MICROFUSION
THREE PHASE SCR POWER CONTROLLERS

MADE IN THE USA

FEATURES

Auto-Ranging Input Voltage
24 - 600 VAC, 45 - 65 Hz

AC Output
8, 16, 32, 50, 80 Amps (@ 50°C 6000 ft)

Control Features
Microprocessor-based controller / phase lock loop timing
4 SCR or 6 SCR configuration
Firing modes: zero-cross / phase angle /
    Zero Cross Transformer (ZCT) Mode
Feedback: voltage, current, true power, external
Adjustable soft start
Output limits: voltage, current, power
Missing cycle detection
SYNC-GUARD™ and TRANS-GUARD™
Dedicated RUN/STOP bit

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 Fieldbus Interfaces

DeviceNet™	EtherNet/IP
EtherCat	Modbus RTU (RS-485)
PROFINET	Modbus TCP (Ethernet)

Easy Setup via Plug-n-Play USB
Load / save configurations
Diagnostics with chart and log operations

OEM Options (Consult Factory)
UL-listed. External panel mount or liquid- cooled
heatsinks in single- and multizone configurations.
Line/load connections ring terminal option.

Two Year Warranty

OPTIONS

General Purpose Input

Second Analog Input Channel
Second setpoint, potentiometer input, or external
    feedback
Pulse Width Modulation (PWM)

Alarm Relay
Form C relay output

2 x 16 Bit Analog Retransmits
Scalable 0/4 - 20 mA or 0 - 10 V

Current Limit, Power Limit, Voltage Limit

Remote Display
2-line, 16-character text display with five buttons

High Performance
True RMS power / load voltage feedback /
    load current feedback / high resolution
    control loop
Increased accuracy, linearity

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

CERTIFICATIONS

c(UL)us LISTED

CE — EN60947-4

100kA SHORT CIRCUIT CURRENT RATING

FC — Part 15 Subpart B Class A Device

RoHS COMPLIANT

Pb-Free

ODVA

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DESCRIPTION

MicroFUSION is an ultra-compact high-performance microprocessor-based power controller, available in single phase, three phase 4 SCR, or three phase 6 SCR 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 amps AC. Auto-ranging voltage circuitry enables main supply voltage from 24-600 VAC, (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 an LED bar graph make operation and troubleshooting simple. A plug-n-play USB interface and free FUSION Control Panel software for the PC further simplifies installing and configuring the controller to your application. For example, controller settings can be duplicated simply by 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 fieldbus interface options include DeviceNet™, EtherNet/IP, EtherCAT, PROFINET, Modbus RTU (RS-485), or Modbus TCP. These can be used to communicate with a PLC or factory control system PROFINET, Modbus TCP, and EtherNet/IP are available as internal fieldbus options. All interfaces are available through an external module. Furthermore, a single external network module can control up to ten zones, reducing system installation costs.
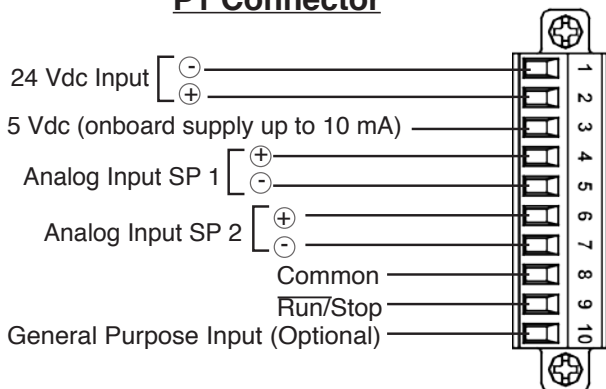
The robust design of MicroFUSION allows for continuous full-frame current operation - without derating - at up to 50° C / 6000 ft altitude. Cooling is accomplished through either natural convection, forced air, optional external panel mount, or optional liquid-cooled chill plate.

