MICROFUSION

SINGLE PHASE SCR POWER CONTROLLERS



FEATURES

Auto-Ranging Input Voltage

UL: 24 - 600 Vac, 45 - 65 Hz
CE: 24 - 690 Vac, 45 - 65 Hz

AC Output

8, 16, 32, 50, 80, 100, 130, 160, 200, 240, 320, 400 A
(@ 6000 ft [1829 m], 122°F [50°C])

Control Features

Microprocessor-based controller, phase lock loop timing
Firing modes:

Zero Cross, Phase Angle,
Zero Cross Transformer (ZCT) Mode,
HiPER Mode[1], and Fast Zero Cross Mode

[1] HiPER firing mode is available as an optional upgrade.

Feedback: Voltage, Current, True Power, External
Adjustable Soft Start: Phase Angle
Output Limits: Voltage, Current, Power
Missing Cycle Detection
SYNC-GUARD™: Power-level multiple Zero-Cross controllers
TRANS-GUARD™: Prevent upstream transformer heating
Dedicated Input Bit for Run/Stop
kWh Meter
Heater Bake out
Resistance Measurement

Analog Interface (Up to Two Analog Inputs)

Standard setpoint ranges: 0 - 5 Vdc, 4 - 20 mA
Field Scalable: 0 - 10 Vdc, 0 - 20 mA, or Potentiometer

Available Internal Fieldbus Interfaces

EtherNet/IP
PROFINET
Modbus TCP (Ethernet)

Easy Setup via Plug-n-Play USB

Load / Save Controller Configurations
Chart Diagnostics and Log Operations

Two Year Warranty

OPTIONAL FEATURES

General Purpose Input

Second Analog Input Channel

Additional Setpoint, Potentiometer Input, External Feedback, or Pulse Width Modulation (PWM)

Alarm Relay

Form C Relay Output

2 x 16 Bit Analog Retransmits

Standard Setpoint Ranges: 0 - 5 Vdc, 4 - 20 mA
Field Scalable: 0 - 10 Vdc, 0 - 20 mA, or Potentiometer

Limit Control

Current, Power, and Voltage

Remote Display

Handheld 2 line, 16 character text display
1/4 Din Mount

High Performance

True RMS Power, Load Voltage Feedback, Load Current Feedback, High Resolution Control Loop

Isolated I/O

500 Vac isolation from 24 Vdc control power to Analog Inputs, General Purpose Input, Run/Stop, and Retransmits

External, Touchsafe Class T Fusing

DESCRIPTION

MicroFUSION is an ultra-compact high-performance microprocessor-based power controller to assist with control of AC loads.

Resistive or transformer-connected loads can be controlled in either Phase Angle, Zero Cross, Zero Cross Transformer (ZCT), Fast Zero Cross (FZC), or HiPER 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 - 400 A· AC. Auto-ranging voltage circuitry enables main supply voltage from 24 - 600 Vac for UL/cUL or 24 - 690 Vac for CE, (45 - 65 Hz) eliminating the need for hardware jumpers or stocking multiple controllers for international voltages. A separate 24 Vdc power source supplies the control electronics and maintains critical communications to your control system when the mains are absent.

Status LEDs and a LED bar graph make operation and troubleshooting simple. A plug-n-play USB interface and free Control Panel software for your PC further simplifies installing and configuring the controller to its designated application. For multiple controllers, controller settings can be duplicated by simply loading a configuration file saved from a previous unit.

