ETHERNET/IP
OPERATING BULLETIN

For CODA-Series Coriolis Mass Flow Instruments

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Introduction

This bulletin covers the installation, network configuration, I/O assembly maps, and explicit messaging for EtherNet/IP (EIP) communication on CODA-series Coriolis mass flow meters (K) and controllers (KC, KF, KG). For general instrument operation, refer to *DOC-MANUAL-CODA*.

CODA instruments with EtherNet/IP are identified by their dual Ethernet connectors (RJ45 or M12, depending on your CODA configuration). These devices function as communications adapters (device type 12) in an EtherNet/IP system and are certified by ODVA™.

CODA EIP devices can be integrated into any process using a daisy-chain, ring, or star topology and are designed to work with any EtherNet/IP-capable PLC.

Hardware

Ethernet Connectors

CODA EIP instruments are equipped with two Ethernet ports. Depending on the device configuration, the instrument uses either standard RJ45 connectors or IP67-rated 4-pin M12 connectors (D-coded). Either port can be used to communicate with the device or to daisy-chain to other EtherNet/IP devices. Both ports are equivalent in a star topology. The device provides a 10/100 Mbps embedded switch between the two ports, enabling linear and ring topologies without an external switch.

M12 Connector Pinout (IP67 Configuration)

IP67-rated CODA EIP instruments use 4-pin D-coded M12 connectors. The pinout for each port is shown below.

Pin	Signal	Description
1	Tx+	Transmit Data +
2	Rx+	Receive Data +
3	Tx–	Transmit Data –
4	Rx–	Receive Data –

Table 1. M12 4-pin D-coded Ethernet connector pinout (female, device side, ×2). Applies to IP67 (M12) CODA configurations only.

LED Status Indicators

Two status LEDs (MOD and NET) are located on top of the instrument near the Ethernet connectors. These LEDs indicate device and network status as described in the table below.

LED State	MOD LED	NET LED
Off	Device not powered	No IP address assigned
Steady Green	Device operational	EIP connection established
Steady Red	Major system fault	Duplicate IP address conflict
Flashing Red	Minor system fault	EIP connection timed out
Flashing Red and Green	Self-test in progress	Self-test in progress

Table 2. MOD and NET LED status indicators.

Network Configuration

IP Address Configuration

By default, CODA EIP devices obtain their IP address via DHCP. If the device loses power, the DHCP-assigned address may change on restart. Assign a static IP address before deploying the device in a production system.

Confirm available IP addresses with your network administrator before making changes.

Assigning a Static IP via BOOTP/DHCP Tool

A static IP can be assigned using Rockwell Automation's BOOTP/DHCP EtherNet/IP Commissioning Tool (free download from rockwellautomation.com) or other compatible utilities such as Molex EIP Tools.

Requirement	Details
Software	Rockwell Automation BOOTP/DHCP EtherNet/IP Commissioning Tool
Hardware	Ethernet cable; PC with an available Ethernet port
Information needed	Device MAC address (on instrument label); target static IP; subnet mask

Table 3. BOOTP/DHCP commissioning requirements.

Procedure

1. Configure the host PC Ethernet adapter with a static IP on the same subnet as the target device (e.g., 192.168.1.50 / 255.255.255.0).
2. Connect an Ethernet cable between the PC and either Ethernet port on the CODA (RJ45 or M12, depending on your configuration).
3. Apply power to the CODA instrument.
4. Launch the BOOTP/DHCP tool and select the configured Ethernet adapter.
5. Wait for the device to appear in the Discovery History list (may take a moment).
6. Right-click the device and select **Add Relation**.
7. Enter the target static IP address and click **OK**.
8. Once the IP is assigned, right-click the device and select **Disable BOOTP/DHCP** to write the address to non-volatile memory.
9. Power-cycle the device. The NET LED should be steady green once the static IP loads.

Re-commissioning (Changing a Previously Assigned IP)

If the device already has a static IP, DHCP must be re-enabled before a new address can be assigned.

