Transfer Switches

Contents

Specifications

See Eaton's *Product Specification Guide*, available on CD or on the Web.

CSI Format:	1995	2010
MTS Manual Transfer Switch	**Section 16496A**	**Section 23.36.13.01**
ATS Contactor with ATC-300+ Controller	**Section 16496B**	**Section 26.36.23.01**
ATS Contactor with ATC-900 Controller	**Section 16496C**	**Section 26.36.23.03**
ATS Molded-Case with ATC-300+ Controller	**Section 16496D**	**Section 26.36.23.05**
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Automatic Transfer Switch Family

Automatic Transfer Switches

Automatic Transfer Switch Family

General Description

Eaton's automatic transfer switches are reliable, rugged, versatile and compact assemblies for transferring essential loads and electrical distribution systems from one power source to another.

Transfer switches are normally supplied in stand-alone enclosures. Eaton has the capability to integrate transfer switches into other Eaton distribution assemblies. See the following table for a list of integrated solutions.

Table 25.0-1. Product Description

Product Type	Tab Reference
Magnum DS switchgear	**20**
Pow-R-Line® switchboards	**21**
Motor control centers	**29**
Panelboards	**22**

Note: For information on "Transfer Switch Panels," refer to CA08100002E, Residential and Light Commercial Catalog, Volume 1, Tab 3.

Design Description

A transfer switch is a critical component of any emergency or standby power system. When the normal (preferred) source of power is lost, a transfer switch quickly and safely shifts the load circuit from the normal source of power to the emergency (alternate) source of power. This permits critical loads to continue running with minimal or no outage. After the normal source of power has been restored, the retransfer process returns the load circuit to the normal power source.

The three basic components of a typical transfer switch are:

1. Power switching device to shift the load circuits to and from the power source.
2. Transfer Logic Controller to monitor the condition of the power sources and provide the control signals to the power switching device and initiate the back generator startup.
3. Control power source to supply operational power to the controller and switching device.

All Eaton transfer switches are designed to meet the requirements set forth by UL® 1008 and are 100% rated switches. Eaton builds contactor-based design switches, molded-case switch (or breaker-based) design switches, and Magnum® power-case switch design switches.

UL 1008 Endurance Testing

The importance of specifying a UL 1008 transfer switch can be seen in **Table 25.0-2**. When specifying any UL 1008 transfer switch, you can be assured that the switch has met and passed the following endurance testing.

UL 1008 Life Expectancy

Transfer switch applications typically require a plant exerciser once a week or once a month. **Table 25.0-3** demonstrates the life expectancy operating the UL 1008 switch once a week for the life of the switch.

Table 25.0-2. UL 1008 Endurance Testing

ATS Rating (Amperes)	Rate of Operation per Minute	With Current	Without Current	Total
0–300	1	6000	—	6000
301–400	1	4000	—	4000
401–800	1	2000	1000	3000
801–1600	0.5	1500	1500	3000
1601–4000	0.25	1000	2000	3000

Table 25.0-3. UL 1008 Life Expectancy

ATS Rating (Amperes)	Minimum Operations per Year	Life Expectancy in Years With Current Applied	Life Expectancy in Years Without Current Applied
0–300	52	115	115
301–400	52	76	76
401–800	52	38	57
801–1600	52	28	57
1601–4000	52	19	57

Utility—Generator

Transfer switches are traditionally applied between a utility and a generator set for emergency and standby power systems.

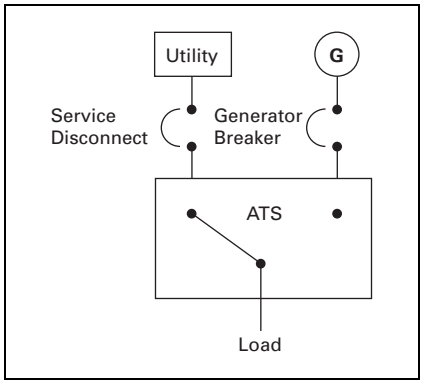

Figure 25.0-1. Standard Application Utility—Generator

Generator—Generator

Transfer switches are sometimes applied between two generator sets for prime power use, often in remote installations. In such applications, source power is periodically alternated between the generator sets to equally share run-time.

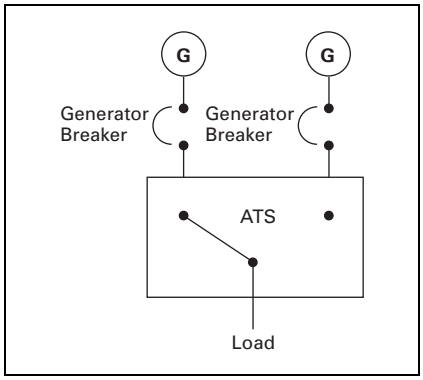

Figure 25.0-2. Standard Application Generator—Generator

Transfer Switch Types

Although an automatic transfer is the most common type of transfer, transfer switches have the following types.

Switch Types

Manual transfer—This type of transfer is a non-automatic transfer switch manually initiated and manually operated. There is no motor operator or solenoid to initiate the transfer. The operator needs to open the enclosure door and operate the manual handle. Manual transfer is available only on a breaker-based design. Service entrance ratings are not available on manual transfer breaker-based designs.

Non-automatic transfer—This type of transfer is manually initiated, but electrically operated via the solenoid in a contactor-based design and the motor operator in a breaker-based design.

Automatic transfer—This type of transfer takes place automatically per the programmable settings in the ATS controller. The ATS controller senses source availability and when the programmed conditions are met, initiates a command to start the transfer including the generator start command (when transferring from a utility to a generator source). An automatic transfer switch can be configured to perform a utility-to-utility transfer or a generator-to-generator transfer (provided the ATS controller has this capability).

Bypass isolation transfer switch—This type of transfer switch includes an automatic transfer switch and also includes the bypass switch that allows the capability to transfer the load to the bypass switch without interrupting the power.

Maintenance bypass transfer switch—A maintenance bypass transfer switch is a manually (manually initiated and electrically operated) initiated transfer switch used for specific applications for a UPS.

Mounting Type

Fixed-mount switch—Most transfer switches use a fixed-mounted power device. For contactor-based designs and breaker-based designs, the transfer switch contactor or molded-case switch is a fixed-mounted design. Individual switching devices may not be removed from the circuit without breaking hard connections to bus bars.

Drawout mount switch—Both contactor-based and Magnum-based transfer switches have optional drawout capability. Magnum ATSs have optional drawout of both Source 1 and Source 2 Magnum power case switch or breaker. Bypass isolation switches have drawout ATS switches. In addition the bypass isolation contactor design has an optional dual drawout design. Magnum bypass isolation transfer switches are supplied as standard with drawout of all the power-case switches.

Transition Type

Open transition—This is a "break-before-make" transfer. There is a definite break in power as the load s taken off one source and connected to the other source.

Open in-phase transition—This is a "break-before-make" transfer. There is a definite break in power as the load is taken off one source and connected to the other source. The ATS controller allows the transfer only when the phase difference between the two sources is near zero. The two position transfer switch is closed on Source 1 or closed on Source 2.

Open in-phase with default to time delay neutral—break-before-make operation using an in-phase monitor for source synchronization. If the in-phase does not initiate a transfer within a programmable time delay, then the transfer will default to a time delay neutral type of transfer.

Delayed transition—This is a "break-before-make" or open transition that also has a "center off" or neutral position with a programmable time delay setting for the neutral position. The three position transfer switch is either closed on Source 1, closed on Source 2, or in a center off, neutral position (not closed on either source).

Delayed transition with load voltage decay—This is a delayed transition with the optional feature to delay in the neutral position to point where the load voltage decays to a programmable voltage level. When the load voltage level reaches the programmable set point, the transfer from the neutral position initiates.

Closed transition—This is a "make-before-break" transfer. Both sources are connected to the load for less than 100ms before the break occurs. The two power sources have to be in synchronism and be good sources for the transfer to take place. These programmable settings for relative phase angle difference, frequency and voltage difference are made in the ATS controller.

Switch Position Types

The power switching device in an automatic transfer switch may be designed as either a two-position or a three-position operation. A two-position switching device can only be closed on Source 1 or closed on Source 2. There is no center off or neutral position. A three-position switching device can be closed on Source 1, closed on Source 2, or be in the center off or neutral position.

Table 25.0-4. Transition Types

Transition	Contactor-Based		Breaker-Based	Magnum-Based
	Two Position	Three Position		
Open	Yes	Yes	Yes	Yes
Open in-phase	Yes	No	No	Yes
Open in-phase default TDN	No	Yes	No	Yes
Delayed time delay neutral	No	Yes	Yes	Yes
Delayed load voltage decay	No	Yes	Yes	Yes
Closed	Yes	Yes	No	Yes

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Installation Types

Emergency—A system legally required and classified as emergency by municipal, state, federal or other governmental agencies. Automatically transfers from the normal source to the emergency source and cannot exceed 10 seconds and occurs automatically. Meets the requirements of NEC® (NFPA® 70 Article 700).

Legally required—Legally required systems are those that are so classified by municipal, state, federal or other governmental agencies. Automatically supply power to selected loads, other than those already classified as emergency. The transfer from normal power to the emergency power cannot exceed 60 seconds and occurs automatically.

Optional—Generally, supplied to selected loads either automatically or manually. There is no time limit associated with the transfer. Article 702.2 is the only article that allows manual transfer switches.

Application Considerations

Service Entrance Rated Transfer Switches

Eaton provides UL 1008 service entrance rated transfer switches using the breaker-based designs or the Magnum power-case switch designs.

Modifying the molded-case switch in the transfer switch by adding trip units and optional ground fault, along with adding the service entrance option eliminates the need for separate upstream disconnect devices and their respective power interconnections. This means the automatic transfer switch (ATS) is installed directly at the point of service entrance, saving valuable space and cost.

Eaton service entrance rated transfer switches have a 100% integrated rating. The ATS as well as the supplied breaker may be applied at 100% of the ATS rating, thus eliminating the need to consider any de-rating factors based upon the breaker rating.

The Eaton service entrance rated ATSs have been tested to and successfully passed the stringent requirements of UL 1008 and carry the integrated UL 1008 rating. This rating ensures the end user that the ATS has passed the dielectric test, endurance test, overload test, withstand rating test and temperature rise requirements of UL 1008.

Built-in Protection

All Eaton molded-case switches are "self protected," such that under extreme fault conditions, the switch will open before destroying itself. This feature allows Eaton to offer "Maintenance-Free Contacts" on the molded-case transfer switch. The molded-case switches have instantaneous magnetic trip units installed in each switch. These trips are not accessible once installed by the factory to eliminate field tapering. The trips are set to a minimum of 12 to 15 times the rated current of the molded-case device, well above any coordination set points. This means they will not interfere with the normal operation of the distribution system.

Separately Derived and Non-Separately Derived Systems (Switching the Neutral)

Separately derived systems are discussed in Article 250.20(D) of the NEC. The code says that a separately derived system is where the alternate source is provided with a grounded conductor (neutral) that is not solidly interconnected with the service supplied grounded conductor (neutral). The NEC does not mandate the need for creating a separately derived system, but does provide guidance on how it is done. Basically the ATS will switch the neutral (four-pole ATS) to keep the two systems totally isolated. This may be done to allow Ground Fault Sensing to work properly, but a separately derived system may be created for other reasons left up to the engineer. If the desire is to bond the generator neutral to ground at the generator, then a separately derived system is being created, and the neutral in the four-pole ATS must be switched.

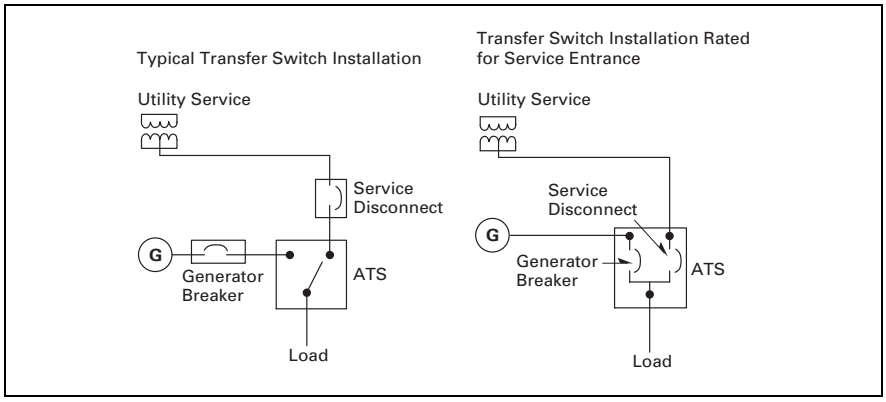

Figure 25.0-3. Service Entrance Rated Transfer Switches

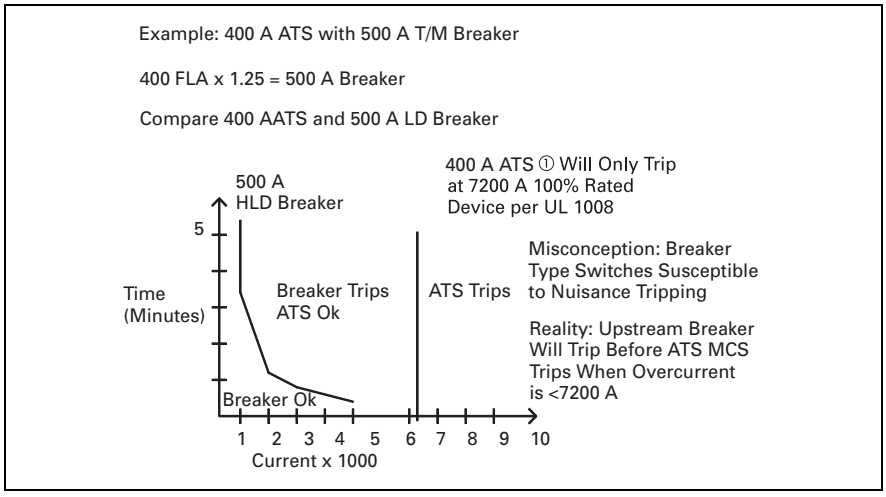

Figure 25.0-4. Built-in Protection

① Magnetic trip 12 x frame rating.

Both the Eaton breaker-based and contactor-based type ATS in all ratings are available with an optional switched neutral. This can be done for either single-phase (three-pole) or three-phase (four-pole) applications. The switched neutral pole is fully rated, meaning it has Withstand, Interrupt and Closing ratings identical to the power contacts. The neutral pole is operated on a common shaft with the power contacts, thereby ensuring simultaneous opening and closing of the neutral. Eaton provides a fully rated switched neutral or fourth pole.

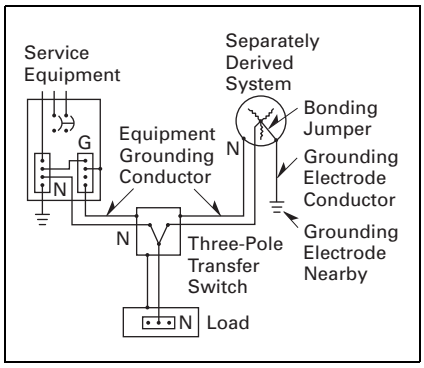

Figure 25.0-5. Separately Derived System

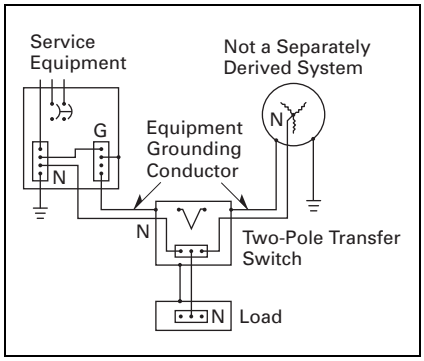

Figure 25.0-6. Non-Separately Derived System

Surge Protection

Eaton can supply, and in fact, highly recommends the use of an SPD (surge protective device) on Service Equipment Rated transfer Switches. The SPDs **should only** be applied on the utility side of the ATS and should be ordered for the correct system voltage on which they are to be used. SPDs are rated in kA, which is simply a longevity measure. The kA rating on an SPD has nothing to do with available fault current. Eaton recommends that for services 800 A and above, a minimum 250 kA rated SPD be supplied. For applications below 800 A, a 160 kA device is suggested. Of course there are other factors that may affect the decision as to the rating, and as always, the final decision is up to the engineer. And remember that an SPD is a transient/surge protective device; it is NOT an overvoltage protective device. An overvoltage condition (such as the backup generator overvoltage) will damage the SPD.

Breaker-Based Versus Contactor-Based Considerations

Eaton builds both molded-case switch (breaker-based) designs up to 1000 A and contactor-based designs up to 1600 A. Both designs are 100% rated designs, have the UL 1008 approval and carry the UL 1008 label. Application considerations may favor one design over the other.

Low amperage applications requiring a high withstand rating are more readily met with the breaker-based design. The breaker-based design meets 65 kA withstand ratings for many of the sizes. Applications requiring a service entrance rating are more readily met with a breaker-based design. An overcurrent trip is added to the molded-case switch without increasing the footprint and the entire SE rated switch is UL 1008 approved. The Eaton breaker-based designs are inherently delayed transition type and this transition type is more suited to highly inductive loads, dual utility applications, and where older AFDs may be used downstream.

Contactor-based designs tend to have a smaller footprint due to less moving parts and a smaller power contactor. Contactor-based ATSs can be applied for those applications not requiring a higher withstand rating. Applications requiring open in-phase transfer are more suited to two-position contactor-based designs. A two-position contactor-based design will operate with a shorter dead bus time than a comparable breaker-based design. This shorter dead bus time enables the ATS controller to perform the open in-phase transfer. In applications where delayed transition is required, a three-position contactor-based design may be used.

Fully Rated Fourth Pole (Switched Neutral)

Eaton provides a fully rated switched neutral or fourth pole, meaning that the fourth pole has withstand, interrupt and closing ratings identical to the power contacts. The neutral pole is operated on a common shaft with the power contacts, thereby ensuring simultaneous opening and closing of the switched neutral.

Eaton's fully rated fourth pole eliminates typical problems with a three-pole overlapping neutral:

- Eliminates nuisance ground trips at the main due to circulating zero sequence harmonic current between sources
- Reduction in ground current due to isolated single ground point lowers arc-flash levels and reduces generator damage
- Eliminates potential for faults to propagate across overlapping neutral; fully rated fourth pole will handle as a normal operation
- Does not generate voltages that exceed normal phase voltage

Note: For more detail, reference Eaton White Paper IA08700002E.

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Short-Circuit Withstand/Closing and Short-Time Current Ratings

The available fault current in a system will determine the withstand rating required for the transfer switch. When talking about available fault current, it is important to understand the difference between a "**Short-Circuit Withstand**/Closing Rating", commonly known as the Withstand Rating and a "**Short-Time Withstand**/Closing Rating" as defined in the UL 1008 test standard as the Short-Time Current Rating. The short-circuit test series actually consists of more than just a withstand test. It is a withstand test followed by a closing test on the same contacts, and then a dielectric test. To pass the withstand portion of the test, the device must stay closed for the test time period. To pass the closing portion of the test, the device must close on the fault and stay closed for the test time period. The short-time test series follows the same sequence but adds a temperature rise on the tested contacts. Additionally, after the short-time test, the contacts must remain viable to allow transfer back to the normal source.

The **short-circuit withstand** rating is typically defined in a time duration (or equivalent number of cycles) at a given magnitude of current. For example, a "0.05 second at 60 Hz (3-cycle) withstand at 65 kA". A 0.05 second at 60 Hz (3-cycle) short-circuit withstand is fairly typical in the industry; however, recent revisions to the UL 1008 standard now allow manufacturers to test to longer durations. Regardless of the duration of the short-circuit withstand test, it is important to understand the permitted condition of the transfer switch contacts following the test. The short-circuit withstand test only ensures that the contacts do not weld, which is important to ensure that it will still transfer to the alternate source. However, the contacts can be damaged even to the point that a retransfer back to the original source may not be possible and this would still be considered a PASS of the short-circuit withstand test.

In contrast to the short-circuit withstand testing that is required by UL, **short-time current rating test** is an optional test that a manufacturer can subject their transfer switches to. The short-time current rating is also defined in a time duration (or equivalent number of cycles) at a given magnitude of current, except that it is typically greater than 0.1 second. Again, the important difference is understanding the allowable condition of the transfer switch following the short-time withstand test. Unlike the short-circuit withstand test, after the short-time current rating test, the transfer switch contacts must still be viable. This ensures that not only can the transfer switch transfer to the alternate source after the fault, it can also transfer back to the normal source and continue to carry the load.

Understanding of the difference in the **short-circuit withstand** rating and the **short-time current** rating is crucial in specifying the proper transfer switch for the application. If the upstream OCPD has an instantaneous trip and total clearing time less than the short-circuit withstand rating (typically 3-cycles), then the ATS may only require a short-circuit withstand rating. However, the ATS also needs to have a short-time current rating if the upstream OCPD does not have an instantaneous trip or if total clearing time exceeds the short-circuit withstand rating (such as a power circuit breaker).

Transfer Switch Selection Guide

Table 25.0-5. Transfer Switch Product Family—Contactor-Based Design

Description	Switch Type	Transition Type			Controller Type	Mounting Type	Voltage	Current Amperes	No. of Poles	NEMA® Enclosure
		Open	Delayed	Closed						
Contactor-based transfer switch design  See **Page 25.1-1**	Automatic non-automatic	■	■		ATC-100 ① ATC-300+ ATC-900	Fixed	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	40 80 100 150 200 225 260 400 600 800 1000 1200 1600	2, 3, 4	Open NEMA 1 NEMA 3R NEMA 4X NEMA 12
Contactor-based transfer switch design  See **Page 25.1-5**	Automatic			■	ATC-900	Fixed	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	40 80 100 150 200 225 260 400 600 800 1000 1200	2, 3, 4	Open NEMA 1 NEMA 3R
Contactor-based bypass isolation transfer switch design  See **Page 25.1-8**	Automatic bypass isolation	■	■	■	ATC-300+ ATC-900	Dual Drawout	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	100 150 200 225 260 400 600 800 1000 1200 1600	2, 3, 4	Open NEMA 1 NEMA 3R NEMA 4X NEMA 12
Contactor-based bypass isolation transfer switch design  See **Page 25.1-14**	Automatic bypass isolation	■	■	■	ATC-300+ ATC-900	Fixed Bypass	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	100 150 200 225 260 400 600 800 1000 1200	2, 3, 4	Open NEMA 1 NEMA 3R NEMA 4X NEMA 12

① Up to 400 A only.

Table 25.0-6. Transfer Switch Product Family—Breaker-Based Design

Description	Switch Type	Transition Type			Controller Type	Mounting Type	Voltage	Current Amperes	No. of Poles	NEMA Enclosure
		Open	Delayed	Closed						
Molded-case switch-based design  See **Page 25.2-1**	Manual	■	■		No controller	Fixed	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	30 70 100 150 225 300 400 600 800 1000	2, 3, 4	Open NEMA 1 NEMA 12 NEMA 3R NEMA 4 NEMA 4X
Molded-case switch-based design  See **Page 25.2-4**	Non-automatic	■	■		No controller	Fixed	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	30 70 100 150 225 300 400 600 800 1000	2, 3, 4	Open NEMA 1 NEMA 12 NEMA 3R NEMA 4 NEMA 4X
Molded-case switch-based design  See **Page 25.2-7**	Automatic	■	■		ATC-100 ① ATC-300+ ATC-900	Fixed	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	30 70 100 150 225 300 400 600 800 1000	2, 3, 4	Open NEMA 1 NEMA 12 NEMA 3R NEMA 4 NEMA 4X
Maintenance bypass  See **Page 25.2-12**	Manual			■	No controller	Fixed	480 480/277 240 240/120 208/120	100 150 225 300 400 600 800 1000	2, 3, 4	Open NEMA 1 NEMA 12 NEMA 3R NEMA 4X

① Up to 400 A only.

Table 25.0-7. Transfer Switch Product Family—Magnum-Based Design

Description	Switch Type	Transition Type			Controller Type	Mounting Type	Voltage	Current Amperes	No. of Poles	NEMA Enclosure
		Open	Delayed	Closed						
Power-case switch Magnum-based design  See **Page 25.3-1**	Non-automatic	■			No controller	Fixed or drawout	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	200 300 400 600 800 1000 1200 1600 2000 2500 3000 3200 4000 ① 5000 ①	2, 3, 4	Open ② NEMA 1-behind NEMA 1-thru NEMA 3R
Power-case switch Magnum-based design  See **Page 25.3-1**	Automatic	■	■	■	ATC-900	Fixed or drawout	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	200 300 400 600 800 1000 1200 1600 2000 2500 3000 3200 4000 5000	2, 3, 4	Open ② NEMA 1-behind NEMA 1-thru NEMA 3R
Power-case switch Magnum-bypass isolation based design  See **Page 25.3-10**	Automatic bypass isolation	■	■	■	ATC-900	Drawout	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	200 300 400 600 800 1000 1200 1600 2000 2500 3200 4000 5000	2, 3, 4	NEMA 1-behind NEMA 1-thru NEMA 3R

① Drawout only.
② Up to 3200 A.

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Automatic Open Transition, 40–1600 A

Contactor-Based ATS with ATC-300+ Controller

General Description

The automatic open transition contactor-based transfer switch is the most basic design that will provide a fully functioning automatic transfer switch.

The power switching operation of Eaton's contactor-based transfer switches may be separated into the following key categories of:

- Open in-phase transition—break-before-make operation using an in-phase monitor for source synchronization
- Open in-phase with default to time delay neutral—break-before-make operation using an in-phase monitor for source synchronization. If the in-phase does not initiate a transfer within a programmable time delay, then the transfer will default to a time delay neutral type of transfer
- Open delayed transition—break-before-make operation using a programmable time delay (true neutral position)

The open in-phase transition uses a two-position mechanism and the open delayed transition uses a three-position mechanism. The mechanism used to operate the Eaton electrical contactor is a momentarily energized solenoid consisting of a stationary core and a moving core that is magnetically driven by an electrical coil.

The mechanism can be electrically and mechanically operated. The design is such that the mechanism is inherently interlocked so that the device cannot be closed on the Source 1 and Source 2 at the same time under any circumstances. When switching from Source 1 to Source 2, or Source 2 to Source 1, the mechanism will only allow a break-before-make operation.

These contactor-based designs can be applied with the ATC-100 controller up to 400 A. The ATC-300+ controller can be applied for applications 40–1600 A. Applications needing communication capability require the ATC-300+ with communication enabled or the ATC-900 controller.

Application Description

An automatic open transition transfer switch may be used for those applications where emergency backup power is required, but a momentary loss of power is acceptable on the retransfer from emergency to normal.

Features

Standard Features—with ATC-300+ Controller

- Auxiliary relay contacts:
  - Source 1 present 2NO and 2NC
  - Source 2 present 2NO and 2NC
- Switch position indication contacts:
  - Source 1 position 1NO and 1NC
  - Source 2 position 1NO and 1NC
- Source 1 and Source 2 sensing:
  - Undervoltage/underfrequency
  - Overvoltage/overfrequency
  - Three-phase rotation protection
  - Three-phase voltage unbalance
- Pre-transfer signal contacts 1NO/1NC (with three-position mechanism)
- Go to emergency (Source 2)
- Seven field-programmable time delays
- LCD-based display for programming, system diagnostics and Help message display
- Mimic diagram with source available and connected LED indication
- Time-stamped history log
- System TEST pushbutton
- Programmable plant exerciser—OFF, daily, 7-, 14-, 28-day interval selectable run time 0–600 minutes no load/load with fail-safe

Optional Features

- Available surge suppression device for power/controller, engine start circuit, phone and cable connections
- Space heater with thermostat
- Eaton IQ and Power Xpert® series metering
- Stainless steel cover for controller
- Open in-phase transition, time delay neutral or in-phase with a default to time delay neutral transfer
- ATC-100 and ATC-900 controllers available
- Modbus® RTU via RS-485
- Source 2 inhibit
- Manual retransfer to normal
- Remote annunciator with control
- Ethernet communication (PXG 900 Gateway)

Commercial Design Highlights

- UL 1008 Listed
- High withstand and closing ratings
- Compact design
- Front access design

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Technical Data

Table 25.1-1. UL 1008 Short Circuit Withstand and Close-On Ratings (kA)

UL 1008 Ampere Rating	Mechanism	480 V		600 V		
		3-Cycle	Specific Breaker	3-Cycle	Specific Breaker	Specific Fuse
40, 80, 100	C2	10,000	30,000	10,000	22,000	100,000 ①
150, 200	C2	10,000	30,000	22,000	35,000	100,000
225, 260, 400	C2	30,000	50,000	—	—	200,000
40, 80, 100, 150, 200	C3, C5	30,000	50,000	22,000	35,000	200,000
225, 260, 400	C3, C5	30,000	50,000	50,000	65,000	200,000
600, 800, 1000, 1200	C3, C5	50,000	65,000	50,000	65,000	200,000
1600	C3, C5	50,000	65,000	—	—	200,000 ①

① Specific fuse rating at 480 V only.