The optional remote display provides clear readouts of key electrical parameters and alarm status. Set-points, limits and alarms are touchpad accessible and easily customized. For additional convenience, a panel mounting kit is also provided, eliminating the need for costly external meters / indicators / switches and the associated costs of wiring and labor.
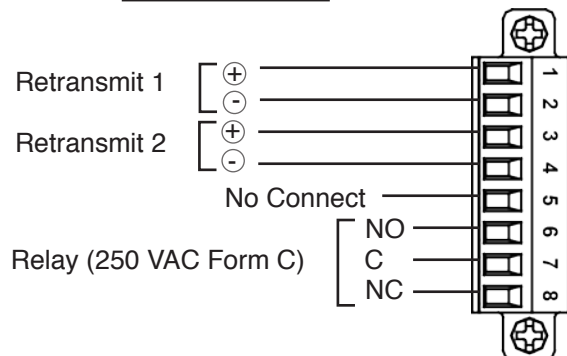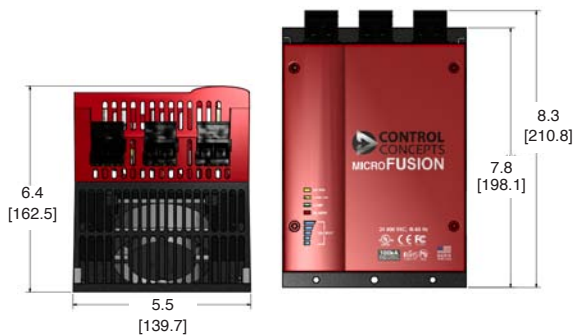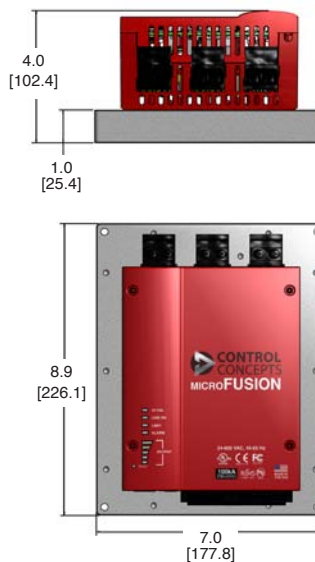
P1/P2 CONNECTOR

P1 Connector

- 24 Vdc Input [− / +] (1, 2)
- 5 Vdc (onboard supply up to 10 mA) (3)
- Analog Input SP 1 [+ / −] (4, 5)
- Analog Input SP 2 [+ / −] (6, 7)
- Common (8)
- Run/Stop (9)
- General Purpose Input (Optional) (10)

P2 Connector

- Retransmit 1 [+ / −] (1, 2)
- Retransmit 2 [+ / −] (3, 4)
- No Connect (5)
- Relay (250 VAC Form C) [NO / C / NC] (6, 7, 8)

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DIMENSIONS

DIN Rail / Panel Mount

6.4 [162.5]

5.5 [139.7]

8.3 [210.8]

7.8 [198.1]

Liquid-Cooled

4.0 [102.4]

1.0 [25.4]

8.9 [226.1]

7.0 [177.8]

External Mount

5.5 [138.9]

2.5 [62.2]

12.0 [304.8]

9.8 [247.7]
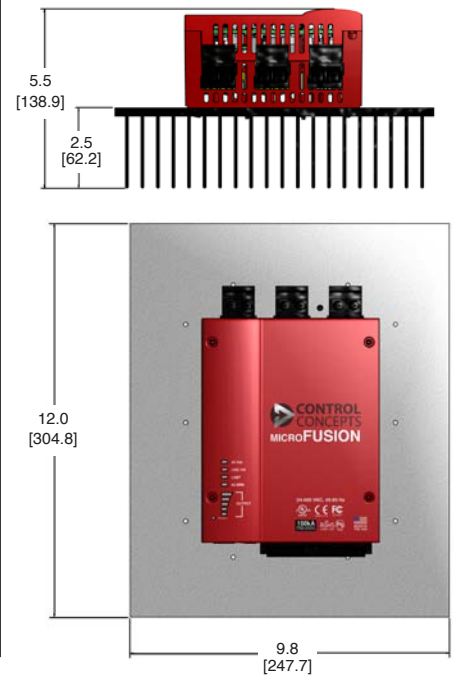
Dimensions: Inches [mm]

SPECIFICATIONS

POWER	
Line Voltage (Auto Ranging)	24 - 600 Vac (Nominal) +10% / -15% (Contact factory for other options)
Line Frequency (Auto Ranging)	45 - 65 Hz
Frame Current Ratings (Amps)	I Continuous RMS (AC) 8 I 16 I 32 I 50 I 80
Current Rating- Peak Surge	20X frame rating
Minimum Hold/Latch Current	500 mA
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	32°F [0°C] - 122°F [50°C] with derating for 60°C
External Panel Mount	122°F [50°C] with no derating
Liquid-Cooled	140°F [60°C] with no derating
Humidity	20% to 90% RH Non-Condensing
Rated Operating Altitude	Up to 6000 ft [1750m] at full rated current
Contaminates	ROHS Compliant, CE Pollution Degree 2
Storage Temperature	- 4 to 176°F [- 20 to 80°C]

PERFORMANCE

	Standard	High Performance Option
Setpoint Resolution	10k	10k or 64k
Internal Control Loop Resolution	16k	64k
Output Resolution	12k @ 50Hz, 10k @ 60Hz	50k @ 50Hz, 42k @ 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

