operation Enabled	Set the terminal strip logic input assigned to the fast stop function to 1.
DC injection stop	Operation Enabled	Set the terminal strip logic input assigned to the DC injection stop function to 0.
Stop via keypad display STOP key	Ready to Switch ON	1. Release the Stop key. 2. Perform the transitions required to return the drive controller to “Run” status.
3-wire control stop via logic input stop (LI1)	Ready to Switch ON	1. Set the logic input assigned to STOP to 1. 2. Perform the transitions required to return the drive controller to “Run” status.

Communication Principle

The ATV58 drive controller can be connected to two fieldbuses:

- The first bus (high speed) uses an optional communication card installed in the drive controller.
- The second bus (standard speeds) uses:
  - — an RS485 port on the keypad display
  - — MODBUS® RTU protocol

Only one bus can control the drive controller. The fieldbus connected to the communication card always takes priority. However, the fieldbus that is not controlling the drive controller may:

- Send configuration words (when the motor is stopped)
- Send adjustments
- Read display words

The bus controlling the drive controller can relinquish control by setting bits 8 and 15 of CMD (word W400) to 1.

Startup Requirements

Table 2 shows the minimum programming requirements to operate the ATV58 drive controller across a serial link using CMD (word W400). You must also set the local frequency reference using LFR (word W401) as described on page 33.

Table 2: Command Word Settings

W400 CMD Bits Set to 1	Hex	Decimal	Drive Controller Performance
15 and 1	8002	32770	The drive controller runs forward at the local frequency reference.
15, 12, and 1	9002	36866	The drive controller stops the motor on the programmed deceleration ramp.
15, 13, and 1	A002	40962	The drive controller stops the motor using the DC injection settings.
15, 14, and 1	C002	49154	The drive controller fast stops using the fast stop settings.
15, 11, and 1	8802	34818	The drive controller runs in reverse at the local frequency reference.

REGISTER DESCRIPTIONS

Register Mapping

⚠ WARNING

UNINTENDED EQUIPMENT ACTION

- Writing to registers that are designated as reserved may cause unintended equipment operation.
- DO NOT write data to registers unless the function to be performed is completely understood. Consult the keypad display instruction bulletin, VVDED397047US or VVDED399094US, for additional details.
- Bit 0 is the right-most (least significant) bit. Bit 15 is the left-most (most significant) bit.

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

Table 3 shows register mapping as viewed in MODICON® programming software (MODSOFT® or CONCEPT™) reference data.

Table 3: MODICON PLC Mapping to ATV58 Registers

ATV58 Drive Controller	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Quantum PLC [1]	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

[1] For Momentum PLCs, consult the MODICON Momentum user's manual.

NOTE: All registers are integers. All decimal places in units are implied.

Accessing Registers: An Overview

The communication link identifies ATV58 drive controllers as a series of holding registers. The tables in this section describe ATV58 registers and their corresponding communication link addresses (words). The registers are grouped by function and are in numerical order.

This document identifies the internal variable words using two formats:

- The logic address in the format W•••, which is coded in decimal for protocols such as MODBUS and PROFIBUS
- The DRIVECOM address, with an index and subindex in the format 16#••••/••. (See Appendix A on page 47 for a description of the DRIVECOM standard state chart.) This hexadecimal code is used by protocols such as INTERBUS S®. This format is equivalent to the notations H••••, ••••h, and 0x••••.

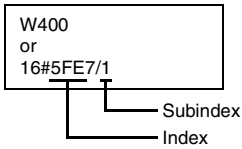

Figure 3: Example of Word Labels

⚠ 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.

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1. For additional information, refer to NEMA ICS 1.1 (latest revision), “Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control” and to NEMA ICS7.1 (latest revision), “Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems.”

If you are using a MODBUS communication link, you may need to add 1 to the register address to obtain the correct address. To determine if this is necessary, read ULN (word W454) with the motor stopped. If you do not read the line voltage in ULN (word W454), then 1 must be added to the register address to obtain the correct address. Repeat this step to verify the correct address.

You must monitor status registers ETA (word W458), ETI (word W459), and ETI2 (word W460) to determine the correct state of the drive controller.

Index of Registers

NOTE: To look up registers by code (e.g., CIC, TCC), refer to "Appendix B" on page 54.

Table 4: Index of Registers by Address Range

Address	Description	Start Page
W1 or 16#5FE0/1 to W17 or 16#5FE0/11	General configuration registers	Page 18
W50 or 16#5FE1/1 to W79 or 16#5FE1/1E	Drive configuration registers	Page 20
W100 or 16#5FE2/1 to W113 or 16#5FE2/E	I/O configuration registers	Page 23
W150 or 16#5FE3/1 to W159 or 16#5FE3/A	Fault configuration registers	Page 26
W250 or 16#5FE5/1 to W314 or 16#5FE5/41	Adjustment registers	Page 27
W400 or 16#5FE7/1 to W403 or 16#5FE7/4	Control registers	Page 33
W450 or 16#5FE8/1 to W495 or 16#5FE8/2E	Monitoring registers	Page 35
W600 or 16#603F to W615 or 16#6049/3	Special DRIVECOM registers	Page 44

Configuration Registers (Read and Write)

General Configuration Registers

NOTE: General configuration registers can only be adjusted with the motor stopped and all run commands removed.

Table 5: General Configuration Registers

Word	Code	Units	Description	Possible Values or Range
W1 or 16#5FE0/1	CIC	—	Incorrect configuration Upon power up, read CIC: If CIC = 0: normal If CIC ≠ 0: malfunction Write CIC to 0 to return to factory settings.	Bit 0 = 0: Normal rating Bit 0 = 1: Drive controller rating modified Bit 1 = 0: Option card detection normal Bit 1 = 1: Type of option card modified Bit 2 = 0: Option card detection normal Bit 2 = 1: Option card removed Bit 3 = 0: Contents of EEPROM correct Bit 3 = 1: Contents of EEPROM incorrect Bits 4 to 15: Reserved
W3 or 16#5FE0/3	CFG	—	Macro-configuration. Modification of this parameter reassigns other parameters.	0 = HDG: Material handling 1 = GEN: General use 2 = VT: Variable torque (except Type FVC)
W4 or 16#5FE0/4	CRL	0.1 mA	Minimum reference of input AI2	0–200 (0 to 20.0 mA)
W5 or 16#5FE0/5	CRH	0.1 mA	Maximum reference of input AI2	40–200 (4.0 to 20.0 mA)
W6 or 16#5FE0/6	TCC	—	2-wire/3-wire control via terminals. Modification of this parameter will reassign the I/O.	0 = 2W: 2-wire control 1 = 3W: 3-wire control
W7 or 16#5FE0/7	TCT	—	Type of 2-wire control	0 = LEL: Level detection (0 or 1) 1 = TRN: Transition detection (switching from 0 to 1 or 1 to 0) 2 = PFO: Transition detection with priority given to forward over reverse
W8 or 16#5FE0/8	PST	—	STOP key has priority (regardless of assigned control mode—i.e., terminal strip, keypad, or serial link)	0 = No 1 = Yes

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Disabling the stop key on the keypad display will prevent the drive controller from stopping when this stop key is pressed. An external stop command must be installed to stop the motor.

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

Table 5: General Configuration Registers (Continued)

Word	Code	Units	Description	Possible Values or Range
W9 or 16#5FE0/9	STR	—	Speed reference storage (+/–Speed)	0 = NO: Reference not saved 1 = RAM: Reference saved in RAM 2 = EEP: Reference saved in EEPROM 3 = SRE: Reference adjustment range limited by parameter SRP (Type FVC only)
W10 or 16#5FE0/A	ADD	—	Drive address via the standard RS485 serial link.	0 to 31 0 = Broadcasting without response
W11 or 16#5FE0/B	ORT	—	Drive power overrating for variable torque applications Modifying this parameter returns the following parameters to the factory settings: UNS, NCR, NSP, COS, TUN, ITH and IDC. This parameter can be modified on ATV58 Type H controllers when the the macro-configuration (CFG, W3) is set to variable torque (VT). See instruction bulletin VVDED397047US (latest revision) for a complete description. For ATV58 Type FVC models, this parameter is always at 0.	0 = No (high overtorque) 1 = Yes (standard overtorque)
W12 or 16#5FE0/C	RIN	—	Inhibits operation of the motor in the reverse direction (by logic input, analog input, serial command, or REV key on the keypad display)	0 = No 1 = Yes
W13 or 16#5FE0/D	BSP	—	Manage low speed operation	0 = No: Normal 1 = BLS: Peak limiting (deadband) 2 = BNS: Base limiting (pedestal)
W14 or 16#5FE0/E	AOL	0.1 mA	Minimum reference of analog output AOx	0 to 200 (0 to 20.0 mA)
W15 or 16#5FE0/F	AOH	0.1 mA	Maximum reference of analog output AOx	0 to 200 (0 to 20.0 mA)
W16 or 16#5FE0/10	TBR	—	Communication speed through the RS485 port	6 = 4800 baud 7 = 9600 baud 8 = 19200 baud
W17 or 16#5FE0/11	RPR	—	Reset kWh or total running time	0 = No 1 = APH: Reset to 0 the kWh 2 = RTH: Reset to 0 the total running time

Drive Configuration Registers

NOTE: Drive configuration registers can only be adjusted with the motor stopped and all run commands removed.