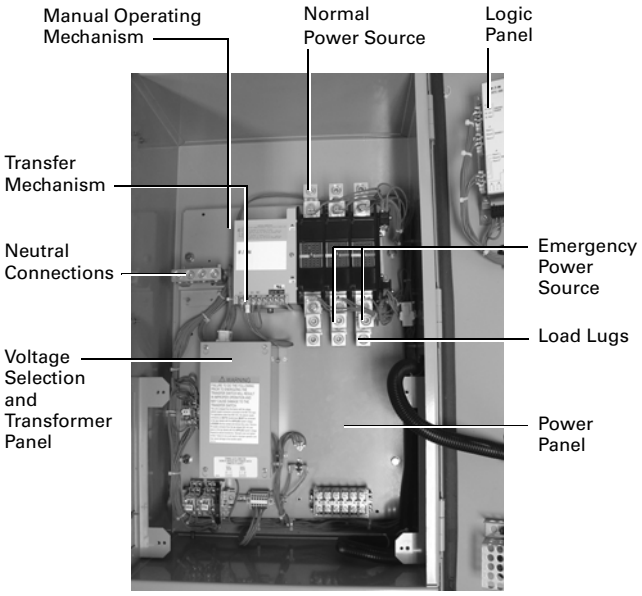
Table 25.1-2. UL 1008 Ratings (100% Rated)

Mounting Type	Voltage	Current Amperes	No. of Poles	NEMA Enclosure
Fixed	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	40 80 100 150 200 225 260 400 600 800 1000 1200 1600	2, 3, 4	Open NEMA 1 NEMA 3R NEMA 12 NEMA 4X

200 A ATS with ATC-300+ Controller

1200 A ATS with ATC-300+ Controller

1600 A ATS with ATC-300+ Controller



Typical Contactor-Based ATS 100–400 A

Dimensions—Approximate Dimensions in Inches (mm)

Table 25.1-3. Contactor-Based Transfer Switch 40–1200 A Open Transition
(See Figure 25.1-7 and Figure 25.1-8)

Ampere Rating	Enclosure	A (Height)	B (Width)	C (Depth)	Load Side, Normal and Standby Source	Neutral Connection	Weight in Lb (kg)
40–100 at 480 V ①	N1, N12, N3R	38.68 (982.5)	18.31 (465.1)	13.34 (338.8)	(1) #14–2/0	(3) #14–1/0	156 (71)
	N4X	37.50 (952.5)	17.50 (444.5)	14.34 (364.2)	(1) #14–2/0	(3) #14–1/0	156 (71)
40–100 at 600 V ①	N1, N12, N3R	38.68 (982.5)	18.31 (465.1)	13.34 (338.8)	(1) #14–2/0	(3) #14–1/0	164 (74)
	N4X	37.50 (952.5)	17.50 (444.5)	14.34 (364.2)	(1) #14–2/0	(3) #14–1/0	164 (74)
150–200 at 480 V ①	N1, N12, N3R	38.68 (982.5)	18.31 (465.1)	13.34 (338.8)	(1) #6–250 kcmil	(3) 1/0–250 kcmil	164 (74)
	N4X	37.50 (952.5)	17.50 (444.5)	14.34 (364.2)	(1) #6–250 kcmil	(3) 1/0–250 kcmil	164 (74)
150–200 at 600 V ①	N1, N12, N3R	52.00 (1321.0)	19.81 (503.2)	16.75 (425.5)	(1) #6–250 kcmil	(3) 1/0–250 kcmil	260 (118)
	N4X	52.00 (1321.0)	21.00 (533.4)	16.75 (425.5)	(1) #6–250 kcmil	(3) 1/0–250 kcmil	260 (118)
225–400 at 480 V ①	N1, N12, N3R	52.00 (1321.0)	19.81 (503.2)	16.75 (425.5)	(2) 3/0–250 kcmil (1) 3/0–600 kcmil	(6) 250–500 kcmil	260 (118)
	N4X	52.00 (1321.0)	21.00 (533.4)	16.75 (425.5)	(2) 3/0–250 kcmil (1) 3/0–600 kcmil	(6) 250–500 kcmil	260 (118)
225–1200 at 600 V ②	N1, N3R	79.41 (2017.0)	29.19 (741.4)	22.46 (570.5)	(4) 1/0–750 kcmil	(12) 1/0–750 kcmil	600 (272) three-pole 650 (295) four-pole
	N12, N4X	84.75 (2152.7)	29.00 (737.0) three-pole 29.00 (737.0) four-pole	24.26 (616.2)	(4) 1/0–750 kcmil	(12) 1/0–750 kcmil	700 (318) 750 (340)
600–1200 at 480 V ②	N1, N3R	79.41 (2017.0)	25.25 (641.4) three-pole 29.19 (741.4) four-pole	22.46 (570.5)	(4) 1/0–750 kcmil	(12) 1/0–750 kcmil	600 (272) three-pole 650 (295) four-pole
	N12, N4X	84.75 (2152.7)	29.00 (737.0) three-pole 29.00 (737.0) four-pole	24.26 (616.2)	(4) 1/0–750 kcmil	(12) 1/0–750 kcmil	700 (318) 750 (340)

① Wallmount.
② Floor standing—height dimension includes the bottom bracket.

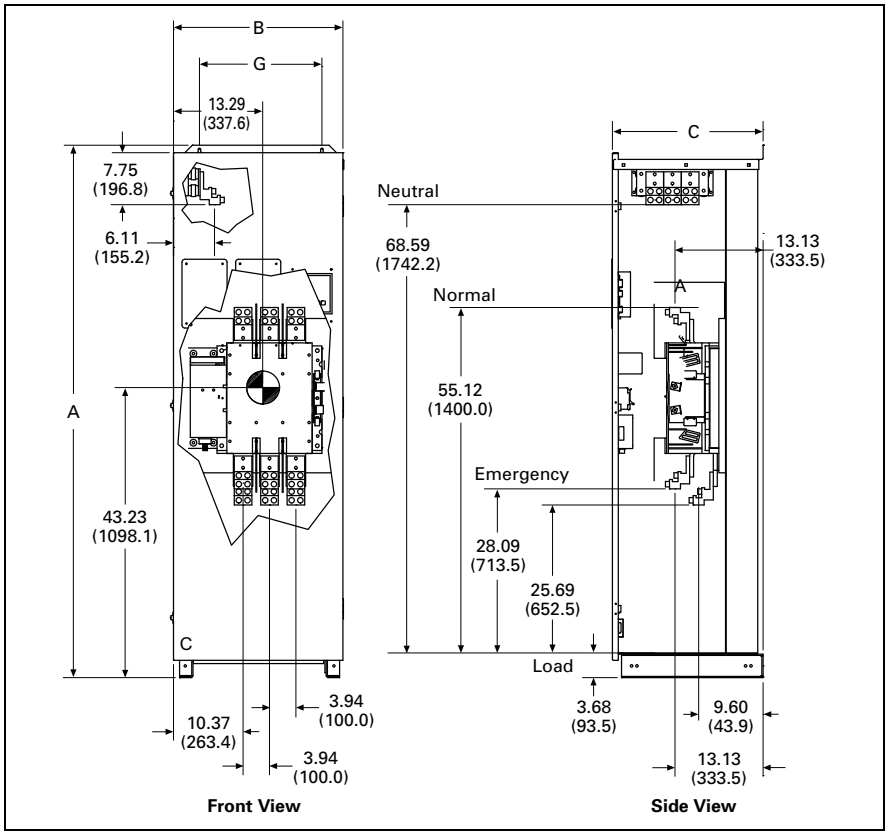


Figure 25.1-7. Automatic, Non-Automatic 600–1200 A Outline NEMA 1 and NEMA 3R

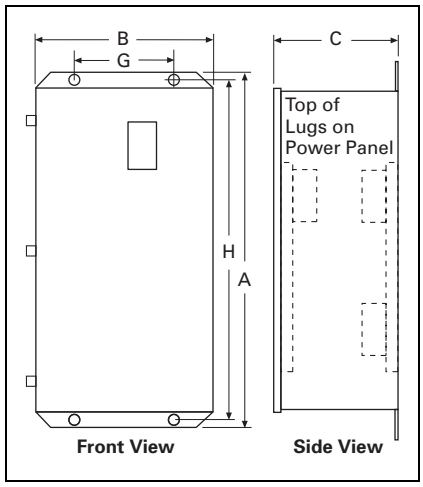


Figure 25.1-8. Automatic, Non-Automatic Up to 400 A Wallmount Outline NEMA1 and NEMA 3R

Table 25.1-4. 1600 A Transfer Switch

Ampere Rating	Enclosure	A (Height)	B (Width)	C (Depth)	Load Side, Normal and Standby Source	Neutral Connection	Weight Lb (kg)
1600 A at 480 V ①	N1	90.00 (2286.0)	40.00 (1016.0)	28.73 (729.7)	(4) 1/0–750 kcmil	(12) 1/0–750 kcmil	730 (331) three-pole 830 (377) four-pole
	N3R	90.72 (2304.3)	40.35 (1024.9)	43.34 (1100.8)	(4) 1/0–750 kcmil	(12) 1/0–750 kcmil	780 (354) three-pole 830 (377) four-pole

① Freestanding.

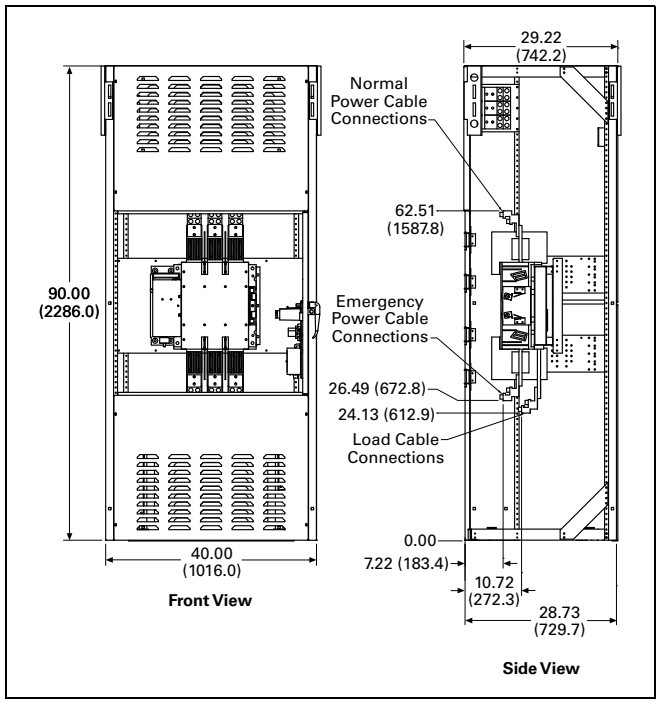


Figure 25.1-9. Automatic, Non-Automatic Open Transition NEMA 1 Enclosure

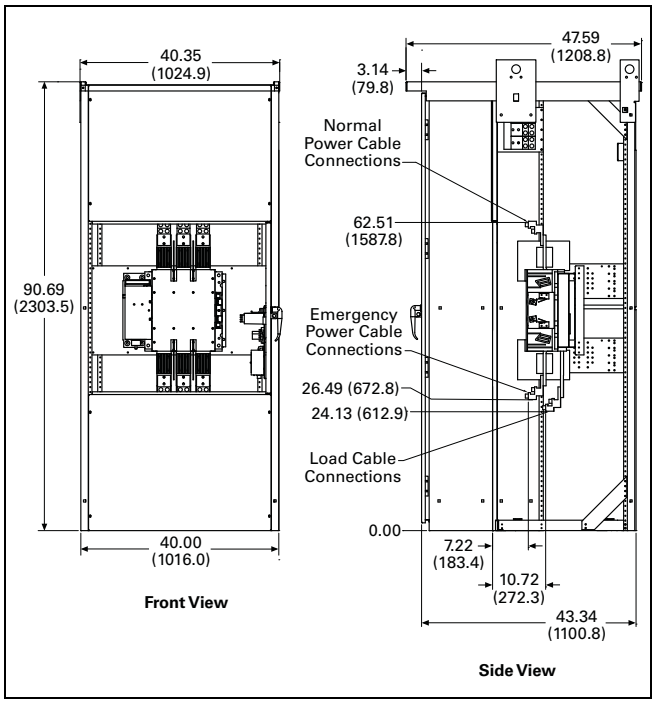
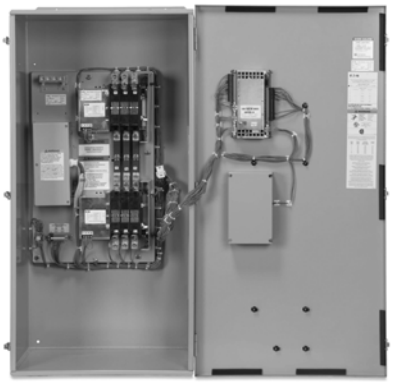


Figure 25.1-10. Automatic, Non-Automatic Open Transition NEMA 3R Enclosure

Automatic Closed Transition, 40–1200 A



Contactor-Based ATS with ATC-900 Controller

General Description

Eaton's closed transition contactor-based automatic transfer switch is designed to avoid intentional interruption of power when both sources of power are available by momentarily paralleling both sources.

The switches are equipped with the Eaton ATC-900 controller that provides operational simplicity and field configuration capability, coupled with enhanced diagnostic and troubleshooting capability.

The make-before-break contact sequence coupled with Eaton's ATC-900 provides a transfer switch that is useful in critical standby power applications available from 40 to 1200 A.

Application Description

A transfer switch designed for closed transition has make-before-break contacts that require the normal and alternate sources to be synchronized. The source contacts on Eaton's CTC9 will parallel for 100 ms or less. The ATC-900 provides all-phase undervoltage, underfrequency, and overvoltage and overfrequency protection as a standard. Consult with the local utility company for permission and to verify the protection requirements as each utility may have different rules regarding closed transition applications. Protective relays may be available as an option upon request.

Closed Transition Controls

The CTC9 accomplishes the closed transition transfer by monitoring the voltage and frequency set point conditions of both power sources. Once the set point conditions are met, the ATC controller will start the closed transition synchronization timer (TSCT). The TSCT is adjustable from 1–60 minutes in duration. This duration is the time during which the ATC-900 controller will monitor the phase angles to anticipate when they will be within 8 electrical degrees. The closed transition scheme is anticipatory, allowing the close contacts signal to be initiated before the sources are exactly in phase. If the TSCT times out and the transfer switch has not reached synchronization, the transfer switch will remain connected to the current power source and a failure to transfer alarm will be displayed.

The transfer switch can also be equipped with an optional open transition transfer method for situations where synchronization is not possible, but a transfer is required. One of the following transition features can be selected:

- Closed transition only
- Closed transition with default to load voltage decay
- Closed transition with default to time delay neutral

Features

Standard Features—with ATC-900 Controller

- Auxiliary relay contacts:
  - Source 1 present 1NO and 1NC
  - Source 2 present 1NO and 1NC
- Switch position indication contacts:
  - Source 1 position 1NO and 1NC
  - Source 2 position 1NO and 1NC
- Source 1 and Source 2 sensing:
  - Undervoltage/underfrequency
  - Overvoltage/overfrequency
- Go to emergency (Source 2)
- Seven field-programmable time delays
- LCD-based display for programming, system diagnostics and Help message display
- Mimic diagram with source available and connected LED indication
- Time-stamped history log
- System TEST pushbutton
- Programmable plant exerciser—OFF, daily, 7-day interval selectable run time 0–600 minutes no load/load with fail-safe
- Multi-tap transformer

Optional Features

- Available surge suppression device for power/controller, engine start circuit, phone and cable connections
- Space heater with thermostat
- Ammeter—load side
- Power quality metering
- Steel cover for controller
- Three-phase rotation protection
- Three-phase voltage unbalance
- Pre-transfer signal contacts 1NO/1NC (with three-position mechanism)

Commercial Design Highlights

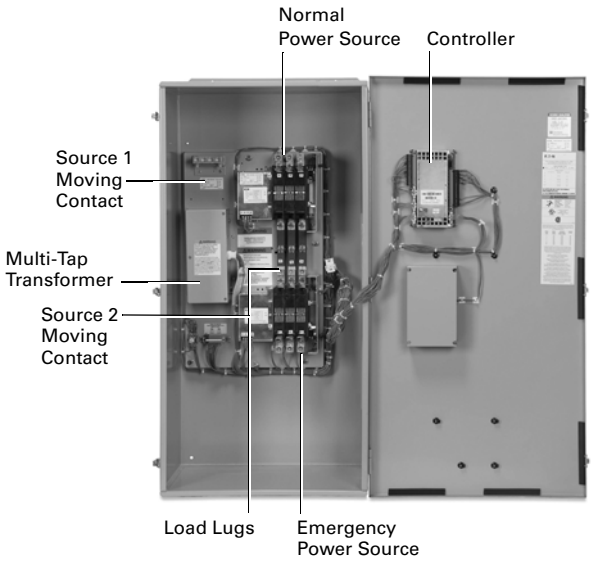
- UL 1008 Listed
- High withstand and closing ratings
- Compact design
- Front access design

25

Technical Data

Table 25.1-5. UL 1008 Short Circuit Withstand and Close-On Ratings (kA)

UL 1008 Ampere Rating	480 V 3-Cycle	480 V Specific Breaker	600 V 3-Cycle	600 V Specific Breaker	Rating When Used with Upstream Fuse			
					Rating (kA)	Test Voltage	Fuse Type	Maximum Fuse Amperes
40	10	30	10	22	100	480	RK5	200
80	10	30	10	22	100	480	RK5	200
100	10	30	10	22	100	480	RK5	200
150	10	30	22	35	100	600	RK5	400
200	10	30	22	35	100	600	RK5	400
225	30	50	50	65	200	600	RK5	600
260	30	50	50	65	200	600	RK5	600
400	30	50	50	65	200	600	RK5	600
600	50	65	50	65	200	600	L	1600
800	50	65	50	65	200	600	L	1600
1000	50	65	50	65	200	600	L	1600
1200	50	65	50	65	200	600	L	1600



Typical Contactor-Based ATC-900 Controller

Table 25.1-6. UL 1008 Ratings (100% Rated)

Mounting Type	Voltage	Current Amperes	No. of Poles	NEMA Enclosure
Fixed	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	40 80 100 150 200 225 260 400 600 800 1000 1200	2, 3, 4	Open NEMA 1 NEMA 3R NEMA 12

Dimensions—Approximate Dimensions in Inches (mm)

Table 25.1-7. Contactor-Based Transfer Switch 40–1200 A Closed Transition (See Figure 25.1-11 and Figure 25.1-12)

Ampere Rating	Enclosure			Bolt Pattern		Standard Terminals		
	A (Height)	B (Width)	C (Depth)	G (Horizontal)	H (Vertical)	Load Side, Normal and Standby Source	Neutral Connection	Weight in Lb (kg)
40–100 at 480 V	52.74 (1339.6)	25.00 (635.0)	17.18 (436.4)	16.00 (406.0)	51.68 (1312.6)	(1) #14–2/0	(3) #14–2/0	190 (86)
40–100 at 600 V	52.74 (1339.6)	25.00 (635.0)	17.18 (436.4)	16.00 (406.0)	51.68 (1312.6)	(1) #6–250 kcmil	(3) #14–1/0	210 (95)
150–200 at 480 V	52.74 (1339.6)	25.00 (635.0)	17.18 (436.4)	16.00 (406.0)	51.68 (1312.6)	(1) #6–250 kcmil	(3) 1/0–250 kcmil	210 (95)
150–200 at 600 V ①	71.02 (1803.9)	31.11 (790.2)	14.69 (373.0)	21.50 (546.0)	70.17 (1782.3)	(1) #6–250 kcmil	(3) 1/0–250 kcmil	420 (191)
225–400 at 480 V	71.02 (1803.9)	31.11 (790.2)	14.69 (373.0)	21.50 (546.0)	70.17 (1782.3)	(2) 3/0–250 kcmil	(6) 250–500 kcmil	420 (191)
225–1200 at 600 V ①	90.00 (2286.0)	46.00 (1168.4)	32.00 (812.8)	N/A	N/A	(4) 1/0–750 cu/al	(12) 1/0–750 kcmil	800 (363)
600–1200 at 480 V ①	90.00 (2286.0)	46.00 (1168.4)	32.00 (812.8)	N/A	N/A	(4) 1/0–750 cu/al	(12) 1/0–750 kcmil	900 (405)

① For NEMA 3R, add 14.60-inch (370.8 mm) to depth.

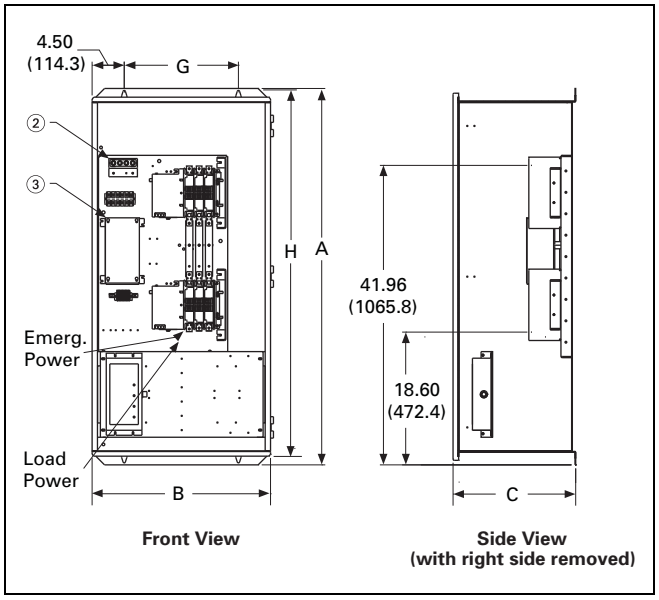


Figure 25.1-11. Automatic Up to 400 A Wallmount NEMA 1

② For switched neutral applications, connect to terminals marked NN, EN and LN. Neutral assembly will not be provided.

③ Transformer pack is not included with 240/120 V, single-phase or 208/120 V, three-phase systems.

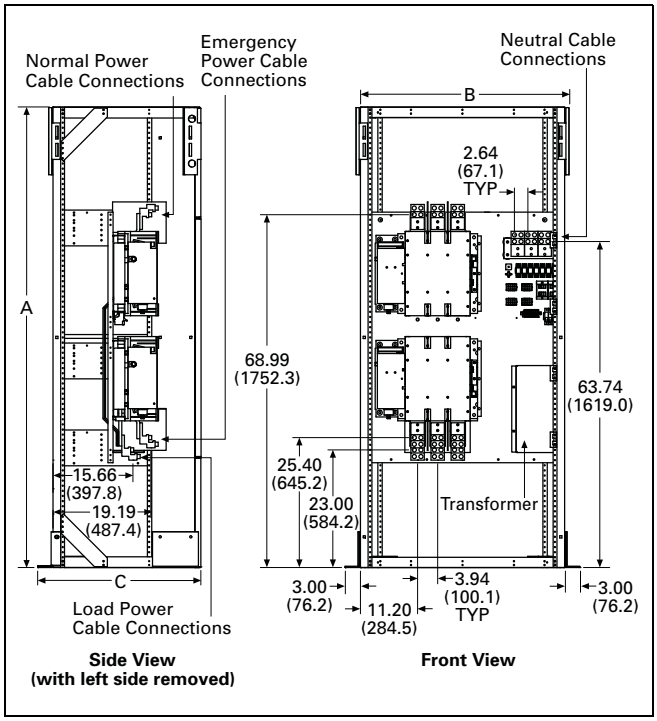


Figure 25.1-12. Automatic 600–1200 A—Floor-Standing NEMA 1

25

Bypass Isolation Transfer Switches, 100–1600 A, Dual Drawout

Bypass Isolation Transfer Switch

General Description

A bypass isolation transfer switch may be used to provide emergency power to life safety and other critical loads where maintenance of the main transfer switch, without interruption of power to the load, is either desirable or required.

The bypass isolation transfer switch may be provided with either open or closed transition type.

- Open delayed transition—break-before-make operation using a programmable time delay (true neutral position)
- Closed transition—make-before-break operation that requires the normal and alternate sources to be synchronized

Application Description

Eaton's automatic transfer switch is designed to provide unmatched performance, reliability and versatility for critical standby power applications. The switches can be equipped with the ATC-300+ or ATC-900 controllers to match your application needs.

Features

Industrial Design Highlights

- Front access is a standard feature on all ratings
- Entry:
  - Top, bottom or both
  - Isolated compartments
- Improved safety:
  - Isolated compartments with barriers
  - Single motion rack-out with doors closed
  - Ability to test power switching elements during drawout process
  - Dual ATS capability—bypass contactor can be controlled by the ATS controller in the bypass mode of operation
- Installation flexibility:
  - Field entry/exit locations can be modified in the field
  - Interchangeable drawout contactors
- Field-selectable multi-tap transformer panel permits operation on a wide range of system voltages
- Dual drawout
- UL 1008 Listed

Standard Features

- Drawout cassette design on both ATS and bypass
- No service interruption in bypass to the same source
- Source available contacts:
  - Source 1 present 2NO and 2NC
  - Source 2 present 2NO and 2NC
- Switch position contacts:
  - Source 1 position 1NO and 1NC
  - Source 2 position 1NO and 1NC
- Source 1 and Source 2 sensing:
  - Undervoltage/underfrequency
  - Overvoltage/overfrequency
  - Three-phase rotation protection
  - Three-phase voltage unbalance/loss
- Pre-transfer signal contacts 1NO and 1NC (open transition only)
- Go to Source 2 (EMERGENCY)
- Field-programmable time delays:
  - Time delay engine start: 0–1200 seconds
  - Time delay normal to emergency: 0–1800 seconds
  - Time delay emergency to normal: 0–1800 seconds
  - Time delay engine cooldown: 0–1800 seconds
  - Time delay emergency failure: 0–6 seconds
- LCD-based display for programming, system diagnostics and Help menu display
- Mimic diagram with source available and connected LED indication
- Time-stamped history log
- System TEST pushbutton
- Programmable plant exerciser—OFF, daily, 7-, 14-, 28-day interval selectable run time 0–600 minutes no load/load with fail-safe

Optional Features

- Available UL 1448 Third Edition surge protection device (SPD)
- Eaton IQ and Power Xpert multi-function power quality metering
- Automatic transfer mode with selectable non-automatic/automatic retransfer mode
- Modbus RTU via RS-485
- Remote annunciation with control
- Open in-phase transition, time delay neutral or in-phase with a default to time delay neutral transfer
- ATC-900 controller
  - Includes Modbus RTU via RS-485
  - Includes four programmable inputs/outputs
  - Includes two plant exercisers
  - Includes LCD color display with easy navigation tools to settings and event logs
  - Expandable I/O (up to 20 I/O total)
  - Optional integrated load metering
  - Optional EtherNet TCP/IP communications

Bypass Isolation Switch Features

Front Access

Front access is a standard feature. Source 1 (NORMAL) Source and Load connections are set up as standard top entry and Source 2 (EMERGENCY) Source connections as bottom entry. These connections are located in their own separate compartments. These connections can be relocated in the field if necessary.

Multi-Tap Transformer

The industry-exclusive multi-tap system voltage selector allows the transfer switch to be applied on most system voltages by proper insertion of the selector plug.

Drawout Contactors

The ATS and the bypass drawout cassette power contactor designs are identical and interchangeable. This standard feature allows the user the ability to withdraw, maintain or swap contactor assemblies, providing redundancy of ATS and bypass functions from one contactor assembly to the other.

Improved Safety

The unique Eaton design includes separation between control and power components. The ATS and bypass isolation contactors are mounted in separate compartments with protective barriers between them. This design prevents the possibility of contact with the rear-mounted power connections to the contactors. In addition, the top and bottom entry have separate compartment doors.

Ease of Maintenance

Transfer to the bypass power contactor is easily initiated and controlled via door-mounted controls. Once the transfer to the bypass contactor is complete, the ATS contactor is easily racked out with the compartment door closed. The ATS contactor may then be tested in the racked out position.

Ease of Transfer

The Eaton design allows the operator to make a quick and simple transfer from the ATS power contactor to the bypass contactor by initiating the electrically operated transfer via a two-position switch. Door-mounted indicating lights confirm that a successful transfer has taken place.

Dual ATS Capability

The controller on conventional bypass isolation switches only controls the ATS contactor. The Eaton design allows the switch controller to remain active in both the ATS and bypass modes, thus providing control to either contactor. This ability of the controller to remain active and control the bypass isolation contactor provides “N+1” redundancy of a second fully functioning ATS, a feature unique to Eaton.

