

## MODBUS RTU REGISTER MAP FOR ALTIVAR 320 DRIVES

- **Logic Address (Hex)** is the Modbus register address. It is provided as a 16-bit number (e.g., 16#0C82 = 3202 decimal).
- **Data Type & Scaling:** Must be inferred from the parameter **Range**. Common interpretations:
  - -599.0 Hz ... 599.0 Hz typically implies **INT16** data type with a scaling of **0.1 Hz per unit** (e.g., a value of 500 = 50.0 Hz).
  - 0.0 % ... 100.0 % implies **UINT16** with a scaling of **0.1 % per unit** or sometimes **0.01 %**. 0.1% is more common for drives (e.g., 1000 = 100.0%). The manual must be checked for confirmation.
  - 0 ... 65535 for status/command words implies raw **UINT16**.
  - Parameters with a range like Refer to programming manual or - require the full manual for precise data type and scaling.
- **R/W:** R = Read-only, W = Write-only, R/W = Read/Write, R/WS = Read/Write (can be saved to drive config).

Register Address (Dec)	Register Address (Hex)	Name	Data Type (Inferred)	Scaling (Inferred)	R/W	Description
8501	2135	CMD	UINT16	-	R/W	Control Word (CiA402)
8504	2138	CMI	UINT16	-	R/W	Extended Control Word
3120	0C30	RPR	UINT16	-	R/W	Reset Counters Command
8602	219A	LFRD	UINT16	1 RPM/LSB?	R/W	Speed Setpoint (RPM)
8502	2136	LFR	INT16	0.1 Hz/LSB	R/W	Frequency Setpoint (-599.0 to 599.0 Hz)
8503	2137	PISP	UINT16	0.1 %/LSB?	R/W	PID Regulator Setpoint (0 to 1000 -> 0.0 to 100.0%)
3201	0C81	ETA	UINT16	-	R	Status Word (CiA402)
3240	0CA8	HMIS	UINT16	-	R	Drive State (See Enumerations)
3202	0C82	RFR	INT16	0.1 Hz/LSB	R	Output Frequency (-3276.7 to 3276.7 Hz)
3204	0C84	LCR	UINT16	0.1 A/LSB	R	Motor Current (0.0 to 6553.5 A)
3205	0C85	OTR	INT16	0.1 %/LSB	R	Motor Torque (-3276.7 to 3276.7 %)
3208	0C88	UOP	UINT16	1 V/LSB?	R	Motor Voltage (0 to 65535 V)
3211	0C8B	OPR	INT16	1 %/LSB?	R	Motor Power (-32767 to 32767 %)
3207	0C87	ULN	UINT16	0.1 V/LSB	R	DC Bus Voltage (Mains Voltage) (0 to 6553.5 V)
7121	1BD1	LFT	UINT16	-	R	Altivar Fault Code (See Enumerations)
7124	1BD4	RSF	UINT16	-	R/WS	Fault Reset Command
6001	1771	ADD	UINT16	-	R/WS	Modbus Address ([OFF] to 247)
6003	1773	TBR	UINT16	-	R/WS	Modbus Baud Rate (See Enumerations)
6004	1774	TFO	UINT16	-	R/WS	Modbus Format (Parity, Stop bits)
6005	1775	TTO	UINT16	0.1 s/LSB	R/WS	Modbus Timeout (0.1 to 30.0 s)

## Modbus RTU Example Frames & CRC

### Assumptions for examples:

- Drive Address: 1
- Output Frequency (RFR) scaling: **0.1 Hz/LSB** (Read value 500 = 50.0 Hz)
- Motor Current (LCR) scaling: **0.1 A/LSB** (Read value 123 = 12.3 A)
- Frequency Reference (LFR) scaling: **0.1 Hz/LSB** (Write value 5000 = 500.0 Hz -> 500.0 Hz will be limited by TFR parameter, e.g., 599.0 Hz)
- Function Code 03 (Read Holding Registers)
- Function Code 06 (Write Single Register)
- CRC Calculation uses standard Modbus polynomial (0xA001). CRC is little-endian in the frame (LSB first).

### 1. Read Motor Current (LCR - Address 3204)

- Request: Read 1 register starting at 3204
  - 01 03 0C 84 00 01 → CRC Calculation → 25 F2
  - **Full Frame:** 01 03 0C 84 00 01 25 F2
- Response: Value of 123 (0x007B) = 12.3 A
  - 01 03 02 00 7B → CRC Calculation → F9 A4
  - **Full Frame:** 01 03 02 00 7B F9 A4

### 2. Read Output Frequency (RFR - Address 3202)

- Request: Read 1 register starting at 3202
  - 01 03 0C 82 00 01 → CRC Calculation → E4 32
  - **Full Frame:** 01 03 0C 82 00 01 E4 32
- Response: Value of 500 (0x01F4) = 50.0 Hz
  - 01 03 02 01 F4 → CRC Calculation → 10 BC
  - **Full Frame:** 01 03 02 01 F4 10 BC

### 3. Write Frequency Reference (LFR - Address 8502) to 50.00 Hz

- Value to write: 50.00 Hz / 0.1 Hz = 500 (0x01F4)
- Request: Write register 8502 with value 500
  - 01 06 21 36 01 F4 → CRC Calculation → 8A 3F
  - **Full Frame:** 01 06 21 36 01 F4 8A 3F
- Response: Echoes the write request
  - 01 06 21 36 01 F4 → CRC Calculation → 8A 3F
  - **Full Frame:** 01 06 21 36 01 F4 8A 3F

### 4. Read Active Fault Code (LFT - Address 7121)

- Request: Read 1 register starting at 7121
  - 01 03 1B D1 00 01 → CRC Calculation → BF 36
  - **Full Frame:** 01 03 1B D1 00 01 BF 36
- Response: Value of 9 (0x0009) = Overcurrent Fault (OCF)
  - 01 03 02 00 09 → CRC Calculation → 78 45
  - **Full Frame:** 01 03 02 00 09 78 45

## Priority Register Checklist

Function	Register Name	Address (Dec)	Address (Hex)	Key Details
<b>Control</b>	CMD	8501	2135	Control Word. Bit-based commands (Run, Enable, Fault reset).
	RPR	3120	0C30	Reset counters command.
	RSF	7124	1BD4	Fault reset command.
<b>Speed</b>	LFR	8502	2136	Frequency Setpoint (Write). Scaling likely 0.1 Hz.
	RFR	3202	0C82	Output Frequency (Read). Scaling likely 0.1 Hz.
<b>Motor Data</b>	LCR	3204	0C84	Motor Current (Read). Scaling likely 0.1 A.
	OTR	3205	0C85	Motor Torque (Read). Scaling likely 0.1 %.
	UOP	3208	0C88	Motor Voltage (Read). Scaling likely 1 V.
	OPR	3211	0C8B	Motor Power (Read). Scaling likely 1 %.
<b>DC Bus</b>	ULN	3207	0C87	DC Bus Voltage (Read). Scaling likely 0.1 V.
<b>Status/Faults</b>	ETA	3201	0C81	Status Word. Overall drive status.
	LFT	7121	1BD1	Active Fault Code. See enumeration for code list.
	HMIS	3240	0CA8	Drive State. Detailed state (Running, Fault, etc.).