Table 6: Drive Configuration Registers

Word	Code	Units	Description	Possible Values or Range
W50 or 16#5FE1/1	SFT	—	Switching frequency range. Adjusting this parameter changes the following parameters to the factory setting: • SFR (W51) • NCR (W54) • NRD (W60) • CLI (W72) • ITH (W258) • IDC (W270) • IBR (W277) • CTD (W282)	0 = LF: Low frequency 1 = HF1: High frequency without derating. If th ≥ 95%, switch to 4 kHz. If th < 70%, return to SFR frequency. 2 = HF2: High frequency with derating by one rating
W51 or 16#5FE1/2	SFR	—	PWM switching frequency (Values 5 and 6 are not on all drive ratings)	0 = 0.5 kHz if SFT = LF 1 = 1 kHz if SFT = LF 2 = 2 kHz if SFT = LF 3 = 4 kHz if SFT = LF 4 = 8 kHz if SFT = HF1 or HF2 5 = 12 kHz if SFT = HF1 or HF2 6 = 16 kHz if SFT = HF1 or HF2
W52 or 16#5FE1/3	TFR	0.1 Hz	Maximum output frequency	If SFR = 0.5 kHz: 10.0 to 62.0 If SFR = 1 kHz: 10.0 to 125.0 If SFR = 2 kHz: 10.0 to 250.0 If SFR = 4 kHz: 10.0 to 500.0 If SFR = 8 kHz: 10.0 to 500.0 If SFR = 12 kHz: 10.0 to 500.0 If SFR = 16 kHz: 10.0 to 500.0
W53 or 16#5FE1/4	FRS	0.1 Hz	Nominal motor frequency	100–5000 (10.0 to 500.0 Hz)
W54 or 16#5FE1/5	NCR	0.1 A	Nominal motor current	0.25 INV to 1.36 INV (INV = drive controller nominal current)
W55 or 16#5FE1/6	UNS	1 V	Nominal motor voltage	ATV58•••M2: 200 to 240 ATV58•••N4: 200 to 500 ATV58F•••N4: 200 to 500
W56 or 16#5FE1/7	NSP	1 rpm	Nominal motor speed	0 to 32767
W57 or 16#5FE1/8	COS	0.01	Motor cosine Phi (power factor)	0.50 to 1.00
W58 or 16#5FE1/9	TLI	1%	Torque limit	0 to 200
W59 or 16#5FE1/A	TUN	—	Auto-tune of motor	0 = No: auto-tune not performed (value from internal table used). If written to 0: return to value from table 1 = Yes: auto-tune command 2 = Done: auto-tune performed

[1] This parameter does not exist for ATV58 Type FVC drive controllers.

Table 6: Drive Configuration Registers (Continued)

Word	Code	Units	Description	Possible Values or Range
W60 or 16#5FE1/B	NRD	—	Motor noise reduction by switching frequency modulation	0 = No 1 = Yes
W61 [1] or 16#5FE1/C	NLD	—	Energy saving function (VT macro only)	0 = No 1 = Yes
W62 or 16#5FE1/D	RPT	—	Type of acceleration and deceleration ramps	0 = LIN: Linear 1 = S: S-shaped 2 = U: U-shaped 3 = CUS: Customized (Type FVC only)
W63 or 16#5FE1/E	DCF	1	Deceleration reduction coefficient used with Fast Stop: DEC ÷ DCF = Fast Stop ramp	1 to 10
W64 or 16#5FE1/F	BRA	—	Deceleration ramp adaptation	0 = No 1 = Yes
W65 or 16#5FE1/10	FRT	0.1 Hz	Ramp switching threshold (switch to AC2 and DE2 if output frequency > FRT and FRT ≠ 0)	0 to HSP
W66 or 16#5FE1/11	BER	—	Reserved	
W67 or 16#5FE1/12	ADC	—	Automatic DC injection on stop; or, for Type FVC only, if CTR = FVC, zero speed is maintained	0 = No 1 = Yes
W68 or 16#5FE1/13	PLS	1	Number of pulses per encoder revolution (For encoder feedback I/O card)	1 to 1024
W69 [1] or 16#5FE1/14	PCC	0.1	Motor power load coefficient (in the event of motor switching)	2 to 10 (0.2 to 1.0)
W70 [1] or 16#5FE1/15	SPC	—	Special motor	0 = No 1 = Yes 2 = PSM: Use for very small motors or for open circuit output voltage testing.
W71 or 16#5FE1/16	PGT	—	Type of motor shaft speed sensor (Indicates the number of signals wired to the encoder feedback I/O card)	0 = INC: Incremental encoder. A, A–, B, B–, are hard-wired 1 = DET: Detector. Only A is hard-wired
W72 or 16#5FE1/17	CLI	0.1 A	Internal current limit	0.1 to 1.36 x INV (INV = drive controller nominal current)
W73 [1] or 16#5FE1/18	FDB	—	Current limit adaptation based on output frequency (VT macro only)	0 = No 1 = Yes

[1] This parameter does not exist for ATV58 Type FVC drive controllers.

Drive Configuration Registers (Read and Write)

These parameters can be modified only with the motor stopped and all run commands removed. The exception is parameter FLU (word W74), which can be modified with the motor running. Parameter FLU can be accessed from the keypad display and from the PC software through the ADJUST menu.

NOTE: Words W74 to W78 exist only on ATV58 Type FVC drive controllers.

Table 7: Drive Configuration Registers (Read and Write)

Word	Code	Unit	Description	Possible values or range
W74 or 16#5FE1/19	FLU	—	Motor fluxing	0 = FNC: Non-continuous fluxing 1 = FCT: Continuous fluxing
W75 or 16#5FE1/1A	CTR	—	Control mode selection	0 = SVC: Open loop 1 = FVC: Closed loop
W76 or 16#5FE1/1B	PGI	1	Number of pulses per encoder revolution (control card)	100 to 5000
W77 or 16#5FE1/1C	SSL	—	Type of speed loop selection	0 = IP: IP structure 1 = PI: PI structure
W78 or 16#5FE1/1D	ENC	—	Check encoder feedback Do not write values 0 or 2. Do not write value 1 if W78 = 2.	0 = No: test not performed 1 = Yes: perform the test 2 = Done: test performed
W79 or 16#5FE1/1E	STT	—	Type of stop. The type of stop assigned by this parameter is carried out until the motor frequency drops below the setting of parameter FFT (W313), after which the motor freewheel stops.	0 = STN: Normal ramp stop 1 = FST: Fast stop 2 = NST: Freewheel stop 3 = DCI: DC injection stop

I/O Configuration Registers

I/O Configuration registers can only be adjusted with the motor stopped and all run commands removed.

NOTE: Assignments to the PID regulator parameters are only accessible if first "on" analog input is assigned to parameter PIF: PID feedback.

Table 8: I/O Configuration Registers

Word	Code	Description	Possible Values or Range	
W100 or 16#5FE2/1	LI1	Assignment of logic input LI1	1 = STP: Stop (if TCC = 3W) 2 = FW: Forward operation (if TCC = 2W)	
W101 or 16#5FE2/2	LI2	Assignment of logic input LI2	0 = NO: Not assigned 2 = FW: Forward operation (if TCC = 3W) 3 = RV: Reverse operation 4 = RP2: Ramp switching 5 = JOG: Jog operation 6 = +SP: +Speed 7 = –SP: –Speed 8 = PS2: 2 preset speeds 9 = PS4: 4 preset speeds 10 = PS8: 8 preset speeds 11 = RFC: Reference switching 12 = NST: Freewheel stop 13 = DCI: DC injection stop	14 = FST: Fast stop 15 = CHP: Motor switching; or open loop/closed loop switching [1] 16 = TL2: Second torque limit 17 = FLO: Force to local 18 = RST: Clear faults 19 = ATN: Auto tune 20 = SPM: Save reference [1] 21 = FLI: Motor fluxing [1] 22 = PAU: PID auto-man 23 = PIS: PID integral shunting [1] 24 = PR2: 2 preset PID references 26 = TLA: Torque limit by AI
W102 or 16#5FE2/3	LI3	Assignment of logic input LI3	0 = NO: Not assigned 3 = RV: Reverse operation 4 = RP2: Ramp switching 5 = JOG: Jog operation 6 = +SP: +Speed 7 = –SP: –Speed 8 = PS2: 2 preset speeds 9 = PS4: 4 preset speeds 10 = PS8: 8 preset speeds 11 = RFC: Reference switching 12 = NST: Freewheel stop 13 = DCI: DC injection stop 14 = FST: Fast stop	15 = CHP: Motor switching; or open loop/closed loop switching [1] 16 = TL2: Second torque limit 17 = FLO: Force to local 18 = RST: Clear faults 19 = ATN: Auto tune 20 = SPM: Save reference [1] 21 = FLI: Motor fluxing [1] 22 = PAU: PID auto-man 23 = PIS: PID integral shunting [1] 24 = PR2: 2 preset PID references 25 = PR4: 4 preset PID references 26 = TLA: Torque limit by AI

[1] Values specific to ATV58 Type FVC models

Table 8: I/O Configuration Registers (Continued)

Word	Code	Description	Possible Values or Range	
W103 or 16#5FE2/4	LI4	Assignment of logic input LI4	0 = NO: Not assigned 3 = RV: Reverse operation 4 = RP2: Ramp switching 5 = JOG: Jog operation 6 = +SP: +Speed 7 = –SP: –Speed 8 = PS2: 2 preset speeds 9 = PS4: 4 preset speeds 10 = PS8: 8 preset speeds 11 = RFC: Reference switching 12 = NST: Freewheel stop 13 = DCI: Injection stop 14 = FST: Fast stop	15 = CHP: Motor switching; or open loop/closed loop switching if CTR = FVC [1] 16 = TL2: Second torque limit 17 = FLO: Forced local mode 18 = RST: Fault reset 19 = ATN: Auto tune 20 = SPM: Save reference [1] 21 = FLI: Motor fluxing [1] 22 = PAU: PID auto-man 23 = PIS: PID integral shunting [1] 24 = PR2: 2 preset PID references 25 = PR4: 4 preset PID references 26 = TLA: Torque limit by AI
W104 or 16#5FE2/5	LI5	Assignment of logic input LI5	0 = NO: Not assigned 3 = RV: Reverse operation 4 = RP2: Ramp switching 5 = JOG: Jog operation 6 = +SP: +Speed 7 = –SP: –Speed 8 = PS2: 2 preset speeds 9 = PS4: 4 preset speeds 10 = PS8: 8 preset speeds 11 = RFC: Reference switching 12 = NST: Freewheel stop 13 = DCI: Injection stop 14 = FST: Fast stop	15 = CHP: Motor switching; or open loop/closed loop switching if CTR = FVC [1] 16 = TL2: Second torque limit 17 = FLO: Forced local mode 18 = RST: Fault reset 19 = ATN: Auto tune 20 = SPM: Save reference [1] 21 = FLI: Motor fluxing [1] 22 = PAU: PID auto-man 23 = PIS: PID integral shunting [1] 24 = PR2: 2 preset PID references 25 = PR4: 4 preset PID references 26 = TLA: Torque limit by AI
W105 or 16#5FE2/6	LI6	Assignment of logic input LI6	0 = NO: Not assigned 3 = RV: Reverse operation 4 = RP2: Ramp switching 5 = JOG: Jog operation 6 = +SP: +Speed 7 = –SP: –Speed 8 = PS2: 2 preset speeds 9 = PS4: 4 preset speeds 10 = PS8: 8 preset speeds 11 = RFC: Reference switching 12 = NST: Freewheel stop 13 = DCI: Injection stop 14 = FST: Fast stop	15 = CHP: Motor switching; or open loop/closed loop switching if CTR = FVC [1] 16 = TL2: Second torque limit 17 = FLO: Forced local mode 18 = RST: Fault reset 19 = ATN: Auto tune 20 = SPM: Save reference [1] 21 = FLI: Motor fluxing [1] 22 = PAU: PID auto-man 23 = PIS: PID integral shunting [1] 24 = PR2: 2 preset PID references 25 = PR4: 4 preset PID references 26 = TLA: Torque limit by AI
W107 or 16#5FE2/8	AI2	Assignment of analog input AI2	0 = NO: Not assigned 2 = FR2: Speed reference 2 3 = SAI: Summing reference	4 = PIF: PI feedback (PI control) 9 = DAI: Subtracting reference [1]