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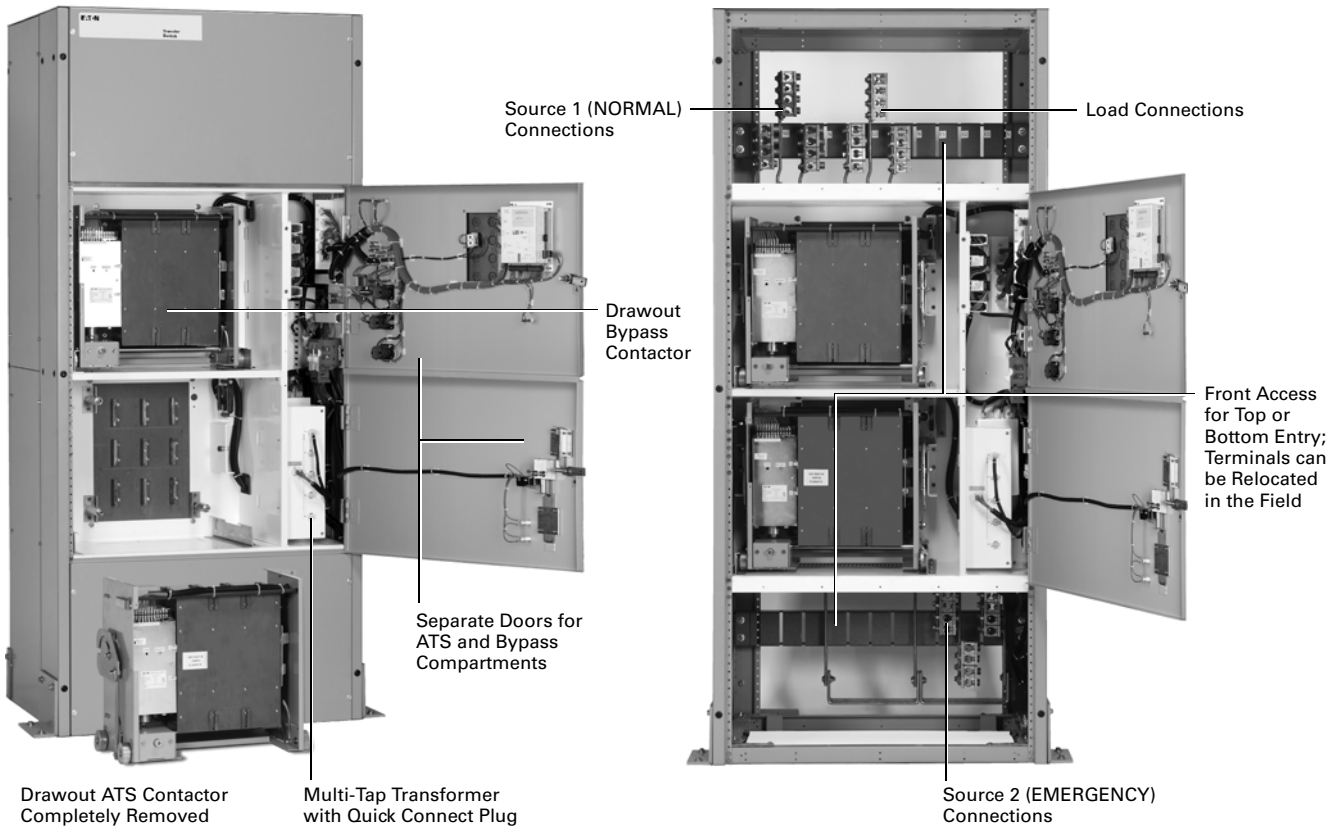

Bypass Isolation Switch Components

Standards and Certifications

- UL 1008 Listed
- CSA® C22.2 No. 178 certified

Technical Data

Table 25.1-8. UL 1008 Short Circuit Withstand and Close-On Ratings (kA)

UL 1008 Ampere Rating	480 V 3-Cycle	480 V Specific Breaker	600 V 3-Cycle	600 V Specific Breaker	Rating When Used with Upstream Fuse			
					Rating (kA)	Test Voltage	Fuse Type	Maximum Fuse Amperes
100	30	50	10	35	100	480	RK5	200
150	30	50	22	35	100	600	RK5	400
200	30	50	22	35	100	600	RK5	400
225	30	50	42	65	200	600	RK5	600
260	30	50	42	65	200	600	RK5	600
400	30	50	42	65	200	600	RK5	600
600	50	65	42	65	200	600	L	1200
800	50	65	42	65	200	600	L	1200
1000	50	65	42	65	200	600	L	1600
1200	50	65	42	65	200	600	L	1600
1600	50	65	—	—	—	—	—	—

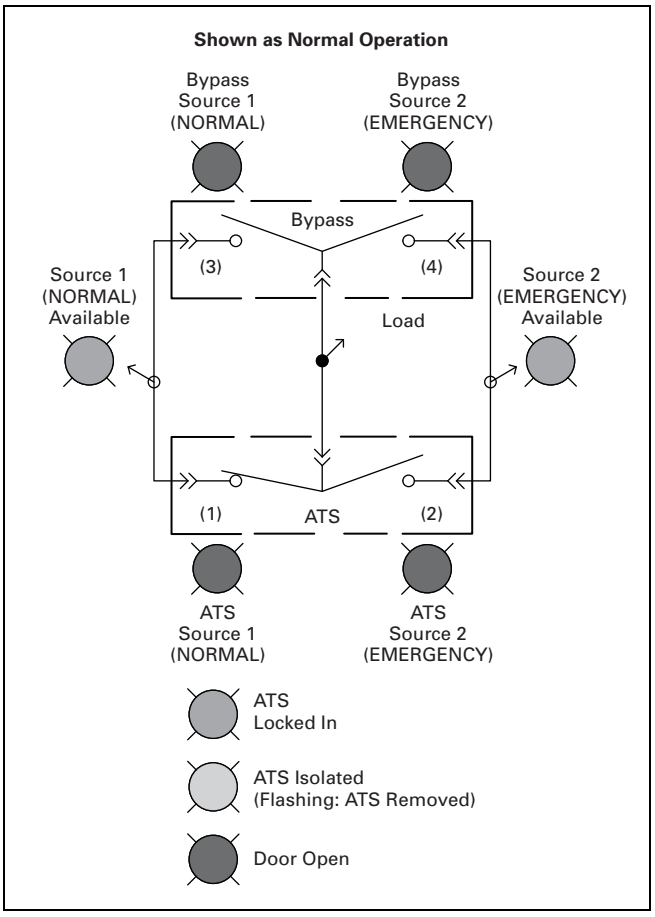

Figure 25.1-13. Bypass Isolation Diagram

Table 25.1-9. UL 1008 Ratings (100% Rated)

Mounting Type	Voltage	Current Amperes	No. of Poles	NEMA Enclosure
Drawout	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	100 150 200 225 260 400 600 800 1000 1200 1600	2, 3, 4	Open NEMA 1 NEMA 3R NEMA 4X ① NEMA 12 ①

① Up to 1200 A.

Dimensions in Inches (mm)

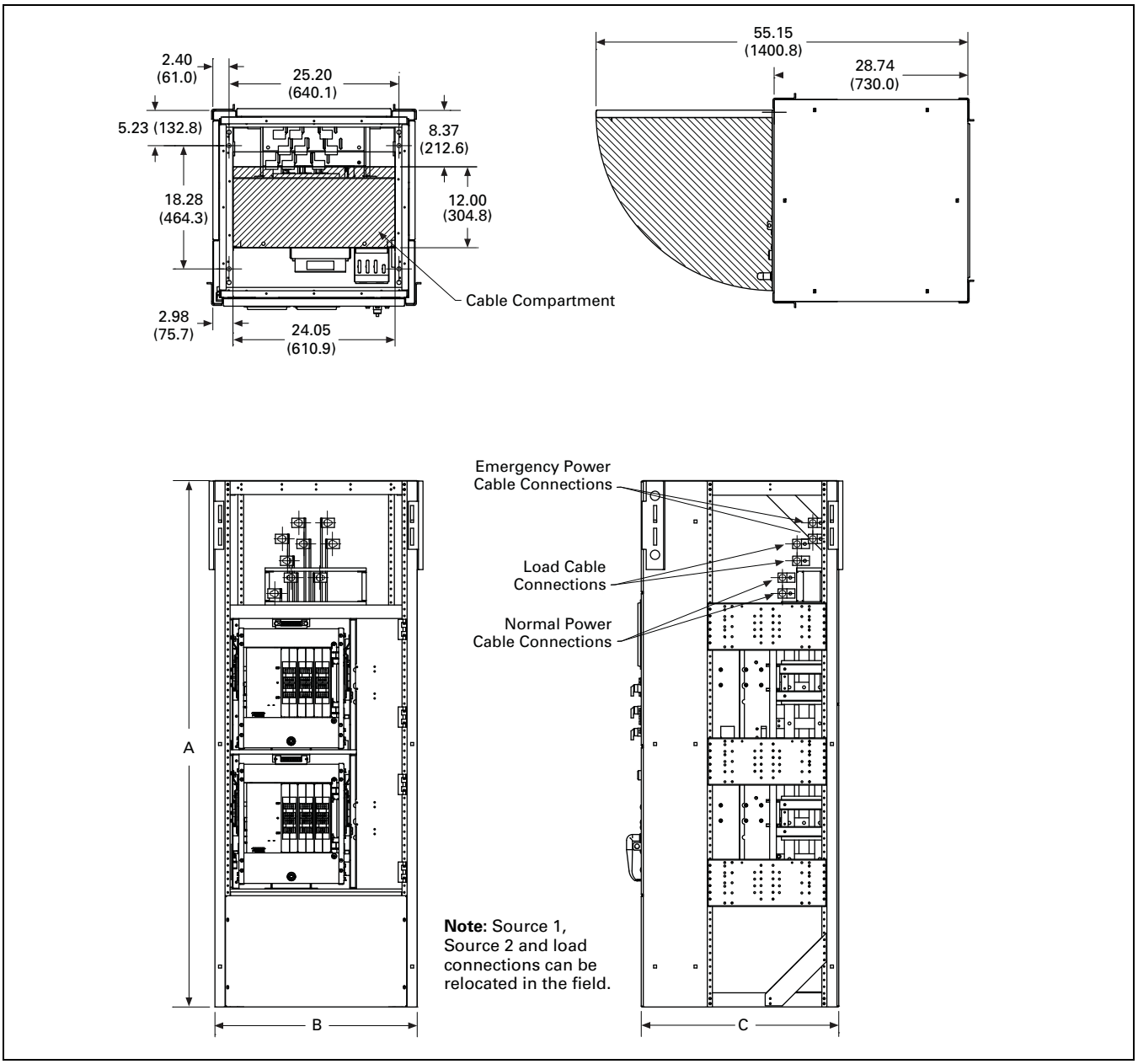

Figure 25.1-14. Bypass Isolation-Based Drawing NEMA 1 and NEMA 3R

Table 25.1-10. Isolation-Based Transfer Switch 100–400A NEMA 1 ①

C-Frame Fixed Bypass	Enclosure			Standard Terminals			Weight Lb (kg)
Switch Rating Amperes	A (Height)	B (Width)	C (Depth)	Line Side (Normal and Emergency)	Load	Neutral	
100–200 at 480 Vac	78.07 (1983.0)	30.00 (762.0)	29.30 (744.2) ②	(1) #6–350 Cu/Al	(1) #6–350 Cu/Al	(3) #6–350 Cu/Al	625 (283.8) NEMA 1
225–400 at 480 Vac	78.07 (1983.0)	30.00 (762.0)	29.30 (744.2) ②	(1) 3/0–600 Cu/Al	(1) 3/0–600 Cu/Al	(3) 3/0–600 Cu/Al	625 (283.8) NEMA 1
100–200 at 600 Vac	78.07 (1983.0)	30.00 (762.0)	29.30 (744.2) ②	(1) #6–350 Cu/Al	(1) #6–350 Cu/Al	(3) #6–350 Cu/Al	625 (283.8) NEMA 1
225–400 at 600 Vac	90.00 (2286.0)	40.00 (1016.0)	28.97 (735.8) ③	(2) 3/0–750 Cu/Al	(2) 3/0–750 Cu/Al	(6) 3/0–750 Cu/Al	1750 (794.5) NEMA 3R

① For seismic applications, it is necessary to use 5–13 UNC Grade or better hex head bolts and washers torqued to 50 lb-ft.
② For NEMA 3R dimensions, add 18.29 inches (464.6 mm) to depth.
③ For NEMA 3R dimensions, add 18.59 inches (472.2 mm) to depth.

Dimensions in Inches (mm)

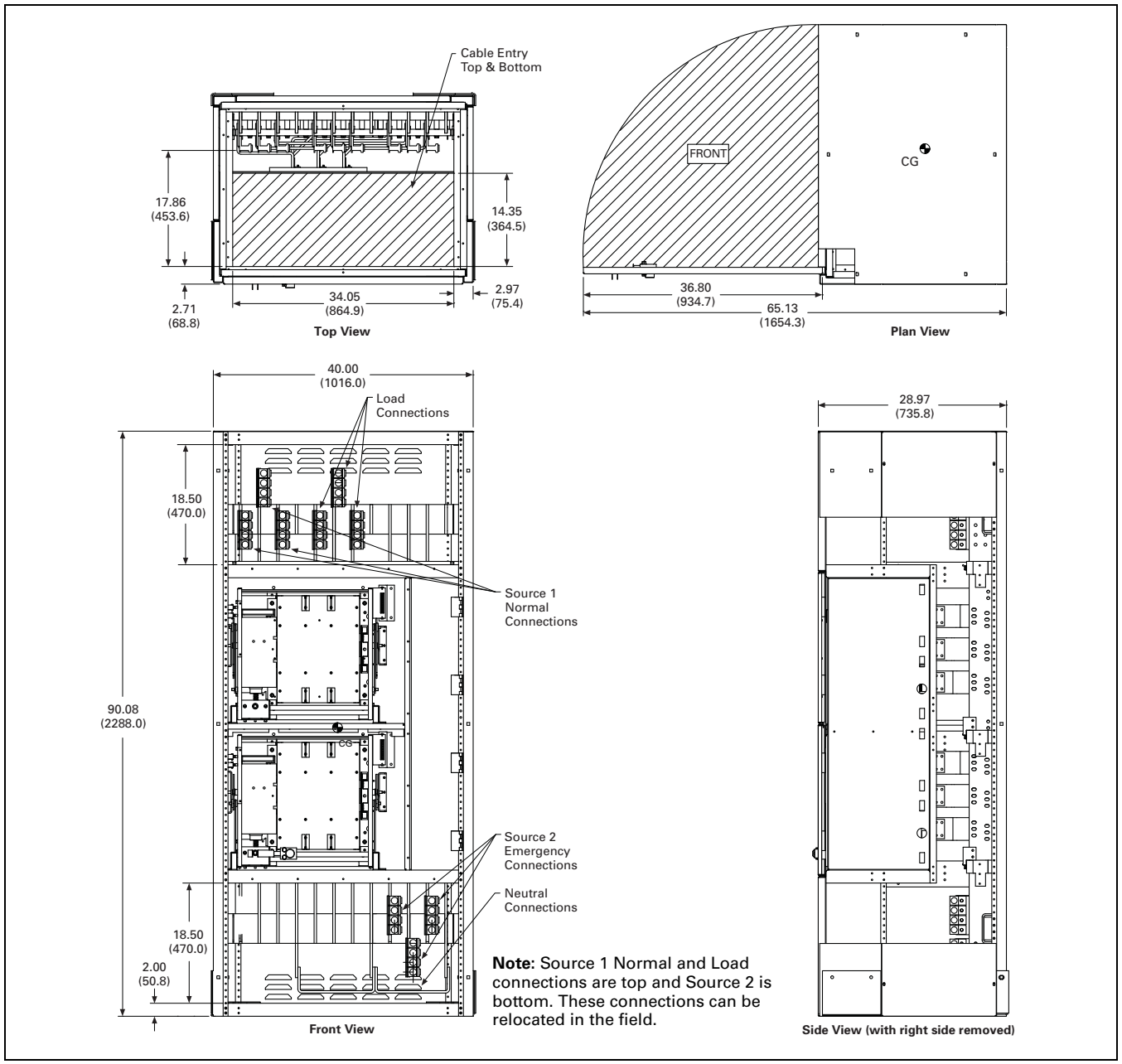

Figure 25.1-15. Bypass Isolation Contactor-Based Design NEMA 1 and NEMA 3R

Table 25.1-11. Contactor-Based Transfer Switch 600–1200 A 480 Vac, 225–1200 A 600 Vac ①

Switch Rating Amperes	Enclosure			Standard Terminals			Weight Lb (kg)
	A (Height)	B (Width)	C (Depth) ②	Line Side (Normal and Emergency)	Load	Neutral	
600 at 480 Vac	90.00 (2286.0)	40.00 (1016.0)	28.97 (735.8)	(2) 3/0–750 Cu/Al	(2) 3/0–750 Cu/Al	(6) 3/0–750 Cu/Al	1750 (794.5)
600 at 600 Vac	90.00 (2286.0)	40.00 (1016.0)	28.97 (735.8)	(2) 3/0–750 Cu/Al	(2) 3/0–750 Cu/Al	(6) 3/0–750 Cu/Al	1750 (794.5)
800–1200 at 480 Vac	90.00 (2286.0)	40.00 (1016.0)	28.97 (735.8)	(4) 3/0–750 Cu/Al	(4) 3/0–750 Cu/Al	(12) 3/0–750 Cu/Al	1850 (839.1)
800–1200 at 600 Vac	90.00 (2286.0)	46.00 (1168.4)	28.97 (735.8)	(4) 3/0–750 Cu/Al	(4) 3/0–750 Cu/Al	(12) 3/0–750 Cu/Al	1850 (839.1)
1600 at 480 V	90.00 (2286.0)	40.00 (1016.0)	40.00 (1016.0)	(5) 1/0–750 Cu/Al	(5) 1/0–750 Cu/Al	(16) 1/0–750 Cu/Al	2200 (997.9)

① For seismic applications, it is necessary to use 5–13 UNC Grade or better hex head bolts and washers torqued to 50 lb-ft.
② For NEMA 3R dimensions, add 18.29 inches (464.6 mm) to depth.

Dimensions in Inches (mm)

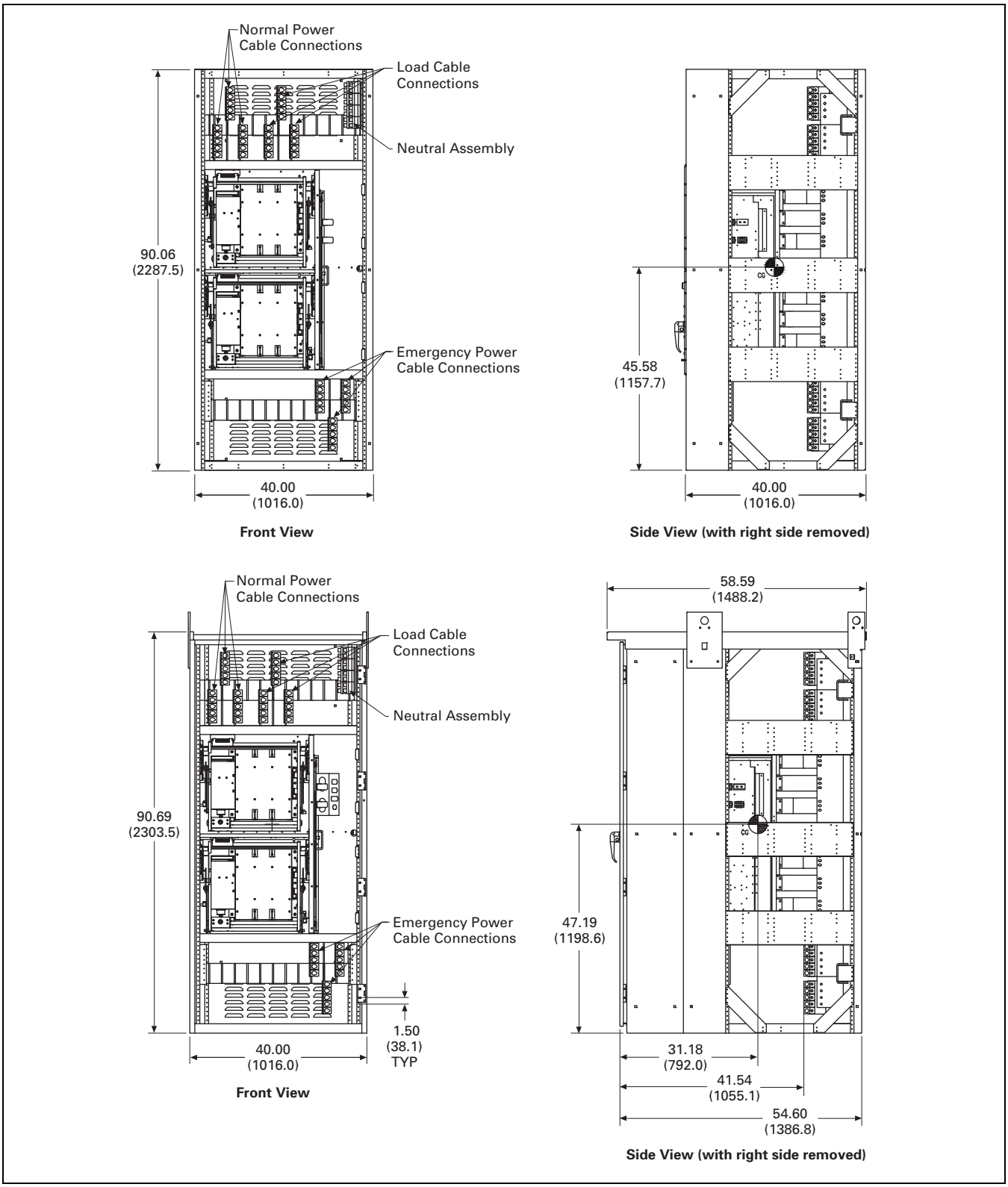

Figure 25.1-16. Bypass Isolation Contactor-Based Design 1600 A NEMA 1 (Top) and NEMA 3R (Bottom)

Bypass Isolation Transfer Switches, 100–1200 A, Fixed Bypass

Bypass Isolation Transfer Switch

General Description

A bypass isolation transfer switch may be used to provide emergency power to life safety and other critical loads where maintenance of the main transfer switch, without interruption of power to the load, is either desirable or required.

The bypass isolation transfer switch may be provided with either open or closed transition type.

- Open delayed transition—break-before-make operation using a programmable time delay (true neutral position)
- Closed transition—make-before-break operation that requires the normal and alternate sources to be synchronized

Application Description

Eaton's automatic transfer switch is designed to provide unmatched performance, reliability and versatility for critical standby power applications. The switches can be equipped with the ATC-300+ or ATC-900 controllers to match your application needs.

Features

Industrial Design Highlights

- Front access is a standard feature on all ratings
- Entry:
  - Must be all top or all bottom
  - Isolated compartments
- Improved safety:
  - Isolated compartments with barriers
  - Single motion rack-out with doors closed
  - Ability to test power switching elements during drawout process
  - Optional dual ATS capability—bypass contactor can be controlled by the ATS controller in the bypass mode of operation
- Installation flexibility:
  - Entry/exit locations are either all top or all bottom—factory configurable only
  - Interchangeable drawout ATS contactor
- Field-selectable multi-tap transformer panel permits operation on a wide range of system voltages
- Fixed-mount bypass contactor
- UL 1008 Listed

Standard Features

- Drawout cassette design on ATS and fixed-mount on bypass
- No service interruption in bypass to the same source
- Source available contacts:
  - Source 1 present 2NO and 2NC
  - Source 2 present 2NO and 2NC
- Switch position contacts:
  - Source 1 position 1NO and 1NC
  - Source 2 position 1NO and 1NC
- Source 1 and Source 2 sensing:
  - Undervoltage/underfrequency
  - Overvoltage/overfrequency
  - Three-phase rotation protection
  - Three-phase voltage unbalance/loss
- Pre-transfer signal contacts 1NO and 1NC (open transition only)
- Go to Source 2 (EMERGENCY)
- Field-programmable time delays:
  - Time delay engine start: 0–1200 seconds
  - Time delay normal to emergency: 0–1800 seconds
  - Time delay emergency to normal: 0–1800 seconds
  - Time delay engine cooldown: 0–1800 seconds
  - Time delay emergency failure: 0–6 seconds
- LCD-based display for programming, system diagnostics and Help menu display
- Mimic diagram with source available and connected LED indication
- Time-stamped history log
- System TEST pushbutton
- Programmable plant exerciser—OFF, daily, 7-, 14-, 28-day interval selectable run time 0–600 minutes no load/load with fail-safe

Optional Features

- Available UL 1448 Third Edition surge protection device (SPD)
- Eaton IQ and Power Xpert multi-function power quality metering
- Automatic transfer mode with selectable non-automatic/automatic retransfer mode
- Modbus RTU via RS-485
- Remote annunciation with control
- Open in-phase transition, time delay neutral or in-phase with a default to time delay neutral transfer
- ATC-900 controller
  - Includes Modbus RTU via RS-485
  - Includes four programmable inputs/outputs
  - Includes two plant exercisers
  - Includes LCD color display with easy navigation tools to settings and event logs
  - Expandable I/O (up to 20 I/O total)
  - Optional integrated load metering
  - Optional EtherNet TCP/IP communications

Bypass Isolation Switch Features

Front Access

Front access is a standard feature. Source 1 (NORMAL), Source 2 (EMERGENCY) and Load connections are set up as either all top or all bottom entry. These connections are located in their own separate compartments.

Multi-Tap Transformer

The industry-exclusive multi-tap system voltage selector allows the transfer switch to be applied on most system voltages by proper insertion of the selector plug.

Drawout ATS and Fixed-Mounted Bypass

The ATS is designed as a drawout with the contactor mounted in a cassette with wheels. This allows the user the ability to withdraw, maintain, inspect and re-insert the ATS.

The bypass contactor is designed as a fixed-mounted design in its own separate compartment.

Improved Safety

The unique Eaton design includes separation between control and power components. The ATS and bypass isolation contactors are mounted in separate compartments with protective barriers between them. This design prevents the possibility of contact with the rear-mounted power connections to the contactors. In addition, the top and bottom entry have separate compartment doors.

Ease of Maintenance

Transfer to the bypass power contactor is easily initiated and controlled via door-mounted controls. Once the transfer to the bypass contactor is complete, the ATS contactor is easily racked out with the compartment door closed. The ATS contactor may then be tested in the isolated position.

Ease of Transfer

The Eaton design allows the operator to make a quick and simple transfer from the ATS power contactor to the bypass contactor by initiating the electrically operated transfer via a two-position switch. Door-mounted indicating lights confirm that a successful transfer has taken place.

Optional Dual ATS Capability

The controller on conventional bypass isolation switches only controls the ATS contactor. The Eaton design allows the switch controller to remain active in both the ATS and bypass modes, thus providing control to either contactor. This ability of the controller to remain active and control the bypass isolation contactor provides "N+1" redundancy of a second fully functioning ATS, a feature unique to Eaton.

