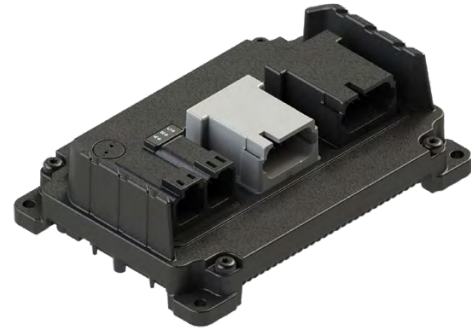


**ENOVATION**  
CONTROLS®

## MCx™ Series

### Rugged Machine Controllers

Get the most out of any application with powerful, flexible and precise controllers. Featuring multiple CAN interfaces, extensive outputs and an available high-current output option, the complete family of MCx series controllers can handle any job, big or small.



## MC2-18-6

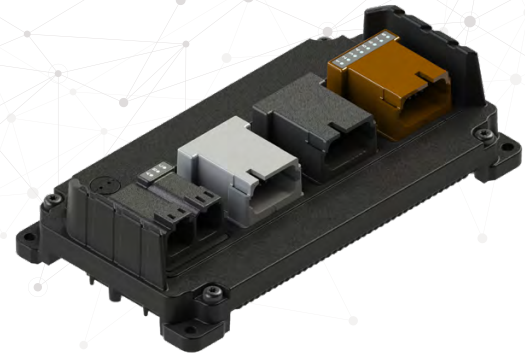
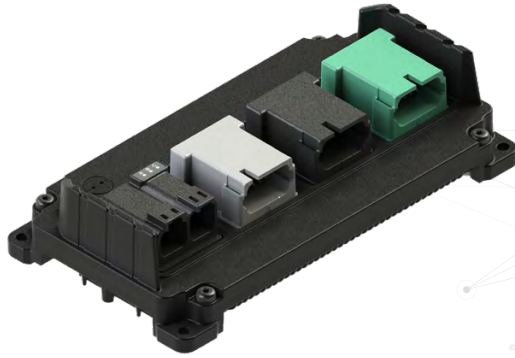
INPUTS	
UNIVERSAL ANALOG / HIGH FREQUENCY	4
UNIVERSAL ANALOG	14
<b>TOTAL INPUTS</b>	<b>18</b>
OUTPUTS (SOFTWARE SELECTABLE)	
4A PWM (FEEDBACK)	2
DUAL-RANGE PWM 4A / 0.5 A (FEEDBACK)	4
15A PWM (FEEDBACK)	-
<b>TOTAL OUTPUTS</b>	<b>6</b>
OTHER	
CAN 2.0B / J1939	2 Channels
SENSOR SUPPLY	(1) 500mA max @ 5 or 10 VDC [Software Selectable Voltage]
CONNECTORS	J1 (18 pin - E key) - DT16-18SE-K004 J2 (18 pin - B key) - DT16-18SB-K004
LED INDICATORS	(1) Green - Power Status (1) Green - Software Configurable (1) Amber - Malfunction Indicator
DIMENSIONS	5.60 x 5.44 x 2.38 in (142.3 x 138.3 x 60.4 mm)

## MC3-21-10

INPUTS	
UNIVERSAL ANALOG / HIGH FREQUENCY	8
UNIVERSAL ANALOG	13
<b>TOTAL INPUTS</b>	<b>21</b>
OUTPUTS (SOFTWARE SELECTABLE)	
4A PWM (FEEDBACK)	6
DUAL-RANGE PWM 4A / 0.5 A (FEEDBACK)	4
15A PWM (FEEDBACK)	-
<b>TOTAL OUTPUTS</b>	<b>10</b>
OTHER	
CAN 2.0B / J1939	3 Channels
SENSOR SUPPLY	(1) 500mA max @ 5 or 10 VDC [Software Selectable Voltage]
CONNECTORS	J1A (4 pin) - DTP06-4S J1B (6 pin) - DT06-6S-E008 J2 (18 pin - A key) - DT16-18SA-K004 J3 (18 pin - B key) - DT16-18SB-K004
LED INDICATORS	(1) Green - Power Status (1) Green - Software Configurable (1) Amber - Malfunction Indicator
DIMENSIONS	7.85 x 5.44 x 2.38 in (199.3 x 138.3 x 60.4 mm)

