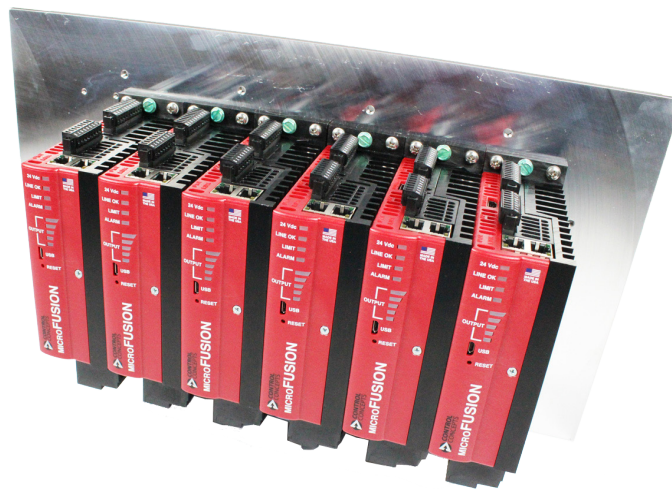


# MICROFUSION

## MULTIZONE SYSTEMS

EXTERNAL PANEL MOUNT / LIQUID COOLED

- Multizone system
- Up to 10 MicroFUSION units
- External panel mount or liquid-cooled heatsink
- Reduces enclosure size
- Reduces air conditioning requirements by moving heat outside the enclosure
- UL, cUL, CE, RoHS, and 100kA SCCR certifications
- IP65, UL Type 4



MicroFUSION is an ultra-compact high-performance microprocessor-based power controller, available in single or three phase models to control AC loads.

Resistive or transformer-connected loads can be controlled in either Phase Angle, Zero Cross, or Zero Cross Transformer (ZCT) Mode. Output is controlled linearly with respect to command signal and can be set to the average or RMS value of the voltage and current, as well as true instantaneous power or external feedback.

MicroFUSION Series power controllers are available in current ratings from 8, 16, 32, 50, 80, 100, 130, 160, 200, 240, 320, 400 Amps AC. Auto-ranging voltage circuitry enables mains supply voltage from 24-600 VAC (UL), 24-690 VAC (CE), or 45-65 Hz, eliminating the need for hardware jumpers or stocking multiple controllers for international voltages. A separate power source supplies the control electronics and maintains critical communications to your control system when the mains are absent.



# SPECIFICATIONS

PERFORMANCE		
	Standard	High Performance Option
Setpoint Resolution	10,000 counts	Selectable 10,000 or 64,000 counts
Internal Control Loop Resolution	16,000 counts	64,000 counts
Output Resolution	12,000 counts @ 50Hz, 10,000 counts @ 60Hz	50,000 counts @ 50Hz, 42,000 counts @ 60Hz
Accuracy (Full Conduction)		
Voltage	3% of span	0.5% of span
Current	3% of span	0.5% of span
Power	3% of span	1% of span
Output Linearity	4% from 5 to 100% output range	1% from 5 to 100% output range
Accuracy	A +10% to -15% line voltage change will result in a max output change of 0.5% from 5 to 100% output range	A +10% to -15% line voltage change will result in a max output change of 0.05% from 5 to 100% output range
Temperature Drift	Output shall not change greater than 0.5% per degree C max over the operating temperature range from 5 to 100% output range	Output shall not change greater than 0.2% per degree C max over the operating temperature range from 5 to 100% output range

POWER	
Line Voltage (Auto Ranging)	UL/cUL: 24 - 600 VAC (Nominal) +10% / -15% (Contact CCI for other options) CE: 24 - 690 VAC (Nominal) +10% / -15% (Contact CCI for other options)
Line Frequency (Auto Ranging)	45 - 65 Hz
Current Rating- Peak Surge	20X frame rating for 10 ms
Minimum Hold/Latch Current	500 mA up to 160A      1A at 200-400A
SCR Rating (PIV)	1600 V peak forward & reverse
Fusing	Optional external Class T, branch-rated, touch-safe fusing
Thermal	Integrated heat sink thermal sensor
Current Limit	20% – 105% of continuous rating of Frame Amp Rating
Current Trip	50% - 450% of continuous rating
Power Dissipation	1.3 Watt per amp of load current per phase
Control Power/Operates Internal Control Electronics	24 Vdc +10 / -15%

