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

**AC Output**
10 - 160 Amps

**Internal Class-T Fusing**
Blown Fuse Indicator

**Analog Interface (Two Analog Inputs)**
Standard setpoint ranges: 0 - 5 Vdc, 4 - 20 mA
Field Scalable 0 - 10 Vdc, 0 - 20 mA, or POT*

**Optional Fieldbus Interface**
Modbus TCP (Ethernet)
Modbus RTU (RS-485)
ODVA-Certified DeviceNet™
Profinet (Ethernet)
Ethernet/IP

**Integrated or Remote Display**
Displays Setpoints, Line / Load Voltage,
Load Current, Load Power, Alarms

* Other scaling options available via control panel software. Contact factory for information.

**Control Features**
Digital Controller / Phase Lock Loop Timing
Zero-Cross / Phase Angle / Burst Mode
Soft Start
Output Limits: Voltage, Current, Power (Phase Angle only)
Missing Cycle Detection
TRANS-GUARD™, SYNC-GUARD™

**Alarms**
Overtemp / Phase Loss / Over Current Trip /
Shorted SCR**
Two form C relay outputs for alarms
Optional Auxiliary I/O Card
  - Up to two retransmit channels of voltage, current, or power

**Easy Setup via Plug-n-Play USB**
Load / Save Configurations
Diagnostics with Chart and Log Operations

**CERTIFICATIONS**

**BRANCH-RATED FUSING: SAVE $$$ - DON’T FUSE TWICE!**

Compact FUSION utilizes integrated Class-T, Branch-rated fusing. It’s fast enough to protect your SCR from dead shorts, reduces nuisance fuse-blowing, and meets UL 508A branch fusing requirements. Integrated fusing gives you fewer pieces to manage and lowers installation costs and footprint size.
The Compact FUSION series controller is a modular digital controller capable of single phase or three phase operation. The modular design allows up to four independent zones of control within one footprint-saving package.

Compact FUSION is nearly identical to its predecessor FUSION, (see sidebar) but with a narrower footprint, onboard branch-rated protection fusing (Class T), and a blown fuse indicator for each line. Optional pass through fusing allows a line to pass through the single phase controller to fuse the return leg of the load.

Loads can be controlled in phase-angle, zero-cross, or burst modes for operation of resistive or transformer connected loads. Output is controlled linearly with respect to command signal and can be set to the average or RMS value of the voltage or current, as well as true instantaneous power or external feedback.

Compact FUSION controllers are available in current ratings from 10 - 160 amps AC. Auto-ranging voltage circuitry enables mains supply voltage from 24-600 VAC, (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.

An integrated display and on-board diagnostics make operation and trouble shooting simple. Limits, set-points, and alarm conditions can be easily viewed and customized. 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. OEMs, for example, can duplicate controller settings by simply loading a configuration file saved from a previous unit.

Parameters can be easily viewed and controlled through the onboard display. For additional convenience, the display can also be remotely mounted on an electrical enclosure door. (See “Utilizing Remote Control,” below)

Setpoints can be controlled through the standard analog or optional 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 Modbus RTU (RS-485), Modbus TCP (Ethernet), DeviceNet™, PROFINET (Ethernet), or EtherNet/IP. These interface options can be used to communicate with a PLC or factory control system. For multi zone controllers consisting of 3 or 4 zones, a Fieldbus interface is required.
THE VISION BEHIND COMPACT FUSION

In 2009, Control Concepts released FUSION: a single controller designed to meet customer requirements and built for use around the world. FUSION series controllers accommodate international supply voltages and meet global safety and environmental standards.

Compact FUSION is our latest controller built on this same vision. The slim design reduces total installed cost and further improves economic impact, and you can expect reliable performance backed by exceptional customer service.

UTILIZING REMOTE CONTROL

A remote display kit is available from Control Concepts, Inc, allowing you to mount the display on the outside of an electrical enclosure and eliminating costly Amp meters, switches, and associated wiring and labor.

The display is rated IP 65 and UL type 1 and 12 to withstand water or dust in demanding factory conditions.

For a complete description and ordering information, see Page 6.