1. Launch the BOOTP/DHCP tool and select the configured Ethernet adapter.
2. Right-click **Entered Relations** and select **Add Relation**.
3. Enter the device MAC address and its current static IP, then click **OK**.

Tip: If the current IP address is unknown, use a network scanner such as EtherNet/IP Explorer or Ping Test Easy to locate the device on the network.

4. Select the device and click **Enable BOOTP/DHCP**. Power-cycle to confirm (NET LED will blink).
5. Follow the procedure above to assign the new static IP.

EDS File

Alicat provides an Electronic Data Sheet (EDS) file that describes the CODA device's I/O assemblies, parameters, and connection capabilities to the PLC configuration software. Install the EDS file before adding the CODA to the PLC project.

Item	Details
File name	CodaEIP_v1_5.eds (contained in CodaEIP_v1_5.zip)
Version	1.5
Download	https://downloads.alicat.com/software/CodaEIP_v1_5.zip
Also available at	alicat.com/manuals

Table 4. EDS file details.

In Rockwell Studio 5000 / RSLogix 5000, install the EDS file via **Tools** → **EDS Hardware Installation Tool** and follow the on-screen wizard. Once registered, the CODA will appear as a selectable device in the I/O tree.

EtherNet/IP Communication

CODA EIP devices support both implicit (cyclic I/O) and explicit (message-based) communication. Implicit I/O uses assembly objects for real-time cyclic data exchange. Explicit messaging via Class 0xB0 provides access to device configuration and diagnostic parameters.

Identity Object (Class 1, Instance 1)

Attribute	Name	Type	Value
1	Vendor ID	UINT	1174 (Alicat Scientific)
2	Device Type	UINT	12 (Communications Adapter)
3	Product Code	UINT	771
4	Revision	STRUCT	Major.Minor
5	Status	WORD	—
6	Serial Number	UDINT	—
7	Product Name	STRING	CODA Coriolis MFM/MFC

Table 5. Identity object attributes.

Supported CIP Network Objects

Object	Class Code	Description
TCP/IP Interface	0xF5	IP address, subnet mask, and gateway configuration
Ethernet Link	0xF6	Ethernet port status; two instances (Port0, Port1)
QoS	0x48	Quality of Service (DSCP marking)
DLR	0x47	Device Level Ring — supports linear, star, and ring topologies
Connection Manager	0x06	Manages I/O and explicit message connections

Table 6. Supported CIP network objects.

I/O Assembly Maps

CODA EIP devices use two assembly pairing options. Select one pairing based on your application requirements. Do not mix assemblies between pairings.

Pairing	Use Case	Configure (O→T)	Output (T→O)	Config Assembly
Standard	Flow measurement and control	Assembly 100 (6 bytes)	Assembly 101 (32 bytes)	Assembly 102 required
Extended / Batch	Batch dispensing with valve drive	Assembly 103 (14 bytes)	Assembly 104 (40 bytes)	Not required

Table 7. Assembly pairing options.

Important: Use either the standard pairing (100 + 101 + 102) or the extended pairing (103 + 104). The extended pairing does not use a configuration assembly.

Assembly 100 — Configure (O→T), Standard, 6 Bytes

Byte Offset	Type	Parameter	Notes
0–1	UINT (16-bit)	Device Control	See Device Control Word section
2–5	REAL (32-bit IEEE float)	Mass Flow Setpoint	Units depend on device configuration

Table 8. Assembly 100 — Configure (Originator to Target).

Note: Mass Flow Setpoint units are determined by the device's Mass Flow Units setting (Class 176 Attribute 15). To identify your current unit selection, read Attribute 15 via explicit messaging — see the Explicit Messaging section. Contact Alicat support if you are unsure of your unit configuration.