ENVIRONMENTAL	
Surrounding Air Operating Temperature - External Panel Mount	32°F [0°C] - 122°F [50°C] with no derating
Surrounding Air Operating Temperature - Liquid Cooled	32°F [0°C] - 140°F [60°C] with no derating
Humidity	20% to 90% RH Non-Condensing
Rated Operating Altitude	Up to 6000 ft [182950m] at full rated current
Contaminates	ROHS Compliant, CE Pollution Degree 2
Storage Temperature	- 4 to 176°F [- 20 to 80°C]

DC POWER CONSUMPTION (AT 24 VDC)	
16 - 160A Single Phase	7 Watts per controller
200 - 240A Single Phase	11 Watts
320 - 400A Single Phase	17 Watts
Onboard Fieldbus Module	Add 0.7 Watts
CCI Connect Module	Add 6 Watts per Connect Module in the system, <b>NOT</b> per controller

COOLING																			
External Panel Mount	Natural Convection																		
Liquid Cooled	Flow rate: 1 GPM [3.79 LPM] minimum Maximum inlet temperature: 122° F [50° C] Maximum pressure: 60 PSI [4.137 Bar] Up to 50% glycol water solution Pressure Drop <table border="1"> <tr> <td>3 Zone</td> <td>2.64 PSI at 1 GPM</td> </tr> <tr> <td>6 zone</td> <td>2.9 PSI at 1 GPM</td> </tr> <tr> <td>10 zone</td> <td>3.35 PSI at 1 GPM</td> </tr> </table> Particulate filtered water containing less than: <table border="1"> <thead> <tr> <th>Mineral</th> <th>Recommended Limit</th> </tr> </thead> <tbody> <tr> <td>Calcium</td> <td>&lt; 50 PPM</td> </tr> <tr> <td>Magnesium</td> <td>&lt; 50 PPM</td> </tr> <tr> <td>Total Hardness</td> <td>&lt; 100 PPM (5 Grains)</td> </tr> <tr> <td>Chloride</td> <td>&lt; 25 PPM</td> </tr> <tr> <td>Sulfate</td> <td>&lt; 25 PPM</td> </tr> </tbody> </table> A corrosive inhibitor must be used for deionized or demineralized water PH must be between 4 and 9.	3 Zone	2.64 PSI at 1 GPM	6 zone	2.9 PSI at 1 GPM	10 zone	3.35 PSI at 1 GPM	Mineral	Recommended Limit	Calcium	< 50 PPM	Magnesium	< 50 PPM	Total Hardness	< 100 PPM (5 Grains)	Chloride	< 25 PPM	Sulfate	< 25 PPM
3 Zone	2.64 PSI at 1 GPM																		
6 zone	2.9 PSI at 1 GPM																		
10 zone	3.35 PSI at 1 GPM																		
Mineral	Recommended Limit																		
Calcium	< 50 PPM																		
Magnesium	< 50 PPM																		
Total Hardness	< 100 PPM (5 Grains)																		
Chloride	< 25 PPM																		
Sulfate	< 25 PPM																		

ENCLOSURE PROTECTIVE RATING	
International	IP 20
Remote Display	IP 65, UL Type 1 & 12
External Panel Mount	IP 65, UL Type 4
Liquid Cooled	IP 65, UL Type 4

ISOLATION	
Signal to Line/Load	4000 Vac minimum
Line/Load to Ground	2500 Vac minimum
Signal to Ground	2000 Vac minimum
Line to Load	1400 Vac minimum
Network	1500 Vac minimum
USB	2500 Vac minimum
Signal to Processor	1500 Vac minimum
Remote Display	2500 Vac minimum

All controllers have 100kA when using less than or equal to 100 Amp class J or T. Installed in enclosure with two latches, 150% of controller size.

Control Concepts recommends sizing fuses approximately 125% frame rating.

