

# TCP/UDP

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## Connections and Ports

Any TCP/IP enabled client device can connect and communicate with the CM1-T. The table below lists the ports and protocols they are associated with

Protocol	Port #	# TCP	# UDP	Description
<a href="#">CML</a>	10001	1	1	Protocol used by the standard motor. Program the motor to run from IO, etc.
<a href="#">Direct Control Port</a>	10002	1	1	Directly control the motor in a number of modes such as position, speed and torque <ul style="list-style-type: none"><li>• The CM1-T Library can be used with the Direct Control port</li></ul>
<a href="#">Modbus TCP</a>	502	1	0	Modbus access to all motor registers including CML and Direct Control. <ul style="list-style-type: none"><li>• The CM1-T Library can be used with the Modbus TCP port</li></ul>
<a href="#">Motor Information Port</a>	30718	0	1	<ol style="list-style-type: none"><li>1. Query the motors configuration (Network configuration, serial number, etc)</li><li>2. Query/Stream the motors information (status, position, speed, etc)</li></ol>
<a href="#">EtherNet/IP</a>	44818 2222	2 0	1 1	EtherNet/IP CIP EtherNet/IP IO <ul style="list-style-type: none"><li>• The CM1-T Library can be used with the EtherNet/IP port</li></ul>

This section focus on the Direct Control Port and the Motor Information port. For information on the other protocols go to their specific section.

## Direct Control Port

Port 10002 can be used to read and write the Direct Control registers. TCP/IP or UDP can be used.

### Write Data Packet

This is the data received by the motor on a write from the TCP/UDP Client.

- TCP/IP or UDP
- Port 10002
- Length = 28 bytes

## Data

Byte	Register	Size/Type	Description
0-3	TargetPosition	DINT	Final target position
4-7	TargetSpeed	DINT	Maximum targetspeed
8-9	TargetTorque	INT	Maximum torque
10-11	TargetAcceleration	INT	Acceleration (used when accelerating to target speed)
12-13	TargetDeceleration	INT	Deceleration (used when stopping)
14-15	Controlword	INT	Control the motor operation
16	ModeOfOperation	SINT	Set the required mode of operation
17	DigitalOUT	SINT	Set the 2 digital outputs. Requires K34=44.
18-19	WriteAddress1	INT	Address of the motor register to write to
20-23	WriteValue1	DINT	Value to be written to the motor register
24-25	ReadAddress1	INT	Address of the motor register to read
26-27	PAD	INT	16-bit padding not used

## Read Data Packet

This is the data transmitted by the motor to the TCP/UDP Client when a write packet is received

- TCP/IP or UDP
- Port 10002
- Length = 36 bytes

## Data

Byte	Register		Description
0-3	us50Counter	DINT	CPU clock time in 50us counts
4-7	ActualPosition	DINT	The actual position of the motor in encoder counts
8-11	MotionTarget	DINT	The actual instantaneous position the motor is currently moving to.
12-15	ActualSpeed	DINT	Actual speed of the motor in encoder counts/s
16-17	MotorStatus	INT	The motors status (error, homing, in position, etc)
18-19	PercentActualCurrent	INT	Percentage (0.1%) of rated current. 1000 = rated, 1100 = peak.
20-21	PercentOverloadTorque	INT	Percentage (0.1%) of overload torque.
22-23	AnalogIN	INT	10 bit analog input value (0-1023)
24-25	DCVoltage	INT	24V DC bus voltage in 0.1V
26	DigitalIN	SINT	Digital IN status. B0-B3 = IN1-IN4
27	Temperature	SINT	Drive temperature in °C
28	ModeOfOperationDisplay	SINT	Indicates the mode of operation currently set
29	ErrorCode	SINT	Error code on communication error
30-31	ReadAddress1	INT	Address of the motor register for ReadValue1
32-35	ReadValue1	DINT	The value in the motor register displayed in ReadAddress1

## Motor Information Port

The motor information port is used to query the motor configuration data as well as all status data. The status data can also be set to stream out at defined time intervals.