Assembly 101 — Output (T→O), Standard, 32 Bytes

Byte Offset	Type	Parameter	Notes
0–3	DWORD (32-bit)	Device Status	See Device Status Word section
4–7	REAL (32-bit IEEE float)	Density	kg/m³
8–11	REAL	Temperature	°C
12–15	REAL	Volumetric Flow	m³/hr
16–19	REAL	Mass Flow	Units depend on device configuration
20–23	REAL	Totalizer	g
24–27	REAL	Mass Flow Setpoint	Units depend on device configuration
28–31	REAL	Totalizer Time	Seconds

Table 9. Assembly 101 — Output (Target to Originator).

Assembly 102 — Configuration, 4 Bytes

Required when using the standard assembly pairing. All bytes are reserved and must be set to 0x00.

Byte Offset	Type	Parameter	Value
0	BYTE	Reserved	0x00
1	BYTE	Reserved	0x00
2	BYTE	Reserved	0x00
3	BYTE	Reserved	0x00

Table 10. Assembly 102 — Configuration.

Assembly 103 — Configure (O→T), Extended / Batch, 14 Bytes

Byte Offset	Type	Parameter	Notes
0–1	UINT (16-bit)	Device Control	See Device Control Word section
2–5	REAL (32-bit IEEE float)	Mass Flow Setpoint	Units depend on device configuration
6–9	REAL	Batch Target Size	Units depend on device configuration
10–13	REAL	Valve Drive	Fractional: 0.0 = fully closed, 1.0 = fully open. Active when Manual Valve Control bit is set.

Table 11. Assembly 103 — Configure (Originator to Target), extended pairing.

Assembly 104 — Output (T→O), Extended / Batch, 40 Bytes

Byte Offset	Type	Parameter	Notes
0–3	DWORD (32-bit)	Device Status	See Device Status Word section
4–7	REAL (32-bit IEEE float)	Density	kg/m³
8–11	REAL	Temperature	°C
12–15	REAL	Volumetric Flow	m³/hr
16–19	REAL	Mass Flow	Units depend on device configuration
20–23	REAL	Totalizer	g
24–27	REAL	Mass Flow Setpoint	Units depend on device configuration
28–31	REAL	Totalizer Time	Seconds
32–35	REAL	STP Volumetric Flow	m³/hr
36–39	REAL	Valve Drive	Fractional: 0.0 = fully closed, 1.0 = fully open

Table 12. Assembly 104 — Output (Target to Originator), extended pairing.

Device Control Word

The Device Control word is a 16-bit field in the configure assembly (Assembly 100, bytes 0–1; or Assembly 103, bytes 0–1). It is used to send commands to the instrument.

Bit(s)	Name	Description
0	Tare	Initiate a flow tare at the current no-flow condition.
1	Reset Totalizer	Reset the totalizer to zero.
2	Start Batch Run	Reset and start a new batch dispensing run.
3–4	Valve Override	0 = No override (normal control) 1 = Normal 2 = Fully closed 3 = Fully open
5	Manual Valve Control	When set, bypasses the PID control loop and drives the valve directly to the fractional position specified by the Valve Drive field (Assembly 103, bytes 10–13; 0.0 = fully closed, 1.0 = fully open). The device acts as an open-loop valve positioner rather than a flow controller. Clear this bit to resume PID flow control.
6–15	Reserved	Set to 0.

Table 13. Device Control word bit definitions.

Edge-triggered commands

Commands are **processed on change**. Sending the same Device Control value repeatedly will not re-issue the command. To send sequential identical commands (for example, two tare operations in a row), write 0x0000 between commands.

Example: To tare the instrument, write 0x0001, then write 0x0000 to clear before sending any further commands.

Device Status Word

The Device Status word is a 32-bit field in the output assembly (Assembly 101, bytes 0–3; or Assembly 104, bytes 0–3). It reports the current instrument state.

Bit(s)	Name	Description
0	Zero Operation in Progress	A tare operation is currently running.
1	Density Under-range	Measured density is below the measurable range.
2	Density Over-range	Measured density is above the measurable range.
3	Batch Control Running	A batch dispensing operation is currently active.
4–31	Reserved	Always 0.

