ALICAT PROFINET MANUAL

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Contents

Alicat Devices with PROFINET

This manual is to assist in using a PROFINET-configured Alicat device. Instructions for connecting a device to TIA portal can be found in this manual as well (page 26). Alicat PROFINET devices use DCP to obtain their IP address.

Alicat PROFINET devices are certified by PROFIBUS. Alicat devices function as Conformance Class B devices and are Netload Class III.

For setup, Alicat provides a GSDML file that can be found at alicat.com/profinet.

Device Body

Alicat PROFINET devices can be produced with two RJ45 ethernet ports, or two M12 connections and an M8 connection.

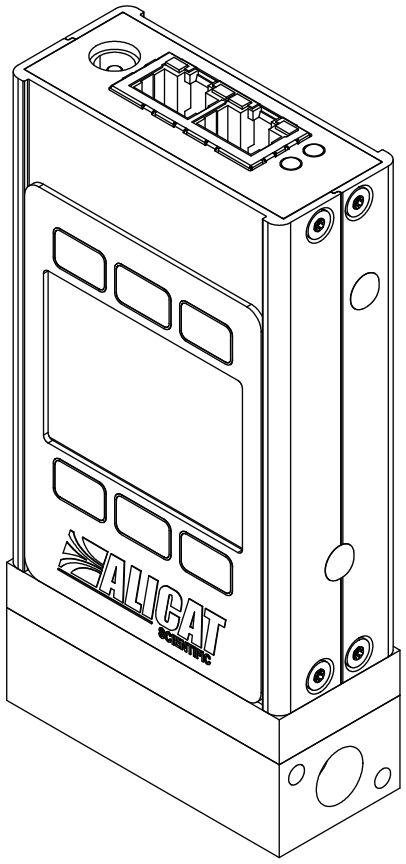
RJ45 Ethernet Ports

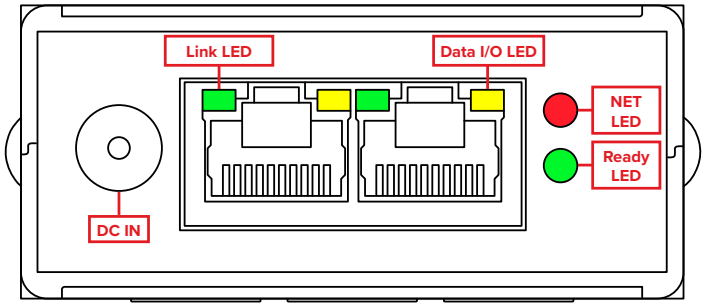
Alicat PROFINET devices that are produced with two RJ45 ports have each port labeled as P1 (right-hand port next to the LEDs) and P2 (left-hand port next to the power).

Each RJ45 port has two LED lights to show when the port is actively connected to the network and when it is transmitting or receiving data. The **Link LED** (green light) shows as a solid green when the port is connected to the network. If the **Link LED** is off, the device cannot connect to the network. The data **IO LED** (yellow light) blinks as data packets are transmitted or received.

To the right of the two RJ45 ports are the **NET LED** and **Ready LED**. The **NET LED** (the light closer to the back of the device) shows when the device is connected to a PLC. The **Ready LED** (the light closer to the display or front of the device) shows the device's operation status. For more information, refer to the following table.

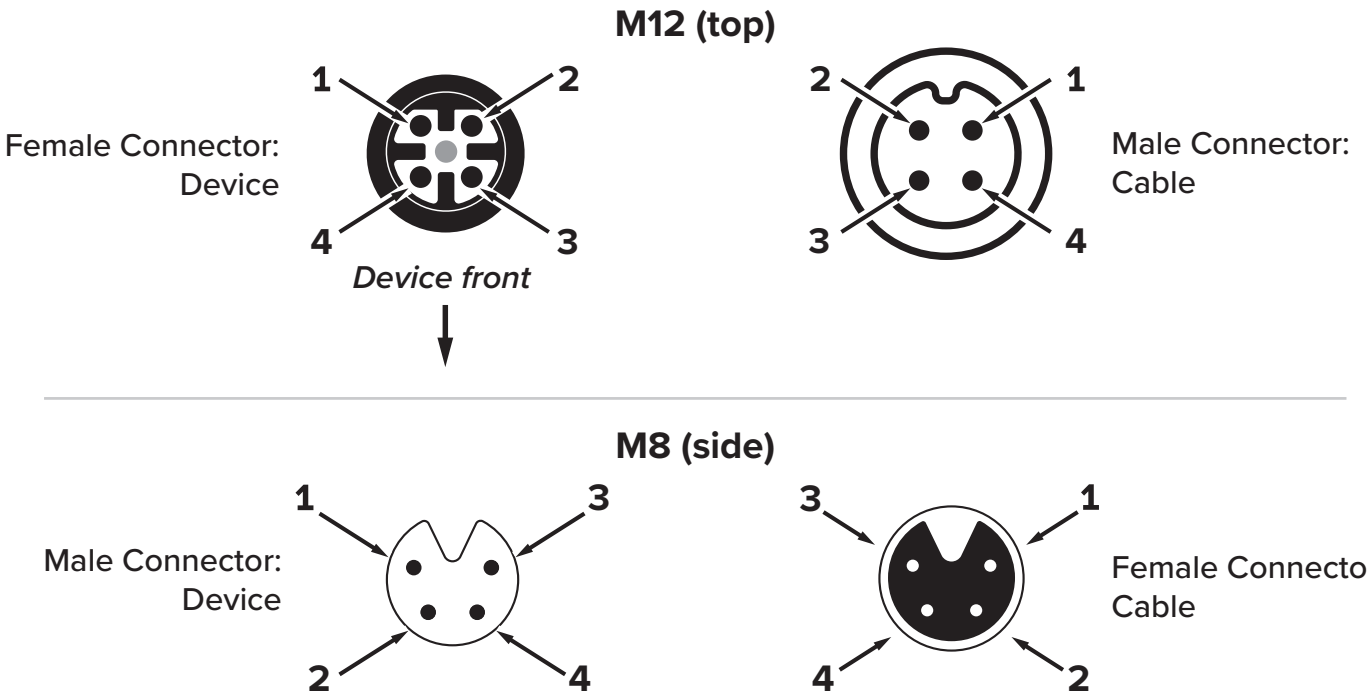
LED Status	Ready LED	NET LED
Off	Startup	Startup
Blinking Red	N/A	No active data exchange
Blinking Green	Flash LED command active	N/A
Solid Green	Configuration complete	Active data exchange





M12 and M8 Pinouts

Alicat PROFINET devices produced with the M12 configuration have the following pinouts.



Pin	4-Pin M12
1	Tx+: Send data +
2	Rx+: Receive data+
3	Tx-: Send data -
4	Rx-: Receive data -

Pin	4-Pin M8
1	Reserved. Do not connect.
2	Power in: powers the device.
3	Reserved. Do not connect.
4	Ground: common ground for power & digital communications.

Network Configuration Menu

Devices with a display can view their assigned IP address from the menu. Navigate to **MENU > Setup > Network > Network Status**. The MAC address is printed on the device to help with IP assignments.

Communication Status Menu

Alicat PROFINET devices with a display have an extra communications menu that is not covered in the standard device menu. To access the screen, select **MENU > SETUP > Network**. The menu then has the option for **Network Status**, **Module Format**, **Cyclic Data**, and **Received Commands**.

Network Status

The **Network Status** page is used to diagnose any communication issues by displaying:

- The industrial protocol that is installed on the device.
- The current firmware version.
- The device's IP address and MAC address.
- If a cable is connected.
- If the device has an active cyclic data connection with the PLC.

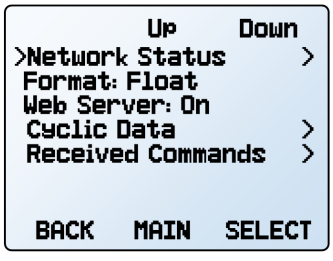
Format

The **Format** option controls how the data values are displayed, in either integer or floating point. Changes to the format take effect after 15 seconds.

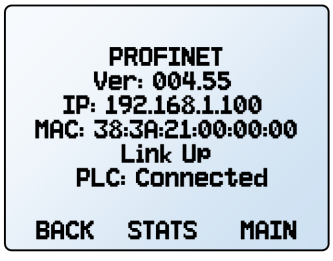
For more information on the module format, see page 7.

Web Server

The **Web Server** option either enables or disables the embedded web server.



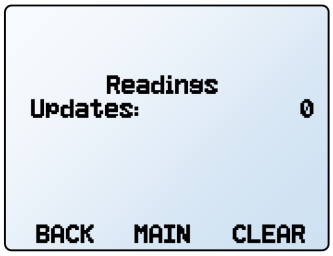
Communications status menu



Network status

Cyclic Data

The **Cyclic Data** screen displays the number of times the device has updated the cyclic data readings. Pressing **Clear** sets the count to 0. For more information on cyclic data, see page 7.



Cyclic data

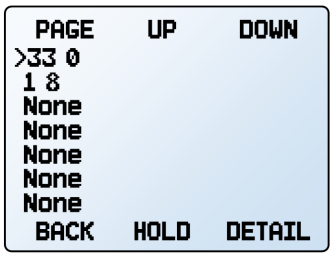
Received Commands

The **Received Commands** screen shows the ten most recent commands written to the device with the most recent at the top. For more information on commands, see page 14.

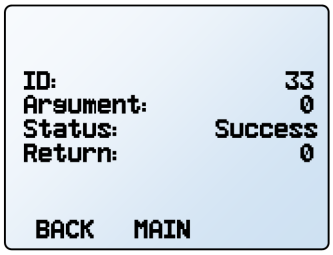
HOLD: Stops the screen from updating any new commands that may be sent to the device.

UPDATE: This option is only present when **HOLD** has been selected. Pressing **UPDATE** restores the device to refreshing the list with new commands.

DETAIL: Opens the currently designated command and displays more details about the command. The screen shows the numerical value of the command ID written to the device, what argument was used, the numerical value of the status of the command, and the value of the information returned if applicable.



Received commands



Details of received command.

PROFINET Interface

Alicat PROFINET devices interact with PROFINET systems using both cyclic and acyclic data.

Cyclic Data

Alicat PROFINET devices provide cyclic data in two separate formats, Floating Point (Float32) or Integer (Integer32) values. Only one format can be active at a time and can be changed from the device screen (page 5). The functions between the two modules do not change. The only difference is how the modules present their readings in either Float32 or Integer32 formats. The module slots are fixed and cannot be changed. The overall packet size is fixed because of this.

Floating Point (Float32) Format

When this module is selected, invalid readings are read as 0xFFFFFFFF. All modules, except the setpoint, are input only. The setpoint module is both input and output. See the following table for the module slots and their descriptions.

Module	Slot	Type	Description
0x1101	1	Float32	The setpoint, both output and input. Output is the requested setpoint, input is the current setpoint.
0x1102	2	Float32	Current valve drive
0x1103	3	Float32	Current pressure reading. This reads the primary pressure if there is a secondary pressure.
0x1104	4	Float32	Current secondary pressure reading. This may be from a second pressure sensor or using a barometer.
0x1105	5	Float32	Current barometric pressure reading
0x1106	6	Float32	Current temperature reading
0x1107	7	Float32	Current volumetric flow reading
0x1108	8	Float32	Current mass flow reading
0x1109	9	Float32	Current totalizer 1 reading
0x110A	10	Float32	Current totalizer 2 reading
0x110B	11	Floast32	Current humidity reading
0x1301	12	Unsigned32	Device status
0x1302	13	Unsigned16	Current gas number
0x1303	14	Unsigned16	Alarm outputs state

Integer (Integer32) Format

When this format is selected, invalid readings are read as –2147483648. All modules, except the setpoint, are input only. The setpoint module is both input and output. See the following table for the module slots, their description, and the data record that contains the number of decimal places for each value. To obtain the value in their engineering units, multiply the value by 10^(negative of the number of decimal places).

