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DATASHEET

Updated: July 16th, 2021

MachineMotion 1 Datasheet

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Introduction

MachineMotion™ datasheet contains detailed technical specifications, such as: functional pinout, input & outputs, specifications, input / output capabilities by model, electronics & embedded software specifications and unit dimensions

Overview

MachineMotion™ is a plug and play industrial controller that contains the necessary infrastructure to realize motion and control applications through a library of modular components. Equipment powered by MachineMotion™ can be programmed through MachineLogic™ – Vention's code-free visual sequence editor – or through Vention's Python SDK.

Features

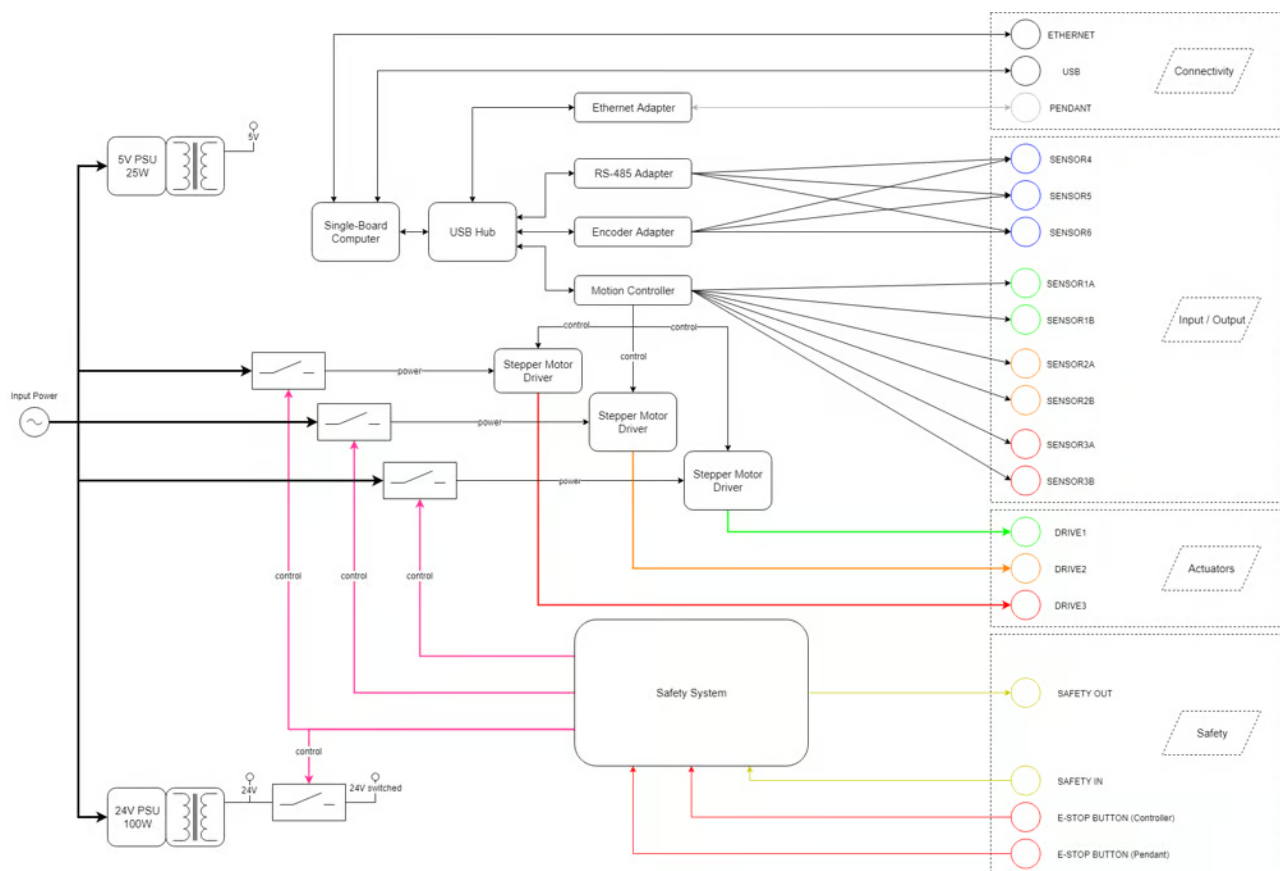
- Three High Power Stepper Motor Outputs
- Six high-speed end-of-travel inductive sensors
- Three auxiliary device inputs (for control modules and encoders)