## INPUT OPTIONS

ANALOG FUNCTION				DIGITAL MODE	
ADC RESOLUTION	12 bits			TYPE	Low/High Side (Software Configurable)
ACCURACY	*0-5 VDC Mode: Typical +/- 0.2 % FS All Other Modes: Typical +/- 1 % FS *			INPUT IMPEDANCE	Nominally 10 kΩ (Configuration Dependent)
MEASURING RANGES	Voltage Mode		Current Mode	SAMPLING FREQUENCY	250 Hz
	0 to 5V (Absolute / Ratio-metric)	0 to 10V	0 to 36V		
INPUT RESISTANCE	10kΩ +/- 20%		200Ω	20kΩ	SWITCH-ON LEVEL
SAMPLING FREQUENCY	1kHz			SWITCH-OFF LEVEL	
HIGH FREQUENCY MODE					
TYPE	Single ended, digital low/high side (Software Configurable)				
INPUT IMPEDANCE	Nominally 10 kΩ (Configuration Dependent)				
INPUT FREQUENCY	1Hz...50kHz				
THRESHOLD 1	Standard switch on at 2.5 V / Standard switch off at 1.25 V				
THRESHOLD 2	Standard switch on at 7.5 V / Standard switch off at 3.75 V				



## MC4-24-20

INPUTS	
UNIVERSAL ANALOG / HIGH FREQUENCY	10
UNIVERSAL ANALOG	14
<b>TOTAL INPUTS</b>	<b>24</b>
OUTPUTS (SOFTWARE SELECTABLE)	
4A PWM (FEEDBACK)	10
DUAL-RANGE PWM 4A / 0.5 A (FEEDBACK)	10
15A PWM (FEEDBACK)	-
<b>TOTAL OUTPUTS</b>	<b>20</b>
OTHER	
CAN 2.0B / J1939	3 Channels
SENSOR SUPPLY	(2) 500mA max @ 5 or 10 VDC [Software Selectable Voltage]
CONNECTORS	J1A (4 pin) - DTP06-4S J1B (6 pin) - DT06-6S-E008 J2 (18 pin - A key) - DT16-18SA-K004 J3 (18 pin - B key) - DT16-18SB-K004 J4 (18 pin - C key) - DT16-18SC-K004
LED INDICATORS	(1) Green - Power Status (1) Green - Software Configurable (1) Amber - Malfunction Indicator
DIMENSIONS	10.09 x 5.45 x 2.38 in (256.2 x 138.5 x 60.4 mm)

## MC4-21-14-H8

INPUTS	
UNIVERSAL ANALOG / HIGH FREQUENCY	8
UNIVERSAL ANALOG	13
<b>TOTAL INPUTS</b>	<b>21</b>
OUTPUTS (SOFTWARE SELECTABLE)	
4A PWM (FEEDBACK)	6
DUAL-RANGE PWM 4A / 0.5 A (FEEDBACK)	8
15A PWM (FEEDBACK)	8
<b>TOTAL OUTPUTS</b>	<b>22</b>
OTHER	
CAN 2.0B / J1939	3 Channels
SENSOR SUPPLY	(2) 500mA max @ 5 or 10 VDC [Software Selectable Voltage]
CONNECTORS	J1A (4 pin) - DTP06-4S J1B (6 pin) - DT06-6S-E008 J2 (18 pin - A key) - DT16-18SA-K004 J3 (18 pin - B key) - DT16-18SB-K004 J4 (18 pin - D key) - DT16-18SD-K004
LED INDICATORS	(1) Green - Power Status (1) Green - Software Configurable (1) Amber - Malfunction Indicator (8) Red - High Current Status <ul style="list-style-type: none"> <li>• Lit - Output Active</li> <li>• Dim - Output Inactive</li> <li>• Blinking Pattern - Faults</li> </ul>
DIMENSIONS	10.09 x 5.45 x 2.38 in (256.2 x 138.5 x 60.4 mm)

## OUTPUT OPTIONS

	4A (FEEDBACK)	4A PWM (FEEDBACK)	DUAL-RANGE PWM 4A / 0.5A (FEEDBACK)	15A [SINGLE] / 25A [PARALLEL] PWM (FEEDBACK)
TYPE	Low/High side, H-bridge (Software configurable as push/pull or float)			
MAX AMPERAGE	4A			15A (Parallel with mated high side driver for 25A)
DIAGNOSTICS	Open/Short Circuit Protection			
PWM FREQUENCY	50 – 5 kHz		50 – 2 kHz	
DITHER FREQUENCY	Configurable			
DITHER AMPLITUDE	Configurable			
CONTROL RANGE	N/A	0.05 - 4A	Low Current Mode: 0.005 – 0.5A High Current Mode: 0.05 - 4A (software configurable)	0.1A – 15A 0.1A – 25A (if in parallel with high side channel)
CONTROL RESOLUTION	N/A	1 mA	Low Current Mode: 1mA High Current Mode: 1 mA (software configurable)	20mA
FLY BACK PROTECTION	Integrated			
DUTY CYCLE RESOLUTION	.01% @ 250Hz			
FAULT MODES	Short circuit, overcurrent and open circuit protection Overtemperature			
OUTPUT INDICATION	N/A			LED with output state & fault state Single Red LED per output

# MCx SERIES SPECS

## COMPUTING

PROCESSOR	Renesas® Super H 72546 @ 200 MHz (32-bit)
FLASH	3.75 MB (1,000 writes)
SRAM	256 KB
MRAM	32 KB
EEPROM	128 KB