[1] Values specific to ATV58 Type FVC models

Table 8: I/O Configuration Registers (Continued)

Word	Code	Description	Possible Values or Range
W108 or 16#5FE2/9	AI3	Assignment of analog input AI3 or of encoder input (according to type of I/O card)	0 = NO: Not assigned 3 = SAI: Summing reference 4 = PIF: PI feedback (PI control) 5 = SFB: Tachogenerator feedback 6 = RGI: Encoder feedback (except Type FVC models) 7 = PTC: PTC probes 8 = ATL: Analog torque limit 9 = DAI: Subtracting reference [1] 10 = PIM: manual speed reference of the PID regulator (auto-man) 11 = FPI: speed reference of the PID regulator (predictive reference) [1]
W110 or 16#5FE2/B	R2	Assignment of relay R2	0 = NO: Not assigned 2 = RUN: Drive running 3 = OCC: Downstream contactor control 4 = FTA: Frequency threshold (FTD) reached 5 = FLA: High speed reached 6 = CTA: Current threshold (CTD) reached 7 = SRA: Frequency reference reached 8 = TSA: Thermal threshold (TTD) reached 9 = BLC: Brake sequence 10 = PEE: PID error [1] 11 = PFA: PID feedback alarm [1] 12 = APL: Loss of 4–20 mA follower signal 13 = F2A: 2nd frequency threshold (F2D) reached
W111 or 16#5FE2/C	LO	Assignment of logic output LO	0 = NO: Not assigned 2 = RUN: Drive running 3 = OCC: Downstream contactor control 4 = FTA: Frequency threshold (FTD) reached 5 = FLA: High speed reached 6 = CTA: Current threshold (CTD) reached 7 = SRA: Frequency reference reached 8 = TSA: Thermal threshold (TTD) reached 10 = PEE: PID error [1] 11 = PFA: PID feedback alarm [1] 12 = APL: Loss of 4–20 mA follower signal 13 = F2A: 2nd frequency threshold (F2D) reached
W112 or 16#5FE2/D	AO	Assignment of analog output AO	0 = NO: Not assigned 1 = OCR: Motor current 2 = OFR: Motor speed 3 = ORP: Ramp output 4 = TRQ: Motor torque 5 = STQ: Signed motor torque 6 = ORS: Signed ramp output 7 = OPS: PID reference 8 = OPF: PID feedback 9 = OPE: PID error 10 = OPI: PID integral 11 = OPR: Motor power output 12 = THR: Motor thermal state 13 = THD: Drive thermal state
W113 or 16#5FE2/E	AO1	Assignment of analog output AO1 (Only on ATV58 Type FVC drive controllers)	0 = NO: Not assigned 1 = OCR: Motor current 2 = OFR: Motor speed 3 = ORP: Ramp output 4 = TRQ: Motor torque 5 = STQ: Signed motor torque 6 = ORS: Signed ramp output 7 = OPS: PID reference 8 = OPF: PID feedback 9 = OPE: PID error 10 = OPI: PID integral 11 = OPR: Motor power output 12 = THR: Motor thermal state 13 = THD: Drive thermal state

[1] Values specific to ATV58 Type FVC models

Fault Configuration Registers

NOTE: Fault configuration registers can only be adjusted with the motor stopped and all run commands removed.

Table 9: Fault Configuration Registers

Word	Code	Units	Description	Possible Values or Range
W150 or 16#5FE3/1	ATR	—	Automatic restart	0 = No 1 = Yes
W151 or 16#5FE3/2	OPL	—	Motor phase loss	0 = No 1 = Yes
W152 or 16#5FE3/3	IPL	—	Input phase loss	0 = No 1 = Yes
W153 or 16#5FE3/4	THT	—	Motor thermal protection	0 = NO: Protection disabled 1 = ACL: Self-cooled motor 2 = FCL: Force-cooled motor
W154 or 16#5FE3/5	LFL	—	Loss of follower	0 = No: No faults 1 = Yes: Immediate fault 2 = STT: Stop without fault via STT setting 3 = LSF: Stop with fault and load LFF speed 4 = LFF: Go to set speed
W155 or 16#5FE3/6	FLR	—	Catch a spinning load	0 = No 1 = Yes
W156 or 16#5FE3/7	STP	—	Controlled stop on loss of input power	0 = NO 1 = MMS: Maintain DC bus 2 = FRP: Follow ramp
W157 or 16#5FE3/8	SDD	—	Ramp not followed	0 = No 1 = Yes
W158 or 16#5FE3/9	RST	—	Type of reset	0 = RSP: Partial reset 1 = RSG: General reset (inhibits all faults)
W159 or 16#5FE3/A	LFF	0.1 Hz	Default speed if 4–20 mA follower signal is lost.	0 to HSP

Adjustment Registers (Read and Write)

NOTE: Adjustment registers can be modified with the motor running or with the motor stopped and all run commands removed.

Table 10: Adjustment Registers

Word	Code	Units	Description	Possible Values or Range
W250 or 16#5FE5/1	HSP	0.1 Hz	High speed	LSP to TFR
W251 or 16#5FE5/2	LSP	0.1 Hz	Low speed	0 to HSP
W252 or 16#5FE5/3	ACC	0.1 s or 0.01 s	Acceleration (time between 0 and FRS)	0: ramp of 0.05 s (special case) 1 to 9999: ramp of 0.1 s to 999.9 s or 0.01 to 99.99. See INR (W291) for Type FVC.
W253 or 16#5FE5/4	DEC	0.1 s or 0.01 s	Deceleration (time between FRS and 0)	0: ramp of 0.05 s (special case) 1 to 9999: ramp of 0.1 s to 999.9 s or 0.01 to 99.99. See INR (W291) for Type FVC.
W254 or 16#5FE5/5	UFR	1%	IR compensation (adjustment of auto-tune value)	0 to 150 if SPC = No 0 to 800 if SPC = Yes 0 if CFG = VT
W255 or 16#5FE5/6	FLG	1%	Frequency loop gain	0 to 100
W256 [1] or 16#5FE5/7	PFL	1%	V/F ratio profile	0 to 100 if CFG = VT 100 if CFG = HDG or GEN
W257 or 16#5FE5/8	STA	1%	Frequency loop stability	0 to 100
W258 or 16#5FE5/9	ITH	0.1 A	Current setting for motor thermal protection	0.25 to 1.36 x INV (drive controller nominal current)
W259 or 16#5FE5/A	SLP	1%	Slip compensation	0 if CFG = VT 0 to 150 if CFG = HDG or GEN
W260 or 16#5FE5/B	AC2	0.1 s or 0.01 s	Acceleration 2 (time between 0 and FRS)	0: ramp of 0.05 s (special case) 1 to 9999: ramp of 0.1 s to 999.9 s or 0.01 to 99.99. See INR (W291) for Type FVC.
W261 or 16#5FE5/C	DE2	0.1 s or 0.01 s	Deceleration 2 (time between FRS and 0)	0: ramp of 0.05 s (special case) 1 to 9999: ramp of 0.1 s to 999.9 s or 0.01 to 99.99. See INR (W291) for Type FVC.

[1] This parameter does not exist for ATV58 Type FVC drive controllers.

Table 10: Adjustment Registers (Continued)

Word	Code	Units	Description	Possible Values or Range
W262 or 16#5FE5/D	JOG	0.1 Hz	Jog frequency	0 to 100 (0.0 to 10.0 Hz)
W263 or 16#5FE5/E	JGT	0.1 s	Delay between two consecutive jog operations	0 to 20 (0.0 to 2.0 s)
W264 or 16#5FE5/F	SP2	0.1 Hz	Preset speed 2	LSP to HSP
W265 or 16#5FE5/10	SP3	0.1 Hz	Preset speed 3	LSP to HSP
W266 or 16#5FE5/11	SP4	0.1 Hz	Preset speed 4	LSP to HSP
W267 or 16#5FE5/12	SP5	0.1 Hz	Preset speed 5	LSP to HSP
W268 or 16#5FE5/13	SP6	0.1 Hz	Preset speed 6	LSP to HSP
W269 or 16#5FE5/14	SP7	0.1 Hz	Preset speed 7	LSP to HSP
W270 or 16#5FE5/15	IDC	0.1 A	DC injection current level	0.1 to 1.36 x INV (drive controller nominal current)
W271 or 16#5FE5/16	TDC	0.1 s	DC injection time (in the case of automatic DC injection at stop) **Type FVC:** Zero speed holding time with CTR = closed loop	0 to 300 = 0.0 s to 30.0 s 301 = CONT: continuous injection
W272 or 16#5FE5/17	TLS	0.1 s	Low speed (LSP) dwell timer	0 = No: no limit 1 to 9999 = time of 0.1 s to 999.9 s
W273 [1] or 16#5FE5/18	BRL	0.1 Hz	Mechanical brake release threshold	0 to 100 (0.0 to 10.0 Hz)
W274 or 16#5FE5/19	BEN	0.1 Hz	Mechanical brake engage threshold **Type FVC:** Not significant if CTR = closed loop	0 to LSP
W275 or 16#5FE5/1A	BRT	0.01 s	Mechanical brake release time	0 to 500 (0.00 to 5.00 s)
W276 or 16#5FE5/1B	BET	0.01 s	Mechanical brake engage time	0 to 500 (0.00 to 5.00 s)

[1] This parameter does not exist for ATV58 Type FVC drive controllers.