- Linux Single-Board Computer
- USB and Ethernet Connectivity
- Hardware G-Code Interpreter
- Python control API

Applications

- Automated equipment
- Cartesian robot
- Functional and reliability test benches
- Conveyor system
- Inspection cells

System Architecture



Electrical Specifications

Certification

Electrical Safety

QAI Lab., SPE-1000 Special Inspection

Power Port

Name	POWER
Rated Voltage	120 Vac +/- 5%
Rated Current	15 A
Typical Current	8.5 A (@ power factor 0.71)
Typical Power	725 W
Standby Current	1.2 A (@ power factor 0.55)
Standby Power	80 W
Emergency Mode Current	0.08 A (@ power factor 0.3)
Emergency Mode Power	3 W
Connector	NEMA C14
Power Cord	3.00m, NEMA 5-15P to IEC 320-C13, SJT

Drive Ports

Name(s)	DRIVE 1, DRIVE 2, DRIVE 3
Motor Type	Bi-polar stepper, 200 steps/rev
Output Peak Voltage	170 V
Maximum Output Current	6 A
Maximum Output Power	350 W
Phase Current	0.38 - 6.00 A
Phase Current Adjustment (internal)	DIP Switches
Micro-steps	1 - 256
Micro-steps Adjustment	DIP Switches
Control Interface (internal)	Step / Dir / Enable Signals
Motor Drivers Certification	CE
Connector	Conxall / SwitchCraft 3382-4SG-3DC

Pin 1	motor phase A +
Pin 2	motor phase A -
Pin 3	motor phase B +
Pin 4	motor phase B -

Sensor Ports (1,2,3)

Name(s)	SENSORxA, SENSORxB, SENSORx
Connector	M12, female, 4-pin, A-Keyed
Pin 1	24V (60mA max. per port)
Pin 2	24V Digital Input (NPN)
Pin 3	0V
Pin 4	0V

Auxiliary Ports (1,2,3)

Name(s)	AUX 1, AUX 2, AUX 3
Connectivity Type	Vention Fieldbus
Connectivity Physical Layer	Half-Duplex RS-485
Connector	M12, female, 8-pin, A-Keyed
Pin 1	24V (60mA max. per port)
Pin 2	0V
Pin 3	Fieldbus, RS-485A
Pin 4	Fieldbus, RS-485B
Pin 5	Encoder A Signal (NPN)
Pin 6	Encoder B Signal (NPN)
Pin 7	Encoder Z Signal (NPN)
Pin 8	Earth

Pendant Port

Name	PENDANT
Connectivity Type	Ethernet (PoE)
Connectivity Physical Layer	IEEE 802.3, Ethernet
Connector	M12, 8-pin, A-Key

Pin 1	24V (0.750mA max.)
Pin 2	0V
Pin 3	TX+
Pin 4	TX-
Pin 5	RX+
Pin 6	RX-
Pin 7	safety_signal +
Pin 8	safety_signal -

Ethernet Port

Name	ETHERNET
Connectivity Type	Standard Ethernet
Physical Layer	IEEE 802.3, Ethernet
Connector	RJ45, 8p8c
Pin 1	NC
Pin 2	TX+
Pin 3	TX-
Pin 4	RX+
Pin 5	RX-
Pin 6	NC
Pin 7	NC
Pin 8	NC

Default Ethernet or 192.168.7.2 Port

Name	DEFAULT ETHERNET or 192.168.7.2
Status	Unused

Safety In Port

Name	SAFETY IN
Type	Redundant Dry Contacts
Connector	M12, female, 4-pin, A-Keyed
Pin 1 (safety cable brown wire)	Channel 1 Contact 1
Pin 2 (safety cable white wire)	Channel 1 Contact 2
Pin 3 (safety cable blue wire)	Channel 2 Contact 1
Pin 4 (safety cable black wire)	Channel 2 Contact 2