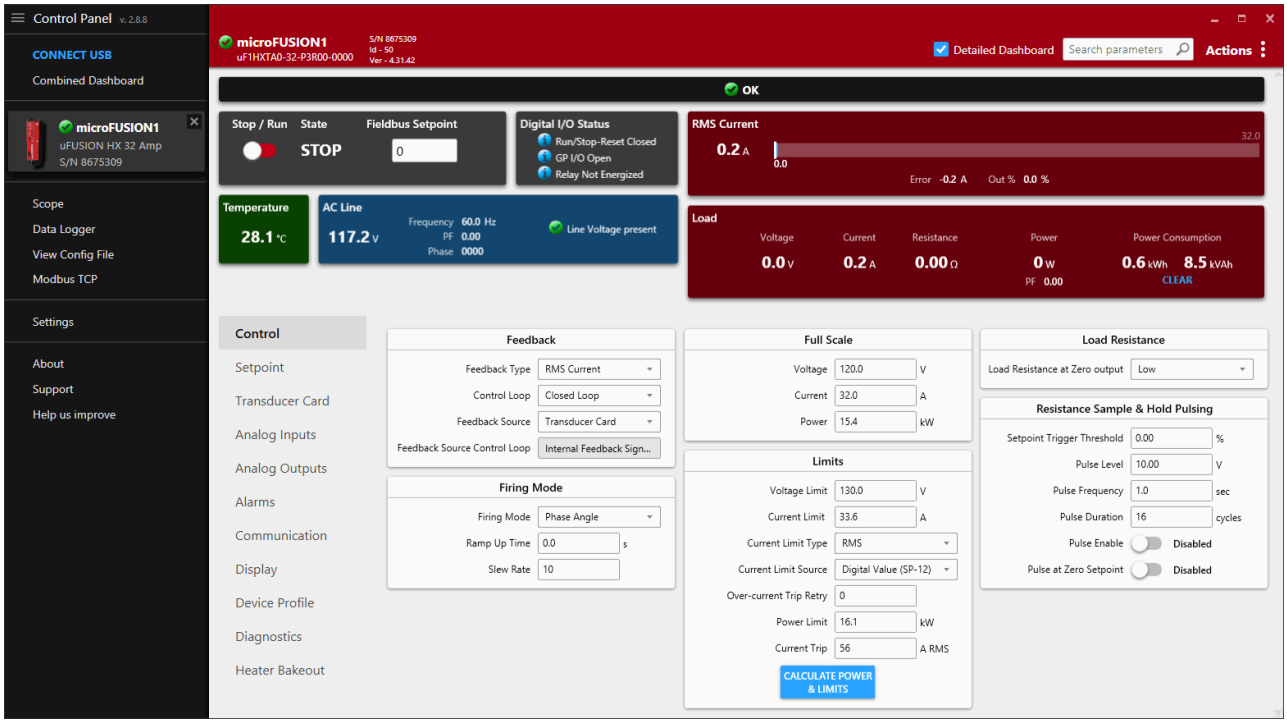
Setpoints can be controlled through the standard analog or optional digital fieldbus interface. The factory-configured analog setpoint signal ranges are 0 - 5 Vdc and 4 - 20 mA, both of which are field scalable from 0 - 10 Vdc or 0 - 20 mA.

The robust design of MicroFUSION allows for continuous full-frame current operation, without derating, up to 122°F [50°C], 6000 ft [1829 m] altitude. Cooling is accomplished through natural convection, forced air, or optional external panel mount.

The optional IP-65 Remote Display provides a clear readout of key parameters and alarm status. Setpoints, limits and alarms are touchpad accessible and easily customized. For additional convenience, a panel mounting kit is available, eliminating the need for external meters, indicators, switches and the associated costs of wiring and labor.

Free Control Panel Software for complete monitoring and control of single or multiple MicroFUSION controllers

Compatible with Microsoft Windows PC computers

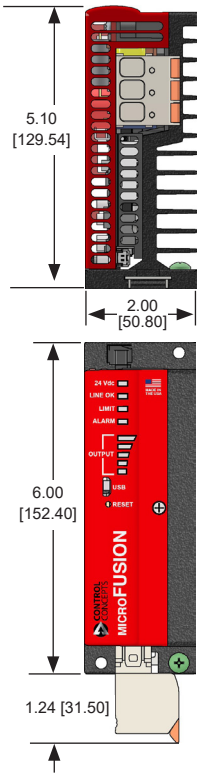


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DIMENSIONS

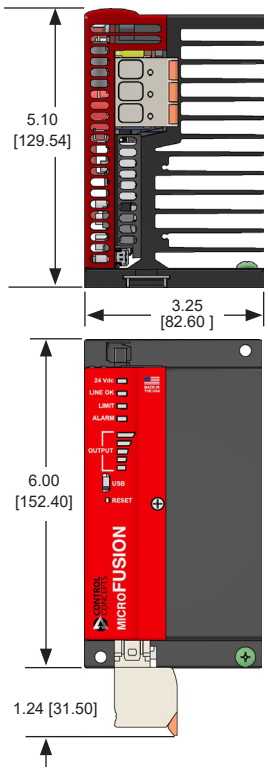
Dimensions in Inches [mm]. MicroFUSION can be DIN rail mounted (up to 50 A) or panel mounted.