Table 10: Adjustment Registers (Continued)

Word	Code	Units	Description	Possible Values or Range
W277 or 16#5FE5/1C	IBR	0.1 A	Mechanical brake release current threshold	0 to 1.36 x INV (drive controller nominal current)
W278 or 16#5FE5/1D	TL2	1%	Second torque limit	0 to 200
W279 or 16#5FE5/1E	RPG	0.01	PI proportional gain	1 to 10000 (0.01 to 100.00)
W280 or 16#5FE5/1F	RIG	0.01/s	PI integral gain	1 to 10000 (0.01 to 100.00)
W281 [1] or 16#5FE5/20	FBS	0.1	PI feedback scale factor	10 to 1000 (1.0 to 100.0)
W282 or 16#5FE5/21	CTD	0.1 A	Motor current threshold for signalling	0.25 to 1.36 x INV (INV = drive controller nominal current)
W283 or 16#5FE5/22	TTD	1%	Thermal threshold for signalling	0 to 118
W284 or 16#5FE5/23	FTD	0.1 Hz	Frequency threshold for signalling	LSP to HSP
W285 or 16#5FE5/24	DTS	0.01	Tachogenerator feedback scaling (For I/O card with analog input)	100 to 200 (1.00 to 2.00)
W286 or 16#5FE5/25	JPF	0.1 Hz	Skip frequency (frequency range: ±2.5 Hz)	0 to HSP
W287 or 16#5FE5/26	PIC	—	Inverts the PI feedback signal	0 = No (normal) 1 = Yes (inverted)
W288 16#5FE5/27	SDC	0.1 A	Continuous DC injection braking current level on stopping after 30 s. See TDC (W271)	Min: 0.1 x INV Max: 1.36 x INV (INV = drive controller nominal current)
W289 or 16#5FE5/28	USC	0.01	Machine coefficient. Applied to RFR for custom display of machine speed under Display parameter USP (USP = RFR x USC).	1 to 10000 (0.01 to 100.00)
W290 or 16#5FE5/29	BIP	—	Brake release pulse	0 = No: Pulse in the direction requested 1 = Yes: Always pulse in the ascending direction
W291 or 16#5FE5/2A	INR	—	Fine increment in the ramp settings for ACC, DEC, AC2, and DE2	0 = 0.1 s 1 = 0.01 s

[1] This parameter does not exist for ATV58 Type FVC drive controllers.

Table 10: Adjustment Registers (Continued)

Word	Code	Units	Description	Possible Values or Range
W292 or 16#5FE5/2B	SRP	1%	Range of action around the reference for +/– speed function	0 to 50% of the reference
W293 or 16#5FE5/2C	TA1	1%	Rounding of the start of the acceleration ramp	0 to 100% of ramp time
W294 or 16#5FE5/2D	TA2	1%	Rounding of the end of the acceleration ramp	0 to (100% of ramp time – TA1)
W295 or 16#5FE5/2E	TA3	1%	Rounding of the start of the deceleration ramp	0 to 100% of ramp time
W296 or 16#5FE5/2F	TA4	1%	Rounding of the end of the deceleration ramp	0 to (100% of ramp time – TA3)
W297 or 16#5FE5/30	SPG	1%	PI type speed loop proportional gain	0 to 1000
W298 or 16#5FE5/31	SIG	1%	PI type speed loop integral gain	0 to 1000
W299 or 16#5FE5/32	REO	—	PID regulator reference offset	–999 to +999
W300 or 16#5FE5/33	PAL	1%	PID feedback alarm min. threshold	0 to 100%
W301 or 16#5FE5/34	PAH	1%	PID feedback alarm max. threshold	0 to 100%
W302 or 16#5FE5/35	PER	1%	PID error alarm max. threshold	0 to 100%
W303 or 16#5FE5/36	RDG	0.01	PID regulator derivative gain	0 to 10000 (0 to 100.00)
W304 or 16#5FE5/37	PSP	0.1 s	PID feedback filter time constant	0 to 100 (0 to 10.0)
W305 or 16#5FE5/38	PSR	1%	PID speed input multiplier ratio	0 to 100
W306 or 16#5FE5/39	PLR	1%	PID regulator deadband ratio	0 to 100
W307 or 16#5FE5/3A	PLB	0.1 Hz	PID regulator deadband threshold	0 to HSP

[1] This parameter does not exist for ATV58 Type FVC drive controllers.

Table 10: Adjustment Registers (Continued)

Word	Code	Units	Description	Possible Values or Range
W308 or 16#5FE5/3B	PI2	1%	2nd preset PID reference	0 to 100
W309 or 16#5FE5/3C	PI3	1%	3rd preset PID reference	0 to 100
W310 or 16#5FE5/3D	PRG	—	PID regulator reference gain	–999 to +999
W311 or 16#5FE5/3E	SF2	0.1 Hz	Skip frequency 2 ± 2.5 Hz around setpoint	0 to HSP
W312 or 16#5FE5/3F	SF3	0.1 Hz	Skip frequency 3 ± 2.5 Hz around setpoint	0 to HSP
W313 or 16#5FE5/40	FFT	0.1 Hz	Frequency threshold for start of freewheel stop during deceleration phase if STT (W79) = STN or FST	0 to HSP
W314 or 16#5FE5/41	F2D	0.1 Hz	Second frequency threshold for signalling	LSP to HSP

[1] This parameter does not exist for ATV58 Type FVC drive controllers.

Control Registers (Read and Write)

⚠ WARNING

UNINTENDED EQUIPMENT ACTION

- Writing to registers that are designated as reserved may cause unintended equipment operation.
- DO NOT write data to registers unless the function to be performed is completely understood. Consult the keypad display instruction bulletin, VVDED397047US or VVDED399094US, for additional details.
- Bit 0 is the right-most (least significant) bit. Bit 15 is the left-most (most significant) bit.

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

Table 11: MODICON PLC Mapping to ATV58 Registers

ATV58 Drive Controller	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Quantum PLC [1]	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

[1] For Momentum PLCs, consult the MODICON Momentum user's manual.

Table 12: Control Registers

Word	Code	Units	Description	Possible Values or Range
W400 or 16#5FE7/1	CMD	—	Command word [1]	Bit 0 = 0 and Bit 15 = 0: Not ready Bit 0 = 1 and Bit 15 = 0: Ready Bit 1 = 0: Return to “Switch On disabled” status Bit 1 = 1: No action Bit 2 = 0 and Bit 15 = 0: E-stop (rapid deceleration) Bit 2 = 1: No action Bit 3 = 0 and Bit 15 = 0: DRIVECOM stop command Bit 3 = 1 and Bit 15 = 0: DRIVECOM run command Bits 4 to 6: Reserved Bit 7 = 0: No action Bit 7 = 1: Reset faults Bit 8 = 0 and Bit 15 = 1: Activate control via serial link Bit 8 = 1 and Bit 15 = 1: Deactivate control via serial link Bits 9 and 10: Reserved Bit 11 = 0: Normal direction command Bit 11 = 1: Reverse direction command Bit 12 = 0: Motor run command (RUN) Bit 12 = 1: Motor stop command Bit 13 = 0: No action Bit 13 = 1: Stop by DC injection command Bit 14 = 0: No action Bit 14 = 1: Fast stop command Bit 15 = 0: DRIVECOM control register Bit 15 = 1: Non-DRIVECOM control register See page 50 for more information.
W401 or 16#5FE7/2	LFR	0.1 Hz or 0.015 Hz	Serial link frequency reference. [1]	LSP to HSP Signed in two’s complement. If bit 9 of CMI is 0, the resolution of LFR is 0.1 Hz (0–5000 = 0.0 to 500.0 Hz). If bit 9 is 1, the resolution of LFR becomes approximately 0.015 Hz per count (0–32767 = 0 to 500 Hz).

[1] Parameter is reinitialized at the end of time-out unless bit 14 (NTO) of CMI (W402 or 16#5FE7/3) is set to 1.
[2] The EEPROM life limit is 100,000 write operations.

Table 12: Control Registers (Continued)

Word	Code	Units	Description	Possible Values or Range
W402 or 16#5FE7/3	CMI	—	Internal control register (application program). [1]	Bit 0 = 0: No action Bit 0 = 1: Factory settings command summary. This bit automatically resets to 0 after accepting the request; but if CMI is a periodic variable, the PLC program must write it to 0 after the first request has been accepted. [2] Bit 1 = 0: No action Bit 1 = 1: Save configuration/adjustments in EEPROM if voltage is sufficient (no USF fault present). This bit automatically resets to 0 after accepting the request; but if CMI is a periodic variable, the PLC program must write it to 0 after the first request has been accepted. [2] Bit 2 = 0: No action Bit 2 = 1: Recall configuration/adjustments in EEPROM. This bit automatically resets to 0 after accepting the request; but if CMI is a periodic variable, the PLC program must write it to 0 after the first request has been accepted. This bit is inactive if the motor is running. Bit 3 = 0: No action Bit 3 = 1: External fault command (EPF) Bit 4 = 0: No action Bit 4 = 1: Ramp switching command Bit 5 = 0: No action Bit 5 = 1: Motor switching command; or Open loop/closed loop switching (Type FVC only) Bit 6 = 0: No action Bit 6 = 1: Second torque limit command Bit 7: Leave this bit at 0 Bit 8 = 0: Normal speed loop ramps (Type FVC only) Bit 8 = 1: Short-circuiting of speed loop ramps (Type FVC only) Bit 9 = 0: Resolution of keypad or serial link speed reference (LFR) is 0.1 Hz Bit 9 = 1: Resolution of keypad or serial link speed reference (LFR) is approximately 0.015 Hz Bits 10 to 11: Reserved Bit 12: Reserved Bit 13 = 0: Drive controller not locked at stop Bit 13 = 1: Drive controller locked at stop Bit 14 (NTO) = 0: Control with communication check Bit 14 (NTO) = 1: Control without communication check Bit 15 = 0: Parameter consistency check Bit 15 = 1: No parameter consistency check, drive controller locked at stop. Switching this bit to 0 revalidates all parameters.
W403 or 16#5FE7/4	PISP	0.001	PI setpoint in serial link mode. [1]	0 to 10,000 PISP is used only if an analog input is assigned to PIF: PID feedback. When using PISP, LFR (frequency reference) and LFRD (speed reference) have no effect on the motor speed. The analog input for PID feedback remains active in the serial link mode.

[1] Parameter is reinitialized at the end of time-out unless bit 14 (NTO) of CMI (W402 or 16#5FE7/3) is set to 1.
[2] The EEPROM life limit is 100,000 write operations.