Safety Out Port

Name	SAFETY OUT
Type	Redundant Dry Contacts
Connector	M12, male, 4-pin, A-Keyed
Pin 1 (safety cable brown wire)	Channel 1 Contact 1
Pin 2 (safety cable white wire)	Channel 1 Contact 2
Pin 3 (safety cable blue wire)	Channel 2 Contact 1
Pin 4 (safety cable black wire)	Channel 2 Contact 2

Embedded & Computing Specifications

Single Board Computer

Processor	AM3358BZCZ Sitara™ MPU
OS	Debian 9.1
Memory	32GB SD-micro
Certification	CE

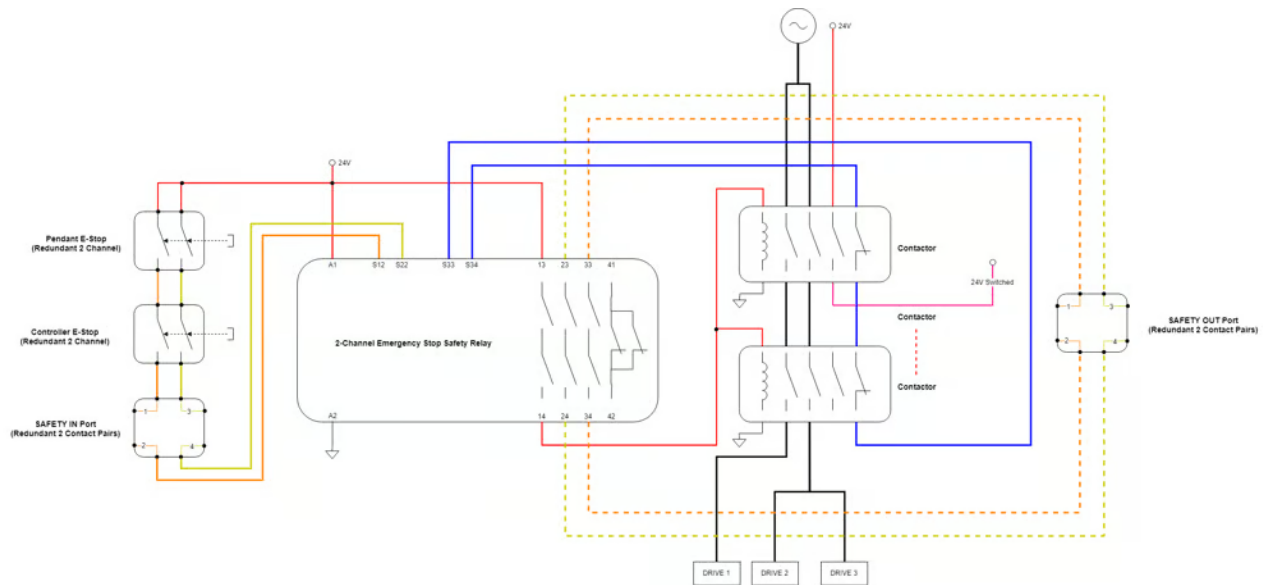
Motion Controller

Processor	ATmega 2560
Interface	Serial over USB
Protocol	G-code

Fieldbus Compatible Modules

24V Digital IO Module	CE-MD-001-0001
High-Current Relays (4) Module	CE-MD-001-0002*available soon
Push-Button Module	CE-MD-001-0003*available soon

Safety System Architecture



Safety Specifications

Implementation (pending certification)

Safety Rating

Suited up to SIL3, Performance Level e, CAT 4

Safety Relay

Manufacturer

Dold

Model Number

LG5925-48-61-24

Type

Emergency Stop

Safety Relay Data - Values per EN ISO 13849-1

Category

4 (EN 954-1)