RELIABILITY	
Mean Time Between Failure (MTBF)	100,000 Hours at 25°C

I <sup>2</sup> t DATA (8.3 - 10 msec)		
Frame Size	Conditions	I <sup>2</sup> t Data
0 - 80	Junction Temp 125°C	16200 A <sup>2</sup> s
100 - 160	Junction Temp 125°C	80000 A <sup>2</sup> s
200 - 240	Junction Temp 125°C	125000 A <sup>2</sup> s
320 - 400	Junction Temp 125°C	320000 A <sup>2</sup> s

SCCR - TYPE 1 COORDINATION		
Frame 1Ø / 3Ø	Required Fusing *	SCCR Rating
8 Amp	10A Fast Acting J or T	100 kA
16 Amp	20A Fast Acting J or T	100 kA
32 Amp	40A Fast Acting J or T	100 kA
50 Amp	60A Fast Acting J or T	100 kA
80 Amp	100A Fast Acting J or T	100 kA
100 Amp	125A Fast Acting J or T	100 kA
130 Amp	175A Fast Acting J or T	100 kA
160 Amp	200A Fast Acting J or T	100 kA
200 Amp	250A Fast Acting J or T	100 kA
240 Amp	300A Fast Acting J or T	100 kA
320 Amp	400A Fast Acting J or T	100 kA
400 Amp	500A Fast Acting J or T	100 kA

\* Maximum fuse Ampere shown above, fuses with lower Ampere rating can also be used.

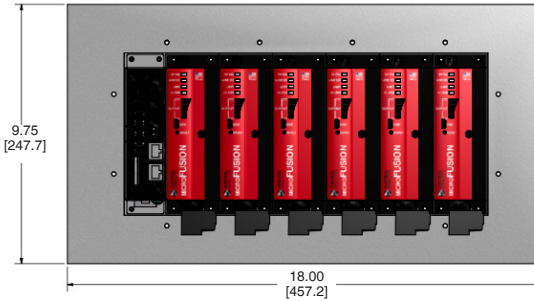
ANALOG SETPOINT INPUTS		
Voltage	0 - 10 Vdc 0 to 65535	Update period: 6 ms
Voltage Impedance	200 kOhm	
Max Voltage	+/- 15 Vdc	
Current Mode	0 - 20 mA 0 to 32767	
Current Impedance	249 Ohm	
Max Current	+/- 31 mA or +/- 7.8 Vdc	
Pulse Width-Modulation	0 - 100% Frequency range: 20 Hz to 2 kHz max	

# DIMENSIONS

Dimensions:  
Inches [mm]

## EXTERNAL PANEL MOUNT

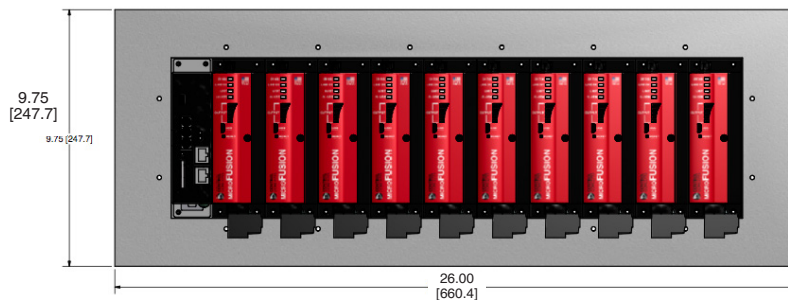
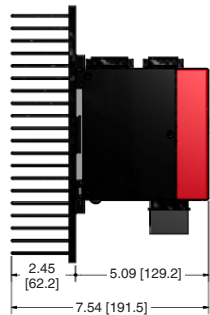
### Single Phase - 6 Zone



NOTE: controllers are pictured with an optional Connect fieldbus interface.

Zone 1 is considered the controller closest to the Connect module.

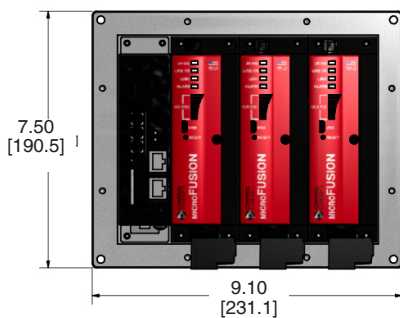
### Single Phase - 10 Zone



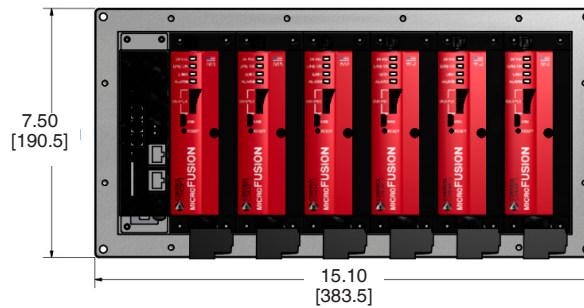
## LIQUID COOLED

NOTE: controllers are pictured with an optional Connect fieldbus interface. Zone 1 is considered the controller closest to the Connect module.