8 - 32 A



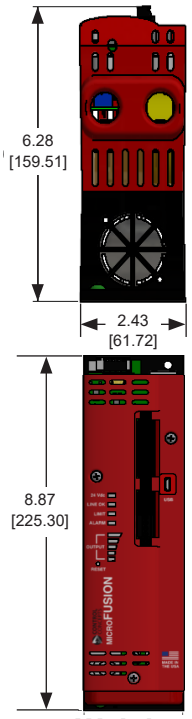
Weight:
1.8 lb [0.816 kg]

50 A



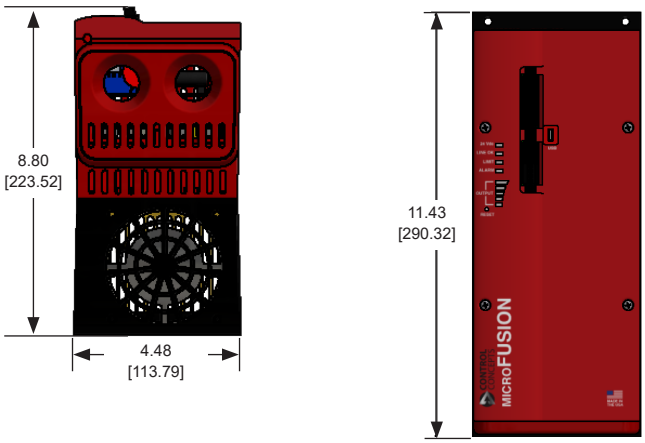
Weight:
3 lb [1.36 kg]

80 - 160 A



Weight:
4.0 lb [1.81 kg]

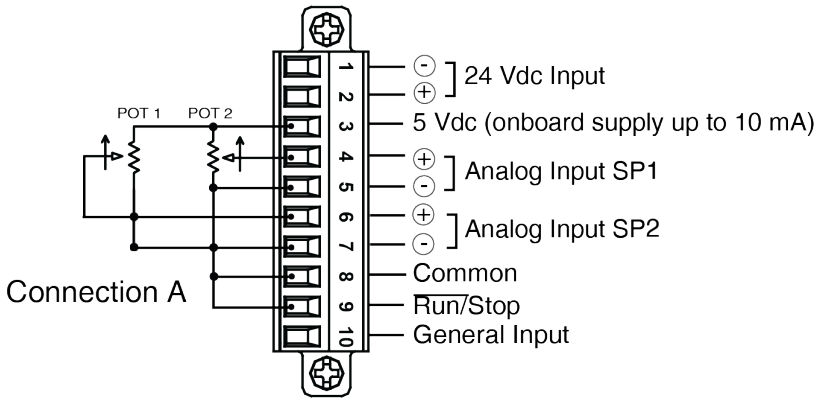
200 - 400 A



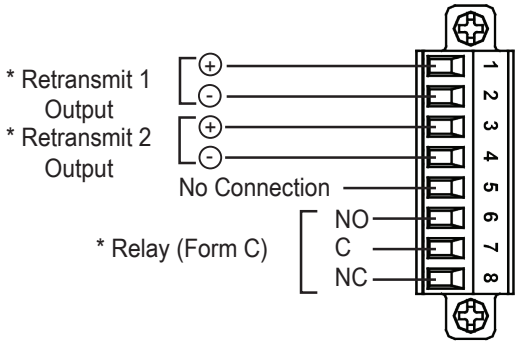
Weight:
7.5 lb [3.40 kg]