Performance Level

PL_e

MTTF_d

> 100 years

DC_{avg}

99%

Safety Relay Data - Values per IEC/EN 62061 / IEC/EN 61508

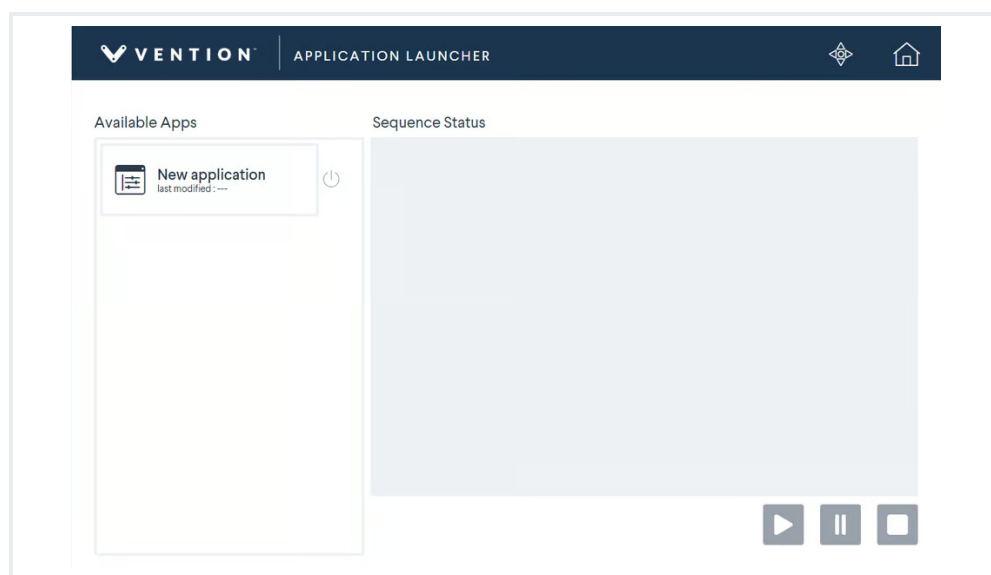
SIL CL	3 (IEC/EN 62061)
SIL	3 (IEC/EN 61508)
HFT (hardware failure tolerance)	1
DC _{avg}	99%
SFF	99.70%
PFH _D	2.66E-10 h ⁻¹

Vention ControlCenter Software

MachineMotion™ comes with pre-loaded control and machine operations software – all of which is accessible through the MachineMotion™ pendant or via ethernet connection. For more details on connecting to the MachineMotion™ refer to the [MachineMotion User Manual \(https://vention.io/docs/guides/machine-motion-user-manual-v1e-82\)](https://vention.io/docs/guides/machine-motion-user-manual-v1e-82)

Application Launcher

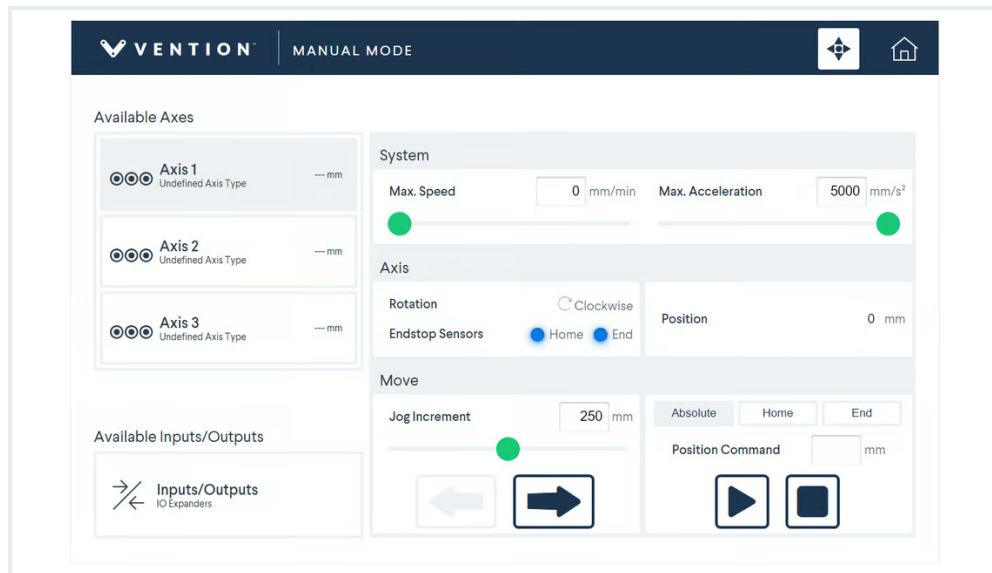
- Launch MachineLogic Applications
- Launch Python Applications
- Configure programs in auto-launch mode (executes automatically after power-ON)