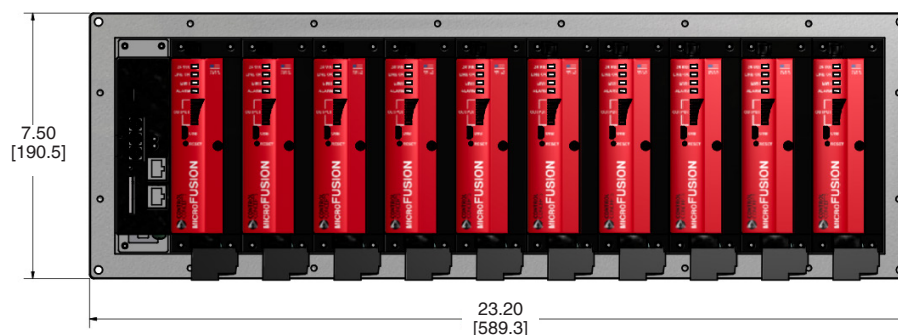
### Single Phase - 3 Zone (80A)



### Single Phase - 6 Zone (80A)



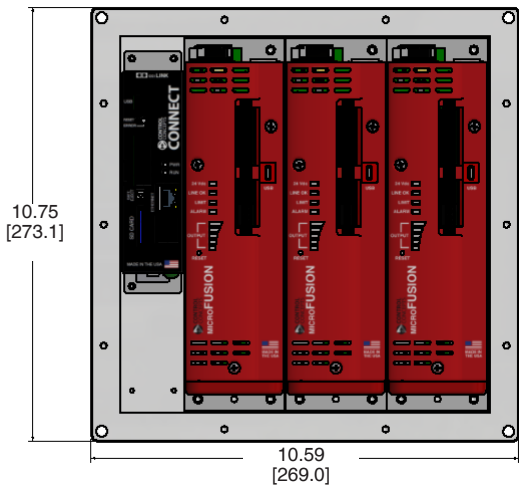
### Single Phase - 10 Zone (80A)



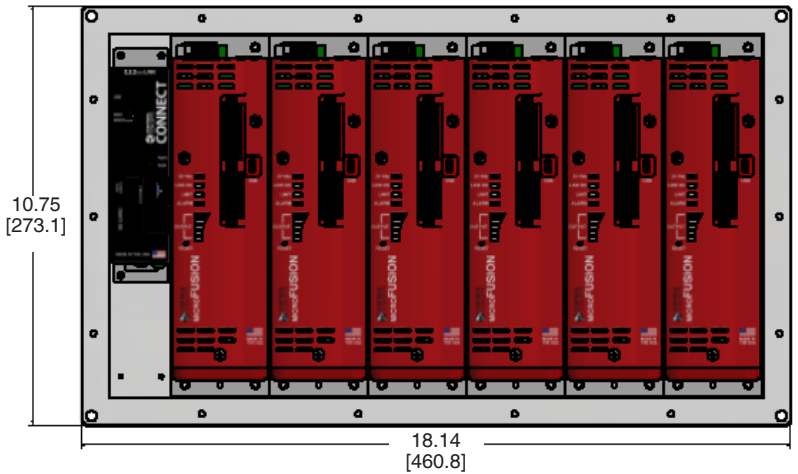
# DIMENSIONS, CONTINUED

Dimensions:  
Inches [mm]

