**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 |
| Control | CMD | 8501 | 2135 | Control Word. Bit-based commands (Run, Enable, Fault reset). |
|  | RPR | 3120 | 0C30 | Reset counters command. |
|  | RSF | 7124 | 1BD4 | Fault reset command. |
| Speed | LFR | 8502 | 2136 | Frequency Setpoint (Write). Scaling likely 0.1 Hz. |
|  | RFR | 3202 | 0C82 | Output Frequency (Read). Scaling likely 0.1 Hz. |
| Motor Data | 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 %. |
| DC Bus | ULN | 3207 | 0C87 | DC Bus Voltage (Read). Scaling likely 0.1 V. |
| Status/Faults | 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.). |