Module	Slot	Type	Description	Decimal Places Location
0x1201	1	Integer32	The setpoint, both output and input. Output is the requested setpoint, input is the current setpoint.	Index 5, Offset 22 (page 9)
0x1102	2	Integer32	Current valve drive	Index 6, Offset 22 (page 10)
0x1103	3	Integer32	Current pressure reading. This reads the primary pressure if there is a secondary pressure.	Index 7, Offset 22 (page 10)
0x1104	4	Integer32	Current secondary pressure reading. This may be from a second pressure sensor or using a barometer.	Index 8, Offset 22 (page 10)
0x1105	5	Integer32	Current barometric pressure reading.	Index 9, Offset 22 (page 11)
0x1106	6	Integer32	Current temperature reading	Index A, Offset 22 (page 11
0x1107	7	Integer32	Current volumetric flow reading	Index B, Offset 22 (page 12)
0x1108	8	Integer32	Current mass flow reading	Index C, Offset 22 (page 12)

Module	Slot	Type	Description	Decimal Places Location
0x1109	9	Integer32	Current totalizer 1 reading	Index D, Offset 22 (page 12)
0x110A	10	Integer32	Current totalizer 2 reading	Index E, Offset 22 (page 13)
0x110B	11	Integer32	Current humidity reading	Index F, Offset 22 (page 13)
0x1301	12	Unsigned32	Device status	
0x1302	13	Unsigned16	Current gas number	
0x1303	14	Unsigned16	Alarm outputs state	

Acyclic Data

There are two possible acyclic write data records and thirteen possible acyclic read data records. All records are in slot 1 (decimal address 270).

Not all acyclic data records are present on every device. It's possible to view the records available on a device by navigating to the **Acyclic Read/Write Data** page of the web server (page 25).

Send Command

Index: 0x0001

The **send command** data record is one of two possible write data records. It is used to command the device to perform actions like taring, setting the gas, or locking the display. For more information on sending commands, see the **Commands** section (page 14).

Byte Offset	Type	Description
0	Unsigned32	ID of the desired command
4	Integer32	Argument of the desired command

Write Gas Mix

Index: 0x0002

The **write gas mix** data record is the second of two write data records. Only mass flow devices have this record enabled. Using this index, the device can save a custom mix to accurately report the mass flow of up to 5 gases mixed together.

Note: *This does not command the device to physically mix the gases. The gases must be mixed in their desired quantities before reaching the device for it to read the mixture properly.*

To use the index, write the desired gas numbers into the data record (starting with byte offset 0) followed by its percentage of the mix in the corresponding byte offset. Please refer to the gas index on page 31 to determine the number associated with the desired gas. Percentages are read as 1 count equals 0.01%. For example, 5000 is read as 50%. If less than 5 gases are being used, write a value of 0 to the remaining byte offsets. Percentages written to this index must sum 100% or creating the gas mixture fails.

Byte Offset	Type	Description
0	Unsigned16	Gas ID of gas number 1
2	Unsigned16	Gas number 1's percentage. 1 count = 0.01%
4	Unsigned16	Gas ID of gas number 2
6	Unsigned16	Gas number 2's percentage. 1 count = 0.01%
8	Unsigned16	Gas ID of gas number 3
10	Unsigned16	Gas number 3's percentage. 1 count = 0.01%
12	Unsigned16	Gas ID of gas number 4
14	Unsigned16	Gas number 4's percentage. 1 count = 0.01%
16	Unsigned16	Gas ID of gas number 5
18	Unsigned16	Gas number 5's percentage. 1 count = 0.01%

Once all the desired gases and their percentages have been written to the index, perform the **Create/Update Gas Mix** command (page 22). The argument for the command sets what the gas number of the new mixture is and can be any number between 236 and 255. If no argument is written, or the argument is 0, the mixture is written to the first available gas number starting with 255 and decreasing. If there are no available gas numbers, the command fails, and an error is returned. To update a gas mixture, use the gas number of the mixture as the argument.

Command Status

Index: 0x0003

The **command status** data record is a read record that contains information on the currently executing or last completed command. This includes the command ID, the argument used in the command, the status of the command, and what value the command returned, if any. For more information on commands and the command statuses, see the **Commands** section (page 14).

Byte Offset	Type	Description
0	Unsigned32	ID of the current or last completed command
4	Integer32	Argument for the current or last completed command
8	Unsigned32	Numerical value of the status of the current or last completed command (see the following table)
12	Integer32	Value returned by the command.

Device Firmware Version

Index: 0x0004

The **device firmware version** data record is a read record that provides information on the current firmware installed on the device.

Byte Offset	Type	Description
0	Unsigned16	The number indicating which major firmware release the device has installed. Example: the 10 in 10v05.0.
2	Unsigned16	The number indicating which minor release the device has installed. Example: the 05 in 10v05.0.
4	Unsigned16	The number indicating which version of the custom firmware is installed, if any. This is usually 0. Example: the .0 in 10v05.0.
6	Unsigned16	Reserved for internal Alicat use. This will always be 0.

Setpoint Information

Index: 0x0005

The **setpoint information** data record is a read record that provides information about the setpoint. This includes which variable is being controlled, the source of that variable's reading, the minimum and maximum valid values, what units the setpoint is in, and where the decimal is in the setpoint reading.

Byte Offset	Type	Description
0	Unsigned16	Setpoint type. Indicates the variable being controlled. See **Appendix A** (page 27) for the value's associated variable.
2	Unsigned16	Setpoint source. Indicates the source of the variable's reading. See **Appendix C** (page 31) for the value's associated source.
4	Float32	Minimum value of the setpoint, without overrange
8	Float32	Maximum value of the setpoint, without overrange
12	Integer32	Minimum value of the setpoint, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
16	Integer32	Maximum value of the setpoint, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
20	Unsigned16	Setpoint units. See **Appendix B** (page 29) to determine what the value indicates.
22	Unsigned16	Setpoint decimal places. The number of digits after the decimal place in the current value, minimum value, and maximum value.

Valve Drive Information

Index: 0x0006

The **valve drive information** data record is a read record that provides information on the valve drive. This includes what the valve drive is controlling, what source the valve drive gets its setting from, the possible minimum and maximum values, what units the valve drive is in, and where the decimal is in the valve drive reading.

Byte Offset	Type	Description
0	Unsigned16	Valve drive type. Indicates what the valve drive is controlling. See **Appendix A-3** (page 28) to determine what the value indicates.
2	Unsigned16	Valve drive source. Indicates where the valve obtains its setting from. See **Appendix C** (page 31) to determine what the value indicates.
4	Float32	Minimum value of the valve drive, without overrange
8	Float32	Maximum value of the valve drive, without overrange
12	Integer32	Minimum value of the valve drive, without overrange. Scale integer by 10^(negative of byte offset 22 value) for the value in engineering units.
16	Integer32	Maximum value of the setpoint, without overrange. Scale integer by 10^(negative of byte offset 22 value) for the value in engineering units.
20	Unsigned16	Valve drive units. See **Appendix B** (page 29) to determine what the value indicates.
22	Unsigned16	Valve drive decimal places. The number of digits after the decimal place in the current value, minimum value, and maximum value.

Pressure Information

Index: 0x0007

The **pressure information** data record is a read record that provides information on pressure readings. This includes the type of pressure being read (absolute, gauge, or differential), the source of the reading, the possible minimum and maximum values, the engineering units, and where the decimal is in the pressure reading.

Byte Offset	Type	Description
0	Unsigned16	Pressure type. Indicates what pressure is being read. See **Appendix A-2** (page 27) to determine what the value indicates. Value is 0 if the reading is not available.
2	Unsigned16	Pressure source. Indicates where the pressure reading is being read at. See **Appendix C** (page 31) to determine what the value indicates. Value is 0 if the reading is not available.
4	Float32	Minimum value of the pressure reading, without overrange
8	Float32	Maximum value of the pressure reading, without overrange
12	Integer32	Minimum value of the pressure reading, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
16	Integer32	Maximum value of the pressure reading, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
20	Unsigned16	Pressure units. Indicates what engineering units the reading is in. See **Appendix B-6** (page 30) to determine what the value indicates.
22	Unsigned16	Pressure decimal places. The number of digits after the decimal place in the current value, minimum value, and maximum value.

Secondary Pressure Information

Index: 0x0008

The **secondary pressure information** data record is a read record that provides information on any secondary pressure readings. This includes the type of pressure being read (absolute, gauge, or differential), the source of the reading, the possible minimum and maximum values, the engineering units, and where the decimal is in the pressure reading. Secondary pressure readings are not always present.

Byte Offset	Type	Description
0	Unsigned16	Secondary pressure type. Indicates what pressure is being read. See **Appendix A-2** (page 27) to determine what the value indicates. Value is 0 if the reading is not available.
2	Unsigned16	Secondary pressure source. Indicates where the pressure reading is being read at. See **Appendix C** (page 31) to determine what the value indicates. Value is 0 if the reading is not available.

Byte Offset	Type	Description
4	Float32	Minimum value of the pressure reading, without overrange
8	Float32	Maximum value of the pressure reading, without overrange
12	Integer32	Minimum value of the pressure reading, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
16	Integer32	Maximum value of the pressure reading, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
20	Unsigned16	Secondary pressure units. Indicates what engineering units the reading is in. See **Appendix B-6** (page 30) to determine what the value indicates.
22	Unsigned16	Secondary pressure decimal places. The number of digits after the decimal place in the current value, minimum value, and maximum value.

Barometric Pressure Information

Index: 0x0009

The **barometric pressure information** data record is a read record that provides information on barometric pressure readings. This includes the type of pressure being read, the source of the reading, the possible minimum and maximum values, the engineering units, and where the decimal is in the pressure reading.

Byte Offset	Type	Description
0	Unsigned16	Barometric pressure type. Indicates what pressure is being read. See **Appendix A-2** (page 27) to determine what the value indicates. Value is 0 if the reading is not available.
2	Unsigned16	Barometric pressure source. Indicates where the pressure reading is being read at. See **Appendix C** (page 31) to determine what the value indicates. Value is 0 if the reading is not available.
4	Float32	Minimum value of the barometric pressure reading, without overrange
8	Float32	Maximum value of the barometric pressure reading, without overrange
12	Integer32	Minimum value of the barometric pressure reading, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
16	Integer32	Maximum value of the barometric pressure reading, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
20	Unsigned16	Barometric pressure units. Indicates what engineering units the reading is in. See **Appendix B-6** (page 30) to determine what the value indicates.
22	Unsigned16	Barometric pressure decimal places. The number of digits after the decimal place in the current value, minimum, and maximum value.

Temperature Information

Index: 0x000A

The **temperature information** data record is a read record that provides information on temperature readings. This includes the type of pressure being read, the source of the reading, the possible minimum and maximum values, the engineering units, and where the decimal is in the temperature reading.

Byte Offset	Type	Description
0	Unsigned16	Temperature type. Indicates what temperature is being read. See **Appendix A-3** (page 28) to determine what the value indicates. Value is 0 if the reading is not available.
2	Unsigned16	Temperature source. Indicates where the temperature reading is being read at. See **Appendix C** (page 31) to determine what the value indicates. Value is 0 if the reading is not available.
4	Float32	Minimum value of the temperature reading, without overrange
8	Float32	Maximum value of the temperature reading, without overrange
12	Integer32	Minimum value of the temperature reading, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
16	Integer32	Maximum value of the temperature reading, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
20	Unsigned16	Temperature units. Indicates what engineering units the reading is in. See **Appendix B-7** (page 30) to determine what the value indicates.
22	Unsigned16	Temperature decimal places. The number of digits after the decimal place in the current, minimum, and maximum values.