Monitoring Registers (Read Only)

Monitoring registers are read only, except for outputs set to Not Assigned.

Table 13: Monitoring Registers

Word	Code	Description	Possible Values or Range
W450 or 16#5FE8/1	FRH	Frequency reference (absolute value)	Value read Units of 0.1 Hz
W451 or 16#5FE8/2	RFR	Output frequency applied to the motor (absolute value)	Value read Units of 0.1 Hz or 0.015 Hz
W452 or 16#5FE8/3	SPD	Motor speed estimated by the drive controller (absolute value)	Value read Units of 1 rpm
W453 or 16#FE8/4	LCR	Motor current	Value read Units of 0.1 A
W454 or 16#5FE8/5	ULN	Line voltage	Value read Units of 0.1 V
W455 or 16#5FE8/6	THR	Motor thermal state (100% = Nominal thermal state, 118% = OLF threshold)	Value read Units of 1%
W456 or 16#5FE8/7	THD	Drive controller thermal state (100% = Nominal thermal state, 118% = OHF threshold)	Value read Units of 1%
W457 or 16#5FE8/8	LFT	Last fault	0 = NOF: No fault saved 1 = INF: Internal fault 2 = EEF: EEPROM memory fault 3 = CFF: Configuration parameters incorrect (initialization) 4 = CFI: Configuration parameters invalid (if writing a configuration) 5 = SLF: Standard communication link fault (link break) 6 = ILF: Fast communication link fault (link break) 7 = CNF: Fast communication network fault 8 = EPF: External fault 9 = OCF: Overcurrent fault (prolonged ICL) 10 = CRF: Precharge relay fault 11 = SPF: Loss of speed feedback fault 12 = ANF: Ramp not followed fault 13 = LFF: Loss of follower fault (4–20 mA) 14 = TSF: Thermal sensor fault 15 = OTF: Motor overheating fault (thermal sensor) 16 = OHF: Drive controller overheating fault (on heatsink) 17 = OLF: Motor overload fault (thermal simulation or thermal sensor) 18 = OBF: DC bus overvoltage fault 19 = OSF: Input supply overvoltage fault 20 = OPF: Motor phase loss fault 21 = PHF: Input supply phase loss fault (> 1 s) 22 = USF: Input supply undervoltage fault (> 200 ms) 23 = SCF: Motor short circuit fault (phase to earth) 24 = SOF: Overspeed fault (with speed feedback: 1.11 x HSP; without feedback: 1.2 x TFR)

Table 13: Monitoring Registers (Continued)

Word	Code	Description	Possible Values or Range
W458 or 16#5FE8/9	ETA	Drive controller DRIVECOM status word	Bit 0 = 0: Power not ready Bit 0 = 1: Power ready for startup Bit 1 = 0: Drive controller not ready Bit 1 = 1: Drive controller ready (RDY) Bit 2 = 0: DRIVECOM stop Bit 2 = 1: DRIVECOM run Bit 3 = 0: No fault Bit 3 = 1: Fault present (FAI) Bit 4 = 0: Power present Bit 4 = 1: Power not present Bit 5 = 0: E-stop (rapid deceleration) in progress Bit 5 = 1: No E-stop Bit 6 = 0: Status ≠ Switching Disabled Bit 6 = 1: Status = Switching Disabled (freewheel stop) Bit 7 = 0: Alarm absent Bit 7 = 1: Alarm present Bit 8: Reserved Bit 9 = 0: Forced local active (FLO) Bit 9 = 1: Forced local inactive Bit 10 = 0: Speed reference not reached (transient state) Bit 10 = 1: Speed reference reached (steady state) Bit 11 = 0: LFRD reference (in rpm) normal (W603 or 16#6042) Bit 11 = 1: LFRD reference (in rpm) exceeded (> HSP or < LSP) Bits 12 and 13: Reserved Bit 14 = 0: No stop from keypad display STOP key Bit 14 = 1: Stop from keypad display STOP key Bit 15 = 0: Forward direction of rotation (output frequency) Bit 15 = 1: Reverse direction of rotation (output frequency)

Table 13: Monitoring Registers (Continued)

Word	Code	Description	Possible Values or Range
W459 or 16#5FE8/A	ETI	Drive controller internal status register no. 1	Bit 0 = 0: Write parameters authorized Bit 0 = 1: Write parameters not authorized (EEPROM saving in progress) Bit 1 = 0: No parameter consistency check, drive controller locked at stop Bit 1 = 1: Parameter consistency check Bit 2 = 0: Fault reset not authorized Bit 2 = 1: Fault reset authorized Bit 3 = 0: No motor fluxing in progress (Type FVC only) Bit 3 = 1: Motor fluxing in progress (Type FVC only) Bit 4 = 0: Motor stopped Bit 4 = 1: Motor running Bit 5 = 0: No DC injection Bit 5 = 1: DC injection Bit 6 = 0: Drive controller running in steady state Bit 6 = 1: Drive controller running in transient state (ACC or DEC) Bit 7 = 0: No thermal overload alarm Bit 7 = 1: Thermal overload alarm Bit 8 = 0: No alarm if excessive braking Bit 8 = 1: Alarm if excessive braking Bit 9 = 0: Drive controller not accelerating Bit 9 = 1: Drive controller accelerating Bit 10 = 0: Drive controller not decelerating Bit 10 = 1: Drive controller decelerating Bit 11 = 0: No current limit alarm Bit 11 = 1: Current limit alarm Bit 12: Reserved Bit 14 = 0, Bit 13 = 0: Control via wired terminal strip Bit 14 = 0, Bit 13 = 1: Control via keypad display Bit 14 = 1, Bit 13 = 0: Control via standard serial link Bit 14 = 1, Bit 13 = 1: Control via fast serial link Bit 15 = 0: Forward direction of rotation requested (reference) Bit 15 = 1: Reverse direction of rotation requested (reference)

Table 13: Monitoring Registers (Continued)

Word	Code	Description	Possible Values or Range
W460 or 16#5FE8/B	ETI2	Drive controller internal status register no. 2	Bit 0 = 0: Drive controller not in factory autotest mode Bit 0 = 1: Drive controller in factory autotest mode Bit 1 = 0: Drive controller not in board test mode Bit 1 = 1: Drive controller in board test mode Bit 2 = 0: Drive controller not in product test mode Bit 2 = 1: Drive controller in product test mode (burn-in) Bit 3 = 0: High speed not reached Bit 3 = 1: High speed reached Bit 4 = 0: Speed reference not reached Bit 4 = 1: Speed reference reached Bit 5 = 0: Frequency threshold (FTD) not reached Bit 5 = 1: Frequency threshold (FTD) reached Bit 6 = 0: Current threshold (CTD) not reached Bit 6 = 1: Current threshold (CTD) reached Bit 7 = 0: PID feedback correct (Type FVC only) Bit 7 = 1: PID feedback exceeded (Type FVC only) Bit 8 = 0: PID error correct (Type FVC only) Bit 8= 1: PID error exceeded (Type FVC only) Bits 9 to 15: Reserved
W461 or 16#5FE8/C	ETI3	Drive controller internal status register no. 3	Bit 0 = 0: Drive controller power does not exceed 7.5 kW @ 230 V or 15 kW @ 400 V Bit 0 = 1: Drive controller power exceeds 7.5 kW @ 230 V and 15 kW @ 400 V Bit 1 = 0: Drive controller power does not exceed 30 kW @ 400 V or 15 kW @ 230 V) Bit 1 = 1: Drive controller power exceeds 30 kW @ 400 V and 15 kW @ 230 V Bit 2 = 0: ATV58 Type H model Bit 2 = 1: ATV58 Type FVC model Bit 3 = 0: Overrating not allowed for lower power range model Bit 3 = 1: Overrating allowed for lower power range model (50/60 Hz switch on 60 Hz, caliber 3 kW @ 460 V to 15 kW @ 460 V, and CFG = VT) Bit 4 = 0: No extended VT ratings Bit 4 = 1: Extended VT ratings (ETI3 bit 3 = 1 and ORT = 1)

Table 13: Monitoring Registers (Continued)

Word	Code	Description	Possible Values or Range
W462 or 16#5FE8/D	DP1	Past fault no. 1	0 = NOF: No fault saved 1 = INF: Internal fault 2 = EEF: EEPROM memory fault 3 = CFF: Configuration parameters incorrect (initialization) 4 = CFI: Configuration parameters invalid (if writing a configuration) 5 = SLF: Standard communication link fault (link break) 6 = ILF: Fast communication link fault (link break) 7 = CNF: Fast communication network fault 8 = EPF: External fault 9 = OCF: Overcurrent fault (prolonged ICL) 10 = CRF: Precharge relay fault 11 = SPF: Loss of speed feedback fault 12 = ANF: Ramp not followed fault 13 = LFF: Loss of follower fault (4–20 mA) 14 = TSF: Thermal sensor fault 15 = OTF: Motor overheating fault (thermal sensor) 16 = OHF: Drive controller overheating fault (on heatsink) 17 = OLF: Motor overload fault (thermal simulation or thermal sensor) 18 = OBF: DC bus overvoltage fault 19 = OSF: Input supply overvoltage fault 20 = OPF: Motor phase loss fault 21 = PHF: Input supply phase loss fault (> 1 s) 22 = USF: Input supply undervoltage fault (> 200 ms) 23 = SCF: Motor short circuit fault (phase to earth) 24 = SOF: Overspeed fault (with speed feedback: 1.11 x HSP; without feedback: 1.2 x TFR)

Table 13: Monitoring Registers (Continued)