P1/P2 CONNECTOR

P1 Command Connector

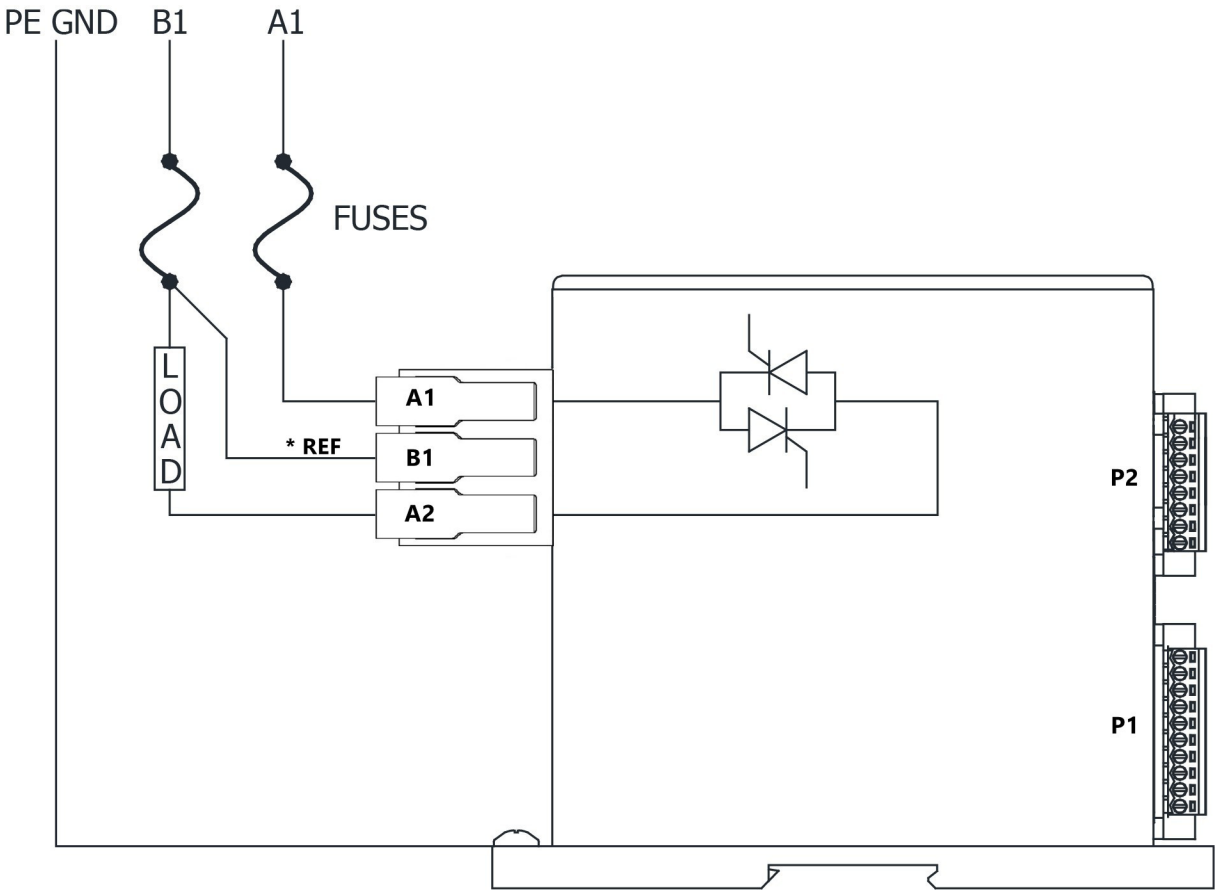


P2 Command Connector



SINGLE PHASE LINE/LOAD CONNECTIONS

SINGLE PHASE 8 - 50 AMP

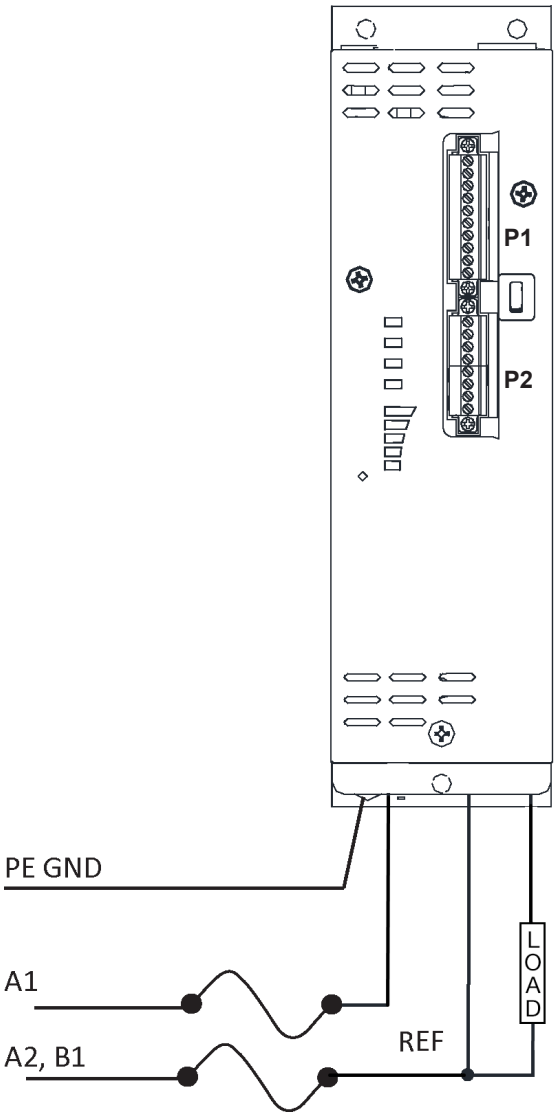


See manual for recommended wire sizes.

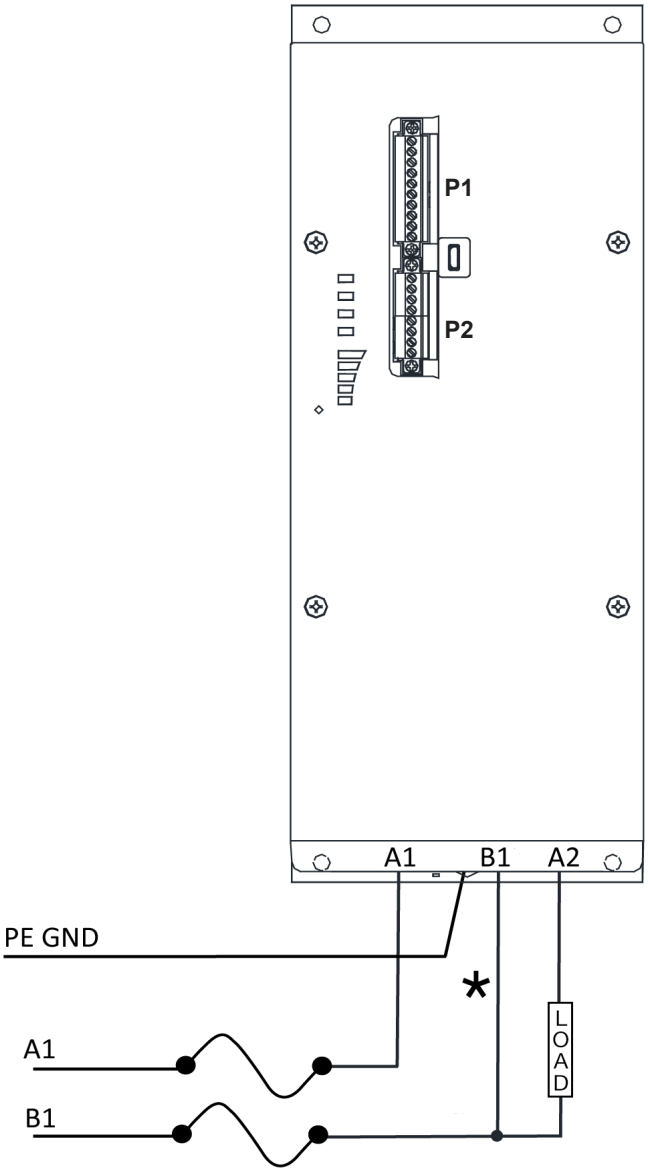
*Note: 0.60 mA maximum through B1 connection at 600 Vac

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SINGLE PHASE 80 - 160 AMP



SINGLE PHASE 200 - 400 AMP



See manual for recommended wire sizes.

*Note: 0.60 mA maximum through B1 connection at 600 Vac

FEATURE COMPARISON

MicroFUSION is available with one of four performance options: SX-S (Standard board), SX-L (Standard board with Current features), HX-L (High Performance board with Current and Voltage features) and HX-P (Fully populated High Performance board)

● = Included
☐ = Option Available at Manufacturing Time
O = Field Upgradable Option
- = Not available

