COMMUNICATIONS PROTOCOL

CoolMax SRX 300 Series Modbus and CAN Communications Protocol

SRX HV 300/30 · SRX HV 300/40 · SRX MV 300/50 · SRX MV 300/60 · Legacy Product

SRX HV 300 · SRX MV 300

1. OVERVIEW

The CoolMax SRX 300 series (SRX HV 300 and SRX MV 300) supports Modbus RTU over RS485 and CAN for remote monitoring and control. This document gives the Modbus memory map and the CAN messages. The CoolMax SRX 300 is no longer manufactured; this protocol is published for systems already installed. For anything not covered here, contact AERL support.

1.1 Physical Connection

Both interfaces are on the controller's RJ45 comms sockets (SRX HV 300: Comms 1 and Comms 2; SRX MV 300: one socket), at the bottom of the controller.

PIN	SIGNAL
1	+12 V (CAN)
2	+12 V (Modbus)
3	CAN-L
4	RS485-A
5	CAN-H
6	RS485-B
7	Not connected
8	Isolated GND

1.2 Network Topology

Modbus and CAN are both linear buses, with short stubs branching from T connectors on the main backbone to each device. Terminate each end of the backbone with a 120 Ω resistor: between RS485-A and RS485-B for Modbus, and between CAN-H and CAN-L for CAN. Several CoolMax SRX controllers can share one bus, and the bus can be connected to other networks with a Modbus-to-Ethernet or CAN-to-Ethernet bridge.

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2. MODBUS RTU

2.1 Communication Parameters

PARAMETER	VALUE
Interface	RS485, Modbus RTU
Bit rate	9600 bps
Modbus address	1–128
Measurement data	IEEE 754 single-precision (32-bit) float, most significant byte first
Data types	16-bit values in one register; 32-bit integers and floats over two registers; 64-bit values over four registers

Register addresses below are given in the conventional Modbus form: discrete input 10001 is offset 0 (read with function 02), and input register 30001 is offset 0 (read with function 04). In each multi-register value the first register holds bytes 1 and 2, the second bytes 3 and 4, and so on, high byte first in each register.

2.2 Discrete Inputs (Single Bit, Read-Only)

A read returns a byte holding 8 consecutive inputs, with the addressed input as the least significant bit. If the quantity read is not a multiple of 8, the last byte is padded with zeros.

ACTIVE EVENTS (1 = EVENT TRIGGERED, 0 = EVENT CLEARED)

ADDRESS	OFFSET	EVENT
10001	0	System power
10002	1	Low output voltage warning
10003	2	Low output voltage fault
10004	3	Low output voltage, genset
10005	4	High output voltage fault
10006	5	High output current fault
10007	6	High discharge current fault
10008	7	High battery temperature fault
10009	8	Input breaker open
10010	9	Output breaker open
10011	10	Temperature sensor fault
10012	11	Negative PV current shutdown
10013	12	High PV current shutdown
10014	13	High PV voltage shutdown
10015	14	High output current shutdown
10016	15	High output voltage shutdown
10017	16	Heatsink temperature too high
10018	17	Fan fault
10019	18	Log file full

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ADDRESS	OFFSET	EVENT
10020	19	Solar panel missing
10021	20	Configuration value out of range
10022–10032	21–31	Reserved

STATUS

ADDRESS	OFFSET	STATUS	VALUE
10033	32	Factory configuration CRC	1 = valid, 0 = invalid
10034	33	Factory configuration check	1 = passed, 0 = failed
10035	34	User configuration CRC	1 = valid, 0 = invalid
10036	35	User configuration check	1 = passed, 0 = failed
10037	36	Event configuration CRC	1 = valid, 0 = invalid
10038	37	Event configuration check	1 = passed, 0 = failed
10039	38	Telemetry configuration CRC	1 = valid, 0 = invalid
10040	39	Telemetry configuration check	1 = passed, 0 = failed
10041–10080	40–79	Reserved (statistics, flags, telemetry, communications, flash)	—
10081	80	Master / slave	0 = master, 1 = slave
10082	81	Active set point	0 = float set point, 1 = bulk set point
10083–10084	82–83	Control mode (2-bit field)	0 = MPPT, 1 = output voltage, 2 = input voltage, 3 = not used
10085–10088	84–87	Reserved	—
10089	88	Safety shutdown state	0 = shut down, 1 = operating
10090–10096	89–95	Reserved	—

2.3 Input Registers (16-Bit, Read-Only)

Each register returns two bytes (0–65535).

