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# MachineMotion Four-Drive Datasheet

## Introduction

MachineMotion v2 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 v2 is a plug and play industrial controller that contains the necessary infrastructure to execute motion and control applications through a library of modular components. Equipment powered by MachineMotion v2 can be programmed through MachineLogic – Vention's code-free visual sequence editor – or through Vention's Python SDK.

*MachineMotion 1 datasheet can be found in the 'Documentation for Previous Product Versions' at the bottom of this page*

## Features

- Control up to four 250 W high performance step-servos with accurate and automatic position adjustments. This allows the actuator to always reach the user-specified position, thanks to a built-in encoder that enables the motors to operate in closed control loops.
- Step-servo junction box with simple cabling, where the brake, home and end-stop sensors can be directly wired to the motor.
- Status light on servo motors and controller for quick diagnostics
- Loaded with code-free software including:
  - Control Center
  - MachineLogic
  - Python
- Open source development tools including:
  - Cloud 9 IDE
  - Javascript
  - Operator mode
  - Manual joggers
- The MachineMotion v2 controller is certified to Canadian, US & European standards.
- IP30 rated enclosure for industrial applications, with active cooling and replaceable filters
- Connect digital I/O and analog modules to control I/O devices
- Supports multiple external communication protocols including MQTT & EtherNet/IP
- Single continuous flex cable to power an actuator, sensors and power-off brake
- Plug and play with all Vention actuators
- Native support for Universal Robots with URcap
- Plug and play safety system with physical and software reset
- Directly connect peripherals locally or remotely using the teach pendant, keyboard, mouse, and monitor

## Applications

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

## Supported robot interfaces

- Fanuc
- Universal robots
- ABB
- Doosan

## Electrical Specifications

<b>Certifications</b>	
North America	<ul style="list-style-type: none"><li>• CSA C22.2 No. 274-17 (Electrical Safety)</li><li>• ANSI/UL 61800-5-1 (Electrical Safety)</li><li>• FCC Part 15 (EMC)</li></ul>
Europe	<ul style="list-style-type: none"><li>• EN 61800-5-1:2007/AMD1:2016 (Low Voltage Directive)</li><li>• EN 61800-3:2017 (EMC Directive)</li><li>• EN 55011:2016 (EMC Directive)</li><li>• EN IEC 63000:2016 (RoHS Directive)</li></ul>
<b>Power Port</b>	
Name	POWER
Rated Voltage	85 to 264 VAC
Rated Current	9A @ 120 VAC
Typical Current	4.5A @ 120 VAC
Typical Power	1200 W
Standby Current	0.7 A (@ power factor 0.55)
Standby Power	84 W

Emergency Mode Current	0.4 A (@ power factor 0.3)
Emergency Mode Power	48 W
Connector	IEC C14
Power Cord	3.00m, NEMA 5-15P to IEC 320-C13, SJT
<b>Drive Ports</b>	
Name(s)	DRIVE 1, DRIVE 2, DRIVE 3, DRIVE 4
Motor Type	Servo-Stepper
Output Peak Voltage	50 V
Maximum Output Current	10 A
Maximum Output Power	350 W
Phase Current Peak	0 - 10 A
Phase Current Adjustment (Internal)	Software controlled
Control Interface (Internal)	CAN/(Step-Dir-Enable) Signals
Motor Drivers Certification	CE
Connector	M23 Amphenol Sine
Pin 1	24 V
Pin 2	0 V
Pin 3	motor phase A+
Pin 4	motor phase A-
Pin 5	motor phase B+
Pin 6	motor phase B-
Pin 7	Encoder A+
Pin 8	Encoder A-
Pin 9	Encoder B+
Pin 10	Encoder B-
Pin 11	Encoder Index+
Pin 12	Encoder Index-
Pin 13	NC
Pin 14	NC
Pin 15	Home/End Limit Switch S1
Pin 16	Home/End Limit Switch S2
Pin 17	24V Safety Switched
<b>Control (1,2,3,4) Ports</b>	
Name(s)	Control 1, Control 2, Control 3, Control 4
Connectivity Type	Communication
Connectivity Physical Layer	CAN/RS485
Connector	M12, female, 8-pin, A-Keyed
Pin 1	24 V (70W max)
Pin 2	0 V
Pin 3	RS485 A
Pin 4	RS485 B
Pin 5	CAN H
Pin 6	CAN L
Pin 7	NC
Pin 8	24V Safety Switched
<b>To PC Port</b>	
Name(s)	To PC
Connectivity Type	Ethernet
Connectivity Physical Layer	IEEE 802.3, Ethernet

