CATERPILLAR®

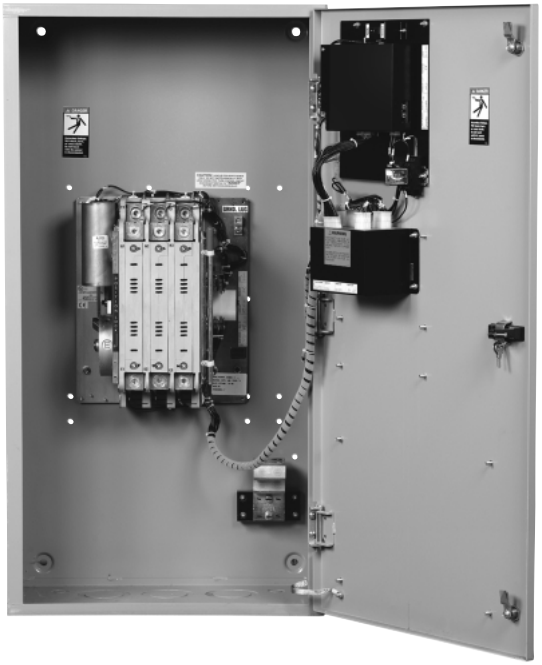
# AUTOMATIC TRANSFER SWITCH

**Engine Division** May 2003

## CTG Series
## Automatic Transfer Switch

The Caterpillar CTG Series transfer switch is pre-configured for applications requiring the dependability and ease of operation found in a full feature power contactor type switch.

- Ratings 40 to 3000 amps (2, 3 or 4 poles)
- UL 1008 listed at 480 VAC
- CSA certified at 600 VAC (200-225 amp – 480 V)
- IEC listed at 480 V
- Double throw, mechanically interlocked contactor mechanism
- Electrically operated, mechanically held
- Designed for emergency and standby applications
- Available in standard open transition (CTG) or delayed transition (CTGD) models



CTG switches are equipped with the next-generation MX150 microprocessor panel, which controls the operation and displays the status of the transfer switch's position, timers and available sources. As an embedded digital controller, the MX150 offers high reliability and ease of unattended operation across a range of applications. The MX150 features include:

- Timer and voltage/frequency settings adjustable without disconnection from power sources
- Built-in diagnostics with LCD display for immediate troubleshooting
- LED/LCD indicators for ease of viewing and long life
- Nonvolatile memory (exerciser battery backup not required for standard switch operation)
- Processor and digital circuitry isolated from line voltage
- Inputs optoisolated for high electrical immunity to transients and noise
- Communications header for network interface



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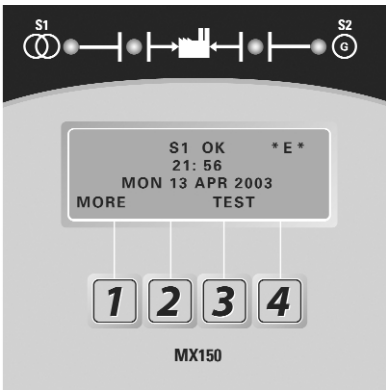
**Fully Approved**

- UL, CSA and IEC listed
- Ringing wave immunity per IEEE 472 (ANSI C37.90A)
- Conducted and Radiated Emissions per EN55022 Class B (CISPR 11) (Exceeds EN55011 & MILSTD 461 Class 3)
- ESD immunity test per EN61000-4-2 (Level 4)
- Radiated RF, electromagnetic field immunity test per EN61000-4-3 (ENV50140) 10v/m
- Electrical fast transient/burst immunity test per EN61000-4-4
- Surge immunity test per EN61000-4-5 IEEE C62.41 (1.2 X 50 ms, 5 & 8 kV)
- Conducted immunity test per EN61000-4-6 (ENV50141)
- Voltage dips and interruption immunity EN61000-4-11

**Design and Construction Features**

- Close differential 3 phase under-voltage sensing of the normal source – factory standard setting 90% pickup, 80% dropout (adjustable); under-frequency sensing of the normal source factory setting 95% pickup (adjustable)
- Voltage and frequency sensing of the emergency source – factory standard setting 90% pickup voltage, 95% pickup frequency (adjustable)
- Test switch (fast test/load/no load) to simulate normal source failure – automatically bypassed should the emergency source fail
- Type 1 enclosure is standard – also available in open style or Types 3R, 4, 4X, or 12.