Volumetric Flow Information

Index: 0x000B

The **volumetric flow information** data record is a read record that provides information on the volumetric flow readings. This includes the type of volumetric flow being read, the source of the reading, the possible minimum and maximum values, the engineering units, and where the decimal is in the volumetric flow reading.

Byte Offset	Type	Description
0	Unsigned16	Volumetric flow type. Indicates what volumetric flow is being read. See **Appendix A-1** (page 27) to determine what the value indicates. Value is 0 if the reading is not available.
2	Unsigned16	Volumetric flow. Indicates where the volumetric flow reading is being read at. See **Appendix C** (page 31) to determine what the value indicates. Value is 0 if the reading is not available.
4	Float32	Minimum value of the volumetric flow reading, without overrange
8	Float32	Maximum value of the volumetric flow reading, without overrange
12	Integer32	Minimum value of the volumetric flow reading, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
16	Integer32	Maximum value of the volumetric flow reading, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
20	Unsigned16	Volumetric flow units. Indicates what engineering units the reading is in. See **Appendix B-4** (page 29) to determine what the value indicates.
22	Unsigned16	Volumetric flow decimal places. The number of digits after the decimal place in the current, minimum, and maximum values.

Mass Flow Information

Index: 0x000C

The **mass flow information** data record is a read record that provides information on the mass flow readings. This includes the type of mass flow being read, the source of the reading, the possible minimum and maximum values, the engineering units, and where the decimal is in the mass flow reading.

Byte Offset	Type	Description
0	Unsigned16	Mass flow type. Indicates what mass flow is being read. See **Appendix A-1** (page 27) to determine what the value indicates. Value is 0 if the reading is not available.
2	Unsigned16	Mass flow. Indicates where the mass flow reading is being read at. See **Appendix C** (page 31) to determine what the value indicates. Value is 0 if the reading is not available.
4	Float32	Minimum value of the mass flow reading, without overrange
8	Float32	Maximum value of the mass flow reading, without overrange
12	Integer32	Minimum value of the mass flow reading, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
16	Integer32	Maximum value of the mass flow reading, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
20	Unsigned16	Mass flow units. Indicates what engineering units the reading is in. See **Appendix B-1** (page 29) to determine what the value indicates.
22	Unsigned16	Mass flow decimal places. The number of digits after the decimal place in the current, minimum, and maximum values.

Totalizer 1 Information

Index: 0x000D

The **totalizer 1 information** data record is a read record that provides information on the totalizer readings. This includes the type of reading for the totalizer, the source of the reading, the possible minimum and maximum values, the engineering units, and where the decimal is in the totalizer reading.

Byte Offset	Type	Description
0	Unsigned16	Totalizer 1 type. Indicates what reading is being totaled. See **Appendix A-1** (page 27) to determine what the value indicates. Value is 0 if the reading is not available.
2	Unsigned16	Totalizer 1. Indicates where the reading is being read at. See **Appendix C** (page 31) to determine what the value indicates. Value is 0 if the reading is not available.
4	Float32	Minimum value of the totalizer 1 reading, without overrange

Byte Offset	Type	Description
8	Float32	Maximum value of the totalizer 1 reading, without overrange
12	Integer32	Minimum value of the totalizer 1 reading, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
16	Integer32	Maximum value of the totalizer 1 reading, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
20	Unsigned16	Totalizer 1 units. Indicates what engineering units the reading is in. See **Appendix B-3** (page 29) for totalizing mass flow and **Appendix B-5** (page 30) for totaling volumetric flow.
22	Unsigned16	Totalizer 1 decimal place. The number of digits after the decimal place in the current, minimum, and maximum values.

Totalizer 2 Information

Index: 0x000E

The **totalizer 2 information** data record is a read record that provides information on the totalizer readings. This includes the type of reading for the totalizer, the source of the reading, the possible minimum and maximum values, the engineering units, and where the decimal is in the totalizer reading.

Byte Offset	Type	Description
0	Unsigned16	Totalizer 2 type. Indicates what reading is being totaled. See **Appendix A-1** (page 27) to determine what the value indicates. Value is 0 if the reading is not available.
2	Unsigned16	Totalizer 2. Indicates where the reading is being read at. See **Appendix C** (page 31) to determine what the value indicates. Value is 0 if the reading is not available.
4	Float32	Minimum value of the totalizer 2 reading, without overrange
8	Float32	Maximum value of the totalizer 2 reading, without overrange
12	Integer32	Minimum value of the totalizer 2 reading, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
16	Integer32	Maximum value of the totalizer 2 reading, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
20	Unsigned16	Totalizer 2 units. Indicates what engineering units the reading is in. See **Appendix B-3** (page 29) for totalizing mass flow and **Appendix B-5** (page 30) for totaling volumetric flow.
22	Unsigned16	Totalizer 2 decimal places. The number of digits after the decimal place in the current, minimum, and maximum values.

Humidity Information

Index: 0x000F

The **humidity information** data record is a read record that provides information on the humidity readings. This includes the type of reading for the humidity, the source of the reading, the possible minimum and maximum values, the engineering units, and where the decimal is in the humidity reading.

Byte Offset	Type	Description
0	Unsigned16	Humidity type. Indicates what humidity is being read. See **Appendix A-3** (page 28) to determine what the value indicates. Value is 0 if the reading is not available.
2	Unsigned16	Humidity. Indicates where the reading is being read at. See **Appendix C** (page 31) to determine what the value indicates. Value is 0 if the reading is not available.
4	Float32	Minimum value of the humidity reading, without overrange
8	Float32	Maximum value of the humidity reading, without overrange
12	Integer32	Minimum value of the humidity reading, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
16	Integer32	Maximum value of the humidity reading, without overrange. Scale the integer by 10^(negative of byte offset 22 value) for the value in engineering units.
20	Unsigned16	Humidity units. Indicates what engineering units the reading is in. See **Appendix B** (page 29) to determine what the value indicates.
22	Unsigned16	Humidity decimal places. The number of digits after the decimal place in the current, minimum, and maximum values.

Commands

Commands require a command ID and argument written to the **send command** data record (index 0x0001). To send a command, write the command ID and the argument to byte offsets 0 and 4, respectively. For example, to command the device to tare the flow, a command ID of 33 is written to offset 0 and the desired time to tare is written in milliseconds to byte offset 4.

Byte Offset	Type	Description
0	Unsigned32	The ID of the desired command
4	Integer32	The argument of the desired command

After a device runs a command, it sets a command status and reports that status with a numerical value. Refer to the following table to determine the associated status with the given numerical value.

Status Value	Status Name	Description
0	SUCCESS	The last command completed successfully.
1	IN_PROGRESS	A command is currently executing.
2	INVALID_ID	The ID of the last command is invalid.
3	INVALID_ARGUMENT	The argument of the last command is invalid.
4	UNSUPPORTED	The last command is not supported by the device.
5	INVALID_MIX_IDX	The requested gas mix number is invalid.
6	INVALID_MIX_GAS	A gas used in the mix does not exist on the device.
7	INVALID_MIX_PCT	The gas mix fractions do not sum to 100%.

Some commands provide a return value. The command descriptions in this manual outline the meaning of any return value the command may provide. If a command does not define a return value, the command places a 0 in the return value field. For more information on where the status and return values are located, see the **Command Status** section (page 9).

It is not possible to repeat a command multiple times in a row. If repetition is necessary, run a **no operation** command between the repeated commands. Running a **no operation** command before or after all commands can prevent any issues with an unintended command repeating.

The following commands outline what firmware version they were first introduced in, their command ID, the command's function, their possible arguments, and the results of a successful command.

Command Function

The command function is used to ensure commands run as intended.

No Operation

Command ID: 0

This command does nothing. It is required to separate identical command IDs and arguments. This command may be used before every command or at any time.

Argument: This command ignores any argument.

Data Readings

The data readings commands provide information on the readings a device can have. This includes the reading types, source, minimum and maximum values, engineering units, and the number of decimal places.

The return values for these commands often return a numerical value that is associated with a specific reading type, reading source, or engineering unit. Where noted, refer to the appropriate appendix (page 27) to determine the association of the given return value.

Query Reading Type

Firmware: 10v07

Command ID: 32

Query reading type sends a request the statistic of the reading noted in the argument.

Argument: Use the value for the desired reading from the following table.

Value	Reading
0	Setpoint
1	Valve drive
2	Pressure
3	Secondary pressure
4	Barometric pressure
5	Temperature
6	Volumetric flow
7	Mass flow
8	Totalizer 1
9	Totalizer 2
10	Humidity

Command response: A SUCCESS status is set if the device has a reading associated with the request argument. The return value is the value of the statistic of the requested reading. Refer to **Appendix A** (page 27) for the value's associated statistic.

An INVALID_ARGUMENT status is set if the device has no reading associated with the requested argument.

Query Reading Source

Firmware: 10v07

Command ID: 27

Query reading source requests the source of the reading noted in the argument.

Argument: Use the value for the desired reading from the following table.

Value	Reading
0	Setpoint
1	Valve drive
2	Pressure
3	Secondary pressure
4	Barometric pressure
5	Temperature
6	Volumetric flow
7	Mass Flow
8	Totalizer 1
9	Totalizer 2
10	Humidity

Command response: A SUCCESS status is set if the device has a reading associated with the requested argument. The return value is the value for the source for the requested reading. Refer to **Appendix C** (page 31) for the value's associated source.

An INVALID_ARGUMENT status is set if the device has no reading associated with the requested argument.

Query Reading Minimum (Integer)

Firmware: 10v07

Command ID: 65538

Query reading minimum (integer) requests the minimum value the reading noted in the argument can have. This value does not include overrange.

Argument: Use the value for the desired reading from the following table.

Value	Reading
0	Setpoint
1	Valve drive
2	Pressure
3	Secondary pressure
4	Barometric pressure
5	Temperature
6	Volumetric flow
7	Mass Flow
8	Totalizer 1
9	Totalizer 2
10	Humidity

Command response: A SUCCESS status is set if the device has a reading associated with the requested argument. The return value is the minimum value of the reading as an integer. Scale this integer by 10^(reading decimal places) to get the minimum in the reading's engineering units.

An INVALID_ARGUMENT status is set if the device has no reading associated with the requested argument.

Query Reading Minimum (Float)

Firmware: 10v07

Command ID: 65536

Query reading minimum (float) requests the minimum value the reading noted in the argument can have. This value does not include overrange.

Argument: Use the value for the desired reading from the following table.

Value	Reading
0	Setpoint
1	Valve drive
2	Pressure
3	Secondary pressure
4	Barometric pressure
5	Temperature
6	Volumetric flow
7	Mass Flow
8	Totalizer 1
9	Totalizer 2
10	Humidity

Command response: A SUCCESS status is set if the device has a reading associated with the requested argument. The return value is the minimum value of the reading as an IEEE-754 single precision floating point value. This value is in the reading's engineering units.

An INVALID_ARGUMENT status is set if the device has no reading associated with the requested argument.

Query Reading Maximum (Integer)

Firmware: 10v07

Command ID: 65539

Query reading minimum (integer) requests the maximum value the reading noted in the argument can have. This value does not include overrange.

Argument: Use the value for the desired reading from the following table.

Value	Reading
0	Setpoint
1	Valve drive
2	Pressure
3	Secondary pressure
4	Barometric pressure
5	Temperature
6	Volumetric flow
7	Mass Flow
8	Totalizer 1
9	Totalizer 2
10	Humidity

Command response: A SUCCESS status is set if the device has a reading associated with the requested argument. The return value is the maximum value of the reading as an integer. Scale this integer by 10^(reading decimal places) to get the maximum in the reading's engineering units.