- Port 30718
- UDP only

The motor receives a 4 byte data packet which indicates the type of request. The response includes a 4 byte header. The request and expected response header are defined as such:

	Command	B3 (Command ID)	B2	B1	B0
1	Configuration Request	0xF6	0x00	0x00	some data
	Configuration Response	0xF7	0x00	0x00	echo some data
2	Information Request	0xF4	Time ms high byte	Time ms low by	some data
	Information Response	0xF5	Counter high byte	Counter low byte	echo some data

## Configuration Data

The configuration data responds with info regarding the motor's network configuration, firmware versions and serial number

To request the configuration data send the following data packet

Byte	Value	Description
0	0x00-0xFF	Any value. This will be echoed back on the response
1	0x00	Ignored
2	0x00	Ignored
3	0xF6	Command ID for configuration request

The response packet is returned as follows

Bytes	Description
0	Echo of some data
1-2	0x0000
3	0xF7 (Command ID)
4-11	N/A
12-15	Current IP Address
16-19	Subnet Mask
20-23	Gateway IP
24-29	MAC Address
30	DHCP Enabled
31	N/A
32-35	CM1-T Interface Firmware Version
36-39	CM1 Drive Firmware Version
40-99	Part Number (ascii)
100-103	Reserved
104-105	Production Date
106-107	Product ID
108-109	Serial Number
110-118	CM1-T Interface Hardware Version
119	Reserved

## Information Data

The information request returns a complete set of the motor's state data including, position, speed, drive status, IO, etc

## Send Data

To request the information data send the following data packet:

length = 4 bytes

Byte	Value	Description
0	0x00-0xFF	Any value. This will be echoed back on the response
1	0x00	Interval Time in ms low byte
2	0x00	Interval Time in ms high byte
3	0xF4	Command ID for information request

### Interval Time

The Interval Time is a 16 bit value that sets the response interval in ms. It has the following characteristics

- Value range: [0-65536]
- If value = 0 then the query sends a single response
- If value > 0 then a response is sent at the interval time

## Receive Data

The following data is received on a request or on an interval response

length = 33 bytes

Byte	Name	Description
0	Data echo	Echo the data sent in B0 of the request
1-2	Counter Value	Each response increments the counter value. A query resets the counter.
3	0xF5 - Command ID	Response command ID is 0xF5
4-7	CPUTime	CPU clock time in 50us counts
8-11	ActualPosition	The actual position of the motor in encoder counts
12-15	ActualTargetPosition	The actual instantaneous position the motor is currently moving to.
16-17	MotorStatus	The motors status (error, homing, in position, etc)
18-19	ActualRatedCurrent	Percentage (0.1%) of rated current. 1000 = rated, 1100 = peak.
20-21	ActualOverloadTorque	Percentage (0.1%) of overload torque.
22-23	AnalogIN	10 bit analog input value (0-1023)
24	DigitalIN	Digital IN status. B0-B3 = IN1-IN4
25	Temperature	Drive temperature in °C
26-27	DCVoltage	24V DC bus voltage in 0.1V
28	DigitalOUT	Digital OUT status. B0-B1 = OUT1-OUT2
29	Reserved	-
30	ModeOfOperationDisplay	Indicates the mode of operation currently set
31	ActualSpeed	Actual speed of the motor in encoder counts/s

## Example Packets

The following example uses [Packet Sender](#) to execute some direct moves, query configuration and query information.

Please be aware of any firewall restrictions especially when using UDP.