Word	Code	Description	Possible Values or Range
W463 or 16#5FE8/E	EP1	Status during past fault no. 1	Bit 0 = 0: Drive controller not ready Bit 0 = 1: Drive controller ready (RDY) Bit 1 = 0: E-stop (coast) in progress Bit 1 = 1: E-stop (coast) not in progress Bit 2 = 0: Status ≠ Switching Disabled Bit 2 = 1: Status = Switching Disabled (freewheel stop) Bit 3 = 0: Forced local active (FLO) Bit 3 = 1: Forced local inactive Bit 4 = 0: Forward rotation (output frequency) Bit 4 = 1: Reverse rotation (output frequency) Bit 5 = 0: Motor stopped Bit 5 = 1: Motor running Bit 6 = 0: No DC injection Bit 6 = 1: DC injection Bit 7 = 0: No thermal overload alarm Bit 7 = 1: Thermal overload alarm Bit 8 = 0: No excessive braking alarm Bit 8 = 1: Excessive braking alarm Bit 9 = 0: Drive controller not accelerating Bit 9 = 1: Drive controller accelerating Bit 10 = 0: Drive controller not decelerating Bit 10 = 1: Drive controller decelerating Bit 11 = 0: No current limit alarm Bit 11 = 1: Current limit alarm Bit 12: Reserved Bit 14 = 0, Bit 13 = 0: Control via wired terminal strip Bit 14 = 0, Bit 13 = 1: Control via keypad display Bit 14 = 1, Bit 13 = 0: Control via standard serial link Bit 14 = 1, Bit 13 = 1: Control via fast serial link Bit 15 = 0: Forward direction of rotation requested (reference) Bit 15 = 1: Reverse direction of rotation requested (reference)
W464 or 16#5FE8/F	DP2	Past fault no. 2	Same format as DP1 (W462 or 16#5FE8/13)
W465 or 16#5FE8/10	EP2	Status during past fault no. 2	Same format as EP1 (W463 or 16#5FE8/14)
W466 or 16#5FE8/11	DP3	Past fault no. 3	Same format as DP1 (W462 or 16#5FE8/13)
W467 or 16#5FE8/12	EP3	Status during past fault no. 3	Same format as EP1 (W463 or 16#5FE8/14)
W468 or 16#5FE8/13	DP4	Past fault no. 4	Same format as DP1 (W462 or 16#5FE8/13)

Table 13: Monitoring Registers (Continued)

Word	Code	Description	Possible Values or Range
W469 or 16#5FE8/14	EP4	Status during past fault no. 4	Same format as EP1 (W463 or 16#5FE8/14)
W470 or 16#5FE8/15	DP5	Past fault no. 5	Same format as DP1 (W462 or 16#5FE8/13)
W471 or 16#5FE8/16	EP5	Status during past fault no. 5	Same format as EP1 (W463 or 16#5FE8/14)
W472 or 16#5FE8/17	DP6	Past fault no. 6	Same format as DP1 (W462 or 16#5FE8/13)
W473 or 16#5FE8/18	EP6	Status during past fault no. 6	Same format as EP1 (W463 or 16#5FE8/14)
W474 or 16#5FE8/19	DP7	Past fault no. 7	Same format as DP1 (W462 or 16#5FE8/13)
W475 or 16#5FE8/1A	EP7	Status during past fault no. 7	Same format as EP1 (W463 or 16#5FE8/14)
W476 or 16#5FE8/1B	DP8	Past fault no. 8	Same format as DP1 (W462 or 16#5FE8/13)
W477 or 16#5FE8/1C	EP8	Status during past fault no. 8	Same format as EP1 (W463 or 16#5FE8/14)

Table 13: Monitoring Registers (Continued)

Word	Code	Units	Description	Possible Values or Range
W478 or 16#5FE8/1D	IOLR	—	State of logic I/O	Bit 0 = State of logic input LI1 (active at 1) Bit 1 = State of logic input LI2 (active at 1) Bit 2 = State of logic input LI3 (active at 1) Bit 3 = State of logic input LI4 (active at 1) Bit 4 = State of logic input LI5 (active at 1) Bit 5 = State of logic input LI6 (active at 1) Bits 6 and 7: Reserved Bit 8 = State of relay R1 (active at 1) Bit 9 = State of relay R2 (active at 1) Write authorized if R2 = No (not assigned) Bit 10 = State of logic output LO (active at 1) Write authorized if LO = No (not assigned) Bit 11 = State of red fault LED (active at 1) Bit 12 = State of precharge relay (active at 1) Bit 13 = State of dynamic brake transistor (active at 1) Bits 14 and 15: Reserved
W479 or 16#5FE8/1E	AI1R	0.001 V	State of analog input AI1 (actual size calibrated and scaled)	Value read
W480 or 16#5FE8/1F	AI2R	0.002 mA	State of analog input AI2 (actual size calibrated and scaled)	Value read 0 to 10000 = 0 to 20 mA
W481 or 16#5FE8/20	AI3R	0.001 V or 1	Voltage of analog input AI3 or number of pulses on encoder input, depending on type of I/O card	–10000 to +10000 (for VW3A58201U option card) or –32768 to 32767 (for VW3A58202U option card)
W482 or 16#5FE8/21	AOR	0.002 mA	Image of analog output AO	Write authorized if AO = No (not assigned) and option card is other than analog or digital I/O option 0 to 10000 = 0 to 20 mA Read only if assigned: Value read
W483 or 16#5FE8/22	DF1	—	Register of active faults no. 1 (no fault if bits = 0)	Bit 0 = 1: Incorrect calibration constants (INF) Bit 1 = 1: Unknown drive controller rating (INF) Bit 2 = 1: Unknown or incompatible option (INF) Bit 3 = 1: HD (ASIC) initialization incorrect (INF) Bit 4 = 1: EEPROM control board fault (EEF) Bit 5 = 1: EEPROM power board fault (EEF) Bit 6 = 1: Incorrect configuration (CFF) Bit 7 = 1: Invalid configuration (CFI) Bit 8 = 1: Standard communication link fault (SLF) Bit 9 = 1: Fast communication link fault (ILF) Bit 10 = 1: Fast communication network fault (CNF) Bit 11 = 1: External fault via standard serial link (EPF) Bit 12 = 1: External fault via fast serial link (EPF) Bit 13 = 1: Motor short circuit fault (SCF) Bit 14 = 1: Precharge relay closure too long (CRF) Bit 15 = 1: Precharge relay command cut-off (CRF)

Table 13: Monitoring Registers (Continued)

Word	Code	Units	Description	Possible Values or Range
W484 or 16#5FE8/23	DF2	—	Register of active faults no. 2 (no fault if bits = 0)	Bit 0 = 1: Speed feedback loss fault (SPF) Bit 1 = 1: Overspeed with speed feedback (SOF) Bit 2 = 1: Ramp not followed with speed feedback (ANF) Bit 3 = 1: Overcurrent fault (prolonged ICL) (OCF) Bit 4 = 1: Loss of follower (4–20 mA) fault (LFF) Bit 5 = 1: Thermal sensor fault (TSF) Bit 6 = 1: Motor overheating fault (thermal sensor) (OTF) Bit 7 = 1: Drive controller overheating fault (OHF) Bit 8 = 1: Motor overload fault (OLF) Bit 9 = 1: Fast communication time-out fault (CNF) Bit 10 = 1: DC bus overvoltage fault (OBF) Bit 11 = 1: Input supply overvoltage fault (OSF) Bit 12 = 1: Motor phase loss fault (OPF) Bit 13 = 1: Input supply phase loss fault (PHF) Bit 14 = 1: Input supply undervoltage fault (USF) Bit 15 = 1: Control board power supply fault (INF)
W485 or 16#5FE8/24	PPN	—	Number of motor pole pairs	Value read
W486 or 16#5FE8/25	CUS	—	I/O reassigned (Macro-configuration = CUS)	0 = No 1 = Yes
W487 or 16#5FE8/26	OTR	1% or 0.1%	Motor torque	Value read 100% corresponds to nominal motor torque
W488 or 16#5FE8/27	FRO	0.1 Hz	Ramp output (signed)	Value read
W489 or 16#5FE8/28	USPL	0.01	Lower byte of machine speed	Value read
W490 or 16#5FE8/29	USPH	0.01	Upper byte of machine speed	Value read
W491 or 16#5FE8/2A	OPR	1%	Output power estimated by the drive controller	Value read 100% corresponds to nominal motor power
W492 or 16#5FE8/2B	AO1R	0.002 mA	Image of analog output AO1. Exists only on Type FVC models.	Write authorized if AO1 = No (not assigned): 0 to 10000 (0 to 20 mA) Read only if assigned: Value read
W493 or 16#5FE8/2C	UOP	0.1 V	Voltage applied to the motor. Exists only on Type FVC models.	Value read
W494 or 16#5FE8/2D	APH	1 kWh or 1 MWh	Drive power meter (kWh)	Value read. If bit 15 = 0, units are kWh as given by bits 0 to 14. If bit 15 = 1, units are MWh as given by bits 0 to 14.
W495 or 16#5FE8/2E	RTH	1 hr	Total motor run time	Value read

Special DRIVECOM Registers

Table 14: Special DRIVECOM Registers

Word	Code	Units	Parameter Name and Description	Possible Values or Range
W600 or 16#603F	ERRD	—	ErrorCode Fault code Read/Write	16#0 = NOF: No fault 16#1000 = CRF: Pre-charge relay fault or = OLF: Motor overload (calculation or PTC probes) or = SOF: Overspeed 16#2310 = OCF: Overcurrent (prolonged LIC) 16#2320 = SCF: Motor short-circuit (phase/earth) 16#3110 = OSF: Line supply overvoltage 16#3120 = USF: Line supply undervoltage (> 200 ms) 16#3130 = PHF: Line supply phase loss (> 1s) 16#3310 = OBF: DC bus overvoltage or = OPF: Motor phase loss 16#4210 = OHF: Drive overheating (heatsink) 16#4310 = OTF: Motor overheating (PTC probes) 16#5520 = EEF: EEPROM memory fault 16#6100 = INF: Internal fault 16#6300 = CFF: Configuration incorrect (on initialization) or = CFI: Configuration invalid (if writing a configuration) 16#7300 = ANF: Ramp not followed or = LFF: Loss of 4–20 mA signal or = TSF: Thermal sensor fault 16#7310 = SPF: Speed feedback missing or miswired 16#7510 = SLF: Serial link fault—keypad port (link break) 16#7520 = ILF: Fast serial link fault—options port (link break) or = CNF: Fast serial link communication network fault 16#9000 = EPF: External fault
W601 or 16#6040	CMDD	—	Controlword Command word—same as parameter CMD Read/Write	
W602 or 16#6041	ETAD	—	Statusword Status word—same as parameter ETA Write prohibited	
W603 or 16#6042	LFRD	1 rpm	SpeedSetP Speed reference in rpm (reference not peak limited) Read/Write	–32768 to 32767
W604 or 16#6043	FRHD	1 rpm	SpeedRef Ramp output (signed) in rpm Write prohibited	

Table 14: Special DRIVECOM Registers (Continued)