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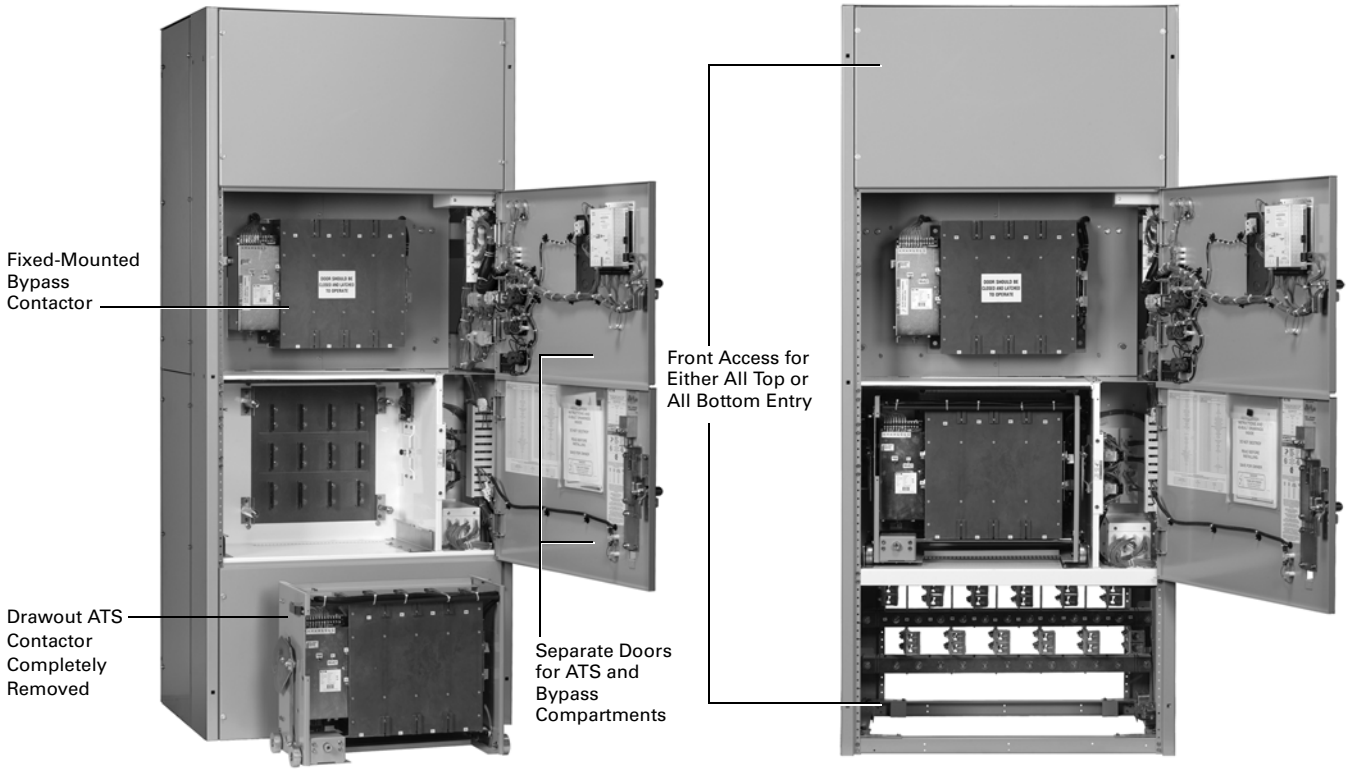


Bypass Isolation—Fixed Bypass Components

Technical Data

Table 25.1-12. UL 1008 Short Circuit Withstand and Close-On Ratings (kA)

UL 1008 Ampere Rating	480 V 3-Cycle	480 V Specific Breaker	600 V 3-Cycle	600 V Specific Breaker	Rating When Used with Upstream Fuse			
					Rating (kA)	Test Voltage	Fuse Type	Maximum Fuse Amperes
100	30	50	22	35	100	480	RK5	200
150	30	50	22	35	100	600	RK5	400
200	30	50	22	35	100	600	RK5	400
225	30	50	42	65	200	600	RK5	600
260	30	50	42	65	200	600	RK5	600
400	30	50	42	65	200	600	RK5	600
600	50	65	42	65	200	600	L	1200
800	50	65	42	65	200	600	L	1200
1000	50	65	42	65	200	600	L	1600
1200	50	65	42	65	200	600	L	1600

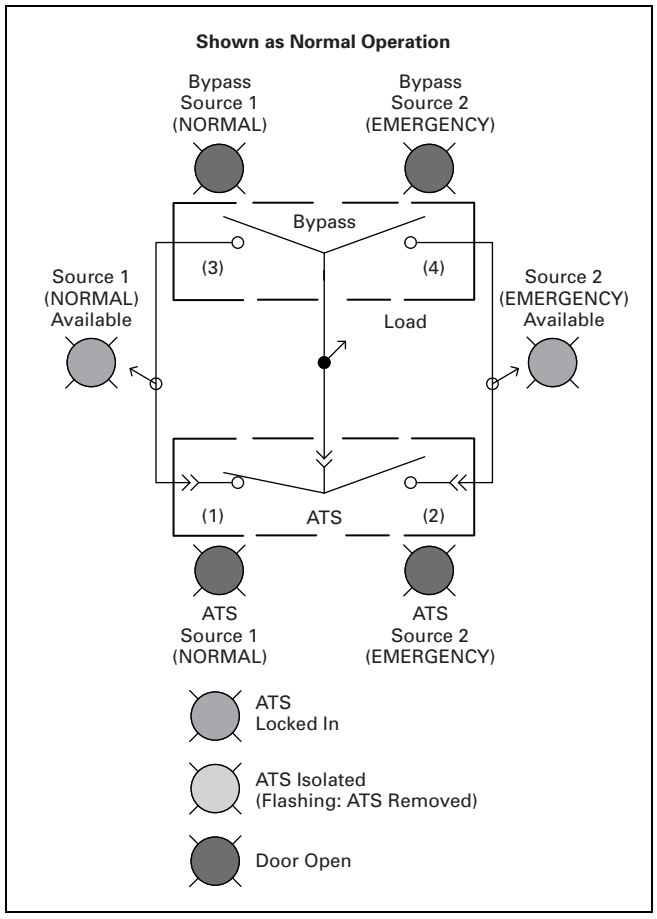
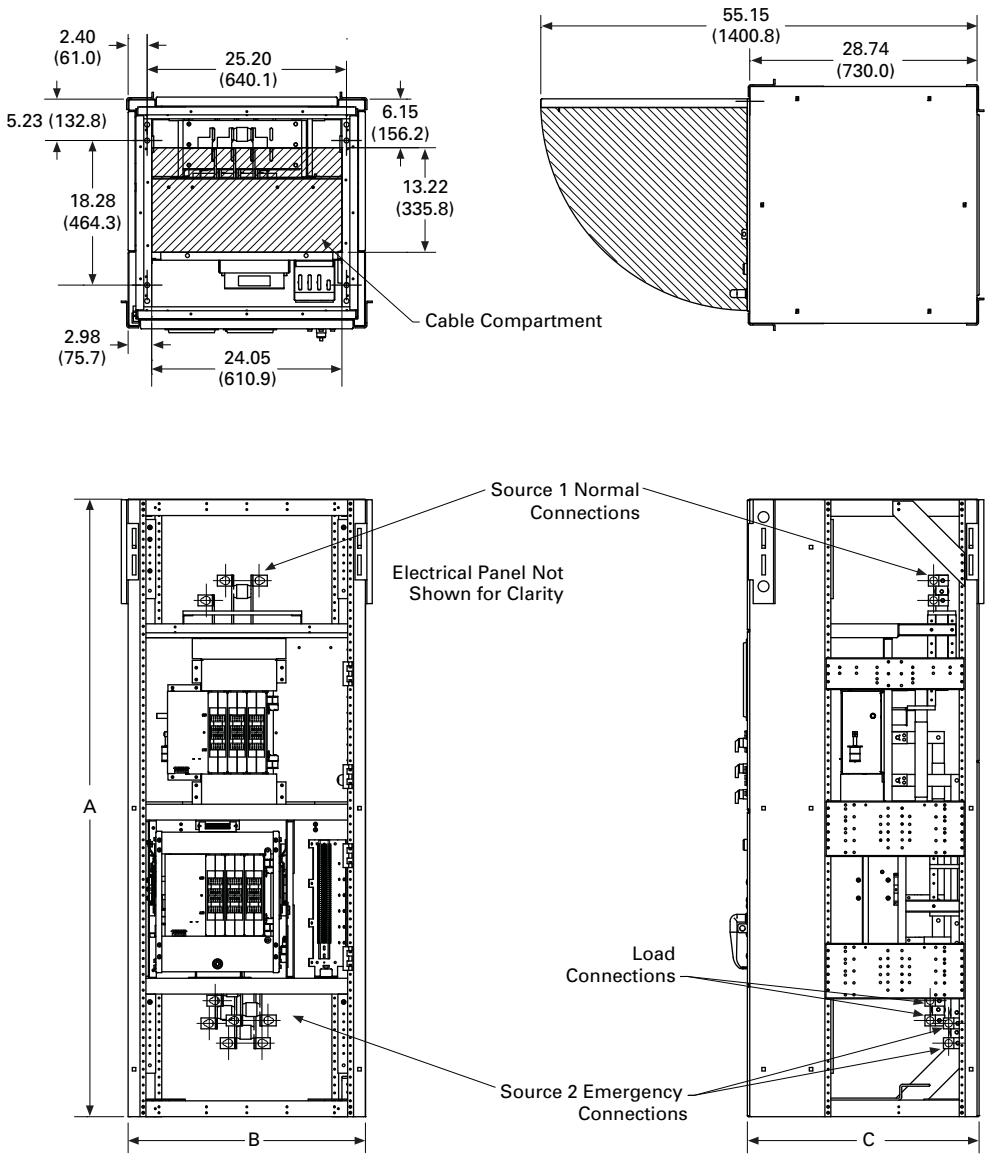


Figure 25.1-17. Bypass Isolation

Table 25.1-13. UL 1008 Ratings (100% Rated)

Mounting Type	Voltage	Current Amperes	No. of Poles	NEMA Enclosure
Fixed	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	100 150 200 225 260 400 600 800 1000 1200	2, 3, 4	NEMA 1 NEMA 3R

Dimensions in Inches (mm)



Note: Source 1 Normal, Source 2 Emergency and load connections are NOT factory or field reconfigurable. Sufficient wireway and bending space is available to come in from either direction.

Figure 25.1-18. Bypass Isolation-Based Design NEMA 1 and NEMA 3R

Table 25.1-14. Isolation-Based Transfer Switch 100–400 A

C-Frame Fixed Bypass	Enclosure			Bolt Pattern		Standard Terminals			Weight in Lb (kg)
Switch Ampere Rating	A (Height)	B (Width)	C (Depth) ①	G (Horizontal)	H (Vertical)	Line Side (Normal)	Load	Neutral	
100–200 at 480/600 V	78.07 (1983.0)	30.00 (762.0)	29.30 (744.2)	N/A	N/A	(1) #6–350 Cu/Al	(1) #6–350 Cu/Al	(3) #6–350 Cu/Al	625 (284)
225–400 at 480 V	78.07 (1983.0)	30.00 (762.0)	29.30 (744.2)	N/A	N/A	(1) 3/0–750 Cu/Al	(1) 3/0–750 Cu/Al	(1) 3/0–750 Cu/Al	625 (284)

① For NEMA 3R, add 15.48 inches (393.2 mm) to depth.

Dimensions in Inches (mm)

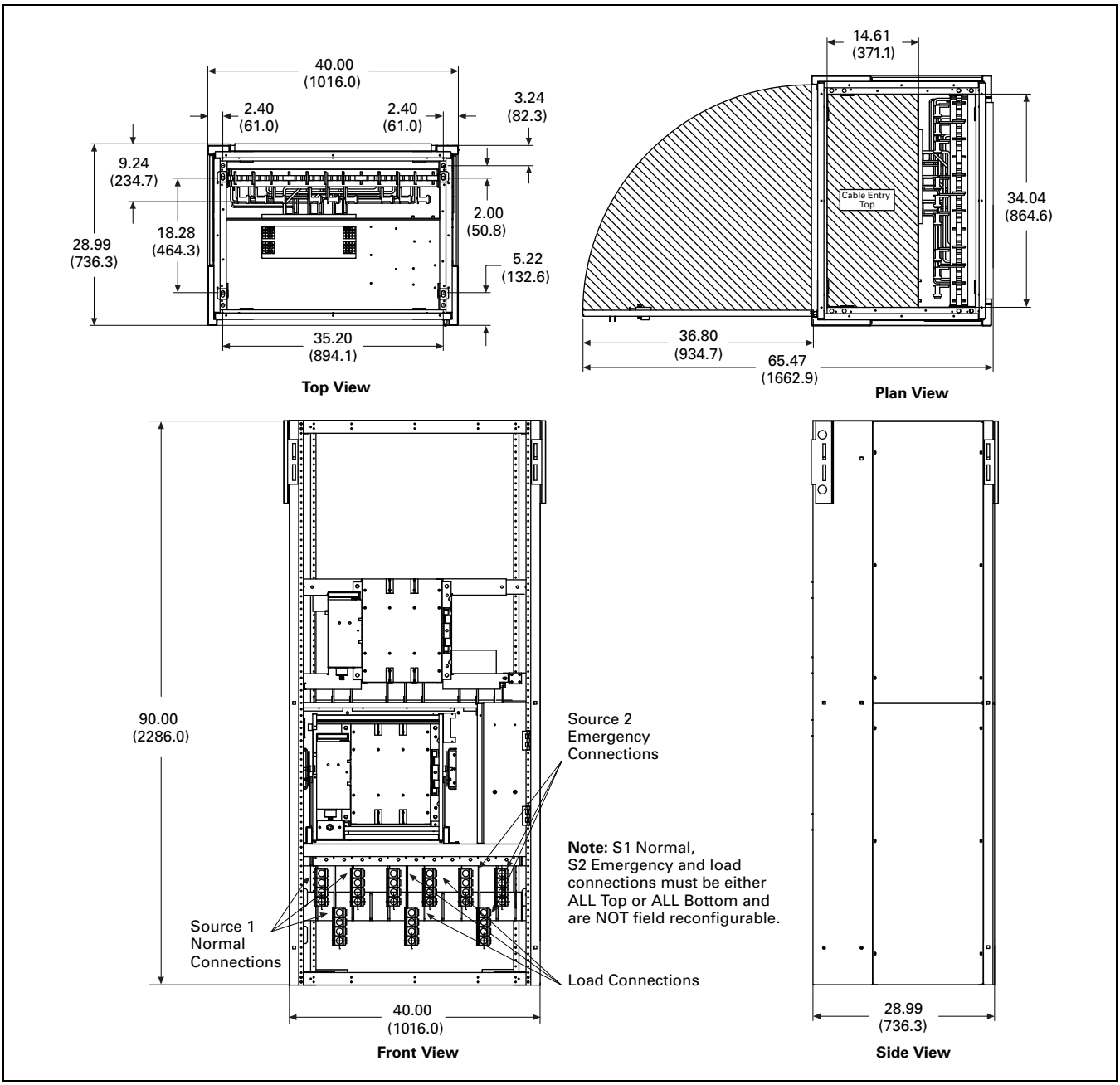


Figure 25.1-19. Bypass Isolation Contactor-Based Design NEMA 1 and NEMA 3R

Table 25.1-15. Contactor-Based Transfer Switch 100–1200 A

Switch Ampere Rating	Enclosure			Standard Terminals			Weight in Lb (kg)
	Height	Width	Depth	Line Side (Normal)	Load	Neutral	
100–200	90.00 (2286.0)	40.00 (1016.0)	28.99 (736.3)	(1) #6–250 Cu/Al	(1) #6–250 Cu/Al	(3) #6–250 Cu/Al	1750 (795) NEMA 1
100–200	90.00 (2286.0)	40.00 (1016.0)	44.47 (1129.5)	(1) #6–250 Cu/Al	(1) #6–250 Cu/Al	(3) #6–250 Cu/Al	1850 (840) NEMA 3R
400–1200 ①	90.00 (2286.0)	40.00 (1016.0)	28.99 (736.3)	(2) 3/0–750 Cu/Al	(2) 3/0–750 Cu/Al	(12) 3/0–750 Cu/Al	1800 (817) NEMA 1
400–1200 ①	90.00 (2286.0)	40.00 (1016.0)	44.47 (1129.5)	(2) 3/0–750 Cu/Al	(2) 3/0–750 Cu/Al	(12) 3/0–750 Cu/Al	1850 (840) NEMA 3R

① NEMA 3R dimensions. If seismic mounting brackets are required, then the width will be 46.00 inches (1168.4 mm).

Service Entrance Rated Automatic Open Transition, 40–1600 A

Service Entrance Rated Contactor-Based ATS with ATC-900 Controller

General Description

The service entrance rated automatic open transition contactor-based design transfer switch will provide a fully functioning automatic transfer switch with an integrated upstream breaker to be applied and installed directly at the point of service entrance.

Eaton's service entrance rated contactor design has been tested and is listed as a 100% rated UL 1008 ATS (automatic transfer switch). In addition, the service entrance rated ATS will have a 100% load rating. The capability to provide a 100% load rating eliminates confusion in applying a 100% rated ATS with a breaker that is only rated for 80% load.

The combined package will provide the ATS in a separate compartment from the upstream breaker. The breaker compartment has a deadfront panel, allowing easy and safe access to the separate contactor compartment when the breaker is tripped to the off position and locked out. Line side connections are made in the breaker compartment and Source 2 and load connections are made in the contactor compartment. The main contactor compartment includes the main power switching device, auxiliary relays, control power and the controller.

The upstream breaker will use the Eaton 310+ trip unit, allowing the user to modify the continuous current rating, adjustable protection curve shaping with LSI or LSIG adjustability and optional selection of the Arcflash Reduction Maintenance System to address National Electrical Code® Section 240.87 for arc energy reduction.

Application Description

The service entrance rated contactor-based design can be used on applications requiring an integrated automatic transfer switch with an upstream breaker. The combined or integrated offering can be used and will come listed as a 100% rated to UL 1008 as suitable for use as service equipment. In addition, the transfer switch will be marked as "Continuous load current not to exceed 100 percent of switch rating."

Features

Standard Features—with ATC-300+ Controller

- Auxiliary relay contacts:
  - Source 1 present 2NO and 2NC
  - Source 2 present 2NO and 2NC
- Switch position indication contacts:
  - Source 1 position 1NO and 1NC
  - Source 2 position 1NO and 1NC
- Source 1 and Source 2 sensing:
  - Undervoltage/underfrequency
  - Overvoltage/overfrequency
  - Three-phase rotation protection
  - Three-phase voltage unbalance
- Pretransfer signal contacts 1NO/1NC (with three-position mechanism)
- Go to emergency (Source 2)
- Seven field-programmable time delays
- LCD-based display for programming, system diagnostics and Help message display
- Mimic diagram with source available and connected LED indication
- Time-stamped history log
- System TEST pushbutton
- Programmable plant exerciser—OFF, daily, 7-, 14-, 28-day interval selectable run time 0–600 minutes no load/load with fail-safe
- Modbus® RTU via RS-485
- Source 1 Eaton Series G breaker with 310+ electronic trip unit with LSI

Optional Features

- Available surge suppression device for power/controller, engine start circuit, phone and cable connections
- Space heater with thermostat
- Eaton IQ and Power Xpert® series metering
- Open in-phase transition, time delay neutral or in-phase with a default to time delay neutral transfer
- ATC-300+ and ATC-900 controllers available
- Source 2 inhibit
- Manual retransfer to normal
- Remote annunciator with control
- Ethernet communication (PXG 900 Gateway)
- Breaker with LSIG electronic trip units
- Breaker with Arcflash Reduction Maintenance System

Commercial Design Highlights

- Integrated service entrance rating listed to UL 1008 100% rated
- Meets overload, endurance, temperature rise and withstand rating per UL 1008
- Separate ATS and breaker compartment permits safe access to the ATS
- Combined breaker/ATS reduces overall equipment size and installation cost
- Lockable breaker permits safe downstream maintenance
- Breaker with electronic trip units provide adjustable ratings and adjustable curve shaping

25

Design Features

Integrated Service Entrance Rating

The service entrance rated contactor design has been tested and listed to UL 1008 as suitable for use as service equipment. In addition, per UL 1008, the switch is rated for 100% load ratings and eliminates application considerations when applying a 100% rated ATS with 100% load ratings.

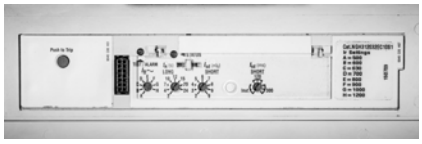
Separate Compartment for ATS and Breaker

The standard design includes a separate deadfront compartment for the incoming breaker and separate compartment for the ATS. This innovative design provides simplified access to cable entrance areas and can reduce personal protection equipment (PPE) requirements when performing installation or routine maintenance.

Electronic Trip Unit on SE Breaker

The service entrance breaker is an Eaton Series G breaker with the 310+ trip unit that provides adjustable rating and breaker curve shaping. The trip unit comes with either LSI or LSIG curve shaping capability. The long delay and short delay functions enable the breaker curves to be manipulated for upstream and downstream breaker coordination.

Arcflash Reduction Maintenance System™



The Eaton 310+ electronic trip units address the National Electrical Code® Section 240.87 for Arc Energy Reduction. These molded-case circuit breakers provide two approved methods to reduce arc energy: energy-reducing maintenance switching with local status indicator and zone selective interlocking.

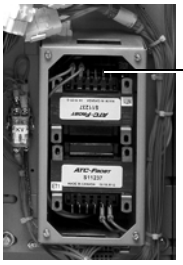
ATC-300+ Controller

Eaton's ATC300+ controller offers a full set of programmable time delays, source 2 inhibit and manual retransfer. The controller comes standard with Modbus communications.

ATC-900 Controller

Eaton's new ATC-900 controller brings ease of use, adaptability, supervisory and programming capabilities to mission-critical applications. The 4.3-inch color TFT display provides simple arrow keys for quick screen navigation. Event logging and recording of time-stamped events are viewed easily. Field configuration of I/O allows user adaptability to special requirements.

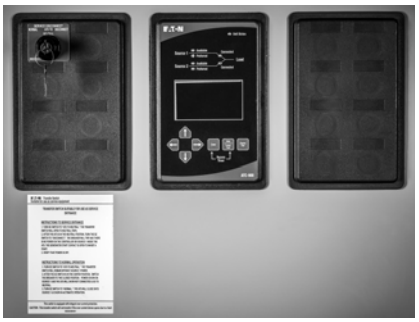
Multi-Tap Voltage Selector



Transformer Panel Allows for Easy Field Changes to Voltage Configurations

Allows the transfer switch to be readily applied on most system voltages by connecting to the proper terminals. Available system voltages include 120, 208, 220, 240, 277, or 480 Vac, 60 Hz.

Lockable Breaker



The upstream service rated breaker includes a door-mounted keyed switch that will allow the breaker to be tripped to the OFF position and electrically locked out. The keyed switch is a three-position switch that has a Normal position, ATS to Neutral position, and Disconnect position that indicates the breaker has been tripped. Once in the Disconnect position, the key may be removed. In addition there is a ship loose handle hasp that allows the breaker handle to be mechanically locked out.

Technical Data

Table 25.1-16. UL 1008 Short-Circuit Withstand and Close-On Ampere Ratings

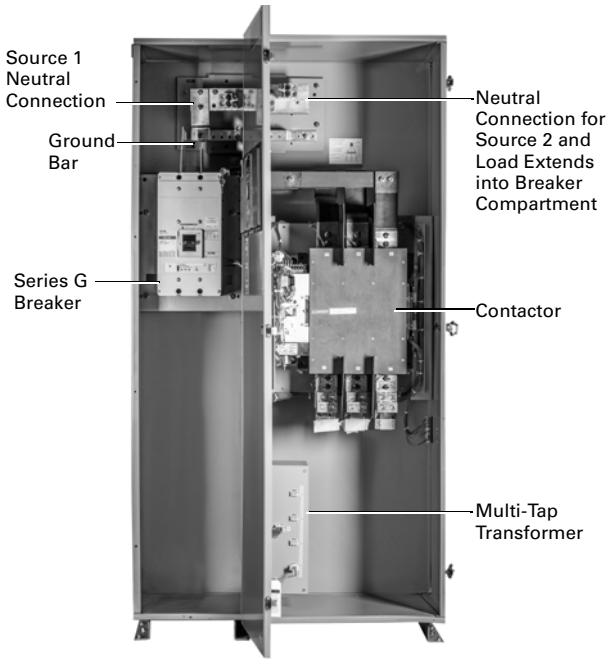
UL 1008 Ampere Rating	Mechanism	Withstand Current Ratings rms Symmetrical
		480 V
40, 80, 100 150, 200 225, 260, 400	C2 C2 C2	30,000 30,000 50,000
40, 80, 100, 150, 200 225, 260, 400 600, 800, 1000,1200 1600	C3, C5 C3, C5 C3, C5 C3, C5	50,000 50,000 65,000 65,000

Table 25.1-17. UL 1008 Ratings (100% Rated)

Mounting Type	Voltage	Current Amperes	No. of Poles ①	NEMA Enclosure
Fixed	480 480/277 480/240 415/240 240 240/120 220 208/120 120	40 80 100 150 200 225 260 400 600 800 1000 1200 1600	2, 3, 4	NEMA 1 NEMA 3R

① Two-pole is available only up to 800 A.

Typical Service Entrance ATS Construction for 600–1000 A NEMA 1



600–1000 A Service Entrance Contactor NEMA 1 (ATS Door Open and Breaker Compartment Panel Removed)

Dimensions—Approximate Dimensions in Inches (mm)

Table 25.1-18. Service Entrance Rated Contactor-Based Transfer Switch 40–1600 A, 100% Load Rating—Dimensions and Approximate Shipping Weight (See Figure 25.1-7 and Figure 25.1-8)

Ampere Rating	Enclosure	A (Height)	B (Width)	C (Depth)	Normal	Emergency	Load	Neutral	Weight in Lb (kg)
40–100 at 480 V	N1/N3R	54.60 (1386.8)	19.81 (503.2)	17.59 (446.8)	(1) #14–2/0	(1) #14–2/0	(1) #14–2/0	(3) #14–1/0	190 (86)
150–200 at 480 V	N1/N3R	54.60 (1386.8)	19.81 (503.2)	17.59 (446.8)	(1) #6–250 kcmil	(1) #6–250 kcmil	(1) #6–250 kcmil	(3) #6–250 kcmil	200 (91)
225–400 at 480 V	N1/N3R	79.00 (2006.6)	25.25 (641.4)	22.46 (570.5)	(1) 3/0–750 kcmil	(2) 3/0–250 kcmil	(2) 3/0–250 kcmil	(6) 250k–500 kcmil	300 (136)
600–1000 at 480 V	N1	79.00 (2006.6)	40.37 (1025.4)	22.59 (573.8)	(4) 4/0–500 kcmil	(4) 1/0–750 kcmil	(4) 1/0–750 kcmil	(12) 4/0–500 kcmil	900 (409)
1000 at 480 V	N3R	90.00 (2286.0)	40.00 (1016.0)	60.22 (1529.6)	(4) 500–1000 kcmil	(4) 1/0–750 kcmil	(4) 1/0–750 kcmil	(12) 4/0–500 kcmil	950 (431)
1200 at 480 V	N1	90.00 (2286.0)	40.00 (1016.0)	48.22 (1224.8)	(4) 500–1000 kcmil	(4) 1/0–750 kcmil	(4) 1/0–750 kcmil	(12) 4/0–500 kcmil	900 (409)
	N3R			62.34 (1583.4)					950 (431)
1600 at 480 V	N1	90.00 (2286.0)	40.00 (1016.0)	48.22 (1224.8)	(4) 500–1000 kcmil	(4) 1/0–750 kcmil	(4) 1/0–750 kcmil	(12) 4/0–500 kcmil	930 (422)
	N3R			62.34 (1583.4)					980 (445)

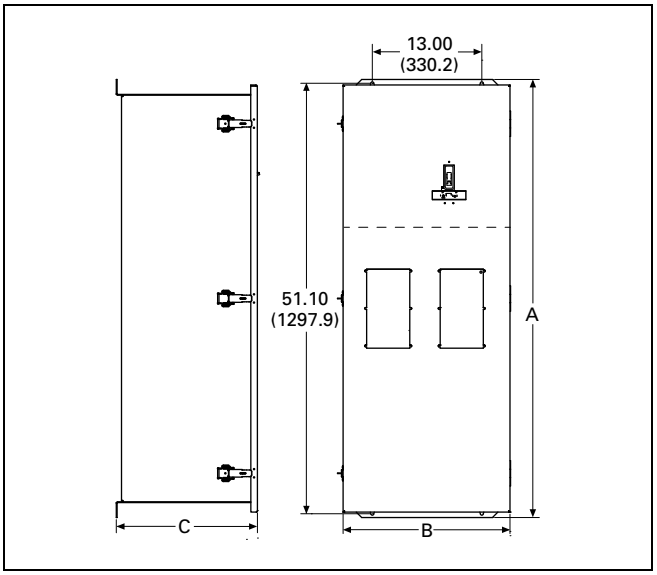


Figure 25.1-20. Automatic, 40–200 A, NEMA 1 and NEMA 3R, Wall Mount

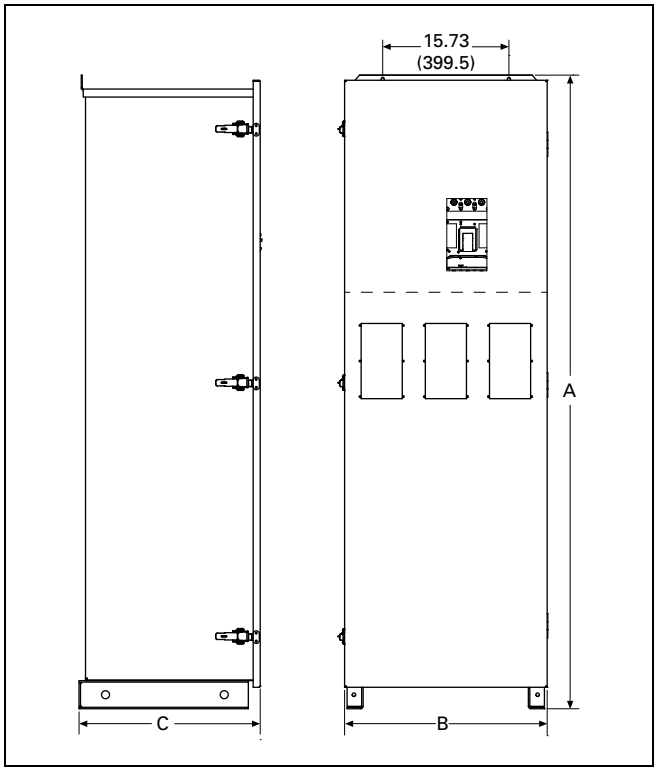


Figure 25.1-21. Automatic, 225–400 A, NEMA 1 and NEMA 3R Floor Standing Wall Attached