Manual Control

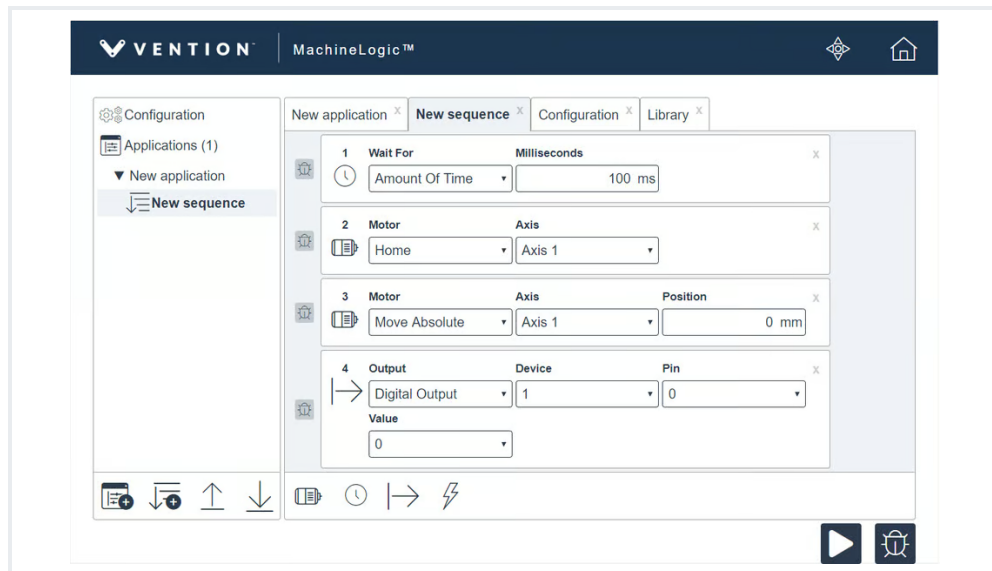
- Send motion commands to actuators
- Configure speed, acceleration and direction