ANALOG SETPOINT INPUTS

Voltage	0 - 10V	0 to 65535	Update rate:
Current	0 - 20 mA	0 to 32767	166.67 Hz every 6 ms
Pulse Width Modulation	0 - 100%	Frequency range: 20 Hz to 2KHz or up to 2KHz max	

SCCR

Frame 3 Ø	Recommended Fusing	SCCR Rating
8 Amp	10 Amp Fast Acting J or T	100 kA
16 Amp	20 Amp Fast Acting J or T	100 kA
32 Amp	40 Amp Fast Acting J or T	100 kA
50 Amp	60 Amp Fast Acting J or T	100 kA
80 Amp	100 Amp Fast Acting J or T	100 kA

COOLING

Din Rail/Panel Mount	Forced Air
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: 2.60 PSI at 1 GPM Particulate filtered water containing less than:

Mineral	Recommended Limit
Calcium	< 50 PPM
Magnesium	< 50 PPM
Total Hardness	< 100 PPM (5 Grains)
Chloride	< 25 PPM
Sulfate	< 25 PPM

A corrosive inhibitor must be used for deionized or demineralized water

RELIABILITY

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

DC POWER CONSUMPTION

Fan Cooled	24 Watts
External Panel Mount	18 Watts
Liquid Cooled	18 Watts
Onboard Fieldbus Module	Add 0.7 Watts
CCI Connect Module	Add 6 Watts

ISOLATION

Signal to Line/Load	3750 Vac minimum
Line/Load to Ground	2500 Vac minimum
Signal to Ground	1500 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

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

FEATURE COMPARISON

MicroFUSION is available with one of two circuit boards. SX is a lower-cost alternative, whereas HX is a fully populated board that can be field-upgraded to include retransmits and other features.

● = Included   ○ = Field Upgradable Option

□ = Option Available at Manufacturing Time   - = Not available

FEATURE LIST	SX	HX
24-600 VAC Auto-Ranging Input	●	●
Phase Angle and Zero Cross Firing Modes	●	●
LED Bar Graph	●	●
Touchsafe Design	●	●
UL-Listed, CE, 100kA SCCR, and RoHS certifications	●	●
Micro USB Connection (USB Plug-N-Play)	●	●
Free Control Panel Software	●	●
DIN Rail Mountable	●	●
Panel Mount	●	●
RUN/STOP	●	●
Overcurrent Trip	●	●
Analog Input (0-10V, 0/4-20 mA or potentiometer)	●	●
CCI Link™ Connectivity	●	●
Fixed Current Limit - 105% of Frame	●	-
Adjustable Current Limit	○	●
Alarm Relay	○	●
Current Control	○	●
Load Voltage Control	-	●
Voltage Limit	-	●
Monitor Current	○	○
Analog Channel 2 Input	○	○
General Purpose Input	○	○
Pulse Width Modulation Input	○	○
Accessory Option: Remote Display	○	○
SYNC-GUARD™ Connectivity	○	○
External Fieldbus Options: DeviceNet, Modbus TCP, Modubs RTU, EtherNet/IP, PROFINET, EtherCat	○	○
Internal Fieldbus Options: PROFINET, Modbus TCP, and EtherNet/IP	□	□
External Panel Mount Heatsink	□	□
Water-Cooled Heatsink	□	□
Zero Cross Transformer Firing Mode	-	○
Retransmit (RTX): 2x High Resolution Analog Retransmits 0-10 VDC or 0/4-20 mA	-	○
Power Limit	-	○
True Power Control	-	○
Monitor True RMS Power	-	○
High Resolution Control Loop	-	○

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Board Type
- SX = Standard
- HX = Upgradable High Performance

Load Configuration
- 4DY = Three Phase 4 SCR (2 Leg)
- 6DY = Three Phase Delta/Wye, 6 SCR
- 64Y = Three Phase 4 Wire Wye, 6 SCR
- 6ID = Three Phase Inside Delta, 6 SCR

Frame
- A = 16 - 32A (Panel Mount / Din Rail)   B = 50 - 80A (Panel Mount / Din Rail)
- C = 16 - 32A (External Mount)   D = 50A (External Mount)
- E = 16 - 32A (Liquid Cooled)   F = 50 - 80A (Liquid Cooled)
- G = 8A (Panel Mount / Din Rail)   H = 8A (External Mount)
- I = 8A (Liquid Cooled)

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

Amp Size
- 08 = 8 Amps [1]   32 = 32 Amps   80 = 80 Amps[2]
- 16 = 16 Amps   50 = 50 Amps

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, & voltage limit
- P = High Performace (Includes Load Voltage Feedback, True RMS Power Control, Current Limit, Power Limit, High Resolution Control Loop)