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LIVE TELEMETRY

ADDRESS	OFFSET	VALUE	TYPE
30001–30004	0–3	Product ID (8 characters)	ASCII
30005–30008	4–7	Serial number (8 characters)	ASCII
30009–30010	8–9	PV voltage (V)	Float
30011–30012	10–11	PV current (A)	Float
30013–30014	12–13	Output voltage (V)	Float
30015–30016	14–15	Output current (A)	Float
30017–30018	16–17	PV open-circuit voltage (V)	Float
30019–30020	18–19	Daily output charge (Ah)	Float
30021–30022	20–21	PV power (W)	Float
30023–30024	22–23	Case temperature (°C)	Float
30025–30026	24–25	Active events	UInt32
30027–30030	26–29	Status flags	UInt64
30031–30034	30–33	Unix time	UInt64
30035–30040	34–39	Reserved	—

The discrete inputs (section 2.2) give each event and status bit individually.

SYSTEM INFORMATION

ADDRESS	OFFSET	VALUE	TYPE
30041–30044	40–43	Hardware version (8 characters)	ASCII
30045–30048	44–47	Firmware version (8 characters)	ASCII
30049–30050	48–49	Model type (4 characters)	ASCII
30051–30054	50–53	Product ID (8 characters)	ASCII
30055–30058	54–57	Serial number (8 characters)	ASCII
30059–30064	58–63	Reserved	—

3. CAN

3.1 Communication Parameters

PARAMETER	VALUE
Hardware	CAN 2.0B compatible; 11-bit standard identifiers
Bit rates	1 Mbps, 500 kbps (default), 250 kbps, 125 kbps, 100 kbps, 50 kbps
Frames	Data frames for most communication; remote frames enabled
Data field	Always 8 bytes
Measurement data	IEEE 754 single-precision (32-bit) float

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3.2 Identifier

The 11-bit identifier is split in two: bits 10–5 hold the **device identifier** and bits 4–0 the **message identifier**. A controller's base address is its device identifier in bits 10–5 with bits 4–0 at zero; each message below is sent at the base address plus its message number.

BITS 10–5	BITS 4–0
Device identifier	Message identifier

3.3 Data Field

The 8-byte data field holds two 32-bit values: the high value in bits 63–32 and the low value in bits 31–0. It is sent and expected least significant byte first, so on a little-endian processor the field overlays a `float[2]` (or `char[8]`) array directly.

3.4 Broadcast Messages

The CoolMax SRX broadcasts these data frames periodically.

ID (BASE +)	MESSAGE	BITS	TYPE	VALUE
0	Identification	63–32	UInt32	Serial number, allocated at manufacture
		31–0	UInt32	Product ID, "A001" as a string
1	PV measurement	63–32	Float	PV current (A)
		31–0	Float	PV voltage (V)
2	Output measurement	63–32	Float	Output current (A)
		31–0	Float	Output voltage (V)
3	PV open-circuit voltage and charge	63–32	Float	Output charge
		31–0	Float	PV open-circuit voltage (V)
4	PV power and battery temperature	63–32	Float	Battery temperature (°C)
		31–0	Float	PV power (W)
5	Active flags	63–0	Bits	See section 3.5
7	Time	63–0	UInt64	System Unix time

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3.5 Active Flags (Base + 5)

BIT	FLAG	MEANING
0	Vout low warning	Low output voltage warning
1	Vout low fault	Low output voltage fault
2	—	Not used
3	Vout high fault	High output voltage fault
4	Iout fault	High output current fault
5	Bat current	High battery discharge current fault
6	Hi bat temp	High battery temperature fault
7–8	—	Not used
9	Bat temp sensor fault	Battery temperature sensor fault
10	Maximizer fault	Regulation or power stage fault
11	Log file full	Log file full
12	Panel missing	Input voltage indicates the panel is missing
13–63	—	Not used

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