- Monitor the state of end-of-travel sensors and connected control devices



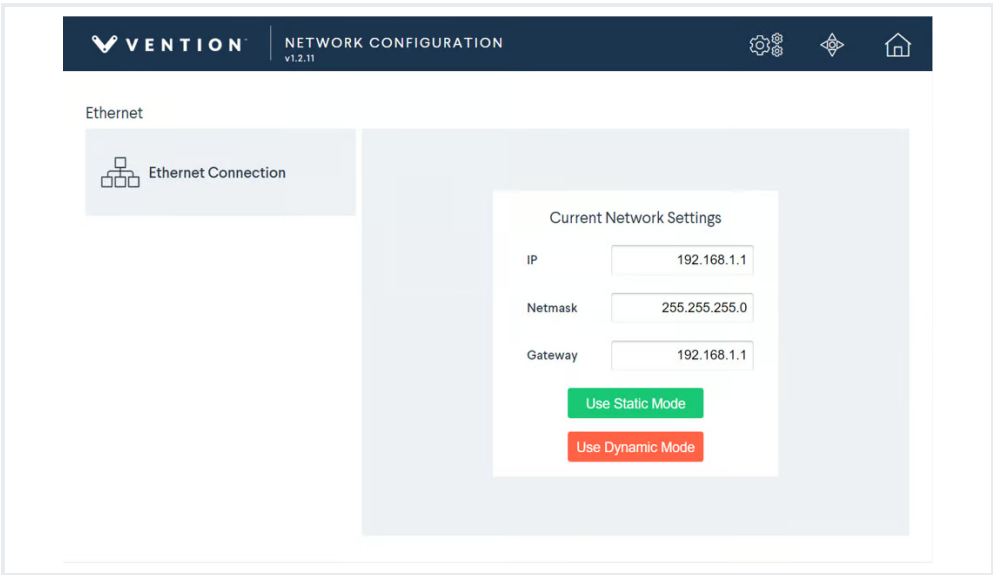
MachineLogic™

- Create automation programs in a simple graphical interface



Network Configuration

- Configure the Ethernet adapter of the MachineMotion controller



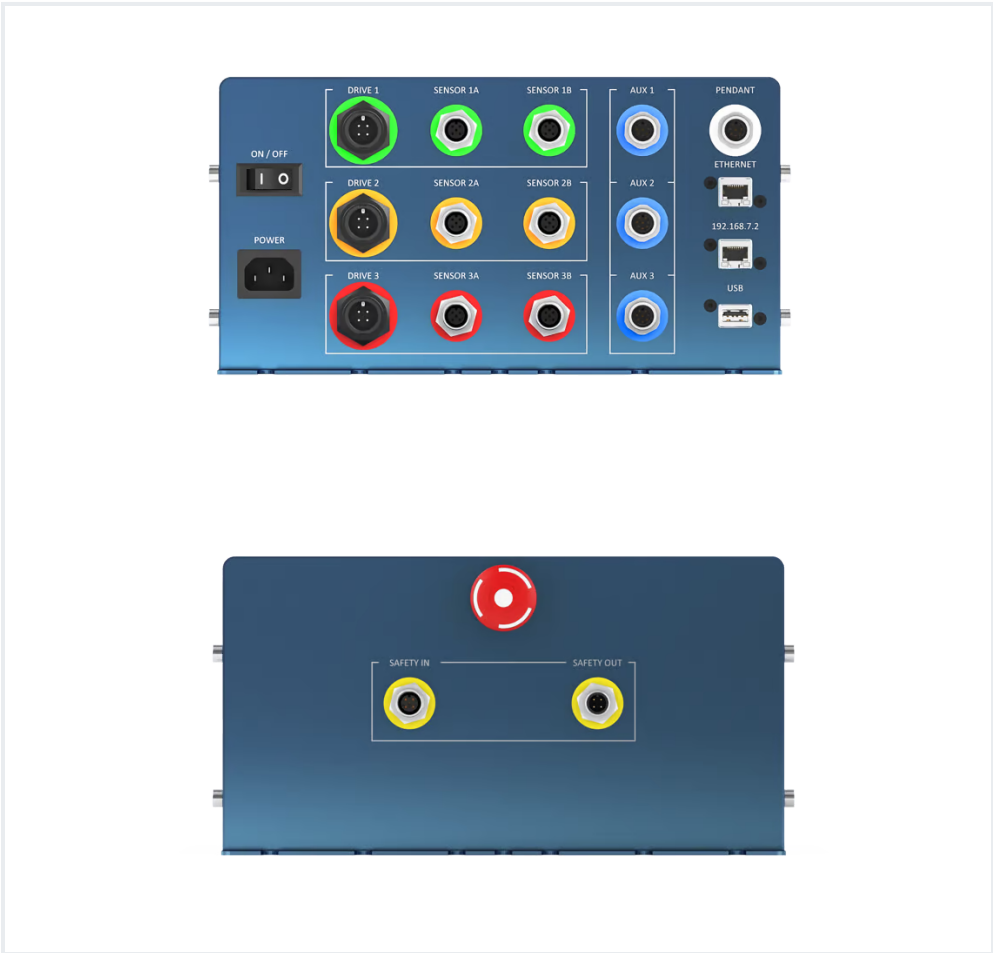
Software & Communication Protocol Specifications

Available Control API
Python
Communication Protocol for Ethernet Adapter
web-socket
REST
Communication Protocol for Fieldbus
MQTT