An INVALID_ARGUMENT status is set if the device has no reading associated with the requested argument.

Query Reading Maximum (Float)

Firmware: 10v07

Command ID: 65537

Query reading maximum (float) requests the maximum value the reading noted in the argument can have. This value does not include overrange.

Argument: Use the value for the desired reading from the following table.

Value	Reading
0	Setpoint
1	Valve drive
2	Pressure
3	Secondary pressure
4	Barometric pressure
5	Temperature
6	Volumetric flow
7	Mass Flow
8	Totalizer 1
9	Totalizer 2
10	Humidity

Command response: A SUCCESS status is set if there is a reading associated with the requested argument. The return value is the maximum value of the reading as an IEEE-754 single precision floating point value. This value is in the reading's engineering units.

An INVALID_ARGUMENT status is set if the device has no reading associated with the requested argument.

Query Reading Engineering Units

Firmware: 10v07

Command ID: 29

Query reading engineering units requests the current engineering units of the reading noted in the argument.

Argument: Use the value for the desired reading from the following table.

Value	Reading
0	Setpoint
1	Valve drive
2	Pressure
3	Secondary pressure
4	Barometric pressure
5	Temperature
6	Volumetric flow
7	Mass Flow
8	Totalizer 1
9	Totalizer 2
10	Humidity

Command response: A SUCCESS status is set if the device has a reading associated with the requested argument. The return value is the value for the engineering units of the requested reading. Refer to **Appendix B** (page 29) for the value's associated engineering units.

An INVALID_ARGUMENT status is set if the device has no reading associated with the requested argument.

Set Reading Engineering Units

Firmware: 10v07

Command ID: 65300 + offset

Set reading engineering units changes the engineering units of the desired reading. When writing the command ID, add the offset of the reading to the command ID (65300). For example, to change the engineering unit of the pressure reading, use 65302 as the command ID.

Not all readings are independent of each other. Changing the engineering units of the pressure reading also changes the secondary pressure and barometric pressure.

Offset	Reading
0	Setpoint
1	Valve drive
2	Pressure
3	Secondary pressure
4	Barometric pressure
5	Temperature
6	Volumetric flow
7	Mass Flow
8	Totalizer 1
9	Totalizer 2
10	Humidity

Argument: Use the value of the associated desired engineering units found in **Appendix B** (page 29).

Command response: A SUCCESS status is set if the reading's engineering units are changed. The return value is the value of the requested engineering units.

An UNSUPPORTED status is set if the offset in the command ID is not associated with the device.

An INVALID_ARGUMENT status is set if engineering units are not valid for the reading.

Query Reading Decimal Places

Firmware: 10v07

Command ID: 30

Query reading decimal places sends a request to the device for the number of digits after the implicit decimal place in the requested reading's current, minimum, and maximum values.

Argument: Use the value for the desired reading from the following table.

Value	Reading
0	Setpoint
1	Valve drive
2	Pressure
3	Secondary pressure
4	Barometric pressure
5	Temperature
6	Volumetric flow
7	Mass Flow
8	Totalizer 1
9	Totalizer 2
10	Humidity

Command response: A SUCCESS status is set if the device has a reading associated with the requested argument. The return value is the number of decimal places available for the reading.

An INVALID_ARGUMENT status is set if the device has no reading associated with the requested argument.

Control

▶ Controllers only

The control commands are commands for Alicat controllers only. These commands manage the setpoint, valve, and totalizer batches.

Set Power-up Setpoint

Firmware: 7v05

Command ID: 12

Set power-up setpoint stores the current setpoint to be immediately used the next time the controller is powered.

Argument: this command ignores the argument value.

Command Response: A SUCCESS status is set, and the device saves the current setpoint as the power-up setpoint.

Setpoint Maximum Ramp (Saved)

Firmware: 10v07

Command ID: 65546

Setpoint maximum ramp (saved) sets the maximum ramp rate of the setpoint and saves it across power cycles. This command should not be used more often than every few minutes.

Argument: To query the current maximum ramp rate, use a negative value.

To disable the maximum ramp rate, use a value of 0.

To set a maximum ramp rate, determine the desired rate of full-scale percentage change per millisecond and then multiply that value by 10,000,000. For example, if a controller were to ramp to a setpoint by 1% of full scale every second, the device would ramp 0.001% every millisecond. Multiply that 0.001% by 10,000,000 to obtain a value of 10,000. Refer to the following table for further example values.

Maximum Ramp Rate	Value
100% of full scale every millisecond	1000000000
1% of full scale every millisecond	10000000
100% of full scale every second	1000000
100% of full scale every minute	16667
1% of full scale every second	10000
100% of full scale every hour	278
1% of full scale every minute	167
10% of full scale every hour	28

Command Response: A SUCCESS status is set after the command is completed. The return value is the current maximum ramp rate. Multiply the value by 0.0000001 to obtain the ramp rate in percent of full scale per millisecond.

Setpoint Maximum Ramp (Temporary)

Firmware: 10v07

Command ID: 65547

Setpoint maximum ramp (temporary) sets the maximum ramp rate of the setpoint. This command does not save the maximum ramp rate and it is lost when the device loses power.

Argument: To query the current ramp rate, use a negative value.

To disable the ramp rate, use a value of 0.

To set a maximum ramp rate, determine the desired rate of full-scale percentage change per millisecond and then multiply that value by 10,000,000. For example, if a controller were to ramp to a setpoint by 1% of full scale every second, the device would ramp 0.001% every millisecond. Multiply that 0.001% by 10,000,000 to obtain a value of 10,000. Refer to the following table for further example values.

Maximum Ramp rate	Value
100% of full scale every millisecond	1000000000
1% of full scale every millisecond	10000000
100% of full scale every second	1000000
100% of full scale every minute	16667
1% of full scale every second	10000
100% of full scale every hour	278
1% of full scale every minute	167
10% of full scale every hour	28

Command Response: A SUCCESS status is set after the command is completed. The return value is the current maximum ramp rate. Multiply the value by 0.0000001 to obtain the ramp rate in percent of full scale per millisecond.

Hold Valve(s)

Firmware: 7v05

Command ID: 6

Hold valve(s) pauses the controller valve(s) and stops any further control of the process. The command can also cancel a current hold.

Argument: Use the value for the desired effect found in the following table.

Value	Description
0	Cancel valve hold and resume normal closed-loop control.
1	Hold all valves closed.
2	Hold valves at their current positions.
3	Exhaust: Close the upstream valve and fully open the downstream valve. Only supported on dual valve controllers.

Command Response: A SUCCESS status is set if the command sets the valve to the desired argument mode.

An UNSUPPORTED status returns if the requested mode is not supported by the device.

An INVALID_ARGUMENT status is set if the argument value is not valid.

Set Active Valve

Firmware: 7v16

Command ID: 15

Set active valve is only available on MCT stream-switching controllers. The command controls which valve is the active valve that controls the process.

Argument: Use the value for the desired valve found in the following table.

Value	Description
0	Upstream valve or only valve
1	Downstream valve or auxiliary valve if dual valve control is enabled.

Command Response: A SUCCESS status is set if the active valve changes.

An INVALID_ARGUMENT status is set if the value used is not valid.

An UNSUPPORTED status is set if the controller is not an MCT controller.

Set Loop Control Variable

Firmware: 7v05

Command ID: 11

Set loop control variable changes the statistic that the controller actively controls. That means a mass flow controller can be changed to control pressure or volumetric flow if needed.

Argument: Use the value for the desired statistic found in the following table.

Value	Description
0	Mass flow
1	Volumetric flow
2	Differential pressure
3	Absolute pressure
4	Gauge pressure
...	Any setpoint value that is found in **Appendix A** (page 27).

Command Response: A SUCCESS status is set if the loop control variable changes.

An INVALID_ARGUMENT is set if the statistic is not available on the device (e.g., trying to control mass flow on a pressure controller).

Set Loop Control Algorithm

Firmware: 7v08

Command ID: 13

Set loop control algorithm selects either PDF or PD²I algorithm for the controller. Only one algorithm can be active at a time.

Argument: Use the value of the desired algorithm found in the following table.

Value	Description
1	PDF closed-loop control algorithm
2	PD²I closed-loop control algorithm

Command Response: A SUCCESS status is set if the desired loop control algorithm is selected.

An INVALID_ARGUMENT status is set if the value is not for a valid algorithm.

Read Closed-Loop Gain

Firmware: 7v08

Command ID: 14

Read closed-loop gain returns the current value of the desired loop gain in the loop control algorithm.

Argument: Use the value of the desired closed-loop gain found in the following table.

Value	Description
0	Proportional gain (p gain) for PDF or PD²I
1	Derivative gain (d gain) for PDF or PD²I
2	Integral gain (I gain) for PD²I

Command Response: A SUCCESS status is set if the argument is a valid choice. The return value is the gain value of the requested closed-loop gain. The value can be between 0 – 65535.

An INVALID_ARGUMENT is set if the gain requested is not a valid choice for the loop control algorithm.

Set Proportional Closed-Loop Control Gain

Firmware: 7v05

Command ID: 8

Set proportional close loop control gain command changes the proportional gain value (P gain) to the desired value used in the argument.

Argument: Use a value between 0 – 65535.

Command Response: A SUCCESS status is set when the command completes, and the gain value is set.

Set Derivative Closed-Loop Control Gain

Firmware: 7v05

Command ID: 9

Set derivative close loop control gain changes the derivative gain value (D gain) to the desired value used in the argument.

Argument: Use a value between 0 – 65535.

Command Response: A SUCCESS status is set when the command completes, and the gain is set.

Set Integral Closed-Loop Control Gain

Firmware: 7v05

Command ID: 10

Set integral close loop control gain changes the integral gain value (I gain) to the desired value used in the argument.

Argument: Use a value between 0 – 65535.

Command Response: A SUCCESS status is set when the command completes, and the gain is set.

Set Inverse Pressure Control

Firmware: 7v18

Command ID: 16

Set inverse pressure control manages how the controller controls pressure. It can be set to control pressure normally or to control the inverse pressure (usually back pressure). This command also sets whether the control mode is saved across power cycles.

Argument: Use the value for the desired setting found in the following table.

Value	Description
0	Enable normal pressure control, not saved across power cycles.
1	Enable inverse pressure (usually back pressure) control, not saved across power cycling.
3	Enable normal pressure control, saved across power cycles.
4	Enable inverse pressure (usually back pressure) control, saved across power cycling.

Command Response: A SUCCESS status is set if the pressure mode has changed.

An INVALID_ARGUMENT status is set if the argument used is not available on the device or does not have an associated pressure control mode.

Query Totalizer Batch (Integer)

Firmware: 10v07

Command ID: 65543

Query totalizer batch (integer) requests the total size of the batch from one of the two totalizers.

Argument: Use a value of 1 to query totalizer 1. Use a value of 2 to query totalizer 2.

Command Response: A SUCCESS status is set if the requested totalizer is enabled. The return value is the total size of the batch of the requested totalizer. To obtain the volume in the requested totalizer's engineering units, multiply the value by 10^(negative totalizer decimal places). The device returns a 0 if batching is disabled.

An INVALID_ARGUMENT status is set if the requested totalizer is not enabled.

Query Totalizer Batch (Float)

Firmware: 10v07

Command ID: 65540

Query totalizer batch (float) requests the total size of the batch from one of the two totalizers.

Argument: Use a value of 1 to query totalizer 1. Use a value of 2 to query totalizer 2.

Command Response: A SUCCESS status is set if the requested totalizer is enabled on the device. The return value is the total size of the batch in the requested totalizer in an IEEE-754 single precision floating point value. This value uses the engineering units of the totalizer. The device returns a 0 if batching is disabled.

An INVALID_ARGUMENT status is set if the requested totalizer is not enabled.