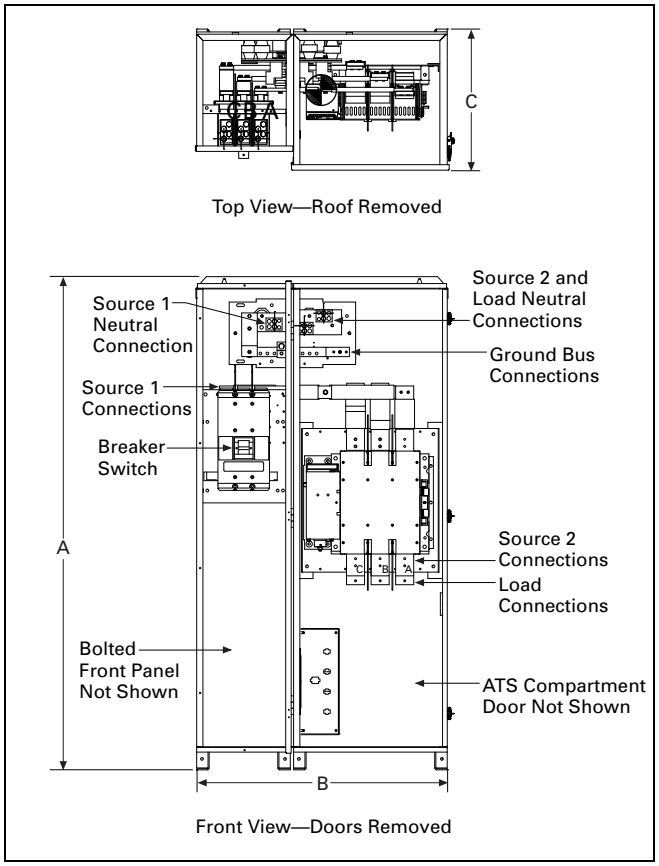


Figure 25.1-22. Automatic, 600–1000 A NEMA 1, 600–800 A NEMA 3R

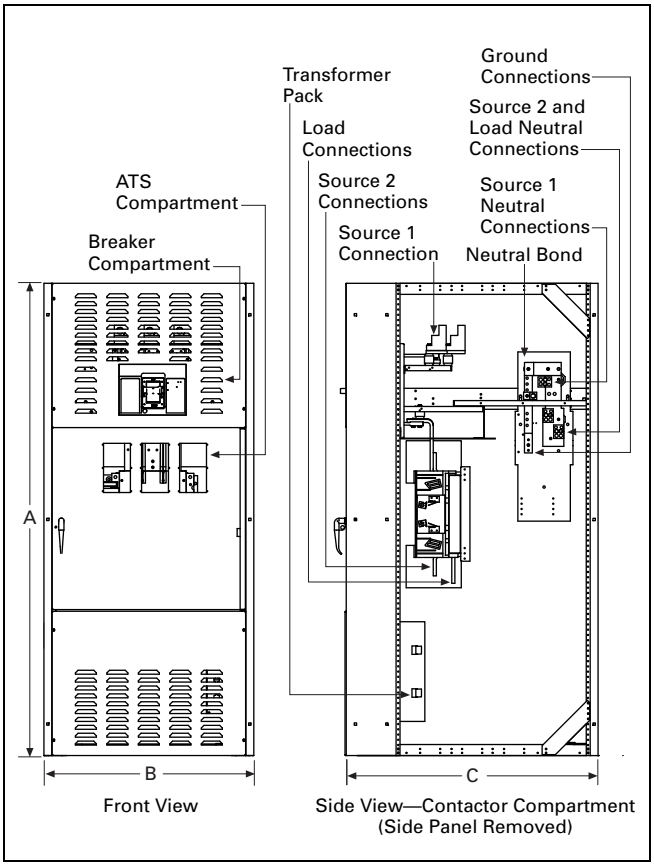


Figure 25.1-23. Automatic, 1200 A and 1600 A, NEMA 1

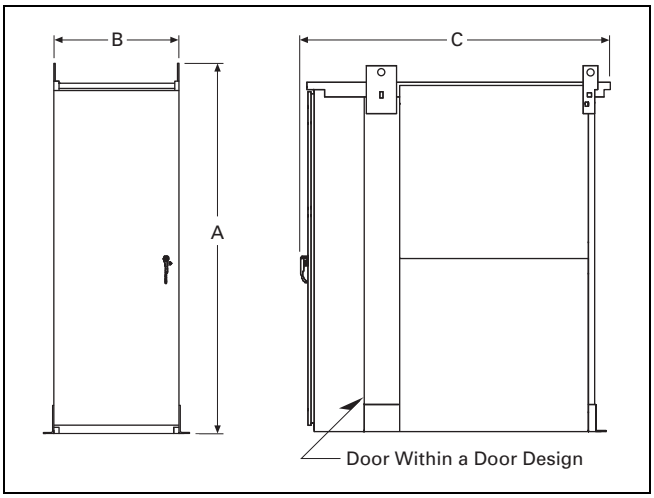


Figure 25.1-24. Automatic 1000–1600 A, NEMA 3R

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Molded-Case Switches—Manual Wallmount

Manual Switch with Door Closed—Must Open Door to Engage the Manual Handle

General Description

Eaton's wallmount manually operated transfer switches are designed for a variety of standby power applications for critical loads. In the event of a primary power source interruption, the user can manually transfer the load circuits to the standby power source. Once primary power has been restored, the user can manually transfer the load circuits back to the primary power source.

Application Description

Manual transfer switches cover applications ranging from 30 to 1000 A through 600 Vac for standard manual configurations and open transition.

Manual transfer switches may be applied for those application where a manually initiated and manually operated transfer is suitable. The front door of the switch must be opened to operate the manual handle. The design comes standard with a dead-front design, allowing safe manual transfer under load. Applications requiring the manual operation to be initiated without opening the door need to select a non-automatic transfer switch. Should an application require a service entrance rating, then a non-automatic or automatic design needs to be selected.

Features and Benefits

Features

- Molded-case switch power contact assemblies
- Positive mechanical interlocking
- Permanently affixed manual operating handle

Benefits

- High withstand, totally enclosed for maximum arc suppression and isolation during power transfer
- Optional trip units offer system overcurrent protection
- Prevents the paralleling of two sources of power
- Permits safe and convenient manual transfer of power

Standards and Certifications

- Complies with UL 1008 and UL 489 standards
- Meets American Bureau of Shipping (ABS) approval

Seismic Qualification

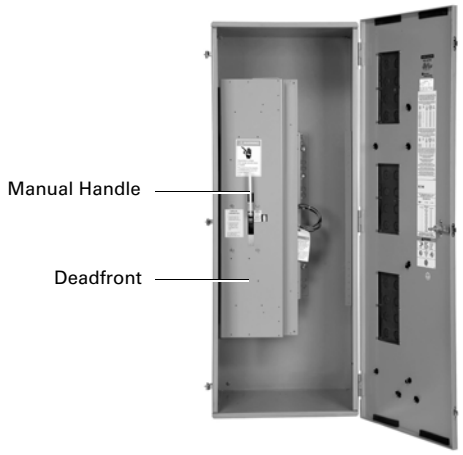
Refer to **Tab 1** for information on seismic qualification for this and other Eaton products.

Technical Data

Table 25.2-1. Wallmount Transfer Switch Standard Terminal Data for Power Cable Connections ①

Switch Ampere Rating	Breaker Frame	Line Side (Normal and Standby Source)	Load Connection	Neutral Connection
30–100 150–225 225–300	HFD HFD HKD	(1) #14–1/0 (1) #6–300 (1) #3–350	(1) #14–1/0 (1) #6–300 (1) #6–350	(3) #14–1/0 (3) #4–300 (3) #4–350
400	HLD	(1) 4/0–600	(2) #1–500	(6) 250–350
600 600 600 (four-pole)	HLD HMDL NB	(1) 3/0–350 (2) #1–500 (3) 3/0–400	(2) #1–500 (2) #1–500 (3) 3/0–400	(6) 250–350 (12) 4/0–500 (3) 3/0–400
800 800 1000	HMDL HNB HNB	(3) 3/0–400 (4) 4/0–500 (4) 4/0–500	(3) 3/0–400 (4) 4/0–500 (4) 4/0–500	(12) 4/0–500 (12) 4/0–500 (12) 4/0–500

① All terminals suitable for copper or aluminum conductors. For alternate terminal sizes, contact Eaton.



Manual Switch with Door Open—
Manually Initiated and Manually Operated

Note: If a service entrance rating is required, then a non-automatic type switch must be selected. Service entrance ratings are not available on a manual transfer switch.

Note: Manual operation of the handle requires opening the door.

Table 25.2-2. UL 1008 Short Circuit Withstand and Close-On Ratings (kA)

Standard UL 1008 3-Cycle—Horizontal and Vertical Industrial						
ATS Ampere Rating	Short Circuit			Ratings When Used with Upstream Fuse (kA)		
	240 V	480 V	600 V	Maximum Fuse Rating	Fuse Type ②	600 V
30 70 100	100 100 100	65 65 65	25 25 25	200 200 200	J, T J, T J, T	200 200 200
150 200 225	100 100 100	65 65 65	25 25 25	400 400 400	J, T J, T J, T	200 200 200
300 400 600	100 100 100	65 65 65 ③	25 25 25	400 600 800/1200	J, T J, T J, T	200 200 100/200
800 1000	65 65	50 ③ 50 ③	25 25	1200/1600 1600	L L	100/200 200

② Class RK5 fuse with 100 kA rating.
③ Four-pole units rated 35 kA.

Table 25.2-3. Wallmount Transfer Switch Ratings (100% Rated)

Mounting Type	Voltage	Current Amperes	No. of Poles	NEMA Enclosure
Fixed	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	30 70 100 150 225 300 400 600 800 1000 1200	2, 3, 4	Open NEMA 1 NEMA 12 NEMA 3R NEMA 4 NEMA 4X

Manual Transfer Switch
Shown without Deadfront

Dimensions

Approximate dimensions in inches (mm). For **Table 25.2-4**–**Table 25.2-6**, refer to **Figure 25.2-1** and **Figure 25.2-2**.

Table 25.2-4. 30–1000 A Type MTVX—NEMA 1, 3R and 12 ①

Switch Type	Enclosure			Gutter Space			Bolt Pattern		Standard Terminals ②			Weight Lb (kg)
	A	B	C	D	E	F	G	H				
	Height	Width	Depth	Width	Depth	Bending	Horizontal	Vertical	Line	Load	Neutral	
HKD (150–225 A)	48.00 (1219.2)	20.81 (528.6)	18.40 (467.4)	8.00 (203.2)	4.00 (101.6)	10.59 (269.0)	11.00 (279.4)	45.50 (1155.7)	(1) #3–350	(1) #6–350	(3) #4–350	305 (138)
HKD (300 A)	56.00 (1422.4)	20.81 (528.6)	18.40 (467.4)	8.00 (203.2)	4.00 (101.6)	13.59 (345.2)	11.00 (279.4)	53.50 (1358.9)	(1) #3–350	(1) #6–350	(3) #4–350	395 (179)
HLD (400 A)	64.00 (1625.6)	25.81 (655.6)	18.40 (467.4)	8.00 (203.2)	4.00 (101.6)	10.54 (267.7)	16.00 (406.4)	61.48 (1561.6)	(1) 4/0–600	(2) #1–500	(6) 250–350	395 (179)
HLD (400 A) ③	53.00 (1346.2)	25.81 (655.6)	18.40 (467.4)	8.00 (203.2)	4.00 (101.6)	11.85 (301.0)	16.00 (406.4)	50.48 (1282.2)	(2) 3/0–350	(2) #1–500	(6) 250–350	395 (179)
HLD (600 A)	64.00 (1625.6)	25.81 (655.6)	18.40 (467.4)	8.00 (203.2)	4.00 (101.6)	10.54 (267.7)	16.00 (406.4)	61.48 (1561.6)	(2) 3/0–350	(2) #1–500	(12) 4/0–500	395 (179)
HLD (600 A) ③	64.00 (1625.6)	25.81 (655.6)	18.40 (467.4)	8.00 (203.2)	4.00 (101.6)	10.54 (267.7)	16.00 (406.4)	61.48 (1561.6)	(2) 400–500	(2) #1–500	(12) 4/0–500	395 (179)
HMDL (600 A)	76.74 (1949.2)	25.81 (655.6)	19.50 (495.3)	8.00 (203.2)	4.00 (101.6)	17.73 (450.3)	16.00 (406.4)	75.15 (1908.8)	(2) #1–500	(2) #1–500	(12) 4/0–500	510 (232)
HMDL (800 A)	76.74 (1949.2)	25.81 (655.6)	19.50 (495.3)	8.00 (203.2)	4.00 (101.6)	17.73 (450.3)	16.00 (406.4)	75.15 (1908.8)	(3) 3/0–400	(3) 3/0–400	(12) 4/0–500	510 (232)
NB (800–1000 A)	76.74 (1949.2)	25.81 (655.6)	19.50 (495.3)	8.00 (203.2)	4.00 (101.6)	17.58 (446.5)	16.00 (406.4)	75.15 (1908.8)	(4) 4/0–500	(4) 4/0–500	(12) 4/0–500	540 (245)

① Consult factory for NEMA 4X.
② Suitable for Cu or Al wire. Consult the factory for other available terminal sizes.
③ Alternate line terminals.
Note: Dimensions are approximate and should not be used for construction purposes.

Table 25.2-5. 30–150 A Type MTHXFD Manual

Dimensions								Weight Lb (kg)
A	B	C	D	E	F	G	H	
22.88 (581.2)	13.13 (333.5)	22.74 (577.6)	22.62 (574.5)	24.50 (622.3)	9.78 (248.4)	10.28 (261.1)	32.31 (820.7)	143 (65)

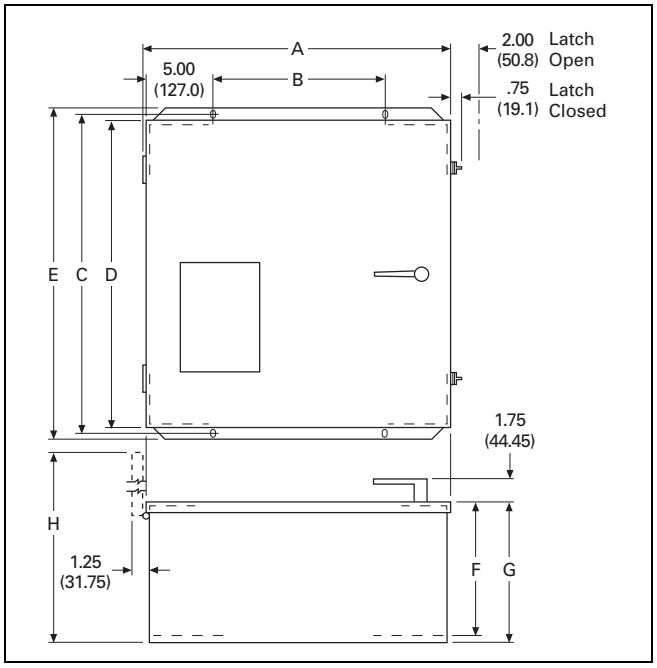


Figure 25.2-1. Dimensions

Table 25.2-6. Power Panel and Transformer Panel

Power Panel Type	Height	Width	Depth
Power Panel			
HFD HKD HLD	11.00 (279.4) 24.50 (622.3) 26.00 (660.4)	17.00 (431.8) 11.88 (301.8) 16.88 (428.8)	6.81 (173.0) 17.50 (444.5) 17.50 (444.5)
HMDL NB	36.25 (920.8) 36.25 (920.8)	16.88 (428.8) 16.88 (428.8)	17.50 (444.5) 19.00 (482.6)
Transformer Panel			
HFD HKD, HLD, HMDL and NB	22.00 (558.8) 28.63 (727.2)	16.50 (419.1) 8.25 (209.6)	6.50 (165.1) 5.50 (139.7)

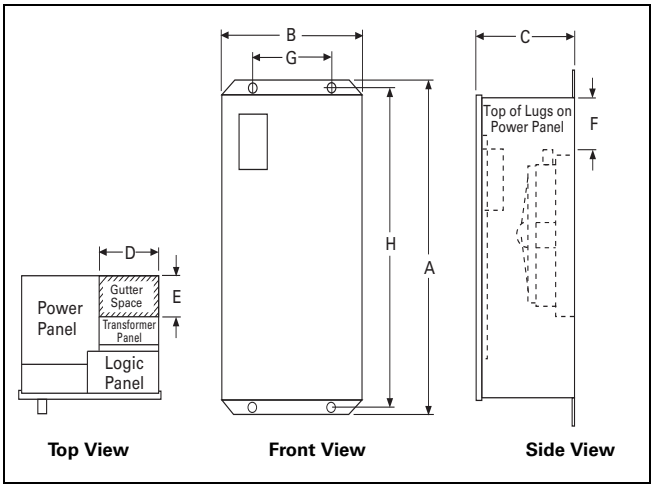


Figure 25.2-2. Dimensions

Molded-Case Switches—Non-Automatic Wallmount

Non-Automatic Wallmount

General Description

Eaton's wallmount non-automatic transfer switches are designed for a variety of standby power applications for critical loads.

In the event of a primary power source interruption, the user can manually transfer the load circuits to the standby power source through the use of an external pushbutton. Once primary power has been restored, the user can manually transfer the load circuits back to the primary power source through the use of an external pushbutton.

Application Description

Non-automatic transfer switches cover applications ranging from 30 to 1000 A through 600 Vac for manual configurations, open transition, standard or service entrance.

Non-automatic transfer switches are manually initiated, but electrically operated designs. Front door-mounted controls allow the operator to initiate the transfer. Overcurrent trips may be added to the design for either or both the normal and emergency source. Service entrance ratings are available.

Features and Benefits

Features

- Molded-case switch power contact assemblies
- Positive mechanical and electrical interlocking
- Permanently affixed manual operating handle
- Pushbutton operation
- Deadfront panel

Benefits

- High withstand, totally enclosed for maximum arc suppression and isolation during power transfer
- Optional trip units offer system overcurrent protection
- Prevents the paralleling of two sources of power
- Permits safe and convenient manual transfer of power under load via external pushbutton initiated operation

Standards and Certifications

- Complies with UL 1008 and UL 489 standards
- CSA C22.2 No. 178 certified

Seismic Qualification

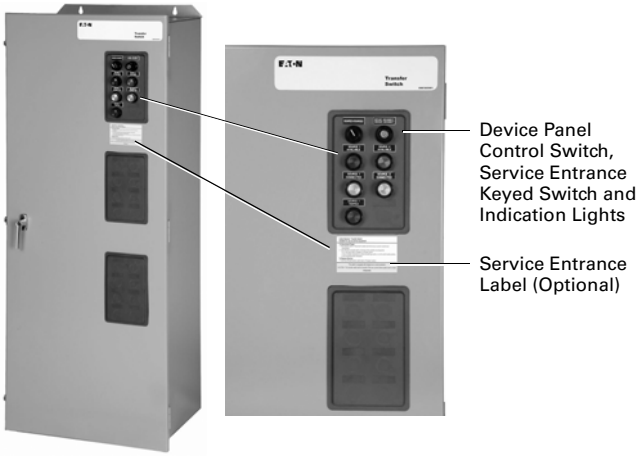
Refer to **Tab 1** for information on seismic qualification for this and other Eaton products.

Technical Data

Table 25.2-7. Wallmount Transfer Switch Standard Terminal Data for Power Cable Connections ①

Switch Ampere Rating	Breaker Frame	Line Side (Normal and Standby Source)	Load Connection	Neutral Connection
30–100	HFD	(1) #14–1/0	(1) #14–1/0	(3) #14–1/0
150–225	HFD	(1) #6–300	(1) #6–300	(3) #4–300
225–300	HKD	(1) #3–350	(1) #6–350	(3) #4–350
400	HLD	(1) 4/0–600	(2) #1–500	(6) 250–350
600	HLD	(1) 3/0–350	(2) #1–500	(6) 250–350
600	HMDL	(2) #1–500	(2) #1–500	(12) 4/0–500
600 (four-pole)	NB	(3) 3/0–400	(3) 3/0–400	(3) 3/0–400
800	HMDL	(3) 3/0–400	(3) 3/0–400	(12) 4/0–500
800	HNB	(4) 4/0–500	(4) 4/0–500	(12) 4/0–500
1000	HNB	(4) 4/0–500	(4) 4/0–500	(12) 4/0–500

① All terminals suitable for copper or aluminum conductors. For alternate terminal sizes, contact Eaton.



Non-Automatic Switch with Doors Closed

Note: Optional service entrance rating shown for this photo.

Non-Automatic Transfer Switch

Device panel shows controls to initiate the manual transfer and control indicating lights. In addition, an optional service entrance rating may be specified. Keyed switch is mounted on the device panel.

Table 25.2-8. UL 1008 Short Circuit Withstand and Close-On Ratings (kA)

Standard UL 1008 Three-Cycle—Horizontal and Vertical Industrial						
ATS Ampere Rating	Short Circuit			Ratings When Used with Upstream Fuse (kA)		
	240 V	480 V	600 V	Maximum Fuse Rating	Fuse Type ②	600 V
30	100	65	25	200	J, T	200
70	100	65	25	200	J, T	200
100	100	65	25	200	J, T	200
150	100	65	25	400	J, T	200
200	100	65	25	400	J, T	200
225	100	65	25	400	J, T	200
300	100	65	25	400	J, T	200
400	100	65	25	600	J, T	200
600	100	65 ③	25	800/1200	J, T	100/200
800	65	50 ③	25	1200/1600	L	100/200
1000	65	50 ③	25	1600	L	200

② Class RK5 fuse with 100 kA rating.
③ Four-pole units rated 35 kA.

Table 25.2-9. Non-Automatic Wallmount Transfer Switch Ratings (100% Rated)

Mounting Type	Voltage	Current Amperes	No. of Poles	NEMA Enclosure
Fixed	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	30 70 100 150 225 300 400 600 800 1000	2, 3, 4	Open NEMA 1 NEMA 12 NEMA 3R NEMA 4 NEMA 4X

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Dimensions in Inches (mm)

Table 25.2-10. 30–1000 A Types NTHE—NTVE NEMA 1, 3R and 12 (See Figure 25.2-3) ①

Switch Type	Enclosure			Gutter Space			Bolt Pattern		Standard Terminals ②			Weight Lb (kg)
	A	B	C	D	E	F	G	H				
	Height	Width	Depth	Width	Depth	Bending	Horizontal	Vertical	Line	Load	Neutral	
HFD (30–100 A) ③	47.74 (1213.0)	20.81 (528.6)	17.22 (437.0)	8.00 (203.2)	4.00 (101.6)	6.22 (157.9)	10.75 (273.0)	45.24 (1049.1)	(1) #14–1/0	(1) #14–1/0	(3) #14–1/0	227 (103)
HFD (150 A) ③	47.74 (1213.0)	20.81 (528.6)	17.22 (437.0)	8.00 (203.2)	4.00 (101.6)	6.22 (157.9)	10.75 (273.0)	45.24 (1049.1)	(1) #6–300	(1) #6–300	(3) #4–300	227 (103)
HKD (150–225 A)	48.00 (1219.2)	20.81 (528.6)	18.40 (467.4)	8.00 (203.2)	4.00 (101.6)	10.59 (269.0)	11.00 (279.4)	45.50 (1155.7)	(1) #3–350	(1) #6–350	(3) #4–350	305 (138)
HKD (300 A)	56.00 (1422.4)	20.81 (528.6)	18.40 (467.4)	8.00 (203.2)	4.00 (101.6)	13.59 (345.2)	11.00 (279.4)	53.50 (1358.9)	(1) #3–350	(1) #6–350	(3) #4–350	395 (179)
HLD (400 A)	64.00 (1625.6)	25.81 (655.6)	18.40 (467.4)	8.00 (203.2)	4.00 (101.6)	10.54 (267.7)	16.00 (406.4)	61.48 (1561.6)	(1) 4/0–600	(2) #1–500	(6) 250–350	395 (179)
HLD (400 A) ④	53.00 (1346.2)	25.81 (655.6)	18.40 (467.4)	8.00 (203.2)	4.00 (101.6)	11.85 (301.0)	16.00 (406.4)	50.48 (1282.2)	(2) 3/0–350	(2) #1–500	(6) 250–350	395 (179)
HLD (600 A)	64.00 (1625.6)	25.81 (655.6)	18.40 (467.4)	8.00 (203.2)	4.00 (101.6)	10.54 (267.7)	16.00 (406.4)	61.48 (1561.6)	(2) 3/0–350	(2) #1–500	(12) 4/0–500	395 (179)
HLD (600 A) ④	64.00 (1625.6)	25.81 (655.6)	18.40 (467.4)	8.00 (203.2)	4.00 (101.6)	10.54 (267.7)	16.00 (406.4)	61.48 (1561.6)	(2) 400–500	(2) #1–500	(12) 4/0–500	395 (179)
HMDL (600 A)	76.74 (1949.2)	25.81 (655.6)	19.50 (495.3)	8.00 (203.2)	4.00 (101.6)	17.73 (450.3)	16.00 (406.4)	75.15 (1908.8)	(2) #1–500	(2) #1–500	(12) 4/0–500	510 (232)
HMDL (800 A)	76.74 (1949.2)	25.81 (655.6)	19.50 (495.3)	8.00 (203.2)	4.00 (101.6)	17.73 (450.3)	16.00 (406.4)	75.15 (1908.8)	(3) 3/0–400	(3) 3/0–400	(12) 4/0–500	510 (232)
NB (800–1000 A)	76.74 (1949.2)	25.81 (655.6)	19.50 (495.3)	8.00 (203.2)	4.00 (101.6)	17.58 (446.5)	16.00 (406.4)	75.15 (1908.8)	(4) 4/0–500	(4) 4/0–500	(12) 4/0–500	540 (245)

① Consult factory for NEMA 4X.
② Suitable for Cu or Al wire. Consult the factory for other available terminal sizes.
③ NTHE with multi-tap voltage selection panel.
④ Alternate line terminals.

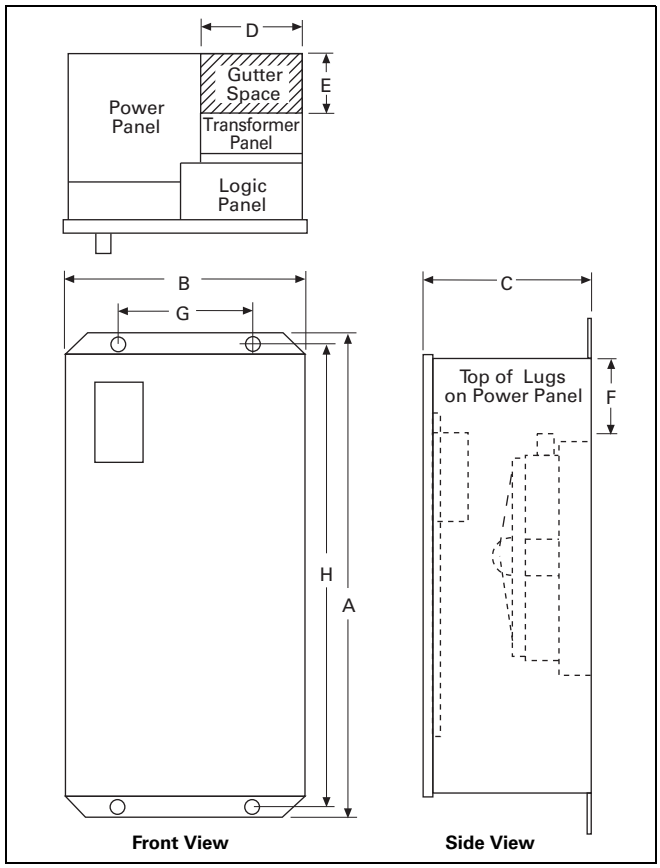


Figure 25.2-3. Dimensions

Table 25.2-11. Power Panel and Transformer Panel

Power Panel Type	Height	Width	Depth
Power Panel			
HFD HKD HLD	11.00 (279.4) 24.50 (622.3) 26.00 (660.4)	17.00 (431.8) 11.88 (301.8) 16.88 (428.8)	6.81 (173.0) 17.50 (444.5) 17.50 (444.5)
HMDL NB	36.25 (920.8) 36.25 (920.8)	16.88 (428.8) 16.88 (428.8)	17.50 (444.5) 19.00 (482.6)
Transformer Panel			
HFD HKD, HLD, HMDL and NB	22.00 (558.8) 28.63 (727.2)	16.50 (419.1) 8.25 (209.6)	6.50 (165.1) 5.50 (139.7)

Molded-Case Switches—Automatic Wallmount

Automatic Wallmount Transfer Switch

General Description

Eaton's wallmount transfer switches are designed for a variety of standby power applications for critical loads. They provide flexibility, reliability and value in a compact package. In the event of a primary power source interruption, a transfer switch provides an effective means to transfer the load circuits to an alternate power source while reducing the possibility of injury or property damage.

Wallmount transfer switches meet or exceed all industry standards for endurance, reliability and performance.

These breaker-based designs can be applied with the ATC-100 (up to 400 A), ATC-300+ or ATC-900 controllers.

Application Description

Suitable for emergency and standby systems (all loads).

These molded-case switch designs are inherently open transition type that features delayed transition.

Delayed Transition

This is a "break-before-make" or open transition that also has a "center off" or neutral position with a programmable time delay setting for the neutral position. The three-position transfer switch is either closed on Source 1, closed on Source 2, or in a center off, neutral position (not closed on either source).