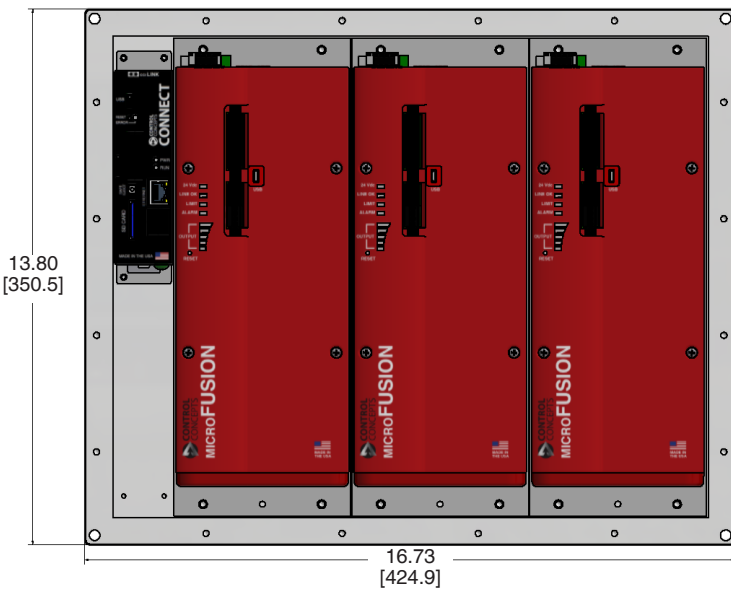
**Single Phase - 3 Zone (160A)**



**Single Phase - 6 Zone (160A)**



**Single Phase  
3 Zone (400A)**

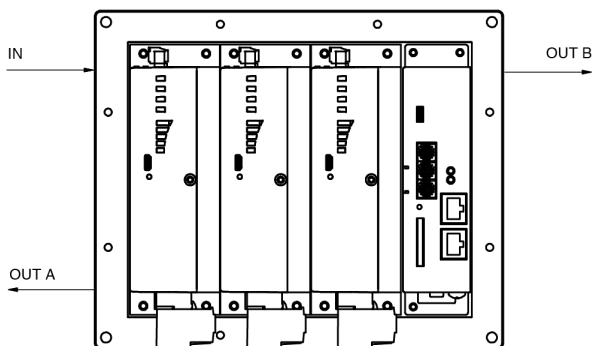


**Layout for water inlet position**

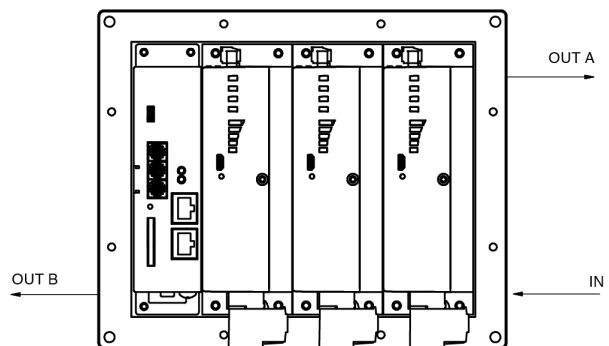
Use the following diagrams to determine the Water Inlet Position in the system model number.

Note: The position of the fieldbus module changes per option.

**Option L**



**Option R**



# MODEL NUMBERS

Select heatsink type and number of zones to create a system model number, then create model numbers for each individual unit.

## CONTROLLER MODEL NUMBER

uF1     -  -

### Board Type

- SX = Standard. See feature comparison on previous page.
- HX = High performance. See feature comparison on previous page.

### Terminal

- L = Lug (100 - 400A)
- T = Pluggable terminal block (8 - 80A)
- R = Ring terminal<sup>1</sup> (8 - 80A)

### Frame Style

- |                                               |                                |
|-----------------------------------------------|--------------------------------|
| C = 16 - 32A (External Mount / Liquid Cooled) | J = 100 - 160A (Liquid Cooled) |
| D = 50 - 80A (External Mount / Liquid Cooled) | K = 200 - 240A (Liquid Cooled) |
| F = 8A (External Mount / Liquid Cooled)       | L = 320 - 400A (Liquid Cooled) |

### Option Board

- |                 |                |
|-----------------|----------------|
| ∅ = None        | E = Modbus TCP |
| I = EtherNet/IP | N = PROFINET   |

### Amp Size

- |                         |                |
|-------------------------|----------------|
| 8 = 8 Amps <sup>2</sup> | 130 = 130 Amps |
| 16 = 16 Amps            | 160 = 160 Amps |
| 32 = 32 Amps            | 200 = 200 Amps |
| 50 = 50 Amps            | 240 = 240 Amps |
| 80 = 80 Amps            | 320 = 320 Amps |
| 100 = 100 Amps          | 400 = 400 Amps |