## ENVIRONMENTAL

OPERATING TEMPERATURE	-40° to +221°F (-40° to +105°C) [May be limited to +85°C/+185°F at full rated current]
STORAGE TEMPERATURE	-40° to +257°F (-40° to +125°C)
OPERATING ALTITUDE	0 - 4000 meters
PROTECTION	IP67, IP69K with Protective Boot
HOUSING	Cast aluminum housing, soft-gel potted for extreme ruggedness and durability

## POWER SUPPLY

SUPPLY VOLTAGE	6-32 VDC, Nominal Operation @ 12 /24 VDC
PEAK SUPPLY VOLTAGE	36 VDC
MAXIMUM CURRENT (MC3/MC4)	50 A (25 A with only 1 Power / 1 GND connected)
MAXIMUM CURRENT (MC4-H8)	100A
IDLE CURRENT 12/24 VDC	< 200mA @ 12VDC < 100mA @ 24VDC
STANDBY CURRENT 12/24 VDC	< 5mA @12VDC < 2.5mA @ 24VDC
NODE/SLEEP PIN	Control sleep, wake and optional node settings

## MECHANICAL TESTING

IP6X	IEC 60529 Section 14.2.6, SAE J1455, Section 4.7.3
IPX7	IEC 60529 Section 14.2.7
IPX9K	IEC 60529, Section 14.2.9 (with protective boot)
VIBRATION	J1455 Section 4.10.4.1/5.82Grms, 8 hours per axis
SHOCK	J1455 Section 4.10.4/6+/-pulses, 50 G's, 6 ms
FLUID COMPATIBILITY	J1455 Section 4.4.3
HANDLING DROP TEST	J1455 Section 4.11.3.1, 1-meter drop on concrete on each of 6 box faces
SALT FOG	ASTM-B117/96 Hours at 35°C 5% NaCl
HUMIDITY / TEMPERATURE	SAE J1455 4.2.3 with reference to ISO 15998-7.2.2 for temperature & humidity levels

IP 69K CE e-Mark ISO-13766 REACH / RoHS

## ELECTRICAL TESTING

2004/108/EC (E-MARK)	Broadband radiated emissions [ref. CISPR 25 sec 6.4], Conducted immunity [ref. ISO 7637-2], Conducted emissions [ref. ISO 7637-2], Narrowband radiated emissions, Radiated immunity [ref. ISO11452-2]
CISPR 11	Radiated emissions [ref. CISPR 16-1]
CISPR 25	Conducted emissions (power lines), Conducted emissions (signal lines), Radiated emissions
EN 60945	Conducted emissions [ref. CISPR 16-1], Conducted immunity (RF disturbance) [ref. EN 61000-4-6], ESD immunity [ref. EN 61000-4-2]
EN 61000-4-2	ESD immunity, 8kV contact & 16 kV air. Response level I.
EN 61326-1	Radiated immunity [ref. EN 61000-4-3], Conducted immunity (fast transients on power & signal lines) [ref. EN 61000-4-4], Conducted immunity (surges on power lines) [ref. EN 61000-4-5], Magnetic immunity [ref. EN 61000-4-8]
SAE J1113-2	Conducted immunity (power leads) [ref. MIL-STD0461F]
SAE J1113-4	Conducted immunity (BCI) [ref. ISO 11452-4]
SAE J1113-11	Conducted immunity (transients on power leads) [ref. ISO 7637-2], 5 pulses of 174V for 350 mS with 4Ω source impedance. Severity level 4, response I.
SAE J1113-12	Conducted immunity (coupling clamp on signal lines) [ref. ISO 7637-3]
SAE J1113-13	ESD immunity [ref. ISO 10605]
SAE J1113-21	Radiated immunity (absorption lined chamber) [ref. ISO 11452-2] >150 V/m (200MHz -3.2GHz)
SAE J1113-22	Radiated immunity (magnetic fields) [ref. MIL-STD-461F]
SAE J1113-26	Radiated immunity (ac electric fields - power lines)
SAE J1455	Inductive switching, 10 sequential 28V +/-600 V pulses of 1ms duration on I/O lines
SHORT CIRCUIT PROTECTION	Internal testing where power outputs, signal lines, all inputs and powered outputs are shorted to Vbat and then ground for one minute each.
SUPPLY VOLTAGE VARIATION	Internal testing suite (dropouts, dips, random bounce, engine cranking). Reverse voltage test is -32 V for one minute.
EXTREME TEMPERATURES	Internal testing of powerup and 24-hour operation at -40° C and 85° C

## SOFTWARE OPTIONS

ACE™	Created by Enovation Controls, ACE is a powerful and easy-to-learn configuration tool to simplify and speed up control system development. ACE was designed for both machine experts with no coding experience and experienced programmers looking for a more efficient way to work.
CODESYS	For users experienced with controller programming, MCx series controllers support CODESYS for development.

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