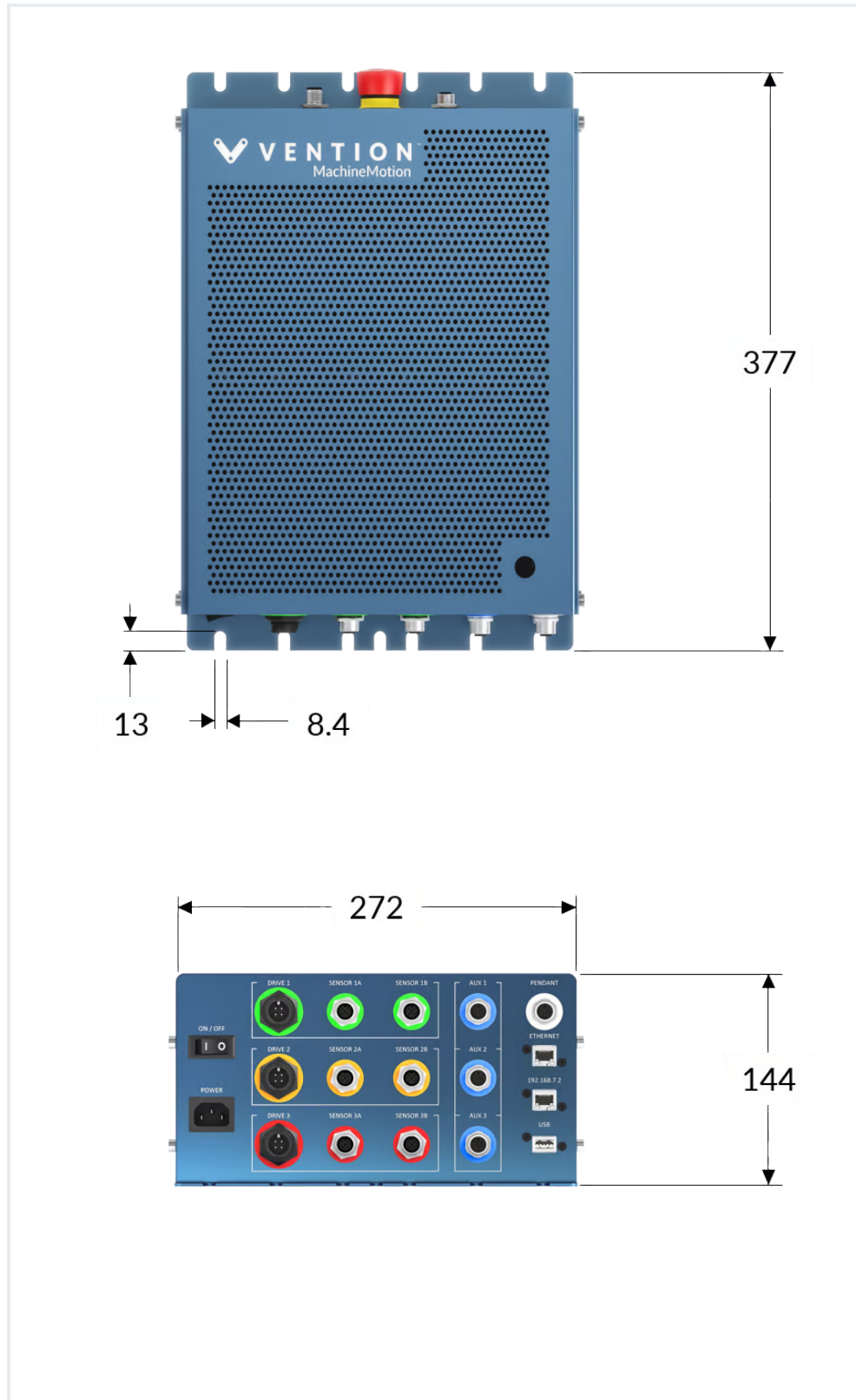
Physical Unit



Functional Pinout



Unit Dimensions



Compatible Hardware

Plug and Play Automation Components

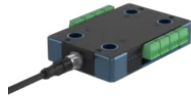
MachineMotion™
Pendant
CE-TP-001-0001



M18 Inductive
Proximity Sensor
CE-SN-004-0001



I/O Expansion
Module
CE-MD-001-0001



Hollow Shaft Optical
Rotary Encoder
CE-SN-002-0001



NEMA34 Stepper
Motors
MO-SM-XXX-XXXX



Emergency Stop
Switch
CE-SA-003-0000