Connector	RJ45
<b>LAN Ports</b>	
Name(s)	LAN 1, LAN 2
Connectivity Type	Ethernet
Connectivity Physical Layer	IEEE 802.3, Ethernet
Connector	RJ45
<b>USB Ports</b>	
Name(s)	USB 1, USB 2
Connectivity Type	USB
Connectivity Physical Layer	USB 2.0
Connector	USB-A 2.0
<b>HDMI Ports</b>	
Name(s)	HDMI
Connectivity Type	HDMI
Connectivity Physical Layer	HDMI
Connector	HDMI Type A
<p>Note: drives inside the MachineMotion 2 operate at 48VDC and are designed to power 2-phase stepper motors. They can deliver up to 10A of current per phase. The maximum power consumption for all the drives together is 1000W.</p> <p><b>Safety In / Pendant Port</b></p>	
Name(s)	SAFETY IN / PENDANT
Type	Redundant Dry Contacts + Reset
Connectivity Physical Layer	IEEE 802.3, Ethernet
Connector	M12, female, 12-pin, A-Keyed
Pin 1	24 V (70W max)
Pin 2	0 V
Pin 3	E-Stop IN Channel 1 Contact 1
Pin 4	E-Stop IN Channel 1 Contact 2
Pin 5	E-Stop IN Channel 2 Contact 1
Pin 6	E-Stop IN Channel 2 Contact 2
Pin 7	Reset Contact 1
Pin 8	Reset Contact 2
Pin 9	Ethernet TX+
Pin 10	Ethernet TX-
Pin 11	Ethernet RX+
Pin 12	Ethernet RX-
<b>Safety Out Port</b>	
Name(s)	SAFETY OUT
Type	Redundant Dry Contacts + Reset
Connector	M12, female, 12-pin, A-Keyed
Pin 1	NC
Pin 2	0 V
Pin 3	E-Stop OUT Channel 1 Contact 1
Pin 4	E-Stop OUT Channel 1 Contact 2
Pin 5	E-Stop OUT Channel 2 Contact 1
Pin 6	E-Stop OUT Channel 2 Contact 2
Pin 7	Reset Contact 1
Pin 8	Reset Contact 2
Pin 9	NC
Pin 10	NC

Pin 11	NC
Pin 12	NC
<b>Ethernet Port</b>	
Name(s)	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
<b>Default Ethernet or 192.168.7.2 Port</b>	
Name	DEFAULT ETHERNET or 192.168.7.2
Status	Unused

## Embedded & Computing Specifications

<b>Single Board Computer</b>	
Processor	TI AM5729
OS	Debian 10
Memory	32GB SD-micro
Certification	CE
<b>Motion Controller</b>	
Processor	Natotec CL4
Interface	CAN
Protocol	G-code
<b>Fieldbus Compatible Modules</b>	
Digital IO Module	CE-MD-001-0001
Analog IO Module	CE-MD-003-0000 *available soon
Push-Button Module	CE-MD-004-0000