Set Totalizer Batch 1 (Integer)

Firmware: 10v07

Command ID: 65544

Set totalizer batch 1 (integer) manages the batch size of totalizer 1.

Argument: Use the desired batch size multiplied by 10^(totalizer decimal places).

To disable batching, use a value of 0.

Command response: A SUCCESS status is set if totalizer 1 is enabled and the size of the batch is valid. The return value is the batch size.

An UNSUPPORTED status is set if totalizer 1 is not enabled.

An INVALID_ARGUMENT status is set if the volume of the batch is larger than what totalizer 1 can hold.

Set Totalizer Batch 1 (Float)

Firmware: 10v07

Command ID: 65541

Set totalizer batch 1 (float) manages the batch size of totalizer 1.

Argument: Use the desired batch size formatted as an IEEE-754 single precision floating point value in the engineering units of totalizer 1.

To disable batching, use a value of 0.

Command response: A SUCCESS status is set if totalizer 1 is enabled and the batch size is valid. The return value is the requested batch volume.

An UNSUPPORTED status is set if totalizer 1 is not enabled.

An INVALID_ARGUMENT status is set if the volume of the batch is larger than what totalizer 1 can hold.

Set Totalizer Batch 2 (Integer)

Firmware: 10v07

Command ID: 65545

Set totalizer batch 2 (integer) manages the batch size of totalizer 2.

Argument: Use the desired batch size multiplied by 10^(totalizer decimal places.

To disable batching, use a value of 0.

Command response: A SUCCESS status is set if totalizer 2 is enabled and the size of the batch is valid. The return value is the batch size.

An UNSUPPORTED status is set if totalizer 2 is not enabled.

An INVALID_ARGUMENT status is set if the volume of the batch is larger than what totalizer 2 can hold.

Set Totalizer Batch 2 (Float)

Firmware: 10v07

Command ID: 65542

Set totalizer batch 2 (float) manages the batch size of totalizer 2.

Argument: Use the desired batch size formatted as an IEEE-754 single precision floating point value in the engineering units of totalizer 2.

To disable batching, use a value of 0.

Command response: A SUCCESS status is set if totalizer 1 is enabled and the batch size is valid. The return value is the requested batch volume.

An UNSUPPORTED status is set if totalizer 2 is not enabled.

An INVALID_ARGUMENT status is set if the volume of the batch is larger than what totalizer 2 can hold.

Administrative

Administrative commands are used to perform actions such as taring the device sensors, creating gas mixes, controlling the display, and restoring factory settings.

Perform Tare

Firmware: 7v05

Command ID: 4

Perform tare instructs the device to use the current reading as the zero reading.

When performing gauge pressure tares, the sensor must be open to the atmosphere.

Differential pressure tares require a common pressure to measure from.

Absolute pressure tares require an equipped barometer.

Flow tares must be performed when there is no current flow through the process. Flow tares are also best when at the process pressure, or as close to it as possible.

Argument: Use the value of the desired tare found in the following table.

Value	Description
0	Tare gauge or differential pressure
1	Tare absolute pressure
2	Tare mass and/or volumetric flow

Command response: A SUCCESS status is set if the requested tare is performed.

An UNSUPPORTED status is set if the requested tare does not apply to the device (e.g., a mass flow tare on a pressure device).

Perform Pressure Sensor Tare

Firmware: 10v07

Command ID: 31

Perform pressure sensor tare instructs the device to use the current gauge or differential pressure reading as the zero reading. An absolute pressure tare uses the barometer's zero reading as the zero reading.

When performing gauge pressure tares the sensor must be open to the atmosphere.

Differential pressure tares require a common pressure to measure from.

Absolute pressure tares require an equipped barometer**.**

Argument: Use the desired time in milliseconds for the tare to take. This can be a value of 0 – 32767. If a value of 0 is used, a default of 256 milliseconds is used.

Command response: A SUCCESS status is set if the tare is performed.

An UNSUPPORTED status is set if the pressure sensor cannot be tared. This is usually due to trying to tare absolute pressure without a barometer.

An INVALID_ARGUMENT status is set if the argument value is less than 0 or greater than 32767.

Perform Secondary Pressure Sensor Tare

Firmware: 10v07

Command ID: 32

Perform secondary pressure sensor tare instructs the device to use the current pressure reading on the secondary pressure sensor as the zero reading. An absolute pressure tare uses the barometer's zero reading as the zero reading. Not all devices have a secondary pressure sensor.

When performing gauge pressure tares the sensor must be open to the atmosphere.

Differential pressure tares require a common pressure to measure from.

Absolute pressure tares require an equipped barometer.

Argument: Use the desired time in milliseconds for the tare to take. This can be a value of 0 – 32767. If a value of 0 is used, a default of 256 milliseconds is used.

Command response: A SUCCESS status is set if the tare is performed.

An UNSUPPORTED status is set if the pressure sensor cannot be tared. This is usually due to attempting to tare absolute pressure without a barometer or not having a secondary pressure sensor.

An INVALID_ARGUMENT status is set if the argument value is less than 0 or greater than 32767.

Perform Flow Tare

▶ Flow devices

Firmware: 10v07

Command ID: 33

Perform flow tare instructs the device to use the current flow reading as the zero reading. This command is used for both volumetric and mass flow.

Argument: Use the desired time in milliseconds for the tare to take. This can be a value of 0 – 32767. If a value of 0 is used, a default of 256 milliseconds is used.

Command response: A SUCCESS status is set if the tare is performed.

An UNSUPPORTED status is set if the pressure sensor cannot be tared. This is usually due to the device not reading volumetric or mass flow.

An INVALID_ARGUMENT status is set if the argument value is less than 0 or greater than 32767.

Reset Totalizer

▶ Flow devices

Firmware: 7v05

Command ID: 5

Reset totalizer instructs the device to clear the current totalizer count.

Argument: No argument is used for this command

Command response: A SUCCESS status is set if the reset is complete.

Set Gas

▶ Mass flow devices

Firmware: 7v05

Command ID: 1

Set gas manages what gas a mass flow device is calibrated to read. The gas must be set to accurately read the mass flow of the process gas.

Argument: Use the index number of the desired gas to measure. The gas index can be found on page 31.

Command response: A SUCCESS status is set if the gas has changed.

An INVALID_ARGUMENT status is set if the requested gas number does not exist.

Create/Update Gas Mix

▶ Mass flow devices

Firmware: 7v05

Command ID: 2

Create/update gas mix writes a new gas mix to the gas index on the device. Before running this command, the custom gas and its properties must be written to the device first. See page 8 for more information on how to write the gas mixture to the device.

Argument: Use 0 or 236-255. This is the gas index number of the new mixture. A value of 0 instructs the device to write to the first available gas index number starting with 255 and moving down. If no gas index numbers are available, then the command will fail.

To update or overwrite a previous custom gas mix, using its gas index number here will overwrite the old mixture.

Command response: A SUCCESS status is set if the gas has changed. The return value is the index number of the gas mix created or updated.

An INVALID_MIX_IDX status is set if the gas index number in the argument is outside of the 236-255 range.

An INVALID_MIX_GAS status is set if one or more gases in the mix do not exist on the device.

An INVALID_MIX_PCT status is set if the percentages of the gases that make up the mixture do not sum 100%.

Delete Gas Mix

▶ Mass flow devices

Firmware: 7v05

Command ID: 3

Delete gas mix removes the specified custom gas mix from the device.

Argument: Use the index number of the desired gas to delete.

Command response: A SUCCESS status is set if the gas mix was deleted.

An INVALID_MIX_IDX status is set if the requested gas mix does not exist.

Set Relative Humidity Percentage

▶ Mass flow devices equipped with humidity sensor

Firmware: 10v07

Command ID: 24

Set relative humidity percentage manages the relative humidity level used for gas corrections.

Argument: Use a value between 0 – 10000. 1 count in the value is equal to 0.01% humidity. For example, use 100 for 1% or 10000 for 100%.

Command response: A SUCCESS status is set if the relative humidity percentage is changed.

An UNSUPPORTED status is set if the relative humidity cannot be set on the device.

An INVALID_ARGUMENT status is set if the argument value is outside of 0 – 10000.

Set Relative Humidity Reference Temperature

▶ Mass flow devices equipped with humidity sensor

Firmware: 10v07

Command ID: 25

Set relative humidity reference temperature manages the relative humidity reference temperature used for gas corrections. This temperature is Celsius.

Argument: Use a value between −3000 – 10000. This value should match the relative humidity percentage.

The range starts at −30°C and reaches 100°C. 1 count in the value is equal to 0.01°C. For example, a value of −3000 is −30°C and a value of 10000 is 100°C.

Command response: A SUCCESS status is set if the relative humidity reference temperature is changed.

An UNSUPPORTED status is set if the relative humidity cannot be set on the device.

An INVALID_ARGUMENT status is set if the argument value is outside of −3000 – 10000.

Lock/Unlock Display

Firmware: 7v05

Command ID: 7

Lock/unlock display instructs the device to either lock or unlock the display on the front of the device. When locked, the device still responds to button presses, but settings cannot be changed using the display.

Argument: Use a value of 0 to unlock the display. Any other value locks the display.

Command response: A SUCCESS status is set if the display is locked or unlocked as requested.

Flash Display

Firmware: 8v28

Command ID: 20

Flash display instructs the device to flash its backlight indefinitely or for a set amount of time.

Argument: Use a number between 1 – 65534 to instruct the device to flash the backlight for that number of seconds. A value of 0 stops the backlight from flashing. A value of 65535 instructs the device to flash the backlight indefinitely.

Command response: A SUCCESS status is set if the backlight is flashing or stopped as requested.

An UNSUPPORTED status is set if no display is connected to the device.

Restore Factory Settings

Firmware: 10v07

Command ID: 26

Restore factory settings reverts all the device settings and configurations to their values when the device was last at Alicat.

> ***!*** *This command should only be used when trying to troubleshoot issues with Alicat support (page 2). All third-party calibrations are removed by performing this command.*

The device needs to be power cycled after performing the restore.

Argument: Use a value of 49374 to confirm that a factory restore is the desired result of the command.

Command response: A SUCCESS status is set if the factory restore completes. This may only be available to read briefly before the restore removes the status.

An UNSUPPORTED status is set if there is an error during the restore process.

An INVALID_ARGUMENT status is set if the argument value is not 49374.

Read Configuration Checksum

Firmware: 8v24

Command ID: 17

Read configuration checksum computes and returns a checksum of the device's calibration and configuration. The checksum is computed at the time of the command initiation and may take 300 milliseconds to complete. A timeout of over 500 milliseconds is recommended.

Any setting that is retained across power cycles is included. Values that may or may not be retained are also included.

Because calibration information is included, two devices with identical configurations may have different checksums. If a device is recalibrated, the checksum may change as well. Changing the device firmware may or may not change the checksum.

Any parameter that changes during routine operation (e.g., setpoint) should be set to a known configuration before reading the checksum.

Argument: Must always be 0.

Command response: A SUCCESS status is set when the checksum is complete, and the argument value is 0. The return value is the checksum of the entire device configuration. This is a value of 0 – 65535.

An INVALID_ARGUMENT status is set when the argument value is not 0.

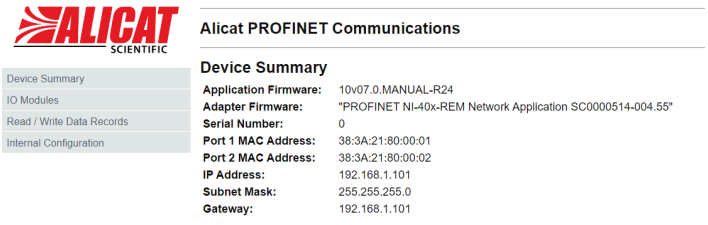
Embedded Web Server

All Alicat PROFINET devices have an embedded web server. The contents of the web server include device and networking information as well as setting configurations. The web server can be accessed by navigating to the IP address of the device using your computer's web browser.