FEATURE LIST	SX-S	SX-L	HX-L	HX-P
Auto-Ranging Input: 24 - 600 Vac for UL/cUL, 690 Vac for CE	●	●	●	●
Phase Angle and Zero Cross Firing Modes	●	●	●	●
Adjustable Phase Angle Soft-Start	●	●	●	●
Heater Bake Out	●	●	●	●
Touchsafe Design	●	●	●	●
UL Listed, CE, 100kA SCCR, and RoHS certifications	●	●	●	●
Micro USB Connection (USB Plug-N-Play)	●	●	●	●
Free Control Panel Software	●	●	●	●
DIN Rail Mountable (Up to 32A)	●	●	●	●
Panel Mount	●	●	●	●
$\overline{\text{Run}}$/Stop	●	●	●	●
Overcurrent Trip	●	●	●	●
Analog Input (0 - 10 Vdc, 0/4 - 20 mA or potentiometer)	●	●	●	●
CCI Link™ Connectivity	●	●	●	●
TRANS-GUARD™ - Prevents upstream transformer heating	●	●	●	●
LED Bar Graph	●	●	●	●
Fixed Current Limit - 105% of Frame	●	-	-	-
Adjustable Current Limit	O	●	●	●
Alarm Relay	O	O	●	●
Current Control	O	●	●	●
Load Voltage Control	-	-	●	●
Voltage Limit	-	-	●	●
Monitor Load Current - Provides load current data via software, display, or fieldbus	O	●	●	●
Isolated I/O	☐	☐	☐	☐
2 Analog Input Channel (0 - 10 Vdc, 0/4 - 20 mA or potentiometer)	O	O	O	O
General Purpose Input	O	O	O	O
Pulse Width Modulation Input (PWM)	O	O	O	O
Accessory Option: Remote Display	O	O	O	O
SYNC-GUARD™ Connectivity - Power level multiple Zero-Cross controllers	O	O	O	O
Internal Fieldbus Options: PROFINET, Modbus TCP, and EtherNet/IP	☐	☐	☐	☐

FEATURE COMPARISON LIST, continues on next page

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FEATURE COMPARISON, CONTINUED

FEATURE LIST, CONTINUED	SX-S	SX-L	HX-L	HX-P
Zero Cross Transformer Firing Mode	-	-	O	O
Retransmit (RTX): 2x High Resolution Analog Outputs 0 -10 Vdc or 0/4-20 mA	-	-	O	O
Power Limit	-	-	O	●
True Power Control	-	-	O	●
Monitor True RMS Power - Provides true power data via software, display, or fieldbus	-	-	O	●
High Resolution Control Loop	-	-	O	●
Kwh Meter	-	-	O	●
HiPer Mode - High performance low conduction angle firing mode	-	-	O	●
Resistance Measurement	-	-	O	●

SPECIFICATIONS

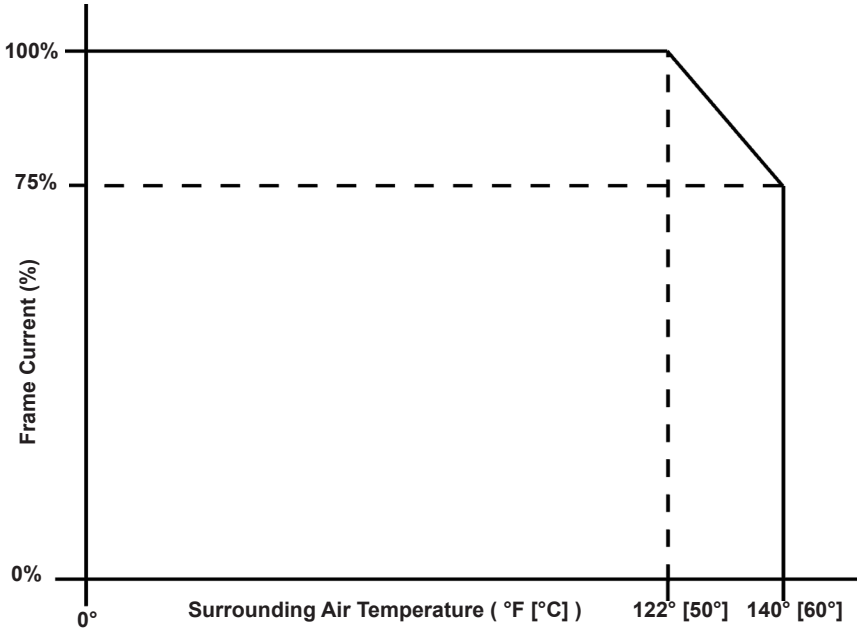
POWER	
Line Voltage (Auto Ranging)	UL/cUL: 24 - 600 Vac (Nominal) (+10% / -15%) (Contact CCI for other options) CE: 24 - 690 Vac (Nominal) (+10% / -15%) (Contact CCI for other options)
Line Frequency (Auto Ranging)	45 - 65 Hz
Frame Current Ratings (Amps)	Continuous RMS (AC) 8 | 16 | 32 | 50 | 80 |100 | 130 | 160 |200 | 240 | 320 | 400
Current Rating - Peak Surge	20x frame rating for 10 ms
Minimum Hold/Latch Current	500 mA up to 160 A 1 A at 200 - 400 A
Max Leakage Current	10.6 mA @ 600 Vac 50/60 Hz
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	105% (SX-S), 20 - 105% (SX-L, HX) of continuous rating of Frame Amp Rating
Current Trip	50 - 450% of continuous rating
Power Dissipation	1.3 W per A of load current per phase
Control Power / Operates Internal Control Electronics	24 Vdc (+10 / -15%)