## Safety Specifications

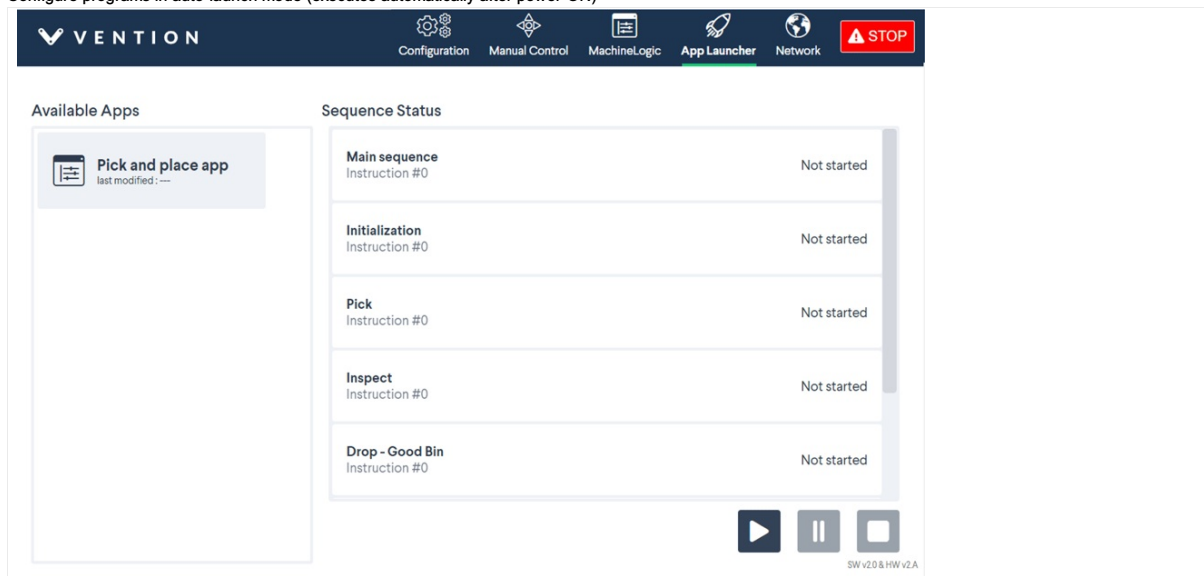
<b>Safety PLC</b>	
Manufacturer	ReeR
Model Number	M1
<b>Safety Data - Values per EN ISO 13849-1</b>	
Category	3
Performance Level	PL <sub>e</sub>
MTTF <sub>d</sub>	64 years
DC <sub>avg</sub>	97.3 %
PFH <sub>D</sub>	8.84E-08 h<>-1
<b>Safety Data - Values per IEC/EN 61508</b>	
SIL	2 (IEC/EN 61508)
HFT (hardware failure tolerance)	1
DC <sub>avg</sub>	97.3%
SFF	99.70%
PFH <sub>D</sub>	1.45E-08 h<>-1
<b>Operation conditions</b>	
d <sub>op</sub>	365 days/year
h <sub>op</sub>	24 hours/day
T <sub>cycle</sub>	8640 s/cycle

## Vention ControlCenter Software

MachineMotion comes with pre-loaded control and machine operations software – all of which is accessible through the MachineMotion pendant or via computer with a USB or Ethernet connection.