### MX150 Control Panel




(Front View)

# Standard Features and Options

**Standard Features**

- Auxiliary Contact: Closed when the switch is in the emergency position
- Auxiliary Contact: Closed when the switch is in the normal position
- 7, 14, 28 day interval timed exerciser, pushbutton/timer operation
- Engine Start Contact
- Indicating LED Pilot Lights:
  - Switch in emergency position
  - Switch in normal position
  - Normal source available
  - Emergency source available
- Time Delay to Engine Start: Standard setting 3 seconds, adjustable 0-10 seconds
- In-Phase Monitor, self-adjusting (Removed on CTGD models)
- Time Delay on Retransfer to Normal: To delay retransfer to normal source (immediate retransfer on generator set failure); standard setting 30 minutes, adjustable 0-30 minutes
- Time Delay for Engine Cool Down: Allows engine to run unloaded after switch retransfer to normal; standard setting 5 minutes, adjustable 0-5 minutes
- Time Delay on Transfer to Emergency: To delay transfer to emergency after verifying emergency source available; standard setting 1 second, adjustable 0-15 seconds

- Pushbutton Bypass of time delay and normal emergency
- Test Switch – Momentary
- Inhibits transfer in either direction when in Inhibit. Allows automatic operation when in Auto. (400-800 amp units)
- Event Log OD 16 Event that track date, time, reason and action taken
- Frequency Indication for S1 and S2
- Peak Shave/Remote Load Test: Input for peak shave or remote load test; includes automatic return to normal if emergency source fails and normal is present; 120 VAC

When specified for use with a CTGD Series delayed transition switch, the control panel also includes the following:

- Time Delay from Neutral Switch Position to Normal on Retransfer: Standard setting 5 seconds, adjustable 1-30 seconds
- Time Delay from Neutral Switch Position to Emergency: Standard setting 5 seconds, adjustable 1-30 seconds
- Center-Off position/Off Delay Timing Indicators

**Optional Attachments**

- Timed Motor Disconnect Circuit: 1 N.C. operates before transfer; adjustable (not available on CTGD models, removes in-phase monitor on CTG); includes timing indicator lamp; adjustable 1-30 seconds
- Plant Exerciser, clock type (no load): Automatically starts the generator to run unloaded at selected intervals (7 day clock operation)
- Plant Exerciser, clock type (load/no load): Allows the generator to start and run unloaded or to simulate a power failure, start generator and run under load (7 day clock operation)
- Plant Exerciser, clock type (load/no load): With 365 day programming options
- Plant Exerciser, clock type (load): Automatically starts the generator and transfers the load at selected intervals (7 day clock operation)
- Heater and Thermostat
- Inhibit Transfer to Emergency: Input circuit to inhibit transfer to emergency; 24 VDC or 120 VAC
- Transfer Presignal: 1 N.O. operates during transfer; adjustable (not available on CTGD models, removes in-phase monitor on CTG); includes timing indicator; adjustable 1-60 seconds
- Network communications interface card (LonWorks/ModBus)
- Maintained Test Switch
- Maintained Test Switch w/Keypad
- Service entrance configuration
- Auxiliary Contact, operates on Source 1 line failure
- Auxiliary Contacts: Closed when the transfer switch is in Source 2 position
- Auxiliary Contacts: Closed when the transfer switch is in Source 1 position
- Battery charger connections
- Alarm panel on transfer to emergency w/silence button & light
- Disconnect Switch: Permits transfer in “AUTO” position and inhibits transfer in “INHIBIT” position.
- Fan contact, operates when generator is running
- Running Time Indicator for Engine Running (Door Mounted Counter)
- Operation Counter (Door Mounted Counter)
- Elevator Pre-Signal Auxiliary Contacts: Open 0-60 seconds prior to transfer to either direction, re-closes after transfer
- Universal Motor Load Disconnect Circuit: Auxiliary Contact opens 0-60 seconds prior to transfer in either direction, re-closes after transfer. Can be configured by end user for Pre-transfer, Post-transfer, or both.
- Voltage Imbalance Monitor (Three Phase)

**Series Power Measurement Meters**

- Digital Meter w/Display of Amps, Volts, Frequency
- Digital Meter w/Display of Amps, Watts, Volts, Frequency, kVA, kVAR, PF, etc.
- Digital Meter w/Display of Amps, Watts, Volts, Frequency, kVA, kVAR, PF, etc. Plus THD capability w/ModBus RS485 part

**NOTE:**
For applications requiring additional options or other configurations, see the CTS Series fully configurable transfer switch.