Device Summary

The first page of the web server is the **Device Summary**. This page provides information on the device and the status of the network connection.

- **Application Firmware:** The current firmware version of the device. This determines what commands are available on the device, as well as controls how the device operates and the menu structure of the device display. See alicat.com/firmware for more information.
- **Adapter Firmware:** The communication protocol that is configured on the device and its firmware. This should display as PROFINET. If it does not, please contact Alicat support for assistance (page 2).
- **Serial Number:** The serial number of the device. This number never changes and is the same number as the number found on the back of the device.
- **Port 1 MAC Address:** The physical address of Ethernet port 1.
- **Port 2 MAC Address:** The physical address of Ethernet port 2.
- **IP Address:** The current IP address assigned by the DCP.
- **Subnet Mask:** The subnet mask of the network the device is connected to. Assigned by the DCP
- **Gateway:** The address of the gateway the device is connected to. Assigned by the DCP.

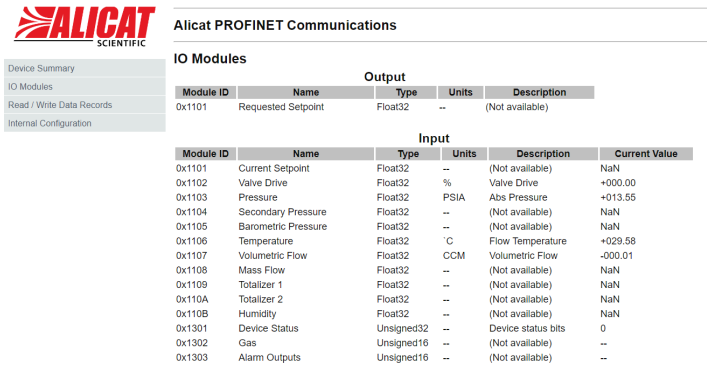


Device summary

IO Modules

The **IO Modules** page contains information about the input and output of the modules of the device. The modules provide information on the device readings including their module ID, readings format, engineering units, and current readings. All modules are input except for the Requested Setpoint.

There are two possible modules, one for floating point values (Float32) and one for integer values (Integer32). Both modules work the same, the only difference is how the readings are formatted. It is possible to select either module using the display panel (page 5). After changing the setting, wait at least 15 seconds for the change to take effect. If the device does not have a display, contact Alicat for assistance in changing the module format.

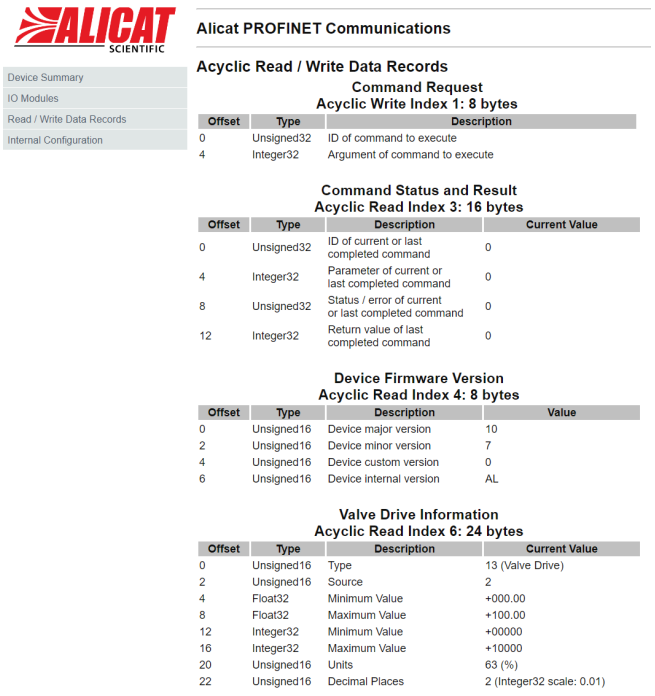


IO modules

Read/Write Data Records

The **Read/Write Data Records** page contains information on what acyclic indexes are available on the device. There are two possible write indexes and thirteen possible read indexes. This is referential to help determine what the device is capable of and what the current readings are. The information includes minimum and maximum values of readings, the engineering units of the reading values, and where the decimal is in the reading. If an index is present on this page, the device is capable of either reading or writing to that index.

For more information on the acyclic read/write indexes, see page 7.



Alicat PROFINET Communications

Device Summary
IO Modules
Read / Write Data Records
Internal Configuration

Acyclic Read / Write Data Records

Command Request
Acyclic Write Index 1: 8 bytes

Offset	Type	Description
0	Unsigned32	ID of command to execute
4	Integer32	Argument of command to execute

Command Status and Result
Acyclic Read Index 3: 16 bytes

Offset	Type	Description	Current Value
0	Unsigned32	ID of current or last completed command	0
4	Integer32	Parameter of current or last completed command	0
8	Unsigned32	Status / error of current or last completed command	0
12	Integer32	Return value of last completed command	0

Device Firmware Version
Acyclic Read Index 4: 8 bytes

Offset	Type	Description	Value
0	Unsigned16	Device major version	10
2	Unsigned16	Device minor version	7
4	Unsigned16	Device custom version	0
6	Unsigned16	Device internal version	AL

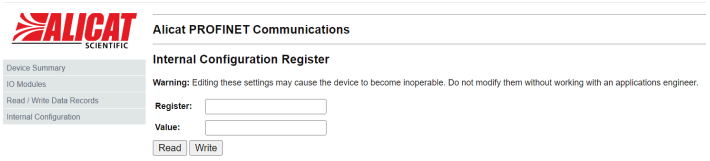
Valve Drive Information
Acyclic Read Index 6: 24 bytes

Offset	Type	Description	Current Value
0	Unsigned16	Type	13 (Valve Drive)
2	Unsigned16	Source	2
4	Float32	Minimum Value	+000.00
8	Float32	Maximum Value	+100.00
12	Integer32	Minimum Value	+00000
16	Integer32	Maximum Value	+10000
20	Unsigned16	Units	63 (%)
22	Unsigned16	Decimal Places	2 (Integer32 scale: 0.01)

Read/write data records

Internal Configuration

The **Internal Configuration** page is used for troubleshooting the device. This page can read and write to device registers that control different settings of the device. Do not attempt to write to registers without knowing how that register works. Overwriting register values may invalidate the device's calibration, disable communication, or permanently damage the device. Please contact Alicat for support (page 2) before attempting to interact with this page.



Alicat PROFINET Communications

Device Summary
IO Modules
Read / Write Data Records
Internal Configuration

Internal Configuration Register

Warning: Editing these settings may cause the device to become inoperable. Do not modify them without working with an applications engineer.

Register:
Value:
Read Write

Internal configuration

TIA Portal Setup

When adding an Alicat device to a TIA Portal project, the GSDML file must first be installed. The GSDML file is available for download from alicat.com/profinet. After obtaining the file, continue with the setup process.

1. From the project view, navigate to **Options** > **Manage general station description files (GSD)**.
2. Click the **browse...** in the new window and navigate to the folder location of the Alicat GSD file. TIA Portal scans the folder for any GSD files and populates them in the **Content of imported path** field.
3. Select the Alicat GSD file and then click **Install**.

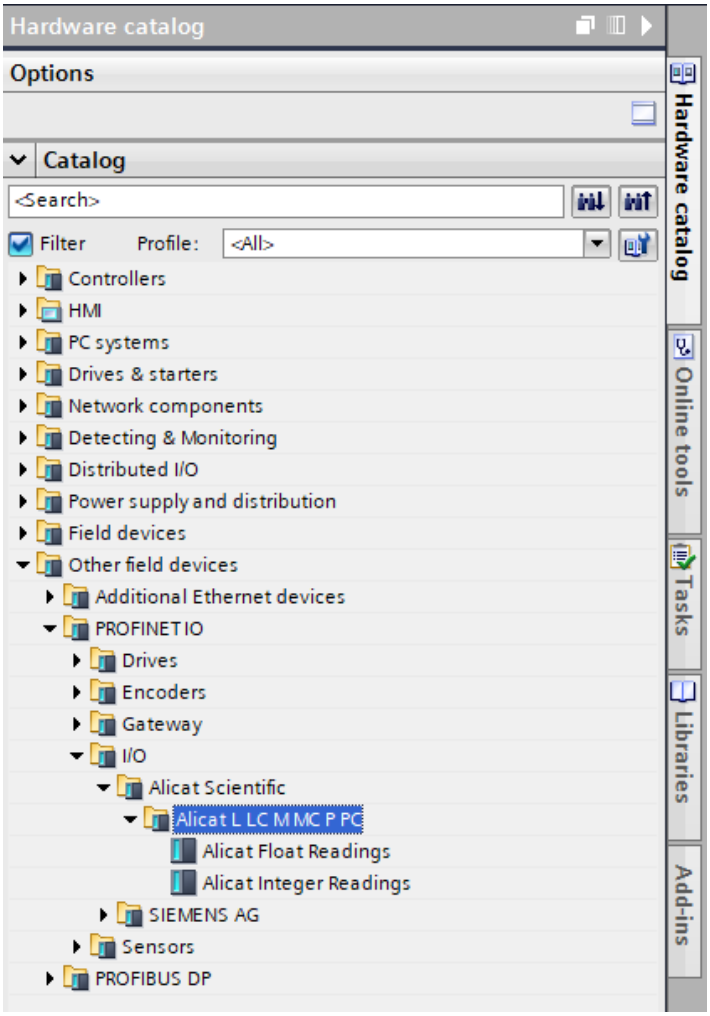
The GSD file installs two modules, Alicat Float Readings and Alicat Integer Readings. Alicat Float Readings module provides cyclic data floating point (Float32) format. The Alicat Integer Readings module provides cyclic data in an integer (Integer32) format. The modules operate the same, the only difference is how readings are displayed. For more information on the modules see page 7.

After installing the GSD file, the two Alicat modules are in the hardware catalog under **Other Field devices** > **PROFINET IO** > **I/O** > **Alicat Scientific** > **Alicat L LC M MC P PC**.

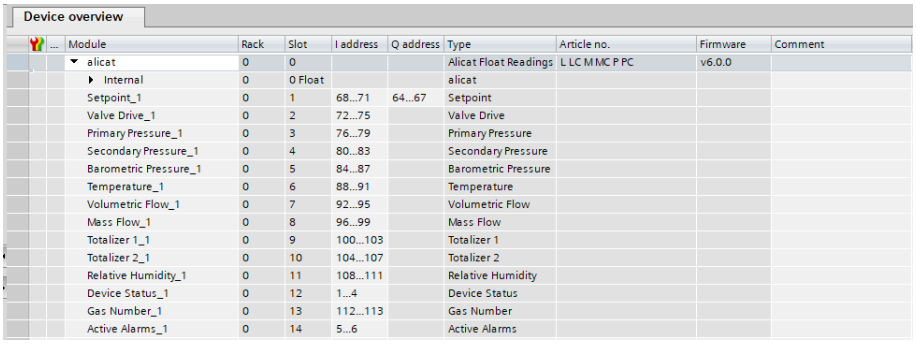
Be sure to use the module that is the same format the device is set to. This can be confirmed through the device's display (page 5) or using the device's embedded web server (page 24).

When adding the device, if you need assistance confirming the device location, the **Flash LED** setting can be used. The Alicat's display screen and Ready LED flash for 15 seconds after selecting the setting.

Use the device view to determine the slot and address of different portions of the module.