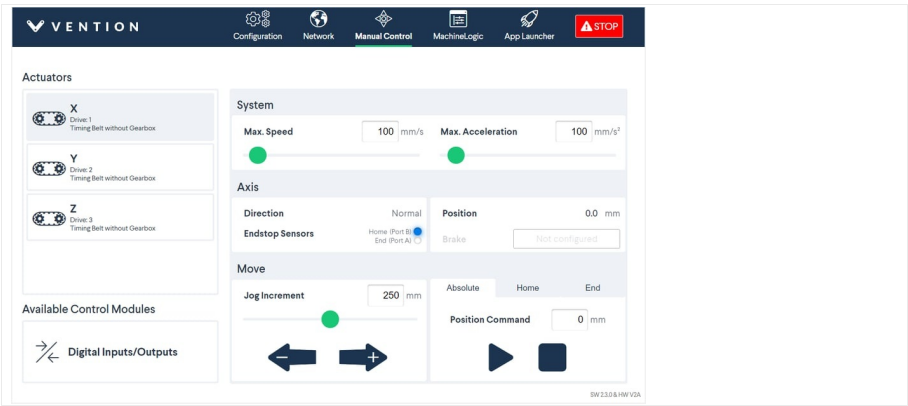
### Application Launcher

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



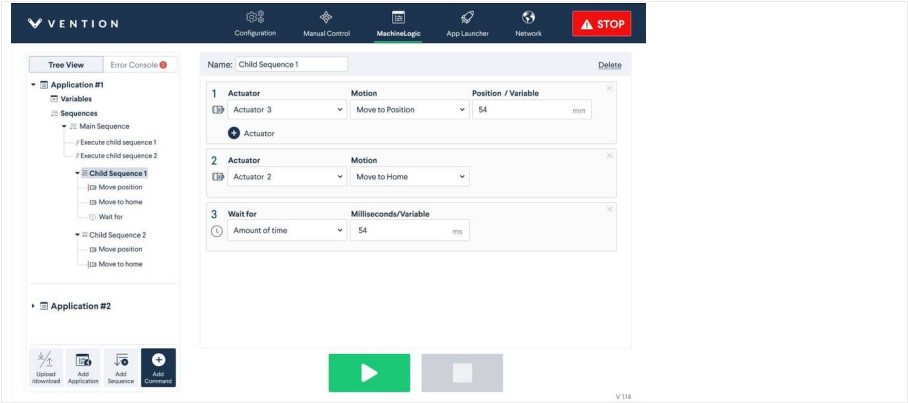
### Manual Control

- Send motion commands to actuators
- Configure speed, acceleration and direction
- Monitor the state of end-of-travel sensors and connected control devices



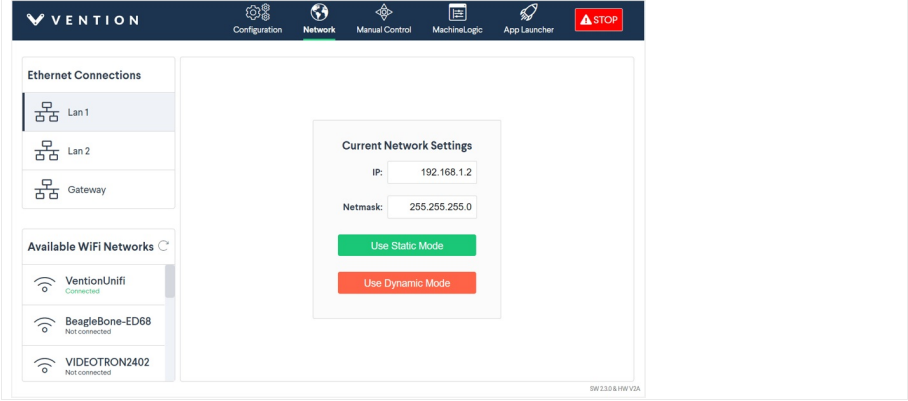
MachineLogic

- Create automation programs in a simple graphical interface



Network Configuration

- Configure the Ethernet ports and WiFi settings (only if the MachineMotion controller is connected to a MachineMotion pendant)



Software & Communication Protocol Specifications

Available Control API
Python
Communication Protocol for Ethernet Adapter
web-socket
Communication Protocol for Fieldbus
MQTT
Security
MachineCloud connection is encrypted (TLS 1.2 & TLS 1.3, A-rated ciphers, RSA 2048-bit keypairs on server and client)