### Performance

- Available with SX:
- S = Standard
  - L = Adjustable Current Limit
- Available with HX:
- L = Adjustable Current Limit, current feedback, load voltage feedback, and voltage limit
  - P = High Performance (Includes Load Voltage Feedback, True Power Control, Current Limit, Power Limit, High Resolution Control Loop)

### I/O

- ∅ = None (Only applicable for SX; HX board is equipped with an alarm relay by default)
- 1 = Alarm Relay (1x Form C)
- 2 = General Purpose Input / Analog Input Channel 2 / Pulse Width Modulation Input
- 3 = Alarm Relay and General Purpose Input / Analog Input Channel 2 / Pulse Width Modulation
- 4 = Isolated I/O (Only applicable for SX; HX board is equipped with an alarm relay by default)
- 5 = Isolated I/O with Alarm Relay
- 6 = Isolated I/O with Gen. Purpose Input / Analog Input Channel 2 / Pulse Width Modulation
- 7 = Isolated I/O with Alarm Relay and Gen. Purpose Input / Analog Input Channel 2 / Pulse Width Modulation

### Retransmits

- ∅ = None
- R = Retransmits<sup>2</sup> (Two 16-bit analog retransmits for voltage, current, or power)

### Sync

- ∅ = None
- S = Digital SYNC-GUARD™

### Zero Cross Transformer Mode

- ∅ = None
- Z = Zero Cross Transformer Mode<sup>2</sup>

<sup>1</sup> Contact factory for availability

<sup>2</sup> Only available with HX type board

## SYSTEM MODEL NUMBER



### Heatsink

EM = External Panel Mount

LC = Liquid-Cooled

### Configuration

See Pages 6-7 to determine the configuration letter.

### Water Inlet Position (Fieldbus Mounts Opposite Side)

L = Left Side

R = Right Side

∅ = External Mount

Control Concepts will assign unit a unique 6-digit number

### Unique Identifier

## AMP CONFIGURATION

### LIQUID-COOLED (LC)

Amp Config	Max Zones	Positions										Weight*
		1	2	3	4	5	6	7	8	9	10	
A	3	80A	80A	80A								11.3 [5.13 kg]
B	6	80A	80A	80A	80A	80A	80A					20.6 [9.24 kg]
C	10	80A	80A	80A	80A	80A	80A	80A	80A	80A	80A	33.2 [15.06 kg]
D	3	160A	160A	160A								16.2 [7.34 kg]
E	3	400A	400A	400A								38.4 [17.41 kg]
F	6	160A	160A	160A	160A	160A	160A					30.4 [13.78 kg]

Liquid cooled heatsinks can have up to 80A in each position. Maximum position and ratings listed. Configurations with fewer zones and/or lower current ratings available.

### EXTERNAL PANEL MOUNT (EM)

Amp Configuration	Positions						Weight*
	1	2	3	4	5	6	
A	16A	16A	16A	16A	16A	16A	21.8 [9.89 kg]
B	16A	16A	16A	-	32A	-	18.0 [8.16 kg]
C	32A	-	32A	-	32A	-	16.1 [7.30 kg]
D	16A	16A	-	-	50A	-	16.1 [7.30 kg]
E	-	-	50A	-	50A	-	14.2 [6.44 kg]

\* Add 1 lbs [0.45 kg] when Connect Module is present.

(Dash signifies empty position)

External panel mount heatsinks are limited to specific amp configurations. Maximum position and ratings listed. Configurations with fewer zones and/or lower current ratings available.