Hardware catalog location



Module	Rack	Slot	I address	Q address	Type	Article no.	Firmware	Comment
alicat	0	0			Alicat Float Readings	L LC M MC P PC	v6.0.0	
Internal	0	0 Float			alicat			
Setpoint_1	0	1	68...71	64...67	Setpoint			
Valve Drive_1	0	2	72...75		Valve Drive			
Primary Pressure_1	0	3	76...79		Primary Pressure			
Secondary Pressure_1	0	4	80...83		Secondary Pressure			
Barometric Pressure_1	0	5	84...87		Barometric Pressure			
Temperature_1	0	6	88...91		Temperature			
Volumetric Flow_1	0	7	92...95		Volumetric Flow			
Mass Flow_1	0	8	96...99		Mass Flow			
Totalizer 1_1	0	9	100...103		Totalizer 1			
Totalizer 2_1	0	10	104...107		Totalizer 2			
Relative Humidity_1	0	11	108...111		Relative Humidity			
Device Status_1	0	12	1...4		Device Status			
Gas Number_1	0	13	112...113		Gas Number			
Active Alarms_1	0	14	5...6		Active Alarms			

Device overview

Appendices

Appendix A: Statistics

Statistics are readings and measurements that devices provide. Use the following values in commands where indicated to apply the desired statistic to the command.

Specific devices and configurations can restrict what statistics are available. The firmware version in parentheses indicates when the statistic was added. If no version is present, the statistic is available on all devices. Please contact Alicat support (page 2) with any questions about a statistic and how it may work with your device.

Appendix A-1: Flow Statistics

Flow statistic	Value	Notes
Batch mass remaining	**12**	Remaining mass in the totalizer batch
Batch volume remaining	**11**	Remaining volume, referenced to flow conditions, in the totalizer batch.
Mass flow	**5**	Current mass flow
Mass flow, average	**69**	Average mass flow over the time of totalizing.
Mass flow, maximum (8v32)	**175**	Highest mass flow since reset.
Mass flow, minimum (8v32)	**174**	Lowest mass flow since reset.
Mass flow, peak	**101**	Peak mass flow during the time of totalizing.
Mass flow setpoint	**37**	Setpoint for mass flow
Mass flow setpoint error (8v00)	**173**	Mass flow minus the ramp-limited setpoint
Time, totalizing	**10**	Amount of time that the totalizer has been running.
Total mass	**9**	Totalized mass
Total volume	**8**	Totalized volume, referenced to flow conditions.
Volumetric flow	**4**	Volumetric flow, referenced to flow conditions.
Volumetric flow, average	**68**	Average volumetric flow, referenced to flow conditions, over the time of totalizing.
Volumetric flow, maximum (8v32)	**167**	Highest volumetric flow since reset
Volumetric flow, minimum (8v32)	**166**	Lowest volumetric flow since reset.
Volumetric flow, peak	**100**	Peak volumetric flow, referenced to flow conditions, during the time of totalizing.
Volumetric flow setpoint	**36**	The setpoint for volumetric flow referenced to flow conditions.
Volumetric flow setpoint error (8v00)	**165**	Volumetric flow minus the ramp-limited setpoint.

Appendix A-2: Pressure Statistics

Pressure statistic	Value	Notes
Pressure, absolute	**2**	Current absolute pressure
Pressure, absolute maximum (8v32)	**151**	Highest absolute pressure since reset
Pressure, absolute minimum (8v32)	**150**	Lowest absolute pressure since reset
Pressure, absolute setpoint	**34**	Setpoint for absolute pressure
Pressure, absolute setpoint error (8v00)	**149**	Absolute pressure minus the ramp-limited setpoint.
Pressure, barometric	**15**	Barometer reading
Pressure, barometric maximum (8v32)	**255**	Highest barometric pressure since reset
Pressure, barometric minimum (8v32)	**254**	Lowest barometric pressure since reset
Pressure, differential	**7**	Current differential pressure reading
Pressure, differential maximum (8v32)	**191**	Highest differential pressure since reset
Pressure, differential minimum (8v32)	**190**	Lowest differential pressure since reset
Pressure, differential setpoint	**39**	Setpoint for differential pressure
Pressure, differential setpoint error (8v00)	**189**	Differential pressure minus the ramp-limited setpoint
Pressure, gauge	**6**	Current gauge pressure reading
Pressure, gauge maximum (8v32)	**183**	Highest gauge pressure since reset
Pressure, gauge minimum (8v32)	**182**	Lowest gauge pressure since rese
Pressure, gauge setpoint	**38**	Setpoint for gauge pressure

Pressure statistic	Value	Notes
Pressure, gauge setpoint error (8v00)	**181**	Gauge pressure minus the ramp-limited setpoint
Pressure, second absolute (7v01)	**344**	For devices with a pressure sensor in a second location, the absolute pressure of the second sensor.
Pressure, second absolute maximum (8v32)	**351**	Highest second absolute pressure since reset
Pressure, second absolute minimum (8v32)	**350**	Lowest second absolute pressure since reset
Pressure, second absolute setpoint (7v01)	**345**	Setpoint for the second absolute pressure.
Pressure, second absolute setpoint error (8v00)	**349**	Second absolute pressure minus the ramp-limited setpoint.
Pressure, second differential (7v01)	**360**	For devices with a pressure sensor in a second location, the differential pressure of the second sensor.
Pressure, second differential maximum (8v32)	**367**	Highest second differential pressure since reset
Pressure, second differential minimum (8v32)	**366**	Lowest second differential pressure since reset
Pressure, second differential setpoint (7v01)	**361**	Setpoint for the second differential pressure
Pressure, second differential setpoint error (8v00)	**365**	Second differential pressure minus the ramp-limited setpoint
Pressure, second gauge (7v01)	**352**	For devices with a pressure sensor in a second location, the gauge pressure of the second sensor. For DILO, this is the pressure upstream of the orifice.
Pressure, second gauge maximum (8v32)	**359**	Highest second gauge pressure since reset
Pressure, second gauge minimum (8v32)	**358**	Lowest second gauge pressure since reset
Pressure, second gauge setpoint (7v01)	**353**	Setpoint for the second gauge pressure
Pressure, second gauge setpoint error (8v00)	**357**	Second gauge pressure minus the ramp-limited setpoint

Appendix A-3: Other Statistics

Other statistic	Value	Notes
None	**1**	No statistic: usually implies an empty location.
Setpoint	**32**	The current ramp-limited setpoint. When specified in a location, the currently active setpoint statistic replaces this statistic.
Setpoint error (8v00)	**133**	Current process value minus the ramp-limited setpoint
Status	**26**	The status of the device. This is typically only used internally.
Temperature, stream	**3**	Current stream temperature
Temperature, stream maximum (8v32)	**159**	Highest stream temperature since reset.
Temperature, stream minimum (8v32)	**158**	Lowest stream temperature since reset
Valve drive	**13**	Valve drive signal
Valve drive setpoint (8v00)	**45**	The setpoint directly drives the currently selected valve.
Vapor fraction (Percent water vapor)	**488**	The molecular fraction of vapor in gas. When the vapor used is water, this is the percentage of water vapor.
Vapor fraction maximum	**495**	Highest vapor fraction since reset
Vapor fraction minimum	**494**	Lowest vapor fraction since reset
Vapor saturation (relative humidity)	**25**	The fraction of complete saturation the device is currently using. When the vapor used is water, this is relative humidity.
Vapor saturation, average	**89**	Average vapor saturation over the time of totalizing
Vapor saturation, maximum (8v32)	**335**	Highest vapor saturation since reset
Vapor saturation, minimum (8v32)	**334**	Lowest vapor saturation since last reset
Vapor saturation, peak	**121**	Peak vapor saturation over the time of totalizing
Vapor saturation, temperature (dew point)	**496**	Temperature that would result in complete vapor saturation. When the vapor used is water, this is the dew point.
Vapor saturation, temperature, maximum	**503**	Highest vapor saturation temperature since reset
Vapor saturation, temperature, minimum	**502**	Lowest vapor saturation temperature since reset

Appendix B: Engineering Units

The following tables provide the values for engineering units for use in commands. The table to refer to is dependent on the statistic that is being modified. For example, use Appendix B-3 when modifying the engineering units for a totalizer measuring standard or normal volumes.

Appendix B-1: Standard and Normal Flow Units

Unit Label	Value	Notes
	0	Unit not specified: use default values.
---	1	Unknown unit: no conversions are performed to other units. If calibrated with different units, the value is displayed in those units.
SµL/m	2	Standard microliter per minute
SmL/s	3	Standard milliliter per second
SmL/m	4	Standard milliliter per minute
SmL/h	5	Standard milliliter per hour
SL/s	6	Standard liter per second
SLPM	7	Standard liter per minute
SL/h	8	Standard liter per hour
SCCS	11	Standard cubic centimeter per second
SCCM	12	Standard cubic centimeter per minute
Scm^3/h	13	Standard cubic centimeter per hour
Sm^3/m	14	Standard cubic meter per minute
Sm^3/h	15	Standard cubic meter per hour
Sm^3/d	16	Standard cubic meter per day
Sin^3/m	17	Standard cubic inch per minute
SCFM	18	Standard cubic foot per minute
SCFH	19	Standard cubic foot per hour
SCFD	21	Standard cubic foot per day Added in 6v08.0.
kSCFM	20	1000 standard cubic feet per minute
NµL/m	32	Normal microliter per minute
NmL/s	33	Normal milliliter per second
NmL/m	34	Normal milliliter per minute
NmL/h	35	Normal milliliter per hour
NL/s	36	Normal liter per second
NLPM	37	Normal liter per minute
NL/h	38	Normal liter per hour
NCCS	41	Normal cubic centimeter per second
NCCM	42	Normal cubic centimeter per minute
Ncm^3/h	43	Normal cubic centimeter per hour
Nm^3/m	44	Normal cubic meter per minute
Nm^3/h	45	Normal cubic meter per hour
Nm^3/d	46	Normal cubic meter per day
Count	62	Setpoint count, 0–64000
%	63	Percent of the full scale

Appendix B-2: True Mass Flow Units

Unit Label	Value	Notes
mg/s	64	Milligram per second
mg/m	65	Milligram per minute
g/s	66	Gram per second
g/m	67	Gram per minute
g/h	68	Gram per hour
kg/m	69	Kilogram per minute
kg/h	70	Kilogram per hour
oz/s	71	Ounce per second
oz/m	72	Ounce per minute
lb/m	73	Pound per minute
lb/h	74	Pound per hour

Appendix B-3: Total Standard and Normal Volume Units

Unit Label	Value	Notes
	0	Unit not specified: use default values.
---	1	Unknown unit: no conversions are performed to other units. If calibrated with different units, the value is displayed in those units.
SµL	2	Standard microliter
SmL	3	Standard milliliter
SL	4	Standard liter
Scm^3	6	Standard cubic centimeter
Sm^3	7	Standard cubic meter
Sin^3	8	Standard cubic inch
Sft^3	9	Standard cubic foot
kSft^3	10	1000 standard cubic feet
NµL	32	Normal microliter
NmL	33	Normal milliliter
NL	34	Normal liter
Ncm^3	36	Normal cubic centimeter
Nm^3	37	Normal cubic meter

Appendix B-4: Volumetric Flow Units

Unit Label	Value	Notes
	0	Unit not specified: use default values.
---	1	Unknown unit: no conversions are performed to other units. If calibrated with different units, the value is displayed in those units.
µL/m	2	Microliter per minute
mL/s	3	Milliliter per second
mL/m	4	Milliliter per minute
mL/h	5	Milliliter per hour
L/s	6	Liter per second
LPM	7	Liter per minute