Delayed Transition With Load Voltage Decay

This is a delayed transition with the optional feature to delay in the neutral position to point where the load voltage decays to a programmable voltage level. When the load voltage level reaches the programmable set point, the transfer from the neutral position initiates.

Features, Benefits and Functions

Industrial Design Highlights

- Double-throw, mechanically interlocked transfer mechanism
- High withstand and closing ratings

Standard Features

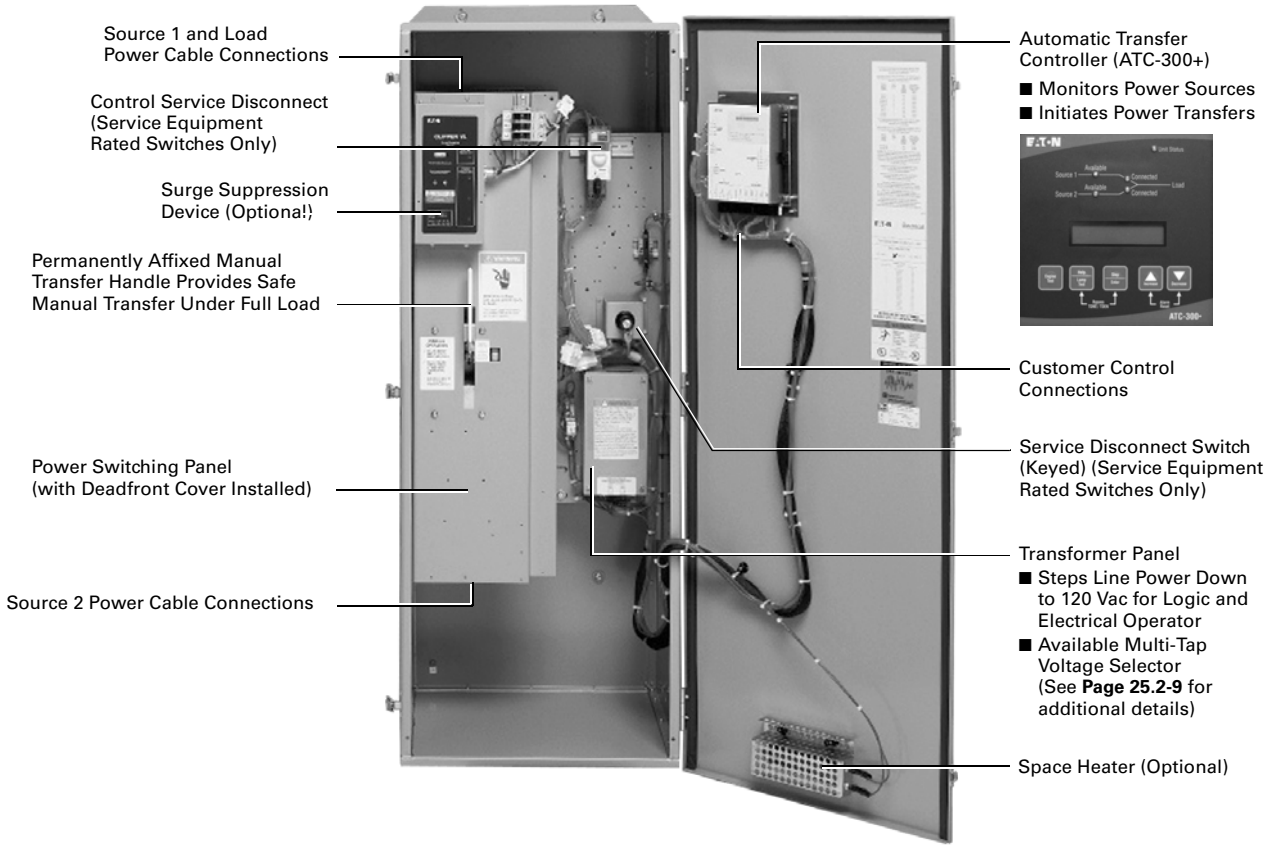
- Auxiliary relay contacts:
  - Source 1 present 2NO and 2NC
  - Source 2 present 2NO and 2NC
- Switch position indication contacts:
  - Source 1 position 1NO and 1NC
  - Source 2 position 1NO and 1NC
- Source 1 and Source 2 sensing:
  - Undervoltage/underfrequency
  - Overvoltage/overfrequency
  - Three-phase rotation protection
  - Three-phase voltage unbalance/loss
- Pre-transfer signal contacts 1NO/1NC
- Go to emergency (Source 2)
- Seven field-programmable time delays
- LCD-based display for programming, system diagnostic and Help message display
- Mimic diagram with source available and connected LED indication
- Time-stamped history log
- System TEST pushbutton
- Programmable plant exerciser—OFF, daily, 7-, 14-, 28-day interval selectable run time 0–600 minutes no load/load with fail-safe
- Safe manual operation under full load with permanently affixed operating handle
- Modbus RTU via RS-485

Optional Features

- Suitable for use as service equipment in the standard enclosure size
- Available SPD for power/controller, engine start circuit, phone and cable connections
- Integrated distribution panels
- Field-selectable multi-tap transformer panel permits operation on a wide range of system voltages
- Integral overcurrent protection
- Space heater with thermostat
- Ammeter—load side
- Stainless steel cover for controller
- ATC-100 and ATC-900 controllers available
- Source 2 inhibit
- Manual retransfer to normal
- Remote annunciator with control
- Ethernet communication (PXG 900 Gateway)
- ATC-900 controller
  - Includes Modbus RTU via RS-485
  - Includes four programmable inputs/outputs
  - Includes two plant exercisers
  - Includes LCD color display with easy navigation tools to settings and event logs
  - Expandable I/O (up to 20 I/O total)
  - Optional integrated load metering
  - Optional EtherNet TCP/IP communications

Seismic Qualification

Refer to **Tab 1** for information on seismic qualification for this and other Eaton products.



Basic Components of Automatic Transfer Switches

Eaton's Superior Design Transfer Switch Characteristics

Unmatched Performance and Versatility

Eaton's family of wallmount transfer switches offers unmatched performance, versatility and value for power switching applications. At the heart of these designs is Eaton's molded-case switch, designed specifically to meet UL 1008.

Superior Main Contact Structure

All Eaton wallmount transfer switches meet or exceed the standards set forth in UL 1008 and UL 489. No other transfer switch manufacturer has met the rigid testing requirements of this combination of standards. Completely enclosed contacts add a measure of safety and reliability. It also ensures the integrity of the contact assemblies and minimizes the need for periodic maintenance of the contacts, reducing downtime.

Fast, Powerful and Safe Power Switching Mechanism

The power panel uses a unidirectional gear motor mechanism. The power panel can be operated manually under a full load.

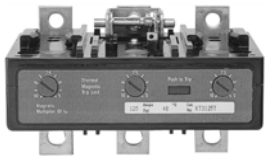
Molded-Case Switch Features

- True four-pole switched neutral availability
- Totally enclosed contact assembly

Molded-Case Switch

Optional Integral Overcurrent Protection Capability

For service entrance and other applications, trip units can be integrated into the power switching section. This eliminates the need for separate upstream protective devices, saving cost and space.



Optional Thermal-Magnetic or Electronic Trip Units

Optional Service Entrance Rated Automatic Transfer Switch

Eaton's service entrance rated molded-case breaker design is a 100% rated ATS and UL 1008 Listed.

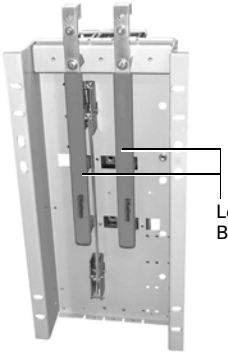
Mechanical Interlock

Wallmount transfer switches feature a rear-mounted, fail-safe mechanical interlock to prevent paralleling of sources. This is, in addition to software interlocking and the interlocking inherently provided by the transfer mechanism.

Triple Interlocks

Load Bus Assembly

The load bus can be oriented for either top or bottom access. Top entry is standard.

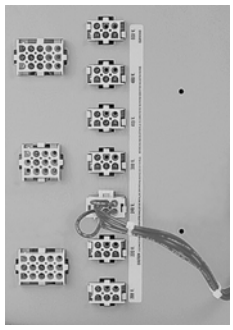


Load Bus

Ease of Maintenance

Keyed quick-disconnect plugs are provided for easy and complete isolation of the control circuitry. Maintenance can be performed on the logic independent from the power sections and still allow the user to manually transfer power under full load conditions.

Logic Disconnect Plugs



Multi-Tap Voltage Selector

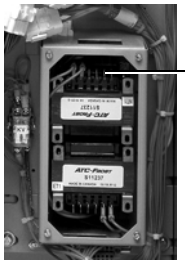
Multi-Tap Voltage Selector

Eaton's industry-exclusive multi-tap system voltage selector allows our transfer switch to be applied on most system voltages just by proper insertion of the selector plug. Available in two configurations: Worldwide multi-tap with 600, 480, 415, 380, 240, 220 and 208 Vac, single- and three-phase, 50 and 60 Hz taps. North American multi-tap with 600, 480, 240, 208 and 120 Vac, single- and three-phase, 60 Hz taps.

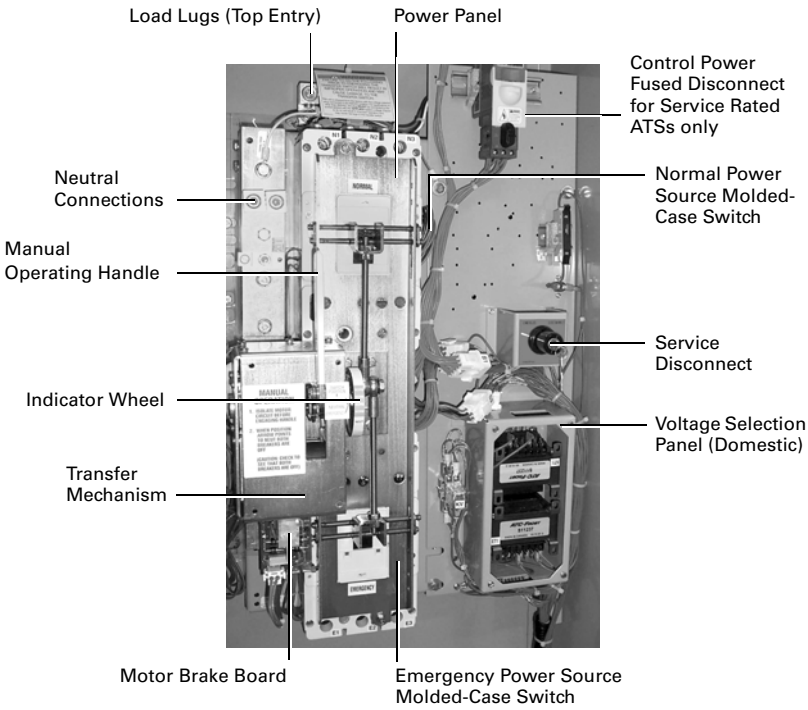
North American Voltage Selector

North American multi-tap transformer comes with 600, 480, 240, 208 and 120 Vac, single- and three-phase, and 60 Hz taps, which are all field selectable. Simply remove the steel cover and move the appropriate blue flag terminal to the desired voltage. All switches are shipped with the blue flag in the 600 V position.

Transformer Panel Location



Transformer Panel Opened



Typical (225–1000 A) Vertical Design Transfer Switch Equipment

Standards and Certifications

They are listed under Underwriters Laboratories UL 1008 Standard for transfer switch equipment and are optionally available as suitable for emergency and standby systems as defined in NFPA 99 for health care facilities.

- UL 1008 listed
- CSA C22.2 No. 178 certified

Technical Data

Electrical Ratings

- Molded-case and circuit breaker 30–1000 A
- Two-, three- or four-pole
- Up to 600 Vac, 50/60 Hz
- NEMA 1, 3R, 12, open

Molded-Case Transfer Switch and Circuit Breaker

Table 25.2-12. UL 1008 Short Circuit Withstand and Close-On Ratings (kA)

Switch Ampere Rating	UL 1008 3-Cycle Any Breaker Rating			Ratings When Used with Upstream Fuse		
	240 Vac	480 Vac	600 Vac	Maximum Fuse Rating	Fuse Type ①	600 Vac
30–100	100	65	25	200	J, T	200
150	100	65	25	400	J, T	200
225	100	65	25	400	J, T	200
300	100	65	25	400	J, T	200
400	100	65	25	600	J, T	200
600 ②	100	65	25	800/1200	J, T	100/200
800 ②	65	50	25	1200/1600	L	100/200
1000 ②	65	50	25	1600	L	200

① Class RK5 fuse with 100 kA rating.
② For 600, 800 and 1000 A ratings, single- through four-pole units are rated 35 kA.

Table 25.2-13. Wallmount Transfer Switch Standard Terminal Data for Power Cable Connections ③

Switch Ampere Rating	Breaker Frame	Line Side (Normal and Standby Source)	Load Connection	Neutral Connection
30–100	HFD	(1) #14–1/0	(1) #14–1/0	(3) #14–1/0
150–225	HFD	(1) #6–300	(1) #6–300	(3) #4–300
150–225	HKD	(1) #3–350	(1) #6–350	(3) #4–350
225–300	HKD	(1) #3–350	(1) #6–350	(3) #4–350
400	HLD	(1) 4/0–600	(2) #1–500	(6) 250–350
600	HLD	(1) 3/0–350	(2) #1–500	(6) 250–350
600	HMDL	(2) #1–500	(2) #1–500	(12) 4/0–500
600 (four-pole)	NB	(3) 3/0–400	(3) 3/0–400	(3) 3/0–400
800	HMDL	(3) 3/0–400	(3) 3/0–400	(12) 4/0–500
800	HNB	(4) 4/0–500	(4) 4/0–500	(12) 4/0–500
1000	HNB	(4) 4/0–500	(4) 4/0–500	(12) 4/0–500

③ All terminals suitable for copper or aluminum conductors. For alternate terminal sizes, contact Eaton.

Table 25.2-14. UL 1008 Ratings (100% Rated)

Mounting Type	Voltage	Current Amperes	Number of Poles	NEMA Enclosure
Fixed	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	30 70 100 150 225 300 400 600 800 1000	2, 3, 4	Open NEMA 1 NEMA 12 NEMA 3R NEMA 4 NEMA 4X

Dimensions in Inches (mm)

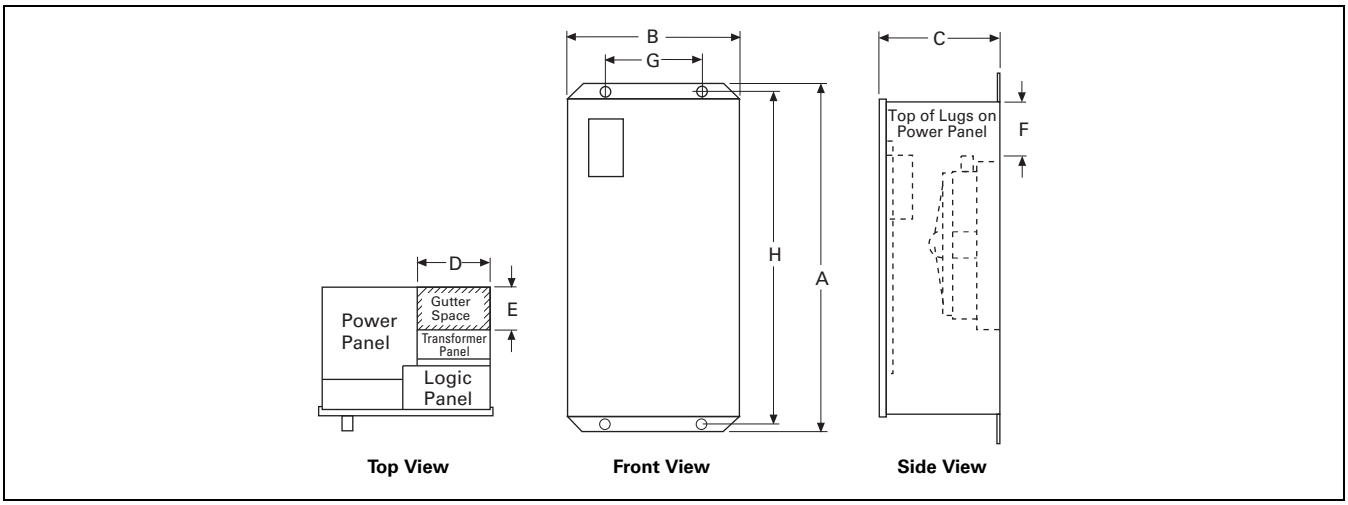


Figure 25.2-4. Dimension Views

Table 25.2-15. Breaker-Based and Molded-Case Transfer Switches—NEMA 1, 3R and 12 ①

Switch Rating Amperes	Switch Type	Enclosure			Gutter Space		Bolt Pattern		Standard Terminals ②			Weight Lb (kg)
		A	B	C	D	E	G	H	Line Side (Normal Load and Standby Source) Connection		Neutral Connection	
		Height	Width	Depth	Width	Depth	Horizontal	Vertical				
Molded-Case												
30–100	HFD ③	47.74 (1213.0)	20.81 (528.6)	17.22 (437.0)	8.00 (203.2)	4.00 (101.6)	10.75 (273.0)	46.44 (1180.0)	—	—	—	232 (105)
150–225	HFD ③	47.74 (1213.0)	20.81 (528.6)	17.22 (437.0)	8.00 (203.2)	4.00 (101.6)	10.75 (273.0)	46.44 (1180.0)	—	—	—	232 (105)
30–100	HFD ④	47.74 (1213.0)	20.81 (528.6)	17.22 (437.0)	8.00 (203.2)	4.00 (101.6)	10.75 (273.0)	46.44 (1180.0)	—	—	—	240 (190)
150	HFD ④	47.74 (1213.0)	20.81 (528.6)	17.22 (437.0)	8.00 (203.2)	4.00 (101.6)	10.75 (273.0)	46.44 (1180.0)	—	—	—	240 (190)
150–225	HFD ③	35.61 (904.0)	20.06 (509.5)	13.34 (339.0)	8.00 (203.2)	4.00 (101.6)	10.75 (273.0)	34.31 (904.0)	—	—	—	150 (68)
150–225	HKD	56.00 (1422.4)	20.81 (528.6)	18.40 (467.4)	8.00 (203.2)	4.00 (101.6)	11.00 (279.4)	45.50 (1155.7)	—	—	—	305 (134)
300	HKD	53.00 (1346.2)	25.81 (655.6)	18.40 (467.4)	8.00 (203.2)	4.00 (101.6)	11.00 (279.4)	53.50 (1358.9)	—	—	—	295 (134)
400	HLD	53.00 (1346.0)	25.81 (655.6)	18.40 (467.4)	8.00 (203.2)	4.00 (101.6)	16.00 (406.4)	51.50 (1308.0)	—	—	—	425 (193)
600	HLD ③	64.00 (1625.6)	25.81 (655.6)	18.40 (467.4)	8.00 (203.2)	4.00 (101.6)	16.00 (406.4)	62.50 (1588.0)	—	—	—	475 (214)
600	HMDL	76.74 (1949.2)	25.81 (655.6)	19.50 (495.3)	8.00 (203.2)	4.00 (101.6)	16.00 (406.4)	75.15 (1908.8)	—	—	—	480 (218)
800	HMDL ③	76.74 (1949.2)	25.81 (655.6)	19.50 (495.3)	8.00 (203.2)	4.00 (101.6)	16.00 (406.4)	75.15 (1908.8)	—	—	—	510 (232)
800–1000	HNB	76.74 (1949.2)	25.81 (655.6)	19.50 (495.3)	8.00 (203.2)	4.00 (101.6)	16.00 (406.4)	75.15 (1908.8)	—	—	—	540 (245)

① Consult factory for NEMA 4X.
② Suitable with copper only.
③ 240/120 V, single-phase, three-wire or 208 V, three-phase, four-wire systems only.
④ With multi-tap voltage selection panel.

Maintenance Bypass Switches Type MBHE 100–1000 A

Type MBHE Maintenance Bypass Switch

General Description

Eaton's Maintenance Bypass Switch is a UL 1008 listed device that provides a simple and effective means for bypassing un-interruptible power supplies while maintaining continuity of power to the critical computer loads. A maintenance bypass switch is a requirement on every UPS installation in order to accommodate the maintenance and testing of the UPS system.

Features

- UL 1008 listing—File E61639
- Make-before-break electrical operation
- Lockout circuit to be wired into the UPS bypass authorization
- Pilot devices to show UPS position "Normal" and "Bypassed"
- Pilot device to show "Lockout" enabled
- Reliable manually initiated electrical operation
- High interrupting ratings are standard
- Molded-case switch designs are available
- Solid neutral connections are standard

Benefits

- Safe and reliable operation is ensured due to the simple and durable switching design
- Unauthorized bypass is prevented by the need of UPS system to send the bypass authorized signal
- 100% current ratings makes selection to the UPS kVA ratings easy to accomplish
- Use of interrupting rating switches makes the maintenance bypass switches adaptable to systems with high levels of available fault current

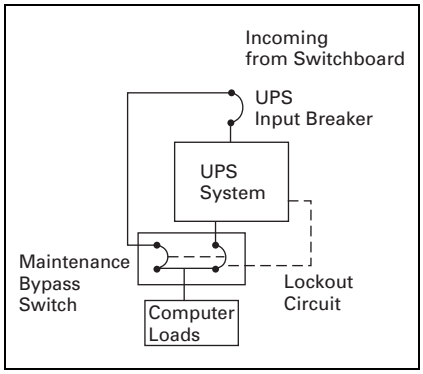


Figure 25.2-5. Single Line Diagram of Maintenance Bypass Switch

Layout Dimensions

Maintenance Bypass Switches

100–1000 A Type MBHE Maintenance Bypass N1, N3R, N12

Table 25.2-16. Manual and Maintenance Bypass Enclosures—Dimensions in Inches (mm)

Ampere Rating	Dimensions						
	A	B	C	D	E	F	G
100–150	22.21 (564.1)	13.13 (333.5)	24.04 (610.6)	22.18 (563.4)	24.92 (633.0)	9.89 (251.2)	32.47 (824.7)
225–300	38.21 (970.5)	29.13 (739.9)	35.66 (905.8)	35.62 (904.7)	37.92 (963.2)	17.89 (454.4)	55.56 (1411.2)
400	38.21 (970.5)	29.13 (739.9)	35.77 (908.5)	35.62 (904.7)	37.92 (963.2)	17.71 (449.8)	55.56 (1411.2)
600	38.21 (970.5)	29.13 (739.9)	59.66 (1515.4)	49.62 (1260.3)	61.92 (1572.8)	17.71 (449.8)	55.76 (1416.3)
800	38.21 (970.5)	29.13 (739.9)	59.66 (1515.4)	49.62 (1260.3)	61.92 (1572.8)	17.71 (449.8)	55.76 (1416.3)
1000	38.21 (970.5)	29.13 (739.9)	59.66 (1515.4)	59.62 (1514.3)	61.92 (1572.8)	17.71 (449.8)	55.76 (1416.3)

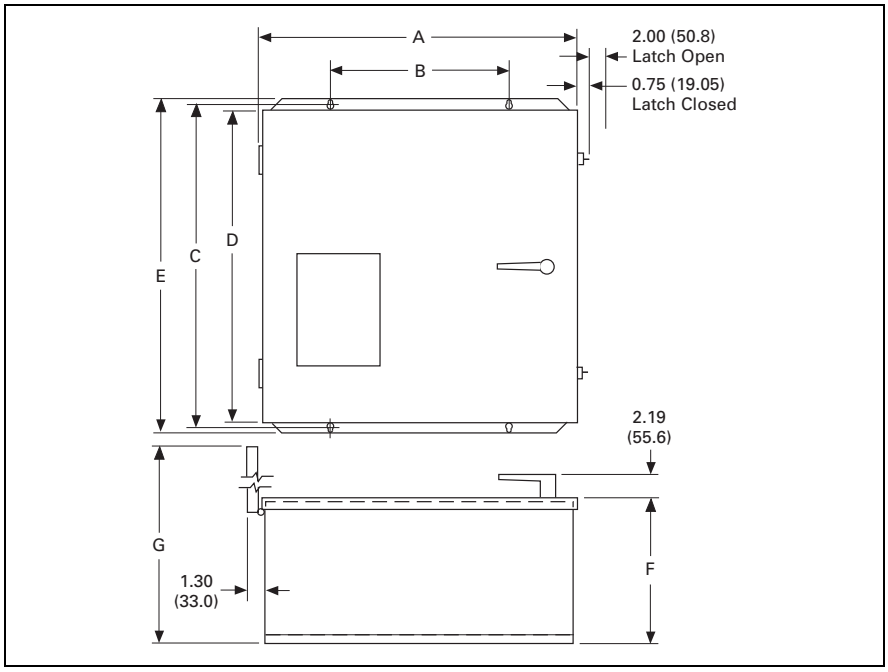


Figure 25.2-6. Maintenance Bypass Switches—Dimensions in Inches (mm)

Floor-Standing Magnum Transfer Switches

Floor-Standing Magnum Transfer Switch

General Description

Eaton's Magnum transfer switches are designed for a variety of standby power applications for critical and noncritical loads. They monitor both Source 1 (Normal) and Source 2 (Emergency) power sources. In the event of a Source 1 power interruption, these switches will automatically transfer the load circuits to the Source 2 power source. Once Source 1 power source has been restored, the process is automatically reversed.

Application Description

The Magnum family of transfer switches covers applications ranging from 200 to 5000 A through 600 Vac. Some of the applications are: automatic or non-automatic configurations, open or closed transition and standard or rated suitable for use as service entrance. They are designed for applications where total system coordination must be accomplished while achieving a high level of withstand, interrupting and closing performance.

Drawout construction is available for applications, such as critical life-support systems, where preventive maintenance, inspection and testing must be accomplished while maintaining continuity of power to the load.

Features, Benefits and Functions

Industrial Design Highlights

- Freestanding enclosure
- High withstand ratings
  - 100 kA standard 3-cycle rating
  - 85 kA standard 30-cycle rating
- Dual drawout on ATS and bypass
- Deadfront
- Safe manual transfer under load
- Electrically operated
- Magnum stored energy mechanism
- Quick make / quick break—switching times (<3 cycles)
- Multi-tap transformer
- True four-pole switched neutral
- Mechanically interlocked
- Integral overcurrent trip option
- Integrated service entrance rating option
- OSHPD listed

Standard Features

- ATC-900 controller
- Drawout cassette on ATS and bypass
- Source available contacts:
  - Source 1 available 1NO/1NC
  - Source 2 available 1NO/1NC
- Switch position contacts:
  - Source 1 position 1NO/1NC
  - Source 2 position 1NO/1NC
- Source 1 and Source 2 sensing:
  - Undervoltage/underfrequency
  - Overvoltage/overfrequency
- Field-programmable time delays
  - Time delay engine start
  - Time delay normal to emergency
  - Time emergency to normal
  - Time delay engine cooldown
  - Time delay emergency failure
- LCD color-based display for programming, system diagnostics and Help menu
- Mimic diagram with source available and connected LED indication
- Four programmable inputs and outputs
- Standard Modbus 485
- USB port for set point downloads and event recording uploads
- Password-protected access to control functions and set point programming
- Two automatic plant exercisers—load or no load, daily, 7-, 14-, 28-day or calendar date operation, 0–600 minute runtime

Optional Features

- Available UL 1449 Third Edition surge protection device (SPD)
- Automatic transfer operation with selectable (via programming) non-automatic or automatic retransfer with fail-safe
- Space heater with thermostat
- Digital multi-function power quality metering
- DC power input for uninterrupted monitoring of ATS status
- Integrated load metering
- Expandable I/O (up to 20 I/O total)
- EtherNet TCP/IP communications

Standards and Certifications

Eaton Magnum transfer switches meet or exceed all industry standards for endurance, reliability and performance. They are listed under Underwriters Laboratories UL 1008 Standard for transfer switch equipment. With certain options, they also comply with Source 2 and standby system requirements as defined in NFPA 99 for health care facilities.