# AMP CONFIGURATIONS

## EXTERNAL PANEL MOUNT (EM)

Amp Configuration	Positions / Number of Zones										Weight*	
	1	2	3	4	5	6	7	8	9	10		
F	16A	16A	16A	16A	16A	16A	16A	16A	16A	16A	16A	33.8 [15.33 kg]
G	16A	16A	16A	16A	16A	16A	16A	16A	16A	-	32A	31.9 [14.47 kg]
H	16A	16A	16A	16A	16A	16A	-	32A	-	32A	30.0 [13.61 kg]	
I	16A	16A	16A	16A	-	32A	-	32A	-	32A	28.1 [12.75 kg]	
J	16A	16A	-	32A	-	32A	-	32A	-	32A	26.2 [11.88 kg]	
K	-	32A	-	32A	-	32A	-	32A	-	32A	24.3 [11.02 kg]	
L	16A	16A	16A	16A	16A	16A	-	-	-	50A	28.1 [12.75 kg]	
M	16A	16A	-	-	-	50A	-	-	-	50A	22.4 [10.16 kg]	
N	-	32A	-	-	-	50A	-	-	-	50A	20.5 [9.30 kg]	
O	-	32A	-	32A	-	32A	-	-	-	50A	22.4 [10.16 kg]	
P	16A	16A	16A	16A	-	32A	-	-	-	50A	26.2 [11.88 kg]	
Q	16A	16A	-	32A	-	32A	-	-	-	50A	24.3 [11.02 kg]	
R	50A	-	-	-	-	50A	-	-	-	50A	20.5 [9.30 kg]	

\*Add 1 lbs [0.45 kg] when Connect Module is present.

- Notes:1. (-) Dash signifies empty position  
 2. External panel mount heatsinks are limited to specific amp configurations.  
 3. Maximum position and ratings listed.  
 4. Configurations with fewer zones and/or lower current ratings available.

## ACCESSORIES

### DIN RAIL POWER SUPPLIES

- 24 Watt – 0091011-0024-1
- 60 Watt – 0091011-0060-1
- 96 Watt – 0091011-0096-1
- 120 Watt – 0091011-0120-1

### USB CABLE

15 FT [4.92 m], Micro USB cable: 0058006-0000-15

### OTHER ACCESSORIES

Please contact us for fuse sizing and other accessory needs and we will accommodate you.



# ACCESSORIES, CONTINUED

## CCI LINK™

MicroFUSION features CCI Link™, a proprietary deterministic digital bus that enables multiple CONTROL CONCEPTS devices to communicate with each other. CCI Link™ is currently used to enable SYNC-GUARD™ over a digital bus.



0.5 ft [0.15m] cable	0058003-0050-005
1 ft [0.3 m] cable	0058003-0050-01
3 ft [0.9m] cable	0058003-0050-03
5 ft [1.5m] cable:	0058003-0050-05
15 ft [4.6m] cable:	0058003-0050-15
25 ft [7.6m] cable:	0058003-0050-25

## FIELD BUS INTERFACE

Modbus RTU (RS-485), Modbus TCP (Ethernet), EtherNet/IP, EtherCAT, PROFINET, or PROFIBUS. Simplify your cabling, eliminate A/D conversion error, and gain access to monitor information. Internal interface option: Modbus TCP, EtherNet/IP, or PROFINET. External interface option: All fieldbus interfaces are available. Controls up to ten zones.



## REMOTE HAND TERMINAL

This handheld display can be plugged into any MicroFUSION or FUSION device to view and change parameters on the display list. Part Number: SMADISPLAY-RTK.

Cables may be purchased to connect the MicroFUSION and FUSION devices.

	<b>MicroFUSION</b>	<b>FUSION</b>
5 ft [1.5m] cable:	0058007-0050-05	0058003-0050-05
15 ft [4.6m] cable:	0058007-0050-15	0058003-0050-15
25 ft [7.6m] cable:	0058007-0050-25	0058003-0050-25



## REMOTE DISPLAY

When the Remote Display is panel mounted it's easy to view and customize limits, setpoints, and alarm conditions via the 2-Line, 16-character text display. UL-type 1 & 12 ratings, IP65

5 ft [1.5m] cable:	SMAUFUSION-RDK5
15 ft [4.6m] cable:	SMAUFUSION-RDK15
25 ft [7.6m] cable:	SMAUFUSION-RDK25



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- |            |           |                 |              |                |
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| Australia  | France    | Latvia          | Romania      | Thailand       |
| Austria    | Germany   | Lithuania       | Russia       | Turkey         |
| Belgium    | Greece    | Malaysia        | Singapore    | United Kingdom |
| Bulgaria   | Hong Kong | Mexico          | Slovakia     | United States  |
| Canada     | Hungary   | Morocco         | Slovenia     | Ukraine        |
| China      | India     | The Netherlands | South Korea  | Vietnam        |
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