# Dimensional Specifications

| CTG and CTGD Series Transfer Switches | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NEMA 1 Enclosed | | | | Weight | |
| Model | Ampere Rating | Poles | Height (A) | Width (B) | Depth (C) | Reference Figure | NEMA 1 | Application Notes |
| CTG | 40, 80, 100 | 2, 3 | 61 (24) | 46 (18) | 27 (10.75) | A | 26 (57) | 1 – 6 |
| | 150, 200 | 4 | 61 (24) | 46 (18) | 27 (10.75) | A | 27 (60) | |
| CTGD | 40, 80, 100, 150, 225, 260, 400 | 2, 3 | 117 (46) | 61 (24) | 36 (14.13) | A | 82 (180) | 1 – 5 |
| | | 4 | 117 (46) | 61 (24) | 36 (14.13) | A | 84 (185) 102 (230) | |
| CTG | 225, 260, 400 | 2, 3 | 117 (46) | 61 (24) | 36 (14.13) | A | 80 (175) | 1 – 5 |
| | | 4 | 117 (46) | 61 (24) | 36 (14.13) | A | 82 (180) | |
| CTG/D | 600 | 2, 3 | 168 (66) | 61 (24) | 50 (19.75) | B | 181 (400) | 1 – 5, 7 |
| | | 4 | 188 (74) | 76 (30) | 50 (19.75) | B | 204 (450) | |
| | 800, 1000, 1200 | 2, 3 | 188 (74) | 76 (30) | 50 (19.75) | B | 215 (475) | 1 – 5, 7 |
| | | 4 | 188 (74) | 102 (40) | 50 (19.75) | B | 254 (560) | |
| | 1600, 2000 | 3 | 229 (90) | 76 (30) | 122 (48) | C | 458 (1010) | 1 – 5, 7, 8 |
| | 2600, 3000 | 4 | 229 (90) | 91 (36) | 122 (48) | C | 526 (1160) | |

APPLICATION NOTES:

1. English dimensions (inches) and weights (pounds) shown in parenthesis adjacent to Metric measurements in cm and Kg.
2. Includes 1.25" door projection beyond base depth. Allow a minimum of 3" additional depth for projection of handle, lights, switches, pushbuttons, etc.
3. All dimensions and weights are approximate and subject to change without notice.
4. Packing materials must be added to weights shown. Allow 15% additional weight for cartons, skids, crates, etc.
5. Special enclosure (NEMA 3R, 4, 4X, 12, etc.) dimensions and layouts may differ. Consult Caterpillar for details.
6. CTG 40-200 require larger 36" H X 24" W X 14" D enclosure when the following options are picked: Motor Disconnect, Annunciator, (R15), Elevator Pre-signal, Volt & Amp Meters & Hour Meter, the optional heater and thermostat are provided.
7. Add 3" in height for lifting eyes.
8. Ventilation louvers on side/rear of 2600 and 3000A units require one side or rear of enclosure to be clear in order to afford proper airflow.

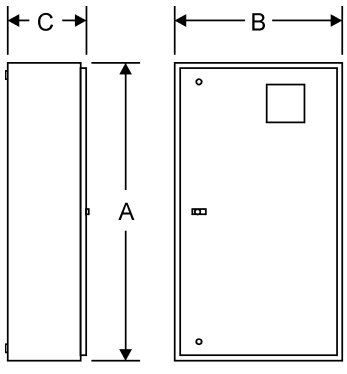



Figure A
CTG Series Transfer Switch
(40-400 amp)

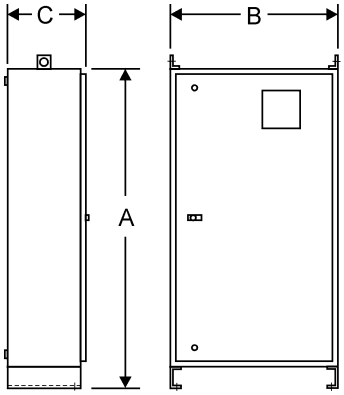



Figure B
CTG Series Transfer Switch
(600-1200 amp)