- UL 1008—standard for safety for automatic transfer switches 4000 and 5000 A available as UL 891 only
- UL 489—standard for circuit breakers and molded case switches
- CSA 22.2-178—Canadian transfer switch standard
- NEC articles—code sections 517, 700, 701, 702—applicable switch equipment
- NFPA 110—Source 2 and Standby Power Systems
- NFPA 99—healthcare facilities
- EGSA 100S—standard for transfer switches
- NEMA ICS10—Standard for transfer switch equipment
- ISO® 9000—International Organization for Standardization
- IBC—International Building Code 2006
- BOCA—Building Officials Code Administrators

Technical Data and Specifications

Floor-Standing Magnum Transfer Switch

- Ambient temperature range: –40 to +40 °C (–40 to +104 °F)
- Operating temperature range: –20 to +70 °C (–4 to +158 °F)
- Operating humidity: up to 90%
- Relative humidity (noncondensing)

Magnum Drawout Transfer Switch

- 200–5000 A
- Two-, three-, four-pole (except units 3200 A and higher only three- or four-pole)
- 120–600 Vac
- 100,000 A withstand/closing/ interrupting at 480 Vac
- Short-time withstand—85,000 for 30 cycles

Magnum Fixed-Mount Transfer Switch

- 200–3200 A; 4000 and 5000 A ratings are drawout
- Two-, three-, four-pole (except units 3200 A and higher only three- and four-pole)
- 120–600 Vac
- 100,000 A withstand/closing/ interrupting at 480 Vac
- Short-time withstand–85,000 for 30 cycles

Transfer Switch Withstand Ratings

Table 25.3-1. System Coordination Information—Withstand, Closing and Interrupting Ratings

Transfer Switch Ampere Rating (100% Rated)	3-Cycle Short-Circuit 600 V (kA)	30-Cycle ① Short-Time 600 V (kA)
UL 1008		
800 1000 1200	100 100 100	85 85 85
1600 2000 2500	100 100 100	85 85 85
3000 3200 4000	100 100 100	85 85 —
UL 891		
4000 5000	— —	85 ② 85 ②

① Ratings used for coordination with upstream breakers with short-time ratings.
② UL 1066 short-time withstand rating.

Table 25.3-2. Floor-Standing Magnum Transfer Switch Mounting

Mounting Type	Voltage	Current Amperes	Number of Poles	NEMA Enclosure
Fixed Drawout	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	200 300 400 600 1000 1200 1600 2000 2500 3000 3200 4000 5000	2, 3, 4	Open NEMA 1 behind NEMA 1 thru NEMA 3R

Magnum Drawout Transfer Switch

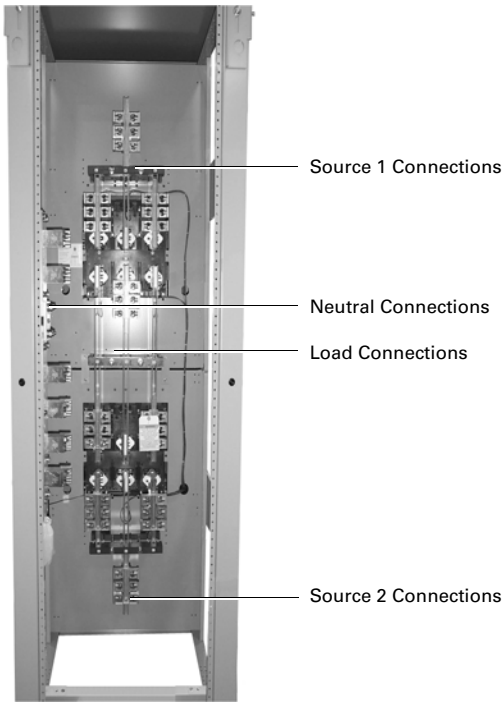
2000 A, Four-Pole, NEMA 1 Enclosed, Through-the-Door Design

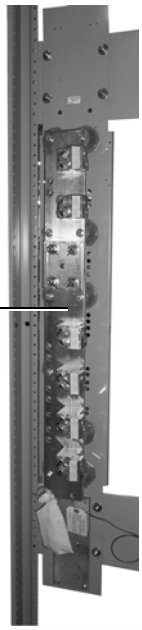
- Drawout construction with switch position indicator
- Completely interchangeable power switching devices
- Available in NEMA Type 1 and 3R enclosures
- Rear, side and top cable access

Magnum Fixed-Mount Transfer Switch

2000 A, Three-Pole, Fixed Design, NEMA Behind-the-Door Enclosure

- Fixed-mount construction
- Available in NEMA Type 1 and 3R enclosures
- Rear, side and top cable access
- Deadfront construction
- Front access only requires an additional wireway to be added

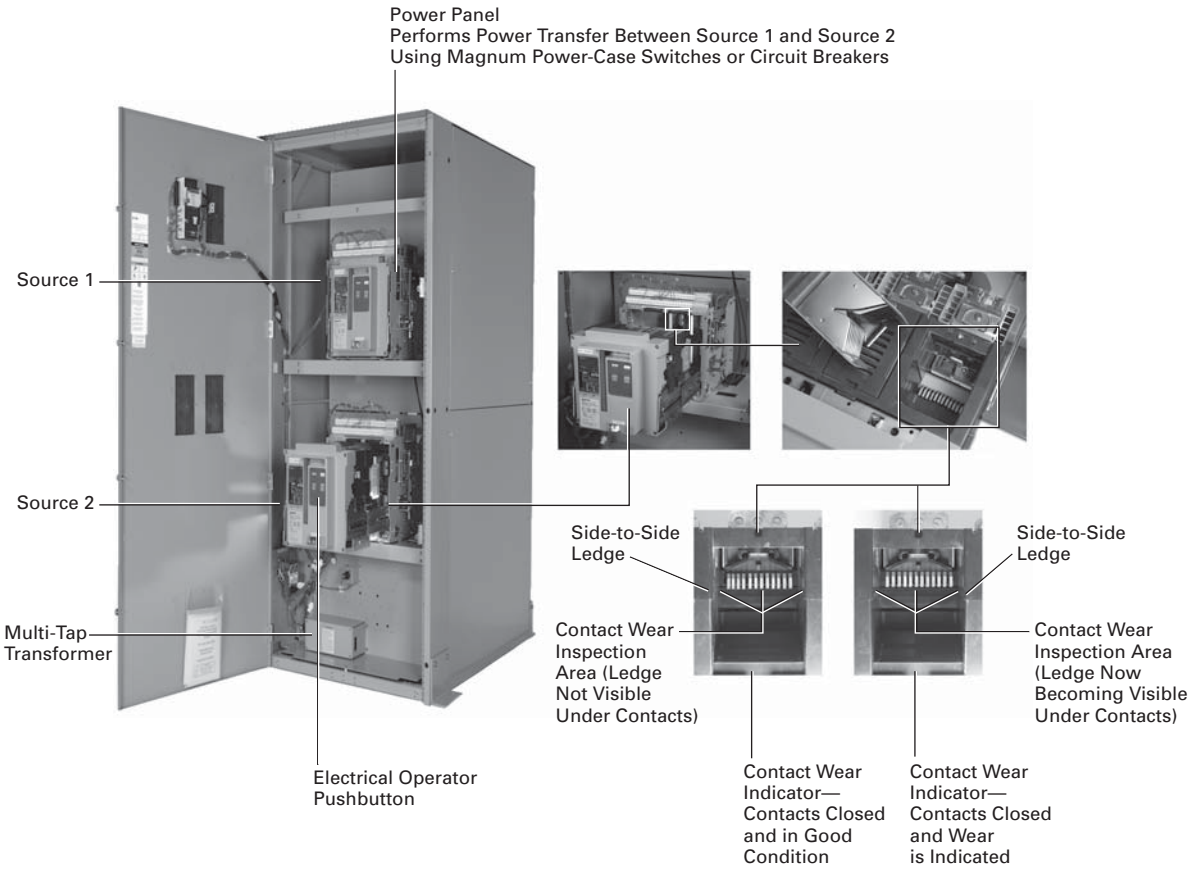




Neutral Assembly

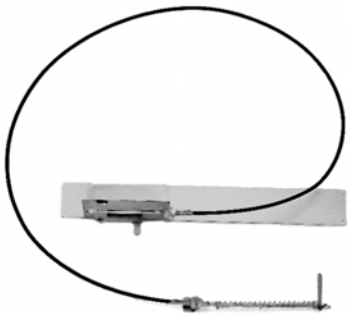
Side View of Magnum Side or Rear Access Required (Half-High Side Panels and Back Panels are Not Shown)

Magnum-Based Transfer Switches



Basic Switch Components of Drawout Magnum Automatic Transfer Switches

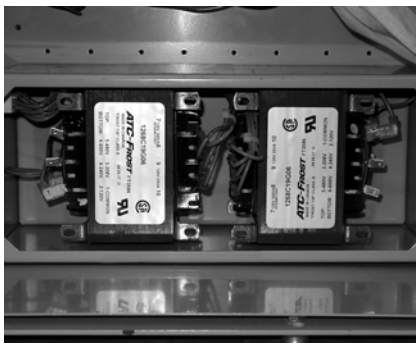
The open transition type Magnum Transfer Switches feature both mechanical (cable) and electrical interlocking to prevent paralleling of sources.



Mechanical Cable Interlock

Multi-Tap Voltage Selector

Allows the transfer switch to be readily applied on most system voltages worldwide by connecting to the proper terminals. Available system voltages include 120, 208, 220, 230, 240, 380, 401, 415, 480, or 600 Vac, 50 or 60 Hz.

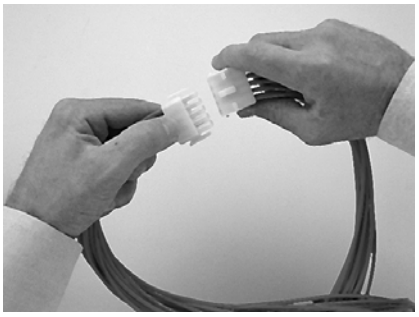


Voltage Selection Terminals

Ease of Maintenance

Keyed quick-disconnect plugs are provided for easy and complete isolation of the control circuitry.

Maintenance can be performed on the logic independent from the power sections and still allow the user to manually transfer power under full load conditions.



Logic Disconnect Plugs

Logic

Application Versatility

Eaton's new ATC-900 controller brings ease of use, adaptability, supervisory and programming capabilities to mission-critical applications. The 4.3-inch color TFT display provides simple arrow keys for quick screen navigation. Event logging and recording of time stamped events are easily viewed or the data may be downloaded by the USB port. Field configuration of I/O allows user adaptability to special requirements.

Automatic Transfer Open/Closed Transition

Open or closed transition type Magnum transfer switches use the Eaton programmable ATC-900 microprocessor-based logic controller.

Refer to Technical Data TD140001EN Open Transition ATC-900 for Automatic Transfer Switches for additional information.

ATC-900

Unmatched Performance and Versatility

The Eaton family of Magnum transfer switches offers unmatched performance, versatility and value for standby power applications. At the heart of these designs is the Magnum switch with the following features:

Superior Main Contact Structure

All Eaton Magnum transfer switches meet or exceed the standards set forth in UL 1008 and UL 489 with high withstand, totally enclosed Magnum switches. No other transfer switch manufacturer has met the rigid testing requirements of this combination of standards. Completely enclosed contacts add a measure of safety and reliability. They also ensures the integrity of the contact assemblies and minimizes the need for periodic maintenance of the contacts, reducing downtime and maintenance time.

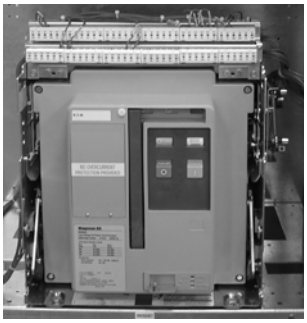
Fast, Powerful and Safe Switching Mechanism

The mechanism uses a high speed ≤ 3-cycle stored energy switching mechanism. This mechanism can be operated manually under a full load.

Ease of Coordination and Application—Short-Time Withstand

The use of electronic trips has allowed performance curve shaping to facilitate proper system coordination. The most significant is the "short time" rated trip unit.

These trip settings may be set for what are considered extremely high currents for much longer durations than the three-cycle withstand test required under UL 1008. To facilitate improved coordination, Eaton Magnum transfer switches have been tested and are provided with 30-cycle, extended withstand ratings.



Magnum Power-Case Switch

Optional Integral Overcurrent Protection Capability

Optional Digitrip Magnum Trip Unit

Service Entrance

For service entrance and other applications, Digitrip™ solid-state trip units can be integrated into the power switching section. This eliminates the need for separate upstream protective devices, saving cost and space. Available with various combinations of long, short time, instantaneous, ground fault protection and communications. Overcurrent trip selection can be made from the series of Eaton Digitrip RMS trip units including the standard Digitrip 520 or optional 520M, 520MC or 1150.

25

Dimensions

Approximate dimensions in inches (mm).

Table 25.3-3. Magnum Fixed-Mount Transfer Switches

Ampere Rating	Number of Poles	A Height	B Width	C Depth	Shipping Weight Lb (kg)
NEMA 1 Enclosed Fixed-Mount Transfer Switch					
200–2000	2	90.00 (2286.0)	32.00 (812.8)	48.00 (1219.2)	1050 (477)
	3	90.00 (2286.0)	32.00 (812.8)	48.00 (1219.2)	1050 (477)
	4	90.00 (2286.0)	32.00 (812.8)	48.00 (1219.2)	1250 (568)
2500–3200	2	90.00 (2286.0)	44.00 (1117.6)	48.00 (1219.2)	1900 (863)
2500–3200	3	90.00 (2286.0)	44.00 (1117.6)	48.00 (1219.2)	1900 (863)
2500–3200	4	90.00 (2286.0)	44.00 (1117.6)	48.00 (1219.2)	2000 (910)
4000 ①	—	①	①	①	①
5000 ①	—	①	①	①	①
NEMA 3R Enclosed Fixed-Mount Transfer Switch					
200–2000	2	90.00 (2286.0)	32.00 (812.8)	63.00 (1600.2)	1600 (726)
	3	90.00 (2286.0)	32.00 (812.8)	63.00 (1600.2)	1600 (726)
	4	90.00 (2286.0)	32.00 (812.8)	63.00 (1600.2)	1800 (817)
2500–3200	2	90.00 (2286.0)	44.00 (1117.6)	63.00 (1600.2)	2400 (1090)
2500–3200	3	90.00 (2286.0)	44.00 (1117.6)	63.00 (1600.2)	2400 (1090)
2500–3200	4	90.00 (2286.0)	44.00 (1117.6)	63.00 (1600.2)	2500 (1135)
4000	—	①	①	①	—
5000	—	①	①	①	—

① At 4000 and 5000 A, the standard design is drawout. See drawout dimensions.

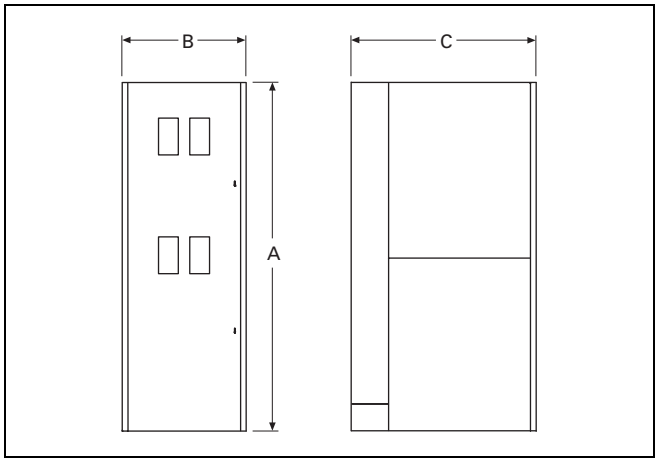


Figure 25.3-1. 200–3200 A Fixed-Mount NEMA 1

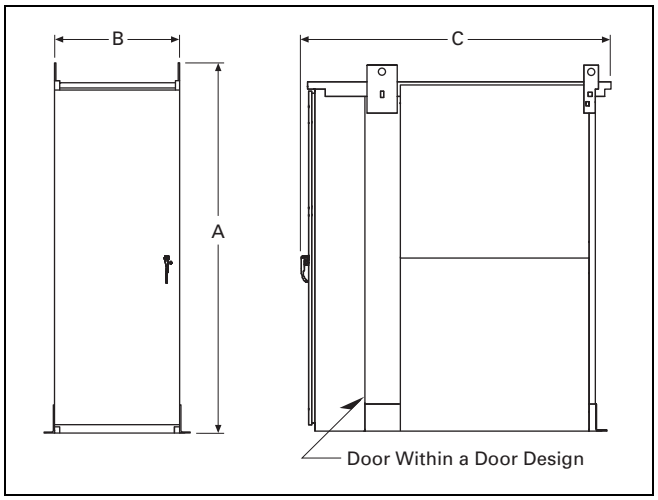


Figure 25.3-2. 200–3200 A Fixed-Mount NEMA 3R

Note: NEMA 3R design features an external blank door and an interior door where the controller/device panel are mounted.

Approximate dimensions in inches (mm).

Table 25.3-4. Magnum Drawout Transfer Switches

Ampere Rating	Number of Poles	A Height	B Width	C Depth	Shipping Weight Lb (kg)
NEMA 1 Enclosed Drawout Transfer Switch					
200–2000	2	90.00 (2286.0)	32.00 (812.8)	60.00 (1524.0)	1600 (727)
	3	90.00 (2286.0)	32.00 (812.8)	60.00 (1524.0)	1600 (727)
	4	90.00 (2286.0)	32.00 (812.8)	60.00 (1524.0)	1900 (864)
2500–3200	2	90.00 (2286.0)	44.00 (1117.6)	60.00 (1524.0)	2500 (1136)
2500–3200	3	90.00 (2286.0)	44.00 (1117.6)	60.00 (1524.0)	2500 (1136)
2500–3200	4	90.00 (2286.0)	44.00 (1117.6)	60.00 (1524.0)	2800 (1273)
NEMA 3R Enclosed Drawout Transfer Switch					
200–2000	2	90.00 (2286.0)	32.00 (812.8)	75.00 (1905.0)	2100 (953)
	3	90.00 (2286.0)	32.00 (812.8)	75.00 (1905.0)	2100 (953)
	4	90.00 (2286.0)	32.00 (812.8)	75.00 (1905.0)	2400 (1090)
2500–3200	2	90.00 (2286.0)	44.00 (1117.6)	75.00 (1905.0)	3000 (1362)
2500–3200	3	90.00 (2286.0)	44.00 (1117.6)	75.00 (1905.0)	3000 (1362)
2500–3200	4	90.00 (2286.0)	44.00 (1117.6)	75.00 (1905.0)	3300 (1498)

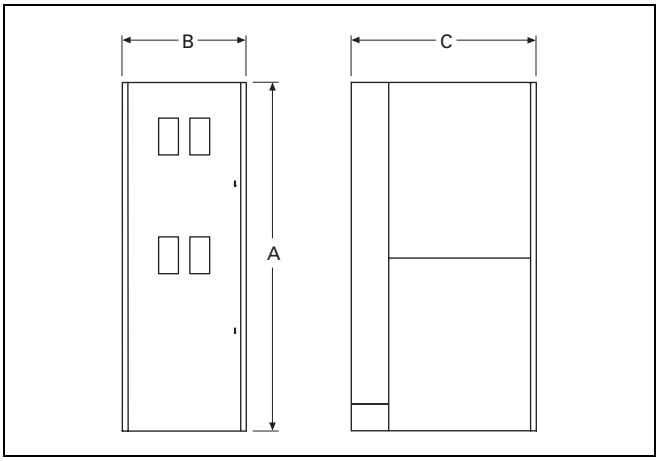


Figure 25.3-3. 200–3200 A Drawout NEMA 1

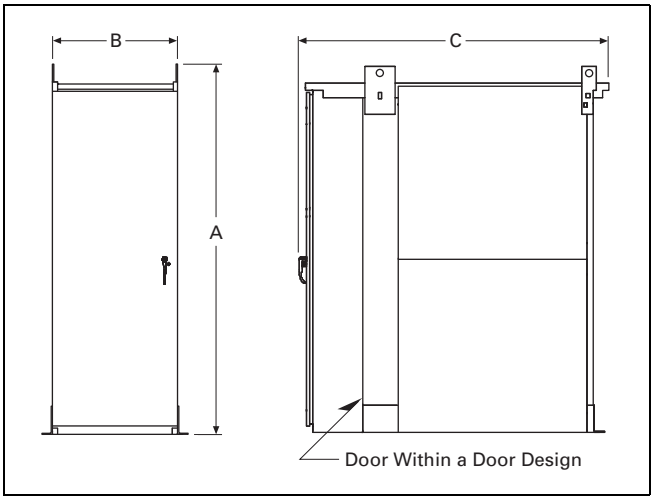
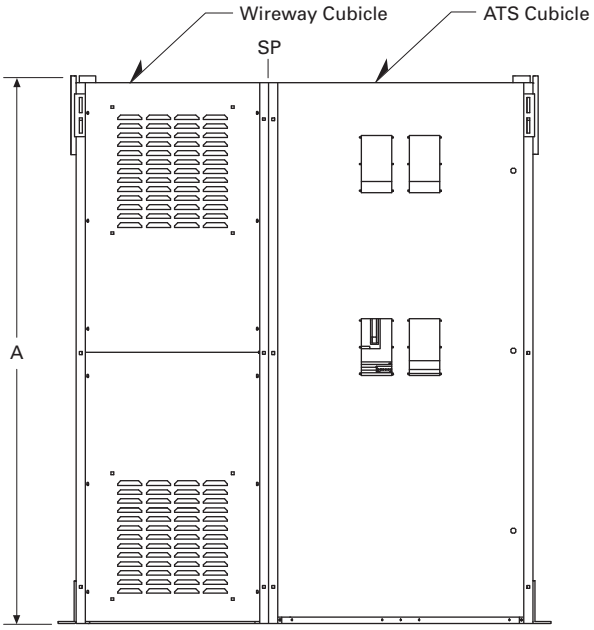
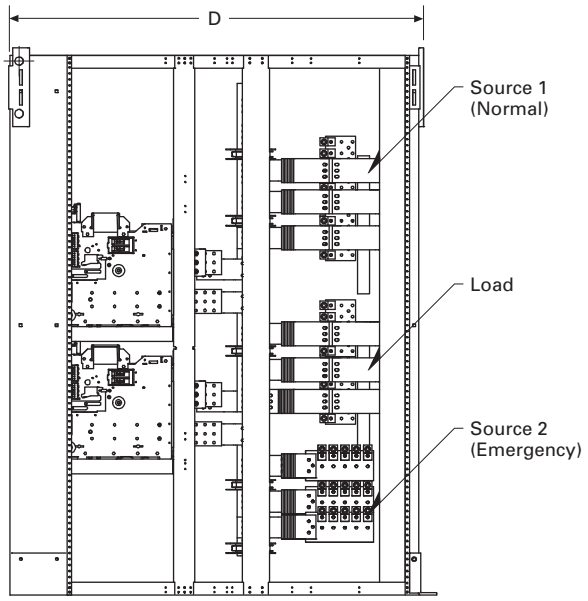


Figure 25.3-4. 200–3200 A Drawout NEMA 3R

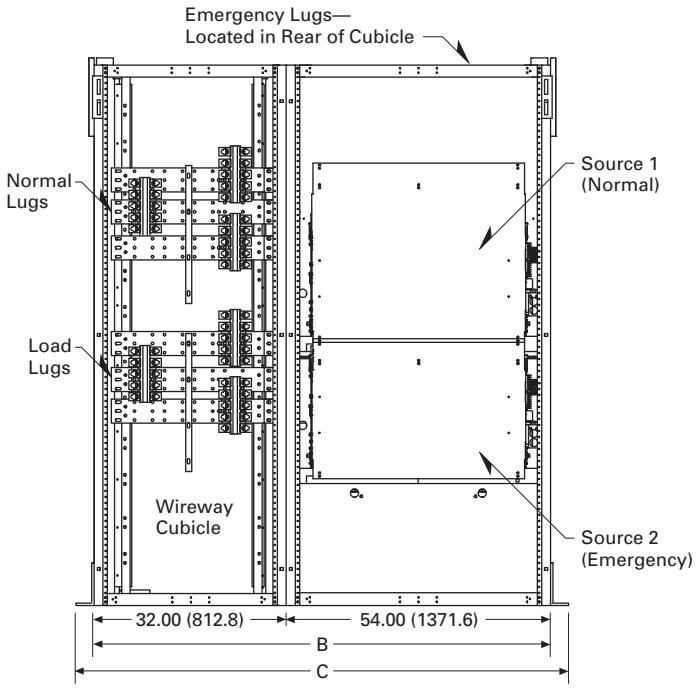
Approximate dimensions in inches (mm).



Front View With Covers
NEMA 1



Right Side View
NEMA 1



Front View Without Covers
NEMA 1

SP = Shipping Split.

Table 25.3-5. Connection Type (4000–5000 A Only)

Connection Type			Wireway Required ①
Line	Emergency	Load	
Cable	Cable	Cable	Yes
Bus	Cable	Cable	Yes
Cable	Bus	Cable	Yes
Cable	Cable	Bus	Yes
Bus	Bus	Cable	No
Bus	Cable	Bus	No
Cable	Bus	Bus	No
Bus	Bus	Bus	No

Table 25.3-6. Magnum Drawout Transfer Switches

Ampere Rating	No. of Poles	A Height	B Width	C ② Width	D Depth	Shipping Weight Lb (kg)
4000	3 or 4	90.00 (2286.0)	86.00 (2184.4)	92.00 (2336.8)	68.00 (1727.2)	③
5000	3 or 4	90.00 (2286.0)	86.00 (2184.4)	92.00 (2336.8)	68.00 (1727.2)	③

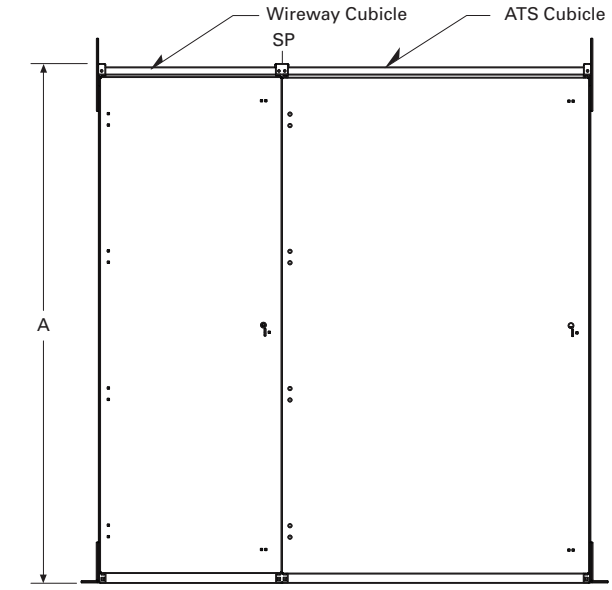
Figure 25.3-5. Magnum 4000–5000 A Units—Drawout NEMA 1

① The typical Magnum ATS at 4000 and 5000 A ratings will include one cubicle with the Source 1 and Source 2 power-case switches or breakers. A second cubicle called a wireway is most likely required unless bus is used for the connections per Connection Type table above. Cable connections to the wireway cubicle can be made from the top or bottom. The wireway cubicle will have removable panels on the front, and cable connections may be made from the top or the bottom. Cable connections to the power-case switch or breaker cubicle are made from the back. The wireway width is 32.00 inches (812.8 mm).

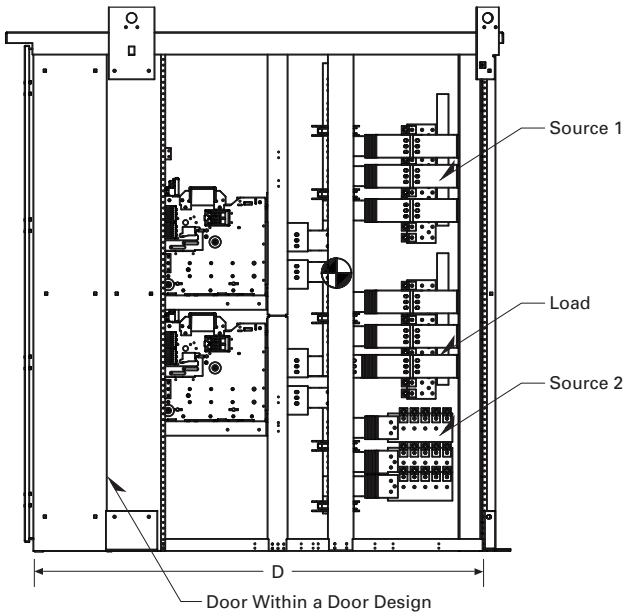
② Seismic mounting adds 3.00 inches (76.2 mm) width to each side or additional 6.00 inches (152.4 mm) to width.

③ Consult factory.

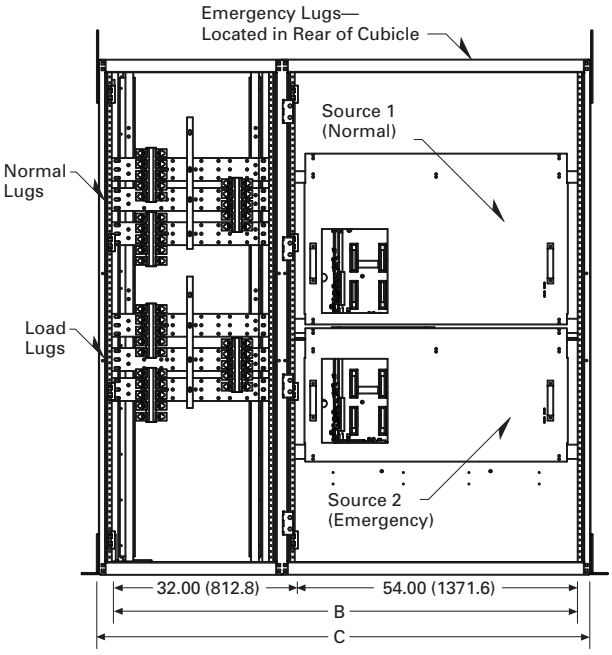
Approximate dimensions in inches (mm).