I/O
- 0 = 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
- 0 = None
- R = Retransmits[1] (Two 16-bit analog retransmits for voltage, load resistance, current, or power)

Sync
- 0 = None
- S = Digital SYNC-GUARD™

Zero Cross Transformer Mode
- Z = Zero Cross Transformer Mode[1]

Branch Rated Class T Fuse Options
- Blank = None
- F010 = 10A   F015 = 15A   F020 = 20A   F025 = 25A   F030 = 30A
- F035 = 35A   F040 = 40A   F045 = 45A   F050 = 50A   F060 = 60A
- F070 = 70A   F080 = 80A   F090 = 90A   F100 =100A

See "Fusing Options," page 7, for more information.

[1] Only available with HX type board

[2] 80 Amps not available for external panel mount

FUSING OPTIONS

All touchsafe kits have 600 VAC, Branch-Rated, Class T Fusing

Three Phase controllers require 3 Pole Fuseblocks.

TOUCHSAFE KITS: THREE PHASE

MODEL NUMBER	CCI PART NUMBER	AMP SIZE	DESCRIPTION
F010	SFKTS63T10	10	3 Pole Assy - 3 x Fuse, 1 x Block, 3 x Cover
F015	SFKTS63T15	15	3 Pole Assy - 3 x Fuse, 1 x Block, 3 x Cover
F020	SFKTS63T20	20	3 Pole Assy - 3 x Fuse, 1 x Block, 3 x Cover
F025	SFKTS63T25	25	3 Pole Assy - 3 x Fuse, 1 x Block, 3 x Cover
F030	SFKTS63T30	30	3 Pole Assy - 3 x Fuse, 1 x Block, 3 x Cover
F035	SFKTS63T35	35	3 Pole Assy - 3 x Fuse, 1 x Block, 3 x Cover
F040	SFKTS63T40	40	3 Pole Assy - 3 x Fuse, 1 x Block, 3 x Cover
F045	SFKTS63T45	45	3 Pole Assy - 3 x Fuse, 1 x Block, 3 x Cover
F050	SFKTS63T50	50	3 Pole Assy - 3 x Fuse, 1 x Block, 3 x Cover
F060	SFKTS63T60	60	3 Pole Assy - 3 x Fuse, 1 x Block, 3 x Cover
F070	SFKTS63T70	70	3 Pole Assy - 3 x Fuse, 1 x Block, 3 x Cover
F080	SFKTS63T80	80	3 Pole Assy - 3 x Fuse, 1 x Block, 3 x Cover
F090	SFKTS63T90	90	3 Pole Assy - 3 x Fuse, 1 x Block, 3 x Cover
F100	SFKTS63T100	100	3 Pole Assy - 3 x Fuse, 1 x Block, 3 x Cover

Recommended fuse sizing: 1.25 x SCR frame rating (Amps).
For Phase Angle, select closest standard fuse size.
For Zero Cross, select next largest size.

ACCESSORIES

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 SYNCGUARD™ over a digital bus. The ability to daisy-chain multiple MicroFUSION units will be released soon.

Available cable lengths:
    6 inch: 0058003-0050-005   1 foot: 0058003-0050-01
    5 foot: 0058003-0050-05   15 foot: 0058003-0050-15
    25 foot: 00580003-0050-25

ACCESSORIES, CONTINUED

FIELDBUS INTERFACE

Modbus RTU (RS-485), Modbus TCP (Ethernet), DeviceNet, EtherNet/IP, EtherCAT, or PROFINET. Simplify your cabling, eliminate A/D conversion error, and gain access to monitor information.

Internal interface option: Modbus TCP, EtherNet/IP, 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.

	MicroFUSION	**FUSION**
5 foot cable:	0058007-0050-05	0058003-0050-05
15 foot cable:	0058007-0050-15	0058003-0050-15
25 foot cable:	0058007-0050-25	0058003-0050-25

REMOTE DISPLAY

Easily view and customize limits, set-points, and alarm conditions on a 2-Line, 16-character text display. UL-type 1 & 12 ratings, IP65

  5 foot cable: SMAUFUSION-RDK5
  15-foot cable: SMAUFUSION-RDK15
  25-foot cable: SMAUFUSION-RDK25

DIN RAIL POWER SUPPLIES

24 VDC DIN Rail Power Supply:
24 Watts = 0091011-0024-1   60 Watts = 0091011-0060-1   96 Watts = 0091011-0096-1

USB CABLE

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

OTHER ACCESSORIES

Please contact us for fuse sizing and other accessory needs and we would be happy to accommodate you.

CONTACT/ORDERING INFORMATION