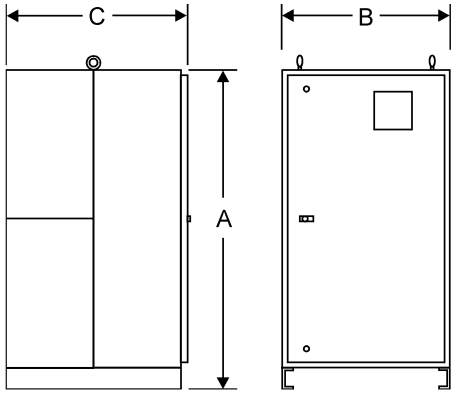



Figure C
CTG Series Transfer Switch
(1600-3000 amp)

| Testing Standards | |
|---|---|
| UL, CSA and IEC listed | UL 1008, CSA 22.2 No. 178, IEC 947-6-1 |
| Ringing wave immunity | IEEE 472 (ANSI C37.90A) |
| Conducted and Radiated Emissions | EN55022 Class B (CISPR 11)<br>(Exceeds EN55011 & MILSTD 461 Class 3) |
| ESD immunity test | EN61000-4-2 (Level 4) |
| Radiated RF, electromagnetic field immunity test | EN61000-4-3 (ENV50140) 10v/m |
| Electrical fast, transient/burst immunity test | EN61000-4-4 |
| Surge immunity test | EN61000-4-5 IEEE C62.41 1.2 X 50µs, 5 & 8 kV) |
| Conducted immunity test | EN61000-4-6 (ENV50141) |
| Voltage dips and interruption immunity | EN61000-4-11 |

| AL/CU UL Listed Solderless Screw-Type Terminals for External Power Connections | | |
|---|---|---|
| | Normal, Emergency and Load Terminals | |
| Switch Size (Amps) | Cables per Pole | Range of Wire Sizes |
| 40 | 1 | #8 to 3/0 AWG |
| 80 | | |
| 100 | | |
| 150 | | |
| 200, 225 | | #6 AWG to 250 MCM |
| 260, 400 | | #4 AWG to 600 MCM |
| 600 | 2 | #2 AWG to 600 MCM |
| 800, 1000, 1200 | 4 | |
| 1600, 2000, 2600, 3000 | 8 | #2 AWG to 600 MCM |

| MX150 Control Setting Ranges | | | |
|---|---|---|---|
| Control Function | | Range | Factory Setting |
| Normal Line Sensing – Under-voltage | Dropout | 75-98% | 80% |
| | Pickup | 85-100% | 90% |
| Normal Line Sensing – Under-frequency | Dropout | 2 Hz below pickup | Set |
| | Pickup | 90-100% | 90% |
| Emergency Line Sensing – Under-voltage | Dropout | 75-98% | 80% |
| | Pickup | 85-100% | 90% |
| Emergency Line Sensing – Under-frequency | Dropout | 2 Hz below pickup | Set |
| | Pickup | 90-100% | 95% |
| Time Delay – Engine Start | | 0-10 seconds | 3 seconds |
| Time Delay – Engine Cool Down | | 0-5 minutes | 5 minutes |
| Time Delay – Transfer to Emergency | | 0-15 seconds | 1 second |
| Time Delay – Retransfer to Normal | | 0-30 minutes | 30 minutes |
| Time Delay – Motor Disconnect or Transfer Presignal (When applicable) | | 1-30 seconds | 5 seconds |
| Delayed Transition Time Delays (When applicable) | | 1-30 seconds | 5 seconds |

# Withstand Current Data

| Withstand Current Ratings per UL 1008 | | | | | | |
|---|---|---|---|---|---|---|
| | Maximum Circuit Amps When Used With | | | | Maximum Circuit Amps When Used With | |
| CTG Switch Ratings (Amps) | Current Limiting Fuse CTG/CTGD | Specific Coordinated Breaker Rating | Any Breaker Rating | CTGD Switch Ratings* (Amps) | Specific Coordinated Breaker Rating | Any Breaker Rating |
| 40, 80, 100, 150, 200 | 200,000 | 30,000 | 10,000 | 40, 80, 100 | 50,000 | 35,000 |
| | | | | 150, 225, 260 | 50,000 | 35,000 |
| 225 260, 400 | | 50,000 | 35,000 | 400 | 50,000 | 35,000 |
| 600, 800 | | 65,000 | 50,000 | 600, 800 | 65,000 | 50,000 |
| 1000, 1200 | | 85,000 | | 1000, 1200 | 85,000 | 50,000 |
| 1600, 2000 2600, 3000 | | 100,000 | 100,000 | 1600, 2000 2600, 3000 | 100,000 | 100,000 |

*CTGD WCR rated 200,000A on all sizes.

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