Word	Code	Units	Parameter Name and Description	Possible Values or Range
W605 or 16#6044	RFRD	1 rpm	SpeedActV Motor speed in rpm Write prohibited	
W606 or 16#6046/1	SMIL	1 rpm	SpdMinMax Minimum speed in 32 bits Equivalent to LSP (W251), but in rpm Read/Write	0 to (HSP × 6 ÷ PPN)
W607	SMIH		Reserved	0
W608 or 16#6046/2	SMAL	1 rpm	SpdMinMax Maximum speed in 32 bits Equivalent to HSP (W250), but in rpm Read/Write	(LSP × 6 ÷ PPN) to (TFR × 6 ÷ PPN)
W609	SMAH	—	Reserved	0
W610 or 16#6048/1	SPAL	1 rpm	SpdAcc Acceleration ramp determined by a speed variation in rpm via words W610 and W611 (32 bits) plus a time variation in seconds given by word W612 (16 bits) Read/Write	1 to 65535
W611	SPAH	—	Reserved	0
W612 or 16#6048/2	SPAT	1 s	SpdAcc Acceleration ramp determined by a speed variation in rpm via words W610 and W611 (32 bits) plus a time variation in seconds given by word W612 (16 bits) Read/Write	0 to 65535
W613 or 16#6049/1	SPDL	1 rpm	SpdDec Deceleration ramp determined by a speed variation in rpm via words W613 and W614 (32 bits) plus a time variation in seconds given by word W615 (16 bits) Read/Write	1 to 65535
W614	SPDH	—	Reserved	0

Table 14: Special DRIVECOM Registers (Continued)

Word	Code	Units	Parameter Name and Description	Possible Values or Range
W615 or 16#6049/2	SPDT	1 s	SpdDec Deceleration ramp determined by a speed variation in rpm via words W613 and W614 (32 bits) plus a time variation in seconds given by word W615 (16 bits) Read/Write	0 to 65535

APPENDIX A

DRIVECOM Standard

The ATV58 serial link control process conforms to the DRIVECOM standard state chart (refer to Figure 4 on page 49). Each state represents an aspect of the internal behavior of the drive controller. The drive controller state changes when:

- The command word, CMD (word W400) or CMDD (word W601), sends a command.
- An event other than a command, such as an external fault, occurs.

The drive controller status is given by the status word, ETA (word W458) or ETAD (word W602).

The drive controller states are described below.

Not Ready to Switch On (Initialization of communications)

The communication card is initializing, but the drive controller is not yet powered or is in the process of powering up. This state can be observed only when using an INTERBUS S communication card, which can be powered separately from the drive controller. For all other cards, this is a transient state during power-up or initialization.

Switch On Disabled (Configuration of the drive controller)

The driver controller is powered up and has completed its initialization routine. Configuration and adjustment parameters can be modified at this time. If all or part of the configuration and settings are to be loaded from an external source, it is recommended that you disable the consistency checking function during the configuration transfer by setting bit 15 in register CMI (word W402) to 1. Once the transfer is complete, you must re-enable the consistency check by setting bit 15 in CMI to 0. Operation of the output voltage circuitry is locked out during this time.

Ready to Switch On and **Switched On**
(Initialization and configuration of the drive controller is complete)

The drive controller is not delivering voltage to the output but is ready and waiting (similar to a Run Permissive function). The configuration and adjustment parameters can be modified if necessary; however, if a configuration parameter is changed, the drive controller returns to the Switch On disabled state.

Operation Enabled (Ability to output voltage to the motor terminals)

The drive controller output voltage circuitry is functional. All run, stop, and auto-tuning functions are acknowledged. Adjustment parameters can be modified at any time. Configuration parameters can be changed only when the motor is stopped; and if a configuration parameter is changed, the drive controller returns to the Switch On disabled state.

Quick Stop Active (E-stop/rapid deceleration)

Activation of this stop mode causes the drive controller to decelerate the motor using the minimum deceleration ramp time. To restart the drive controller output, the controller must be returned to the Switch On disabled state. From this point, sequential transition commands can return the controller to the Operation enabled state.

Malfunction Reaction Active
(Ability to determine what action to take when a fault occurs)

The drive controller detects a fault and reacts by performing an action that is appropriate (and perhaps pre-programmed, in certain cases) to the type of fault. Other drive functions are disabled during this time.

Malfunction (Drive controller in faulted state)

The drive controller has detected the occurrence of a fault that warrants disabling the drive functions. A fault reset command or the cycling of the main power is required to return the controller to the Switch On disabled state. From this point, sequential transition commands can return the controller to the Operation enabled state. For more information, refer to “Switch On Disabled (Configuration of the drive controller)” on page 47.

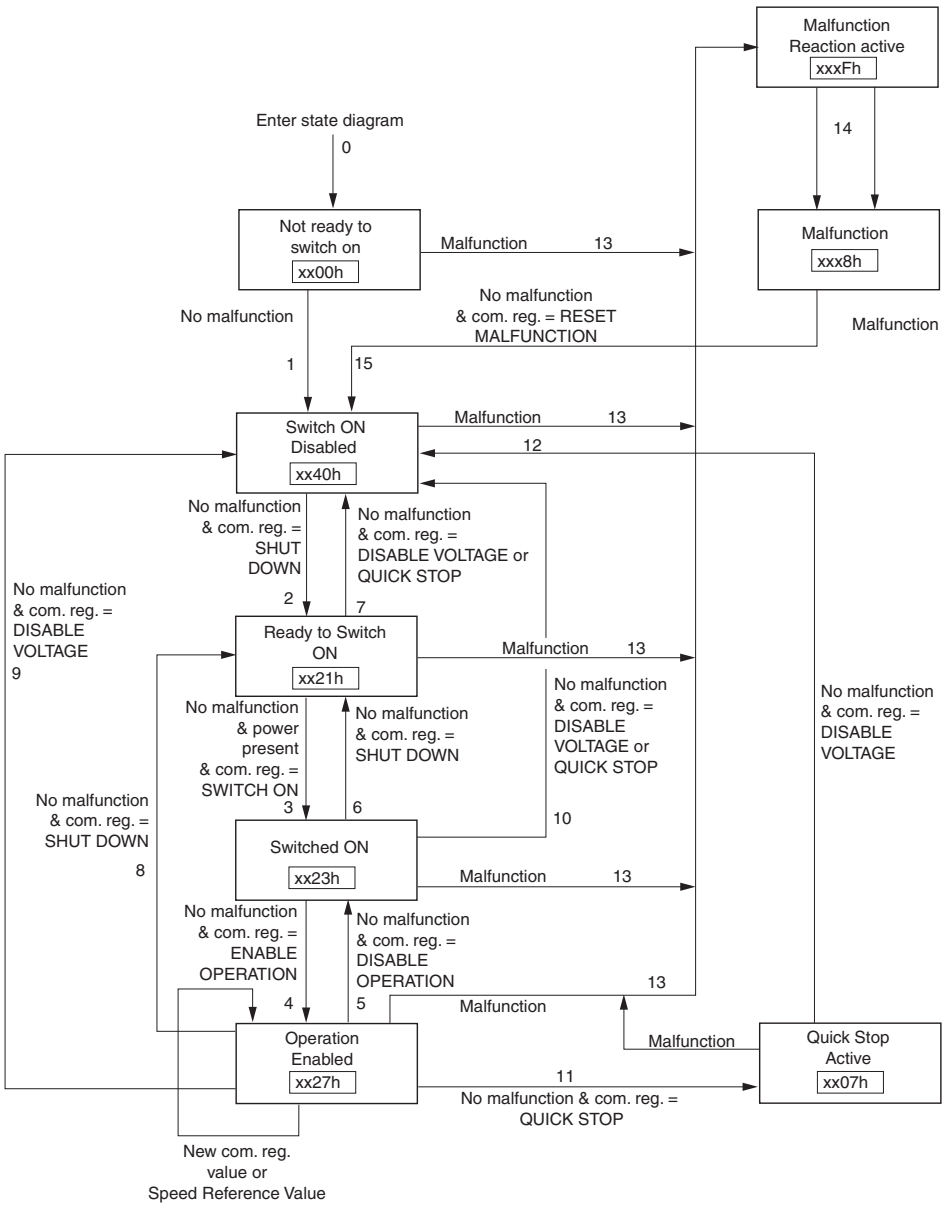

Figure 4: DRIVECOM Standard State Chart

DRIVECOM Standard Registers

Table 15: Bit Definitions of the Command Word CMD (Word W400) or CMDD (Word W601)

	DRIVECOM standard	Adaptation of the ATV58 controller to the DRIVECOM standard	
Bit 0	Switch On	Ready status	0 = not ready, 1 = ready
Bit 1	Disable Voltage	Disable output voltage circuitry	0 = output disabled, 1 = no effect
Bit 2	Quick-Stop	E-stop (rapid deceleration)	0 = stop, 1 = no effect
Bit 3	Enable Operation	DRIVECOM mode run/stop	0 = stop, 1 = run
Bit 4	Optional	Reserved	
Bit 5	Optional	Reserved	
Bit 6	Optional	Reserved	
Bit 7	Fault Reset	Fault reset control	0 = no effect, 1 = reset
Bit 8	Reserved	Control via serial link [1]	0 = activated, 1 = deactivated
Bit 9	Reserved	Reserved	
Bit 10	Reserved	Reserved	
Bit 11	Specific to manufacturer	Motor direction	0 = forward, 1 = reverse
Bit 12	Specific to manufacturer	Motor run/stop with ramp	0 = run with ramp, 1 = stop with ramp
Bit 13	Specific to manufacturer	Stop by DC injection	0 = no effect, 1 = DC injection stop
Bit 14	Specific to manufacturer	Fast stop	0 = no effect, 1 = fast stop
Bit 15	Specific to manufacturer	See page 14 [2]	

[1] See also “Communication Principle” on page 14.

[2] When the keypad display is installed in the drive controller, this bit is set to 1.

Table 16: Command Word Commands

State After Command Is Given	Command in DRIVECOM Figure 4	Bit 7	Bit 3	Bit 2	Bit 1	Bit 0	Transition in DRIVECOM diagram [1]	Typical values of the Command Word
Switch On Disabled	Initialization state	1	0	0	0	0	1	16 #0080
Ready to Switch On	Shut down	X	X	1	1	0	2, 6, 8	16 #0006
Switched On	Switch On	X	X	1	1	1	3	16 #0007
Switch On Disabled	Disable voltage	X	X	X	0	X	7, 9, 10, 12	16 #0000
Switch On Disabled E-Stop Active	E-stop (rapid deceleration)	X	X	0	1	X	7, 10, 11	16 #0002
Switched On	Disable operation	X	0	1	1	1	5	16 #0007
Operation Enabled	Enable operation	X	1	1	1	1	4	16 #000F
Switch On Disabled	Reset malfunction	0>1	X	X	X	X	15	16 #0080

X: State is not significant, 0>1: Rising edge (switch from 0 to 1)

[1] See Figure 4 on page 49 or Figure 5 on page 53.