Table 14. Device Status word bit definitions.

Explicit Messaging — Class 176 (0xB0)

Class 176 (0xB0), Instance 1 provides access to device configuration and diagnostic parameters via explicit CIP messaging (Get_Attribute_Single / Set_Attribute_Single). All values use little-endian byte order.

Attr	Name	Type	Access	Notes
1	Fullscale Flow	REAL	Get	Units depend on Attr 15
2	Fullscale Density	REAL	Get	kg/m³
3	Exp Alpha	REAL	Get/Set	Thermal expansion coefficient
4	STP Density	REAL	Get/Set	kg/m³

Attr	Name	Type	Access	Notes
5	Volumetric Flow Fullscale	REAL	Get	Units depend on Attr 16
6	P-Gain	REAL	Get/Set	PID proportional gain
7	I-Gain	REAL	Get/Set	PID integral gain
8	D-Gain	REAL	Get/Set	PID derivative gain
9	Crack	REAL	Get/Set	Valve crack-open offset
10	Power-Up Setpoint	REAL	Get/Set	Setpoint applied at startup
11	Setpoint Source	UINT8	Get/Set	Setpoint input source selection
12	Valve Override	UINT8	Get/Set	Valve override mode
13	Feedback Select	UINT8	Get/Set	Control loop feedback variable
14	Device Type	UINT8	Get	Instrument type code
15	Mass Flow Units	UINT8	Get/Set	Engineering units for mass flow
16	Volumetric Flow Units	UINT8	Get/Set	Engineering units for volumetric flow
17	Totalizer Select	UINT8	Get/Set	Totalizer variable selection
18	Totalizer Units	UINT8	Get/Set	Units depend on Attr 17
19	Serial Number	STRING	Get	Instrument serial number
20	Firmware Revision	STRING	Get	Current firmware version string
21	Batch Size Target	REAL	Get/Set	Target batch size
22	Default P-Gain	REAL	Get	Factory default PID P-gain
23	Default I-Gain	REAL	Get	Factory default PID I-gain
24	Default D-Gain	REAL	Get	Factory default PID D-gain
25	Default Crack	REAL	Get	Factory default valve crack offset
26	STP Volumetric Flow Units	UINT8	Get/Set	Engineering units for STP volumetric flow
27	STP Temperature	REAL	Get/Set	°C — reference temperature for STP calculation
28	Gas Index	UINT16	Get/Set	Selected gas index
29	Overdrive	UINT8	Get/Set	Overdrive mode enable
30	Overdrive Frequency	UINT8	Get/Set	Overdrive frequency setting
31	Overdrive HW Trigger Count	UINT8	Get/Set	Hardware trigger counter for overdrive

Table 15. Class 176 (0xB0) explicit messaging attributes. Little-endian byte order.

Troubleshooting

Symptom	Likely Cause	Resolution
Device not visible in BOOTP/DHCP tool	No power, or host PC not on same subnet	Verify power and Ethernet cable connections (RJ45 or M12, depending on your CODA configuration). Confirm host PC Ethernet adapter is configured with a static IP on the same subnet as the target device.
NET LED off after power-up	No IP address assigned	Assign a static IP using the BOOTP/DHCP tool.
NET LED flashing red	EIP connection timed out	Verify PLC IP configuration. Confirm the device IP matches what is configured in the PLC project.
NET LED steady red	Duplicate IP address on network	Assign a unique static IP address to the device.
MOD LED steady red	Major system fault	Power-cycle the device. If fault persists, contact Alicat support.
PLC shows no live data	Incorrect assembly pairing or EDS not installed	Verify the assembly pair: 100 + 101 + 102 (standard) or 103 + 104 (extended). Confirm the EDS file is installed and the correct product is selected in the PLC project.
Commands not executing (tare, reset, etc.)	Device Control value not changing	Device Control is edge-triggered. Write 0x0000 between commands so the next command is detected as a new value.

Table 16. Common issues and resolutions.

For issues not listed above, contact Alicat support:

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