Unit Label	Value	Notes
L/h	8	Liter per hour
US GPM	9	US gallon per minute
US GPH	10	US gallon per hour
CCS	11	Cubic centimeter per second
CCM	12	Cubic centimeter per minute
cm^3/h	13	Cubic centimeter per hour
m^3/m	14	Cubic meter per minute
m^3/h	15	Cubic meter per hour
m^3/d	16	Cubic meter per day
in^3/m	17	Cubic inch per minute
CFM	18	Cubic foot per minute
CFH	19	Cubic foot per hour
CFD	21	Cubic foot per day Added in 6v08.0.
count	62	Setpoint count, 0–64000
%	63	Percent of full scale

Appendix B-5: Total Volume Units

Unit Label	Value	Notes
	0	Unit not specified: use default values.
---	1	Unknown unit: no conversions are performed to other units. If calibrated with different units, the value is displayed in those units.
µL	2	Microliter
mL	3	Milliliter
L	4	Liter
US GAL	5	US gallon
cm^3	6	Cubic centimeter
m^3	7	Cubic meter
in^3	8	Cubic inch
ft^3	9	Cubic foot
µP	61	Micropoise, a measure of viscosity: no conversions are performed to or from other units

Appendix B-6: Pressure Units

Unit Label	Value	Notes
	0	Unit not specified: use default values.
---	1	Unknown unit: no conversions are performed to other units. If calibrated with different units, the value is displayed in those units.
Pa	2	Pascal
hPa	3	Hectopascal
kPa	4	Kilopascal
MPa	5	Megapascal
mbar	6	Millibar
bar	7	Bar
g/cm^2	8	Gram force per square centimeter
kg/cm	9	Kilogram-force per square centimeter
PSI	10	Pound-force per square inch
PSF	11	Pound-force per square foot
mTorr	12	Millitorr
torr	13	Torr
mmHg	14	Millimeter of mercury at 0 °C
inHg	15	Inches of mercury at 0 °C
mmH_2O	16	Millimeter of water at 4 °C (NIST conventional)
mmH_2O	17	Millimeter of water at 60 °F
cmH_2O	18	Centimeter of water at 4 °C (NIST conventional)
cmH_2O	19	Centimeter of water at 60 °F
inH_2O	20	Inch of water at 4 °C (NIST conventional)
inH_2O	21	Inch of water at 60 °F
atm	22	Atmosphere (absolute pressure only, no A/G/D suffix is applied)
V	61	Volt: no conversions are performed to or from other units (intended only for log-linear absolute pressure sensors, no A/G/D suffix is applied)
count	62	Setpoint count, 0–64000
%	63	Percent of full scale (no A/G/D suffix is applied)

Appendix B-7: Temperature Units

Unit Label	Value	Notes
	0	Unit not specified: use default values.
---	1	Unknown unit: no conversions are performed to other units. If calibrated with different units, the value is displayed in those units.
°C	2	Degree Celsius
°F	3	Degree Fahrenheit
°K	4	Kelvin
°Ra	5	Degree Rankine

Appendix B-8: Time Interval Units

Unit Label	Value	Notes
	0	Unit not specified: use default values.
---	1	Unknown unit: no conversions are performed to other units. If calibrated with different units, the value is displayed in those units.
h:m:s	2	The value displayed as hours:minutes:seconds.
ms	3	Millisecond
s	4	Second
m	5	Minute
hour	6	Hour
day	7	Day

Appendix C: Device Data Sources

Use the following table to determine the data source of a given value.

Data Source	Value	Notes
Instant display	**1**	Data source on the device. Smoothed for front panel display.
Instant serial	**2**	Data source on the device. Smoothed for serial values.
Totalizer 2	**25**	Readings taken from the second totalizer.

Appendix D: Gas Numbers

#	Short Name	Long Name
0	Air	Air (Clean Dry)
1	Ar	Argon
2	CH_4	Methane
3	CO	Carbon Monoxide
4	CO2	Carbon Dioxide
5	C_2H_6	Ethane
6	H_2	Hydrogen
7	He	Helium
8	N_2	Nitrogen
9	N_2O	Nitrous Oxide
10	Ne	Neon
11	O_2	Oxygen
12	C_3H_8	Propane
13	nC_4H_{10}	Normal Butane
14	C_2H_2	Acetylene
15	C_2H_4	Ethylene (Ethene)
16	iC_4H_{10}	Isobutane
17	Kr	Krypton
18	Xe	Xenon
19	SF_6	Sulfur Hexafluoride[1]
20	C-25	25% CO_2, 75% Ar
21	C-10	10% CO_2, 90% Ar
22	C-8	8% CO_2, 92% Ar
23	C-2	2% CO_2, 98% Ar
24	C-75	75% CO_2, 25% Ar
25	He-25	25% He, 75% Ar
26	He-75	75% He, 25% Ar
27	A1025	90% He, 7.5% Ar, 2.5% CO_2
28	Star29	Stargon CS (90% Ar, 8% CO_2, 2% O_2)
29	P-5	5% CH_4, 95% Ar
30	NO	Nitric Oxide[2]
31	NF_3	Nitrogen Trifluoride[2]
32	NH_3	Ammonia[2]
33	Cl_2	Chlorine[2]
34	H_2S	Hydrogen Sulfide[2]
35	SO_2	Sulfur Dioxide[2]
36	C_3H_6	Propylene[2]
80	1Buten	1-Butylene[2]
81	cButen	Cis-Butene (cis-2-Butene)[2]
82	iButen	Isobutene[2]
83	tButen	Trans-2-Butene[2]
84	COS	Carbonyl Sulfide[2]
85	DME	Dimethylether (C_2H_6O)[2]
86	SiH_4	Silane[2]
100	R-11	Trichlorofluoromethane (CCl_3F)[2,3]
101	R-115	Chloropentafluoroethane (C_2ClF_5)[2,3]
102	R-116	Hexafluoroethane (C_2F_6)[2]
103	R-124	Chlorotetrafluoroethane (C_2HClF_4)[2,3]
104	R-125	Pentafluoroethane (CF_3CHF_2)[2,3]
105	R-134A	Tetrafluoroethane (CH_2FCF_3)[2,3]
106	R-14	Tetrafluoromethane (CF_4)[2]
107	R-142b	Chlorodifluoroethane (CH_3CClF_2)[2,3]
108	R-143a	Trifluoroethane ($C_2H_3F_3$)[2,3]
109	R-152a	Difluoroethane ($C_2H_4F_2$)[2]
110	R-22	Difluoromonochloromethane ($CHClF_2$)[2,3]
111	R-23	Trifluoromethane (CHF_3)[2,3]
112	R-32	Difluoromethane (CH_2F_2)[2,3]
113	R-318	Octafluorocyclobutane (C_4F_8)[2]
114	R-404A	44% R-125, 4% R-134A, 52% R-143A[2,3]
115	R-407C	23% R-32, 25% R-125, 52% R-143A[2,3]
116	R-410A	50% R-32, 50% R-125[2,3]
117	R-507A	50% R-125, 50% R-143A[2,3]
140	C-15	15% CO_2, 85% Ar
141	C-20	20% CO_2, 80% Ar
142	C-50	50% CO_2, 50% Ar
143	He-50	50% He, 50% Ar
144	He-90	90% He, 10% Ar
145	Bio5M	5% CH_4, 95% CO_2
146	Bio10M	10% CH_4, 90% CO_2
147	Bio15M	15% CH_4, 85% CO_2
148	Bio20M	20% CH_4, 80% CO_2
149	Bio25M	25% CH_4, 75% CO_2
150	Bio30M	30% CH_4, 70% CO_2
151	Bio35M	35% CH_4, 65% CO_2
152	Bio40M	40% CH_4, 60% CO_2
153	Bio45M	45% CH_4, 55% CO_2
154	Bio50M	50% CH_4, 50% CO_2
155	Bio55M	55% CH_4, 45% CO_2
156	Bio60M	60% CH_4, 40% CO_2
157	Bio65M	65% CH_4, 35% CO_2
158	Bio70M	70% CH_4, 30% CO_2
159	Bio75M	75% CH_4, 25% CO_2
160	Bio80M	80% CH_4, 20% CO_2
161	Bio85M	85% CH_4, 15% CO_2
162	Bio90M	90% CH_4, 10% CO_2
163	Bio95M	95% CH_4, 5% CO_2
164	EAN-32	32% O_2, 68% N_2
165	EAN-36	36% O_2, 64% N_2
166	EAN-40	40% O_2, 60% N_2
167	HeOx20	20% O_2, 80% He
168	HeOx21	21% O_2, 79% He
169	HeOx30	30% O_2, 70% He
170	HeOx40	40% O_2, 60% He
171	HeOx50	50% O_2, 50% He
172	HeOx60	60% O_2, 40% He
173	HeOx80	80% O_2, 20% He
174	HeOx99	99% O_2, 1% He
175	EA-40	Enriched Air-40% O_2
176	EA-60	Enriched Air-60% O_2
177	EA-80	Enriched Air-80% O_2
178	Metab	Metabolic Exhalant (16% O_2, 78.04% N_2, 5% CO_2, 0.96% Ar)
179	LG-4.5	4.5% CO_2, 13.5% N_2, 82% He
180	LG-6	6% CO_2, 14% N_2, 80% He
181	LG-7	7% CO_2, 14% N_2, 79% He
182	LG-9	9% CO_2, 15% N_2, 76% He
183	HeNe-9	9% Ne, 91% He
184	LG-9.4	9.4% CO_2, 19.25% N_2, 71.35% He
185	SynG-1	40% H_2, 29% CO, 20% CO_2, 11% CH_4
186	SynG-2	64% H_2, 28% CO, 1% CO_2, 7% CH_4
187	SynG-3	70% H_2, 4% CO, 25% CO_2, 1% CH_4

#	Short Name	Long Name
188	SynG-4	83% H_2, 14% CO, 3% CH_4
189	NatG-1	93% CH_4, 3% C_2H_6, 1% C_3H_8, 2% N_2, 1% CO_2
190	NatG-2	95% CH_4, 3% C_2H_6, 1% N_2, 1% CO_2
191	NatG-3	95.2% CH_4, 2.5% C_2H_6, 0.2% C_3H_8, 0.1% C_4H_{10}, 1.3% N_2, 0.7% CO_2
192	CoalG	50% H_2, 35% CH_4, 10% CO, 5% C_2H_4
193	Endo	75% H_2, 25% N_2
194	HHO	66.67% H_2, 33.33% O_2
195	HD-5	LPG: 96.1% C_3H_8, 1.5% C_2H_6, 0.4% C_3H_6, 1.9% n-C_4H_{10}
196	HD-10	LPG: 85% C_3H_8, 10% C_3H_6, 5% n-C_4H_{10}
197	OCG-89	89% O_2, 7% N_2, 4% Ar
198	OCG-93	93% O_2, 3% N_2, 4% Ar
199	OCG-95	95% O_2, 1% N_2, 4% Ar
200	FG-1	2.5% O_2, 10.8% CO_2, 85.7% N_2, 1% Ar
201	FG-2	2.9% O_2, 14% CO_2, 82.1% N_2, 1% Ar
202	FG-3	3.7% O_2, 15% CO_2, 80.3% N_2, 1% Ar
203	FG-4	7% O_2, 12% CO_2, 80% N_2, 1% Ar
204	FG-5	10% O_2, 9.5% CO_2, 79.5% N_2, 1% Ar
205	FG-6	13% O_2, 7% CO_2, 79% N_2, 1% Ar
206	P-10	10% CH_4 90% Ar
210	D-2	Deuterium

1 *Sulfur hexafluoride is a highly potent greenhouse gas monitored under the Kyoto Protocol.*

2 *Corrosive-resistant units only*

3 *Under the Montreal Protocol and Kigali Amendment, the production and consumption of these ozone-depleting substances (ODS) is being or has been phased out. It is recommended you ensure compliance with this universally ratified treaty before attempting to use these gases, in addition to R113, R-123, and R-141b.*