Table 17: Bit Definitions of the Status Word ETA (Word 458) or ETAD (Word W602)

	DRIVECOM standard	Adaptation of the ATV58 controller to the DRIVECOM standard	
Bit 0	Ready to Switch On	Drive controller initialization	0 = not initialized, 1 = initialized
Bit 1	Switched On	Drive controller ready state	0 = not ready, 1 = ready
Bit 2	Operation Enabled	DRIVECOM run/stop	0 = stop, 1 = run
Bit 3	Malfunction	Fault status	0 = no fault present, 1 = fault present
Bit 4	Voltage disabled	Power to output	0 = power present, 1 = power absent
Bit 5	Quick Stop	E-stop (rapid deceleration)	0 = E-stop active, 1 = E-stop inactive
Bit 6	Switch On Disabled	Drive controller locked out	0 = not in Switch On disabled state 1 = in Switch On disabled state
Bit 7	Alarm	Alarm	0 = no alarm present, 1 = alarm present
Bit 8	Message	Reserved	
Bit 9	Remote	Forced local mode	0 = in forced local, 1 = not in forced local
Bit 10	Reference Reached	Reference reached	0 = not reached (transitory), 1 = reached (stable)
Bit 11	Limit Value for Reference	DRIVECOM reference exceeded	0 = OK, 1 = out of limit (> HSP or < LSP)
Bit 12	Reserved	Reserved	
Bit 13	Reserved	Reserved	
Bit 14	Specific to manufacturer	Stop via keypad	0 = keypad stop inactive, 1 = keypad stop active
Bit 15	Specific to manufacturer	Direction of rotation	0 = forward, 1 = reverse

Table 18: Status Word (ETA) States

State in DRIVECOM Figure 4	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Not Ready to Switch On	0	X	X	0	0	0	0
Switch On Disabled	1	X	X	0	0	0	0
Ready to Switch On	0	1	X	0	0	0	1
Switched On	0	1	X	0	0	1	1
Operation Enabled	0	1	X	0	1	1	1
Malfunction (Fault)	0	X	X	1	0	0	0
Malfunction Reaction (Response to Fault) Active	0	X	X	1	1	1	1
Quick Stop Active	0	0	X	0	1	1	1

X: State is not significant

DRIVECOM Standard Adapted to the ATV58 Drive Controller

Figure 5 on page 53 illustrates the DRIVECOM standard state chart as adapted to the characteristics of the ATV58 drive controller.

Example of the Sequence of Transition Commands after a Fault

When a fault occurs, the status word is set to xxx8h. The fault must be cleared by setting the command word to a value of 0080h. The drive controller is now on and locked, with the status word set to a value of xx40h. To enter Standby status, write 0006h to the command word. The status word now has a value of xx21h. Next, enter Ready state by writing 0007h to the command word. The status word now has a value of xx23h. The motor can now be commanded to rotate forward (by writing 000Fh to the command word) or in reverse (by writing 080Fh to the command word).

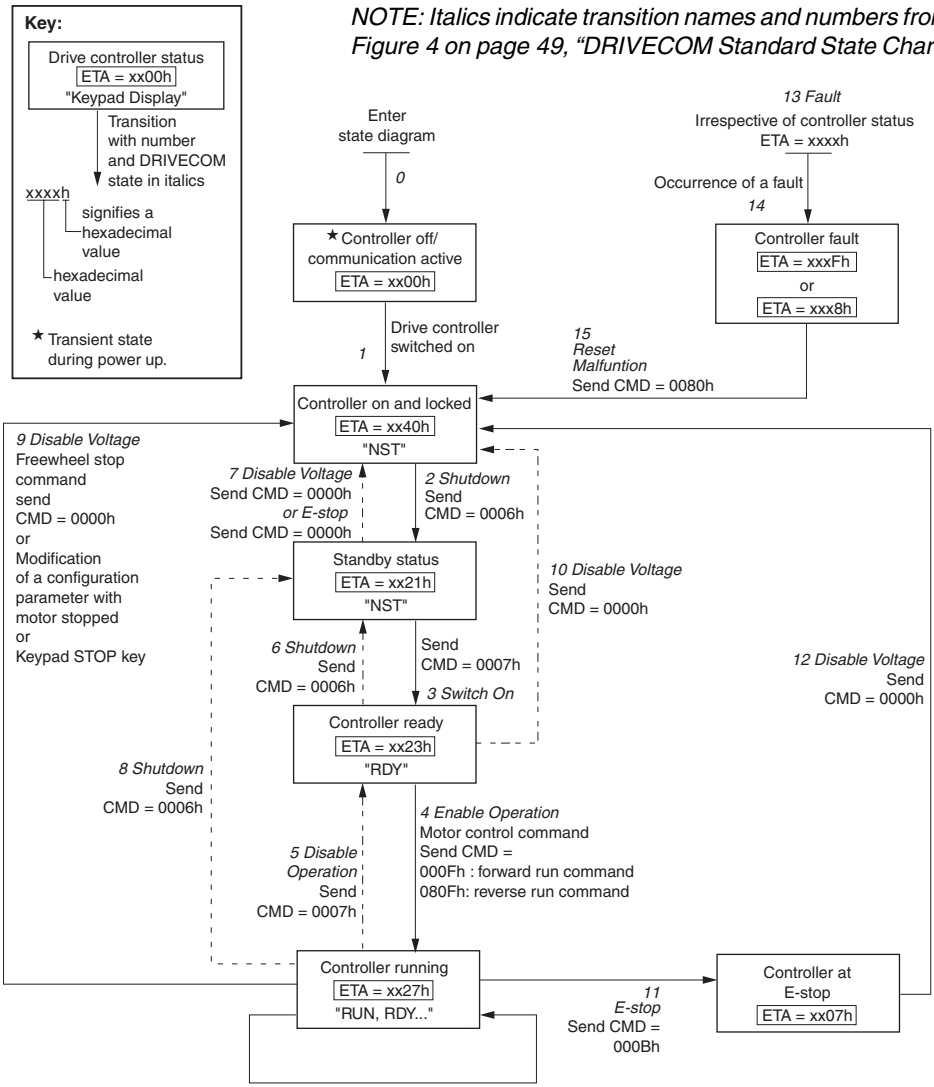

Figure 5: DRIVECOM as Implemented on the ATV58 Drive Controller

APPENDIX B

Alphabetical Index of Codes

Code	Address
AC2	W260
ACC	W252
ADC	W67
ADD	W10
AI1R	W479
AI2	W107
AI2R	W480
AI3	W108
AI3R	W481
AO	W112
AO1	W113
AO1R	W492
AOH	W15
AOL	W14
AOR	W482
APH	W494
ATR	W150
BEN	W274
BER	W66
BET	W276
BIP	W290
BRA	W64
BRL	W273
BRT	W275
BSP	W13
CFG	W3
CIC	W1
CLI	W72
CMD	W400
CMDD	W601
CMI	W402
COS	W57
CRH	W5
CRL	W4
CTD	W282
CTR	W75
CUS	W486
DCF	W63
DE2	W261
DEC	W253

Code	Address
DF1	W483
DF2	W484
DP1	W462
DP2	W464
DP3	W466
DP4	W468
DP5	W470
DP6	W472
DP7	W474
DP8	W476
DTS	W285
ENC	W78
EP1	W463
EP2	W465
EP3	W467
EP4	W469
EP5	W471
EP6	W473
EP7	W475
EP8	W477
ERRD	W600
ETA	W458
ETAD	W602
ETI	W459
ETI2	W460
ETI3	W461
F2D	W314
FBS	W281
FDB	W73
FFT	W313
FLG	W255
FLR	W155
FLU	W74
FRH	W450
FRHD	W604
FRO	W488
FRS	W53
FRT	W65
FTD	W284
HSP	W250

Code	Address
IBR	W277
IDC	W270
INR	W291
IOLR	W478
IPL	W152
ITH	W258
JGT	W263
JOG	W262
JPF	W286
LCR	W453
LFF	W159
LFL	W154
LFR	W401
LFRD	W603
LFT	W457
LI1	W100
LI2	W101
LI3	W102
LI4	W103
LI5	W104
LI6	W105
LO	W111
LSP	W251
NCR	W54
NLD	W61
NRD	W60
NSP	W56
OPL	W151
OPR	W491
ORT	W11
OTR	W487
PAH	W301
PAL	W300
PCC	W69
PER	W302
PFL	W256
PGI	W76
PGT	W71
PI2	W308
PI3	W309

Code	Address
PIC	W287
PISP	W403
PLB	W307
PLR	W306
PLS	W68
PPN	W485
PRG	W310
PSP	W304
PSR	W305
PST	W8
R2	W110
RDG	W303
REO	W299
RFR	W451
RFRD	W605
RIG	W280
RIN	W12
RPG	W279
RPR	W17
RPT	W62
RST	W158
RTH	W495
SDC	W288
SDD	W157
SF2	W311
SF3	W312
SFR	W51
SFT	W50
SIG	W298
SLP	W259
SMAH	W609
SMAL	W608
SMIH	W607
SMIL	W606
SP2	W264
SP3	W265
SP4	W266
SP5	W267
SP6	W268
SP7	W269

Code	Address
SPAH	W611
SPAL	W610
SPAT	W612
SPC	W70
SPD	W452
SPDH	W614
SPDL	W613
SPDT	W615
SPG	W297
SRP	W292
SSL	W77
STA	W257
STP	W156
STR	W9
STT	W79
TA1	W293
TA2	W294
TA3	W295
TA4	W296
TBR	W16
TCC	W6
TCT	W7
TDC	W271
TFR	W52
THD	W456
THR	W455
THT	W153
TL2	W278
TLI	W58
TLS	W272
TTD	W283
TUN	W59
UFR	W254
ULN	W454
UNS	W55
UOP	W493
USC	W289
USPH	W490
USPL	W489

Symbols

A

B

C

D

E

F

G–H

I–J

L

M–N

O

P

R

S

T

U–V

W

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Replaces VVDED397058US dated 1/01

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