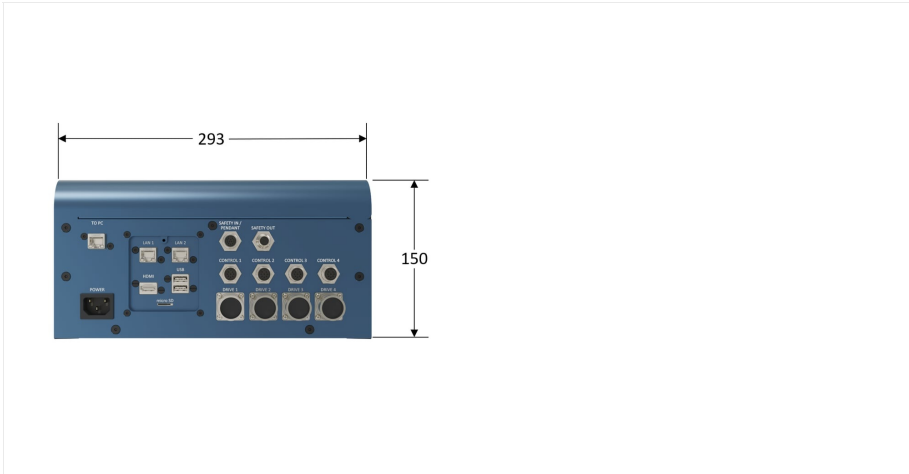
Physical Unit



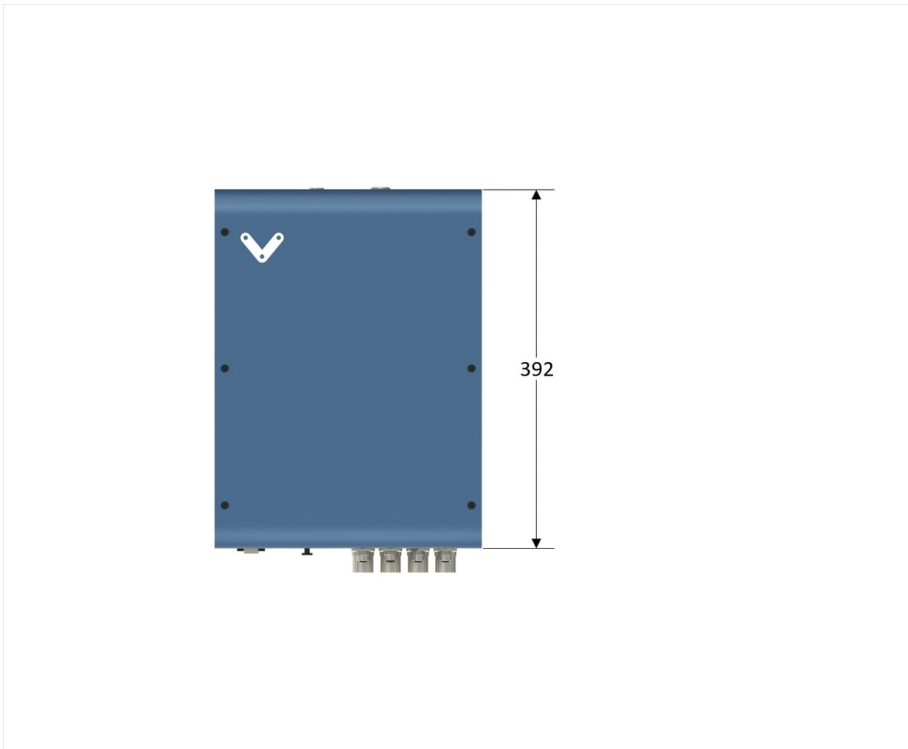
**Functional Pinout**



**Unit Dimensions**












Compatible Hardware

Plug and Play Automation Components

<p>MachineMotion™ Pendant CE-TP-004-0001</p> 	<p>M18 Inductive Proximity Sensor CE-SN-004-0001</p> 
<p>Digital I/O Module CE-MD-001-0001</p> 	<p>Power-Off Brake MO-PT-002-0001</p> 
<p>NEMA34 Servo Motors MO-SM-01X-0000</p> 	<p>Emergency Stop and Reset Module CE-SA-007-0000</p> 

Documentation for Previous Product Versions

MachineMotion 1	^
<a href="#">MachineMotion 1 Datasheet</a>	