ENVIRONMENTAL	
Surrounding Air Operating Temp	32°F [0°C] to 122°F [50°C] with derating for 140°F [60°C]
Humidity	20% to 90% RH Non-Condensing
Rated Operating Altitude	Up to 6000 ft [1829 m] at full rated current
Contaminates	RoHS Compliant, CE Pollution Degree 2 (only non-conductive pollution occurs)
Storage Temperature	-4°F [-20°C] to 176°F [80°C]

SPECIFICATIONS, CONTINUED

RELIABILITY	
Mean Time Between Failure (MTBF)	Designed for 50,000 Hours

TEMPERTURE DERATING
Surrounding Air Temperature effect on the Controller



PERFORMANCE		
	Standard	**High Performance Option**
Setpoint Resolution	10k	10k or 64k
Internal Control Loop Resolution	16k	64k
Output Resolution	12k @ 50 Hz, 10k @ 60 Hz	50k @ 50 Hz, 42k @ 60 Hz
Response Time	Adjustable from 50 ms to 2 s	Adjustable from 50 ms to 2 s
Accuracy (Full Conduction)		
Voltage	3.0% of frame rating	0.5% of frame rating
Current	3.0% of frame rating	0.5% of frame rating
Power	3.0% of frame rating	1.0% of frame rating
Output Linearity	4.0% from (5 - 100%) output range	1.0% from (5 - 100%) output range
Accuracy	(+10% / -15%) line voltage change will result in a max output change of 0.5% from (5 - 100%) output range	+10% to -15% line voltage change will result in a max output change of 0.05% from (5 - 100%) output range
Temperature Drift	Output shall not change greater than 0.5% per degree C max over the operating temperature range from (5 - 100%) output range	Output shall not change greater than 0.2% per degree C max over the operating temperature range from (5 - 100%) output range

SPECIFICATIONS, CONTINUED

COOLING	
Din Rail/Panel Mount	Forced Air / Natural Convection

DC POWER CONSUMPTION	
8 - 32 A Single Phase	7 W
45 A Single Phase DC	9 W
50 - 160 A Single Phase	7 W
200 - 240 A Single Phase	11 W
320 - 400 A Single Phase	17 W
Onboard Fieldbus Module	Add 0.7 W

ENCLOSURE PROTECTIVE RATING	
International	IP 20
Remote Display	IP 65, UL Type 1 & 12

I^2t DATA (8.3 - 10 msec)		
Frame Size	**Conditions**	**I^2t Data**
0 - 32	Junction Temp 125°C	16200 A^2s
50 - 160	Junction Temp 125°C	80000 A^2s
200 - 240	Junction Temp 125°C	125000 A^2s
320 - 400	Junction Temp 125°C	320000 A^2s

ISOLATION	
Signal to Line/Load	3750 Vac minimum
Line/Load to Ground	2500 Vac minimum
Signal to Ground	1500 Vac minimum
Network	1500 Vac minimum
USB	2500 Vac minimum
Signal to Processor	1500 Vac minimum
Remote Display	2500 Vac minimum

RELAY (125Vac Form C)	
Max Voltage Rating	125 Vac / 30 Vdc
Max Switching Current	1 A
Vac Rating	125 Vac / 0.3 A
Vdc Rating	30 Vdc / 1 A

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

* Maximum fuse A shown above, fuses with lower A rating can also be used.
** To meet SCCR rating Fast acting J or T fusing must be used.