Name	Send Data Bytes
Direct - Clear Error	00 00 00 00 10 00 00 00 4C 04 64 00 64 00 20 00 03 00 00 00 00 00 00 00 00 00 00 00
Direct - Disable	00 00 00 00 10 00 00 00 4C 04 64 00 64 00 10 00 03 00 00 00 00 00 00 00 00 00 00 00

Direct - Halt & Clear Start Bit & Enable	00 00 00 00 10 00 00 00 4C 04 64 00 64 00 02 00 03 00 00 00 00 00 00 00 00 00 00
Direct - Run to 0	00 00 00 00 10 00 00 00 4C 04 64 00 64 00 01 00 03 00 00 00 00 00 00 00 00 00 00
Direct - Run to 1000	E8 03 00 00 10 00 00 00 4C 04 64 00 64 00 01 00 03 00 00 00 00 00 00 00 00 00 00
Direct - Set current pos to 0	00 00 00 00 10 00 00 00 4C 04 64 00 64 00 40 00 03 00 00 00 00 00 00 00 00 00 00
Direct - Start Home Search	00 00 00 00 10 00 00 00 4C 04 64 00 64 00 80 00 03 00 00 00 00 00 00 00 00 00 00
Query Config	00 00 00 f6
Query Info	00 00 00 f4
Query Info 1s	00 e8 03 f4

- *Direct - Run* uses a speed = 10, acceleration = 100, deceleration = 1000 and Torque = 1100.

The image below shows Packet Sender with the response to Query Info

The screenshot shows the Packet Sender application window. The top section contains fields for Name, ASCII, HEX, Address, Port, Resend Delay, and a dropdown for TCP. Below this is a table of saved packets with columns: Send, Name, Resend, To Address, To Port, Method, ASCII, and Hex. The bottom section shows a log of traffic with columns: Time, From IP, From Port, To Address, To Port, Method, Error, ASCII, and Hex.

Send	Name	Resend	To Address	To Port	Method	ASCII	Hex
1	Direct - Clear Error	0	192.168.3.22	10002	TCP	\00\00\00...	00 00 00 00 10 00 00 00 4C 04 64 00 64 00 20 00 03 00 00 00 00 00 00 00 00 00 00
2	Direct - Disable	0	192.168.3.22	10002	TCP	\00\00\00...	00 00 00 00 10 00 00 00 4C 04 64 00 64 00 10 00 03 00 00 00 00 00 00 00 00 00 00
3	Direct - Halt & Clear Start Bit & Enable	0	192.168.3.22	10002	TCP	\00\00\00...	00 00 00 00 10 00 00 00 4C 04 64 00 64 00 02 00 03 00 00 00 00 00 00 00 00 00 00
4	Direct - Run to 0	0	192.168.3.22	10002	TCP	\00\00\00...	00 00 00 00 10 00 00 00 4C 04 64 00 64 00 01 00 03 00 00 00 00 00 00 00 00 00 00
5	Direct - Run to 1000	0	192.168.3.22	10002	TCP	\e8\03\00...	E8 03 00 00 10 00 00 00 4C 04 64 00 64 00 01 00 03 00 00 00 00 00 00 00 00 00 00
6	Direct - Set current pos to 0	0	192.168.3.22	10002	TCP	\00\00\00...	00 00 00 00 10 00 00 00 4C 04 64 00 64 00 40 00 03 00 00 00 00 00 00 00 00 00 00
7	Direct - Start Home Search	0	192.168.3.22	10002	TCP	\00\00\00...	00 00 00 00 10 00 00 00 4C 04 64 00 64 00 80 00 03 00 00 00 00 00 00 00 00 00 00
8	Query Config	0	255.255.255.255	30718	UDP	\00\00\00...	00 00 00 f6
9	Query Info	0	192.168.3.22	30718	UDP	\00\00\00...	00 00 00 f4
10	Send Info 1s	0	192.168.3.22	30718	UDP	\00\00\00...	00 e8 03 f4

Time	From IP	From Port	To Address	To Port	Method	Error	ASCII	Hex
10:21:18.233	192.16...	30718	You	59571	UDP		\00\00\00...	00 00 00 F5 2A 13 03 02 02 00 00 00 02 00 00 00 08 80 00 00 00 FD 03 00 35 EF 00 01 00 03 00
10:21:18.228	You	59571	192.168.3.22	30718	UDP		\00\00\00f4	00 00 00 f4

The Packet Sender database for the above example can downloaded here - [CM1-T Example.ini](#)