APPLICATIONS

Constant Resistive Loads
(Nickel Chromium)

Variable Resistive Loads
Silicon Carbide
Molybdenum Disilicide
Graphite
Tungsten Lamps

Transformer Coupled Loads
Inductive
(Not Intended for Motor Applications)

Electron Beam
Crystal Growing and Processing

Gas Discharge
Ultra Violet
### PERFORMANCE SPECIFICATIONS

#### POWER

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line Voltage (auto ranging)</td>
<td>24 - 600 Vac (Nominal) +10% / -15% *</td>
</tr>
<tr>
<td>Line Frequency (auto switching)</td>
<td>45 - 65 Hz</td>
</tr>
<tr>
<td>Frame Current Ratings (Amps)</td>
<td>I Continuous RMS</td>
</tr>
<tr>
<td>Fusing (Amps)</td>
<td>10</td>
</tr>
<tr>
<td>Fused at</td>
<td>15</td>
</tr>
<tr>
<td>Current Rating- Peak Surge</td>
<td>20X continuous rating</td>
</tr>
<tr>
<td>Minimum Hold/Latch Current</td>
<td>1 A RMS</td>
</tr>
<tr>
<td>SCR Rating (PIV)</td>
<td>1600 V peak forward &amp; reverse</td>
</tr>
<tr>
<td>Fusing</td>
<td>Internal; Branch-Rated Class T</td>
</tr>
<tr>
<td>Thermal</td>
<td>Integrated heat sink thermal sensor</td>
</tr>
<tr>
<td>Current Limit</td>
<td>20% – 105% of continuous rating of Frame Amp Rating</td>
</tr>
<tr>
<td>Current Trip</td>
<td>50% - 450% of continuous rating</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>1.3 Watt per amp of load current per phase</td>
</tr>
<tr>
<td>Control Power / Operates Internal Control Electronics</td>
<td>100 - 240 Vac 50/60 Hz</td>
</tr>
</tbody>
</table>

#### RELIABILITY

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Time Between Failure (MTBF)</td>
<td>Designed for 50,000 Hours</td>
</tr>
</tbody>
</table>

#### ENCLOSURE PROTECTIVE RATING

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>International</td>
<td>IP 20</td>
</tr>
<tr>
<td>Removable Display</td>
<td>IP 65, UL Type 1 &amp; 12</td>
</tr>
</tbody>
</table>

#### ENVIRONMENTAL

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surrounding Air Operating Temperature</td>
<td>32°F [0°C] - 122°F [50°C]</td>
</tr>
<tr>
<td>Humidity</td>
<td>20% to 90% RH Non-Condensing</td>
</tr>
<tr>
<td>Rated Operating Altitude</td>
<td>Up to 6000 ft [1750m] at full rated current</td>
</tr>
<tr>
<td>Contaminates</td>
<td>ROHS Compliant</td>
</tr>
<tr>
<td></td>
<td>CE Pollution Degree 2</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>- 4 to 176°F [- 20 to 80°C]</td>
</tr>
</tbody>
</table>

#### ISOLATION

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal to Line/Load</td>
<td>3750 Vac minimum</td>
</tr>
<tr>
<td>Line/Load to Ground</td>
<td>2500 Vac minimum</td>
</tr>
<tr>
<td>Signal to Ground</td>
<td>1500 Vac minimum</td>
</tr>
<tr>
<td>Line to Load</td>
<td>1400 Vac minimum</td>
</tr>
<tr>
<td>Network</td>
<td>1500 Vac minimum</td>
</tr>
<tr>
<td>USB</td>
<td>2500 Vac minimum</td>
</tr>
<tr>
<td>Signal to Processor</td>
<td>1500 Vac minimum</td>
</tr>
<tr>
<td>Remote Display</td>
<td>2500 Vac minimum</td>
</tr>
</tbody>
</table>

* Contact factory for other options
Type of Controller
- ZC - Zero Cross
- PA - Phase Angle
- DC - Direct Current

Number of Legs of Control
- 1 - 1 Leg
- 2 - 2 Leg (ZC only)
- 3 - 3 Leg

Module Amperage Selections

<table>
<thead>
<tr>
<th>Current Size</th>
<th>Single Phase</th>
<th>Three Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Zones</td>
<td>1 Zone</td>
<td>1 Zone</td>
</tr>
<tr>
<td>Lines Fused</td>
<td>L1</td>
<td>L1</td>
</tr>
<tr>
<td>10 Amps</td>
<td>1000</td>
<td>1100</td>
</tr>
<tr>
<td>25 Amps</td>
<td>2000</td>
<td>2200</td>
</tr>
<tr>
<td>50 Amps</td>
<td>3000</td>
<td>3300</td>
</tr>
<tr>
<td>80 Amps</td>
<td>4000</td>
<td>4400</td>
</tr>
<tr>
<td>100 Amps</td>
<td>5000</td>
<td>5500</td>
</tr>
<tr>
<td>125 Amps</td>
<td>6000</td>
<td>6600</td>
</tr>
<tr>
<td>160 Amps</td>
<td>7000</td>
<td>7700</td>
</tr>
</tbody>
</table>

NOTE: F = Pass-Through Fuse
Multi-Zone Note: When combining current sizes, the first two and last two numbers must be identical. (Examples: 3311, 6655) Higher numbers precede lower numbers.