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

ACCESSORIES

CCI Link Communications

MicroFUSION features CCI Link™, a proprietary deterministic digital bus that enables multiple CONTROL CONCEPTS devices to communicate with each other.

0.5 ft [0.15 m] cable	0058003 - 0050 - 005
1 ft [0.30 m] cable	0058003 - 0050 - 01
3 ft [0.91 m] cable	0058003 - 0050 - 03
5 ft [1.52 m] cable:	0058003 - 0050 - 05
15 ft [4.57 m] cable:	0058003 - 0050 - 15
25 ft [7.62 m] cable:	00580003 - 0050 - 25

REMOTE DISPLAY

The Remote Display is panel mounted with an easy to view a 2 Line, 16 character text display. Customize limits, setpoints, and view alarm conditions via CCI-Link interface. When mounted in an enclosure the display is IP65, UL-type 1 & 12 rated.

4.82 ft [1.5 m] cable:	SMACCILINK-RDK5
16.4 ft [5 m] cable:	SMACCILINK-RDK15
24.6 ft [7.5 m] cable:	SMACCILINK-RDK25



DIN RAIL POWER SUPPLIES

24 W	0091011 - 0024 - 1
60 W	0091011 - 0060 - 1
96 W	0091011 - 0096 - 1
120 W	0091011 - 0120 - 1

USB CABLE

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

6.6 ft [2 m], USB C to USB C cable with Micro adapter: 0058004-0002-066

OTHER ACCESSORIES

Contact our sales department for fuse sizing and other accessory needs via website, e-mail, or phone.

MODEL NUMBERS

uF1 □□□□ - □ - □□□□□

Board Type
SX = Standard
HX = High Performance

Terminal
L = Lug (80 - 400 A)
T = Pluggable Terminal Block (8 - 50 A)

Frame Style
A = 16 - 32 A (Panel Mount / DIN Rail)
B = 50 A (Panel Mount / DIN Rail)
E = 8 A (Panel Mount / DIN Rail)[2]
G = 80 - 160 A (Panel Mount)
H = 200 - 240 A (Panel Mount)
I = 320 - 400 A (Panel Mount)

Option Board
0 = None
I = EtherNet/IP
E = Modbus TCP
N = PROFINET

Amp Size
8 = 8 A[2]
16 = 16 A
32 = 32 A
50 = 50 A
80 = 80 A
100 = 100 A
130 = 130 A
160 = 160 A
200 = 200 A
240 = 240 A
320 = 320 A
400 = 400 A

Performance
Available with SX:
S = Standard
L = Adjustable Current Limit and Current Feedback
Available with HX:
L = Adjustable Current Limit, Current Feedback, Load Voltage Feedback, and Voltage Limit.
P = Load Voltage Feedback, True RMS Power Control, Current Limit, Power Limit, High Resolution Control Loop

IO
0 = None[3]
1 = Alarm Relay (1x Form C)
2 = General Purpose Input, Analog Input Channel 2, Pusle Width Modulation Input[3]
3 = Alarm Relay and General Purpose Input, Analog Input Channel 2, Pulse Width Modulation
4 = Isolated I/O[3]
5 = Isolated I/O with Alarm Relay
6 = Isolated I/O with Gen. Purpose Input, Analog Input Channel 2, Pulse Width Modulation[3]
7 = Isolated I/O with Alarm Relay and Gen. Purpose Input, Analog Input Channel 2/ Pulse Width Modulation

Retransmits
0 = None
R = Retransmits[2] (Two 16-bit analog retransmits for Voltage, Load Resistance, Current, and Power)

Options
0 = None
S = Digital SYNC - GUARD™
H = HiPER Firing Mode

Zero Cross Transformer Mode (ZCT)
0 = None
Z = Zero Cross Transformer Mode[2]

[1]Contact factory for availablitiy
[2]Only available with HX type board
[3]Only applicable for SX; Alarm Relay is standard for HX

CONTROL CONCEPTS has a worldwide presence in more than 51 countries

Algeria	Finland	Japan	Portugal	Taiwan
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
Czech Rep.	Indonesia	New Zealand	South Africa	
Denmark	Ireland	Norway	Spain	
Egypt	Israel	Philippines	Sweden	
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