Factory Industrial Communications*
- 0 - None
- E - Modbus TCP (Ethernet)
- N - Profinet
- D - DeviceNet
- S - Modbus RTU (RS-485)
- I - Ethernet/IP
*This is in addition to USB, which comes standard on all controllers.

Configuration Data (supplied by Control Concepts, Inc.)
- Includes configuration data such as load configurations, firing modes, feedback, limits, setpoints, ramp rates, etc.
- 0000 - Standard
- 0001 - 3 Phase Controller with a Inside Delta Load
- 0002 - 3 Phase Controller with a 4 Wire Wye Load
- XXXXX - Custom configuration data such as load configurations, firing modes, feedback, limits, setpoints, ramp rates, etc., assigned by factory.

Option Card
- 0000 - No option card
- 1000 - Auxiliary I/O expansion card [Details found in Installation & Maintenance Manual]

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Controller Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF - PA - 1 - 7000 - 0 - 0000 - 1000</td>
<td>Single Phase, Phase Angle, 160 Amps, Aux I/O Card</td>
</tr>
<tr>
<td>CF - PA - 1 - 3330 - E - 0000 - 0000</td>
<td>(3x) Single Phase, Phase Angle, 50 Amps, Modbus TCP</td>
</tr>
<tr>
<td>CF - ZC - 2 - 3311 - 0 - 0000 - 0000</td>
<td>(2x) Three Phase, Two Leg, Zero Cross, 50 Amps in Zone 1, 10 Amps in Zone 2</td>
</tr>
<tr>
<td>CF - PA - 1 - 7F5F - 0 - 0000 - 0000</td>
<td>(2x) Single Phase, Phase Angle, 160 Amps with Pass-Through Fusing, 100 Amps with Pass-Through Fusing</td>
</tr>
</tbody>
</table>

**Custom configurations are available.** Contact factory with special requirements and for availability. This may require a "-SP[□□]" to be appended to the model number which would be supplied by Control Concepts, Inc.
Internal fusing reduces power control-related panel space requirements significantly. Three-phase models are also built almost four inches slimmer than their equivalents in the original Fusion series.

Compare panel space requirements between Compact Fusion and the original Fusion model to see how slimmer dimensions translate into big savings.
ACCESSORIES

AUXILIARY I/O CARD

**Retransmit**
- 2 Analog output channels
- Scalable 0-10V dc or 0-20mA with up to 15 Vdc compliance voltage
- Each channel may be assigned either the RMS or AVG value of the load voltage, load current, or true instantaneous load power

**Digital I/O**
- 2 Digital inputs (TTL compatible, pull up to 5V through a 10KΩ resistor)
- 2 Digital Outputs (Relay driver transistor based, Open collector that sinks up to 48 Vdc at 150 mA

FIELDBUS INTERFACE

MODBUS RTU (RS-485), MODBUS TCP (Ethernet), DeviceNet, or EtherNet/IP, or PROFINET.
Simplify your cabling, eliminate A/D conversion error, and gain access to monitor information.
In the model number, use:
- S for Modbus RTU (RS-485)
- D for DeviceNet
- E for Modbus TCP (Ethernet)
- I for EtherNet/IP
- N for PROFINET

REMOTE DISPLAY

- Controller display is mountable in a 1/4 DIN cutout
- UL-type 1 & 12 ratings, IP65
- Outside Dimensions: 4.156 [105.6] x 4.156 [105.6]
- Display Mounting Kit includes: Gasket, custom mounting brackets with screws, shielded cable, circuit board retainer
  5 ft [1.52m] (CCI P/N: SMAFUSION-RD5)

USB CABLE

- 15 ft [4.92m] USB Cable (CCI P/N: 0058004-0000-15)

FUSES AND OTHER ACCESSORIES

- A wide range of fuses and fuse blocks are available.
- Please contact factory for fuse sizing and any other accessory needs and we would be happy to accommodate you.