Front View NEMA 3R With Cover



Right Side View



Front View Without Covers

SP = Shipping Split.

Table 25.3-7. Connection Type (4000–5000 A Only)

Connection Type			Wireway Required ①
Line	Emergency	Load	
Cable	Cable	Cable	Yes
Bus	Cable	Cable	Yes
Cable	Bus	Cable	Yes
Cable	Cable	Bus	Yes
Bus	Bus	Cable	No
Bus	Cable	Bus	No
Cable	Bus	Bus	No
Bus	Bus	Bus	No

Table 25.3-8. Magnum Drawout Transfer Switches

Ampere Rating	No. of Poles	A Height	B Width	C ② Width	D Depth	Shipping Weight Lb (kg)
4000	3 or 4	90.00 (2286.0)	86.00 (2184.4)	92.00 (2336.8)	82.35 (2091.7)	③
5000	3 or 4	90.00 (2286.0)	86.00 (2184.4)	92.00 (2336.8)	82.35 (2091.7)	③

Figure 25.3-6. Magnum 4000–5000 A Units—NEMA 3R

① The typical Magnum ATS at 4000 and 5000 A ratings will include one cubicle with the Source 1 and Source 2 power-case switches or breakers. A second cubicle called a wireway is most likely required unless bus is used for the connections per Connection Type table above. Cable connections to the wireway cubicle can be made from the top or bottom. The wireway cubicle will have removable panels on the front, and cable connections may be made from the top or the bottom. Cable connections to the power-case switch or breaker cubicle are made from the back. The wireway width is 32.00 inches (812.8 mm).

② Seismic mounting adds 3.00 inches (76.2 mm) width to each side or additional 6.00 inches (152.4 mm) to width.

③ Consult factory.

Bypass Isolation Transfer Switch

Bypass Isolation Transfer Switch

General Description

A bypass isolation switch uses loadbreak isolation and bypass transfer power contacts. Thus, should voltage be lost on the line to which the ATS is connected, and should a manual bypass be required to the other line, this can be accomplished safely and quickly as described below. With contactor designs using non-loadbreak isolation and bypass switches, manual bypass to the other line is hindered by mechanical or electrical safety interlocking.

Application Description

The bypass isolation switch is designed for applications where maintenance, inspection and testing must be performed while maintaining continuous power to the load. This is typically required in critical life-support systems and standby power situations calling for safe system maintenance with no power disruptions. Such a design allows for the quick removal of the different switching devices for inspection, maintenance or replacement.

Features, Benefits and Functions

Eaton's transfer switch is a rugged, compact design using Magnum power switches or Magnum power circuit breakers to transfer essential loads from one power source to another. Open transition switching devices are interlocked to prevent both switching devices from being closed at the same time. The versatile design, in addition to standard transfer functions, offers an optional integral thermal and short-circuit protection in either or both switching devices.

The switching devices are in a compact vertical arrangement. The logic can be easily disconnected from the switching device without disturbing critical connections. The enclosure is free standing, and by using the specially supplied cleats, the switch is seismic approved (Option 42). The terminals are mounted in the rear of the switch, permitting rear, top, bottom or side cable or bus bar entrance.

The switching devices have a high withstand rating. The high-speed, stored-energy switching mechanism guarantees a transfer time of less than three cycles.

Industrial Design Highlights

- Freestanding enclosure
- High withstand ratings
  - 100 kA standard 3-cycle rating
  - 85 kA standard 30-cycle rating
- Dual drawout on ATS and bypass
- Deadfront
- Safe manual transfer under load
- Electrically operated
- Magnum stored energy mechanism
- Quick make / quick break—switching times (<3 cycles)
- Multi-tap transformer
- True four-pole switched neutral
- Mechanically interlocked
- Integral overcurrent trip option
- Integrated service entrance rating option
- OSHPD listed

Standard Features

- ATC-900 controller
- Drawout cassette on ATS and bypass
- Source available contacts:
  - Source 1 available 1NO/1NC
  - Source 2 available 1NO/1NC
- Switch position contacts:
  - Source 1 position 1NO/1NC
  - Source 2 position 1NO/1NC
- Source 1 and Source 2 sensing:
  - Undervoltage/underfrequency
  - Overvoltage/overfrequency
- Field-programmable time delays
  - Time delay engine start
  - Time delay normal to emergency
  - Time emergency to normal
  - Time delay engine cooldown
  - Time delay emergency failure
- LCD color-based display for programming, system diagnostics and Help menu
- Mimic diagram with source available and connected LED indication
- Four programmable inputs and outputs
- Standard Modbus 485
- USB port for set point downloads and event recording uploads
- Password-protected access to control functions and set point programming
- Two automatic plant exercisers—load or no load, daily, 7-, 14-, 28-day or calendar date operation, 0–600 minute runtime

Optional Features

- Available UL 1449 Third Edition surge protection device (SPD)
- Automatic transfer operation with selectable (via programming) non-automatic or automatic retransfer with fail-safe
- Space heater with thermostat
- Digital multi-function power quality metering
- DC power input for uninterrupted monitoring of ATS status
- Integrated load metering
- Expandable I/O (up to 20 I/O total)
- EtherNet TCP/IP communications

Seismic Qualification

Refer to **Tab 1** for information on seismic qualification for this and other Eaton products.

Technical Data

Magnum Bypass Isolation Front View
NEMA 1 Through-the-Door

Front Access Option 54A is Available on All Magnum Designs NEMA 1 Behind the Door

Table 25.3-9. Floor-Standing Magnum Transfer Switch Mounting

Mounting Type	Voltage	Current Amperes	Number of Poles	NEMA Enclosure
Drawout	600 600/347 480 480/277 480/240 415/240 380/220 240 240/120 220 220/127 208/120 120	200 300 400 600 1000 1200 1600 2000 2500 3000 3200 4000 5000	2, 3, 4	NEMA 1-Behind NEMA 1-Thru NEMA 3R

Table 25.3-10. System Coordination Information—Withstand, Closing and Interrupting Ratings

Transfer Switch Ampere Rating (100% Rated)	3-Cycle Short-Circuit 600 V (kA)	30-Cycle ① Short-Time 600 V (kA)
UL 1008		
800 1000 1200	100 100 100	85 85 85
1600 2000 2500	100 100 100	85 85 85
3000 3200 4000	100 100 100	85 85 —
UL 891		
4000 5000	— —	85 ② 85 ②

① Ratings used for coordination with upstream breakers with short-time ratings.
② UL 1066 short-time withstand rating.

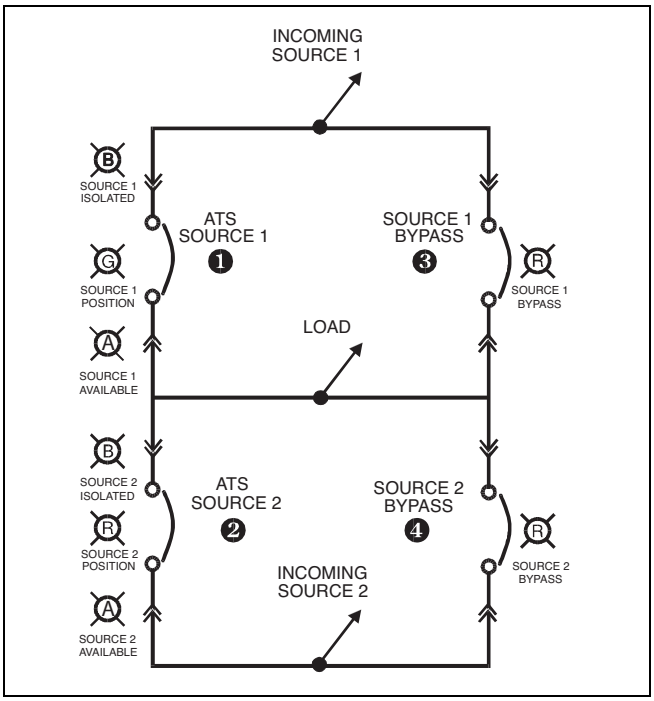


Figure 25.3-7. Typical Bypass Isolation Switch Schematic

25

Dimensions

Approximate dimensions in inches (mm).

Table 25.3-11. Magnum Bypass Isolation Drawout Transfer Switches

Ampere Rating	Number of Poles	A Height	B Width	C Depth	Shipping Weight Lb (kg)
NEMA 1 Enclosed Drawout Transfer Switch					
200–2000	2	90.00 (2286.0)	64.00 (1625.6)	60.00 (1524.0)	3100 (1409)
	3	90.00 (2286.0)	64.00 (1625.6)	60.00 (1524.0)	3100 (1409)
	4	90.00 (2286.0)	64.00 (1625.6)	60.00 (1524.0)	3700 (1682)
2500–3200	2	90.00 (2286.0)	64.00 (1625.6)	60.00 (1524.0)	4700 (2136)
2500–3200	3	90.00 (2286.0)	64.00 (1625.6)	60.00 (1524.0)	4700 (2136)
2500–3200	4	90.00 (2286.0)	64.00 (1625.6)	60.00 (1524.0)	5500 (2500)
NEMA 3R Enclosed Drawout Transfer Switch					
200–2000	2	90.00 (2286.0)	64.00 (1625.6)	75.00 (1905.0)	3700 (1682)
	3	90.00 (2286.0)	64.00 (1625.6)	75.00 (1905.0)	3700 (1682)
	4	90.00 (2286.0)	64.00 (1625.6)	75.00 (1905.0)	4300 (1955)
2500–3200	2	90.00 (2286.0)	64.00 (1625.6)	75.00 (1905.0)	5300 (2410)
2500–3200	3	90.00 (2286.0)	64.00 (1625.6)	75.00 (1905.0)	5300 (2410)
2500–3200	4	90.00 (2286.0)	64.00 (1625.6)	75.00 (1905.0)	6000 (2730)

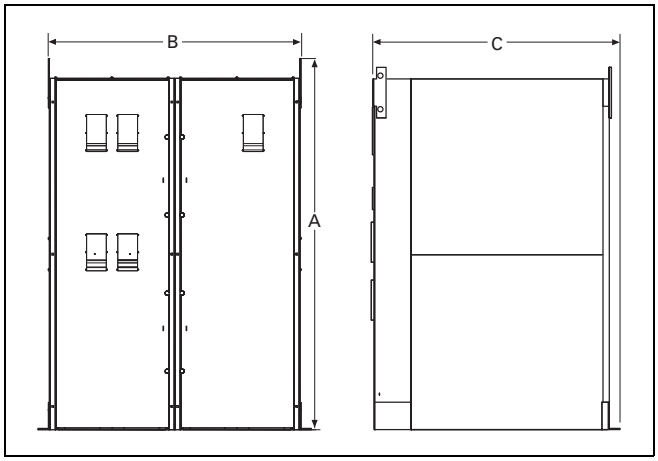


Figure 25.3-8. 200–3200 A Drawout NEMA 1

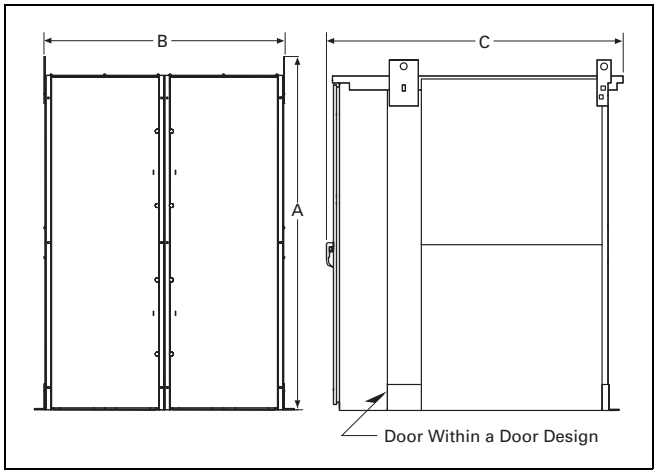


Figure 25.3-9. 200–3200 A Drawout NEMA 3R

Approximate dimensions in inches (mm).

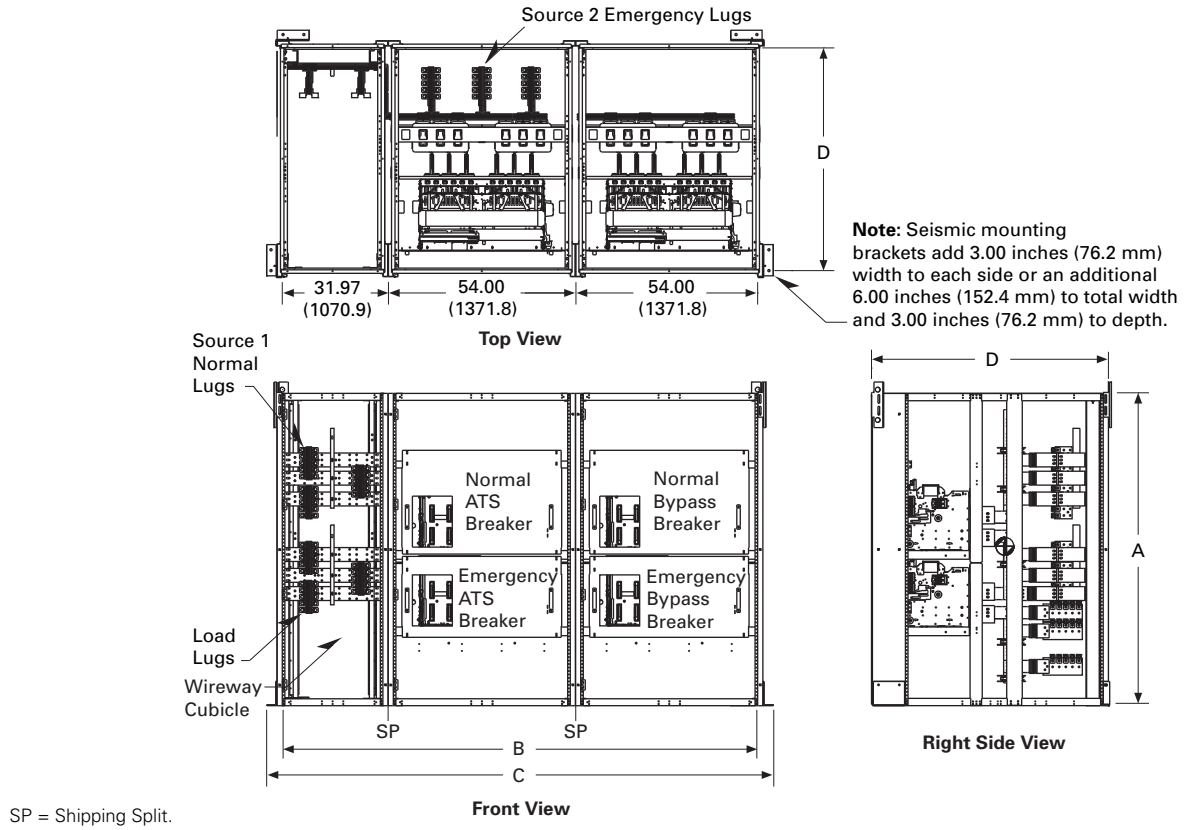


Figure 25.3-10. Magnum 4000–5000 A Units—NEMA 1

Note: The 4000 and 5000 A bypass isolation ATS will include two cubicles for the Source 1 and Source 2 Normal and the Bypass power-case switch. An additional cubicle called a wireway is provided for the Normal and Load connections. The wireway cubicle will have removable panels on the front, and cable connections may be made from the top or the bottom. Cable connections for Emergency are made in the rear. The wireway width is 32.00 inches (812.8 mm).

Table 25.3-12. Magnum Bypass Isolation Drawout Transfer Switches

Ampere Rating	Number of Poles	A Height	B Width	C ① Width	D ② Depth	Shipping Weight Lb (kg)
NEMA 1 Enclosed Drawout Transfer Switch						
4000	2 or 3	90.00 (2286.0)	139.97 (3555.3)	146.00 (3708.4)	68.00 (1727.3)	6900 (3133)
	4	90.00 (2286.0)	139.97 (3555.3)	146.00 (3708.4)	68.00 (1727.3)	7600 (3450)
5000	2 or 3	90.00 (2286.0)	139.97 (3555.3)	146.00 (3708.4)	68.00 (1727.3)	7900 (3587)
	4	90.00 (2286.0)	139.97 (3555.3)	146.00 (3708.4)	68.00 (1727.3)	8600 (3904)
NEMA 3R Enclosed Drawout Transfer Switch						
4000	2 or 3	90.00 (2286.0)	139.97 (3555.3)	146.00 (3708.4)	80.82 (2052.8)	7900 (3587)
	4	90.00 (2286.0)	139.97 (3555.3)	146.00 (3708.4)	80.82 (2052.8)	8600 (3904)
5000	2 or 3	90.00 (2286.0)	139.97 (3555.3)	146.00 (3708.4)	80.82 (2052.8)	8900 (4041)
	4	90.00 (2286.0)	139.97 (3555.3)	146.00 (3708.4)	80.82 (2052.8)	9600 (4358)

① Seismic mounting adds 3.00 inches (76.2 mm) width to each side or additional 6.00 inches (152.4 mm) to width.
② Rear mounted seismic mounting adds 3.00 inches (76.2 mm) to depth.

Table 25.3-13. Terminals

Ampere Rating	Normal, Emergency and Load	Neutral
4000	(10) 3/0–750 kcmil	(48) 4/0–500 kcmil
5000	(12) 3/0–750 kcmil	(48) 4/0–500 kcmil

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Product Selection Guide

Table 25.4-1. ATC Controller Feature Selection Chart

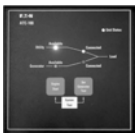
Feature Description	ATC-100	ATC-300+	ATC-900
			
Transition			
Open transition	Standard	Standard	Standard
Closed transition	Not available	Not available	Standard
Timers			
Time delay normal to emergency (TDNE)	Standard	Standard	Standard
Time delay engine start (TDES)	Standard	Standard	Standard
Time delay emergency to normal (TDEN)	Standard	Standard	Standard
Time delay engine cooldown (TDEC)	Standard	Standard	Standard
Time delay emergency fail (TDEF)	Standard	Standard	Standard
Engine/Generator Exerciser			
Plant exerciser (PE) with fail-safe	Selectable—OFF, 7-, 14-, 28-day interval fixed run time 15 minutes no load/load with fail-safe	Selectable—OFF, 7-, 14-, 28-day interval, 0–600 minutes, no load/load with fail-safe	Two independent exerciser modes—OFF, daily, 7-, 14-, 28-day interval or by calendar date (up to 12 independent calendar dates). Test operations include independent transfer time delays
Source 1 Sensing			
All-phase undervoltage and underfrequency protection	Standard	Standard	Standard
All-phase overvoltage and overfrequency protection	Standard	Standard	Standard
Three-phase rotation sensing	Not available	Standard	Standard
Three-phase voltage unbalance	Not available	Standard	Standard
Source 2 Sensing			
All-phase undervoltage and underfrequency protection	Standard	Standard	Standard
All-phase overvoltage and overfrequency protection	Standard	Standard	Standard
Three-phase rotation sensing	Not available	Standard	Standard
Three-phase voltage unbalance	Not available	Standard	Standard
Manual Controls			
Test operators	Standard	Standard	Standard
Four-position test selector switch (FPSS)	Not available	Not available	Optional
Time delay bypass pushbutton	Not available	Standard	Standard
Maintenance selector switch (MSS)	Not available	Optional	Optional
Automatic/manual operation selector switch	Not available	Optional	Optional
Automatic/manual retransfer selector switch	Not available	Not available	Optional
Manual retransfer pushbutton	Not available	Optional	Optional
Indications / Status Display			
Source 1 connected / Source 2 connected	Standard	Standard	Standard
Source 1 available / Source 2 available	Standard	Standard	Standard
Source 1 tripped / Source 2 tripped	Standard	Standard	Standard

Table 25.4-1. ATC Controller Feature Selection Chart (Continued)

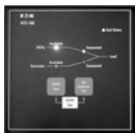
Feature Description	ATC-100	ATC-300+	ATC-900
			
Customer Outputs			
Source 1 / Source 2 present contacts	Not available	Standard—2NO and 2NC	Not available
Source 1 available / Source 2 available contacts	Not available	Not available	Standard—1 Form C
Load sequence	Not available	Not available	Configurable—1 Form C
Selective load shed	Not available	Not available	Configurable—1 Form C
Load bank control	Not available	Not available	Configurable—1 Form C
Pre-transfer	Not available	Standard—1 Form C	Configurable—1 Form C
Pre-/post-transfer	Not available	Not available	Configurable—1 Form C
Source 1 connected	Not available	Not available	Configurable—1 Form C
Source 2 connected	Not available	Not available	Configurable—1 Form C
ATS not in automatic	Not available	Not available	Configurable—1 Form C
General alarm	Not available	Standard	Configurable—1 Form C
ATS in test	Not available	Not available	Configurable—1 Form C
Engine test aborted	Not available	Not available	Configurable—1 Form C
Cooldown in process	Not available	Not available	Configurable—1 Form C
Engine start contact status	Not available	Not available	Configurable—1 Form C
Emergency inhibit on	Not available	Not available	Configurable—1 Form C
Switch Position Indication Contact			
Source 1 position indication contact	Not available	Standard—1 Form C	Standard—1 Form C
Source 2 position indication contact	Not available	Standard—1 Form C	Standard—1 Form C
Customer Inputs			
Go to emergency (Source 2)	Not available	Standard	Standard—configurable input
Load shed / emergency inhibit	Not available	Standard	Standard—configurable input
Monitor mode	Not available	Optional	Standard—configurable input
Bypass timers	Not available	Not available	Standard—configurable input
Lockout	Not available	Optional	Standard—configurable input
Manual retransfer on/off	Not available	Programmed	Standard—configurable input
Manual retransfer	Not available	Standard	Standard—configurable input
Slave in	Not available	Not available	Standard—configurable input
Remote engine test	Not available	Not available	Standard—configurable input
Preferred source selection	Not available	Not available	Standard—configurable input
Remote load test	Not available	Not available	Standard—configurable input
ATS on bypass	Not available	Not available	Standard—configurable input
Integrated Metering			
DCT metering—load side	Not available	Not available	Optional
Communications			
Modbus 485	Not available	Optional	Standard
Modbus TCP/IP	Not available	Optional	Optional

Table 25.4-2. ATC Controller Specification Selection Chart

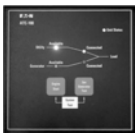
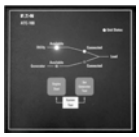
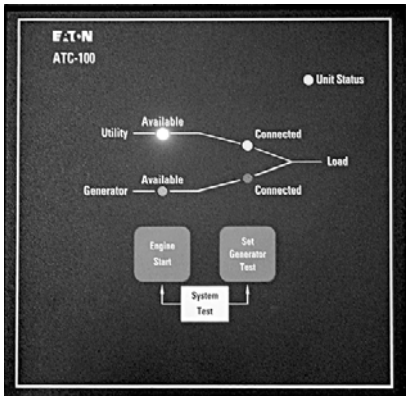
Specification Description	ATC-100	ATC-300+	ATC-900
			
Transfer Mode Open Transition			
Delayed—time delay neutral	Standard—based on construction	Standard—based on construction	Standard—based on construction
In-phase monitoring	Standard—based on construction	Standard—based on construction	Standard—based on construction
Load voltage decay	Not available	Not available	Standard—based on construction
Transfer Mode Closed Transition			
Closed transition	Not available	Not available	Standard—based on construction
Closed transition/In-phase	Not available	Not available	Standard—based on construction
Closed transition/In-phase/ Time delay neutral	Not available	Not available	Standard—based on construction
Closed transition/In-phase/ Load voltage delay	Not available	Not available	Standard—based on construction
Service Entrance Rating			
Source 1, Source 2 or both, and with and without ground fault protection	Not available	Optional	Optional
Stainless Steel Cover			
SS lockable cover for controller			
Programming Selections			
Time delay normal to emergency	3 seconds (fixed)	0–1800 seconds	0–166 seconds
Time delay emergency to normal	5 minutes (fixed)	0–1800 seconds	0–166 seconds
Time delay engine cooldown	5 minutes (fixed)	0–1800 seconds	0–166 seconds
Time delay engine start	3 seconds (fixed)	0–120 seconds	0–120 seconds
Time delay neutral	Not available	0–120 seconds	0–120 seconds or based on load voltage decay of 2–30% of nominal
Time delay Source 2 fail	Not available	0–6 seconds	0–6 seconds
Time delay voltage unbalance	Not available	10–30 seconds	10–30 seconds
Voltage unbalance three-phase	Not available	0 or 1 (1 = enabled)	Enabled or disabled
Phase reversal three-phase	Not available	Dropout 5–20% Pickup (DO –2%) –3%	Dropout 5–20% Pickup (DO –2%) –3%
In-phase	Not available	0 or 1 (1 = enabled)	
Load sequencing	Not available	Not available	0–120 seconds (up to xx devices)
Pre-transfer signal	Not available	1–120 seconds	0–120 seconds
Plant exerciser	Selectable—OFF, 7-, 14-, 28-day interval, fixed run time 15 minutes, no load/load with fail-safe	Selectable—OFF, 7-, 14-, 28-day interval, 0–600 minutes, no load/ load with fail-safe	Two independent exerciser modes—OFF, daily, 7-, 14-, 28-day interval or by calendar date (up to 12 independent calendar dates). Test operations include independent transfer time delays
Preferred source selection	Not available	Not available	Source 1, Source 2 or None
Commitment to transfer in TDNE	Not available	Not available	Enabled or disabled
Retransfer mode N/A automatic or manual	Not available	Optional	Enabled or disabled
Auto daylight saving time adjustment	Not available	Not available	Enabled or disabled
System selection	Utility/generator	Utility/generator or dual utility	Utility/generator, dual utility, dual generator or three source

Table 25.4-2. ATC Controller Specification Selection Chart (Continued)

Specification Description	ATC-100	ATC-300+	ATC-900
			
Voltage Specifications			
System application voltage	Up to 480 Vac	Up to 600 Vac	Up to 600 Vac
Voltage measurements	Source 1 and 2	Source 1 and 2—VAB, VBC and VCA	Source 1, 2 and load—VAB, VBC and VCA
Voltage measurement range	120–480 Vac	0–790 Vac rms	0–700 Vac rms
Operating power	95–145 Vac	65–145 Vac	65–160 Vac 24 Vdc (±10%)
Frequency Specifications			
Frequency measurements	Source 2	Source 1 and 2	Source 1 and 2
Frequency measurement range	50–60 Hz	40–70 Hz	40–70 Hz
Environmental Specifications			
Operating temperature range	–20 to +70 °C	–20 to +70 °C	–20 to +70 °C
Storage temperature range	–30 to +85 °C	–30 to +85 °C	–30 to +85 °C
Operating humidity	0 to 95% relative humidity (noncondensing)	0 to 95% relative humidity (noncondensing)	0 to 95% relative humidity (noncondensing)
Operating environment	Resistant to ammonia, methane, nitrogen, hydrogen and hydrocarbons	Resistant to ammonia, methane, nitrogen, hydrogen and hydrocarbons	Resistant to ammonia, methane, nitrogen, hydrogen and hydrocarbons
Front Panel Indication			
Mimic diagram with LED indication	Unit status, Source 1 and 2 available and connected (five total)	Unit status, Source 1 and 2 available and connected (five total)	Unit status, Source 1 and 2 available and connected (seven total)
Main display	N/A	LCD-based display, 2 lines, 16 characters	LCD display, 4.3 inch color TFT (480x272)
Display language	N/A	English, French and Spanish	English, French and Spanish
Communications capable	N/A	Modbus 485	Modbus 485 or Ethernet TCP/IP
Enclosure compatibility	NEMA 1 and 3R	NEMA 1, 12, 3R and 4X UV resistant faceplate	NEMA 1, 12, 3R and 4X UV resistant faceplate

ATC-100 Controller



ATC-100 Controller

General Description

The ATC-100 Controller is a comprehensive, multi-function, microprocessor-based ATS controller. It is a compact, self-contained, panel-mounted device designed to replace traditional relay and solid-state logic panels.

Application Description

The ATC-100 Controller provides both fixed and jumper-selectable settings to allow for a range of applications. It operates from all system voltages between 120 and 480 Vac, single-phase and three-phase, at 50 or 60 Hz. In addition, a period of no control power operation is provided.

The ATC-100 Controller monitors the condition of the three-phase line-to-line voltage and frequency of both the utility and generator power sources. It can also be set up for single-phase operation. The ATC-100 controller provides the necessary intelligence to ensure that the transfer switch operates properly through a series of sensing and timing functions.

The ATC-100 controller is designed for use on standby systems. The use of the ATC-100 controller is not recommended to be used for emergency systems.

The ATC-100 controller can be used with both the breaker-based design and the contactor-based design. See **Table 25.4-4** for ranges and factory settings.

Features, Benefits and Functions

Standard Features

- Auxiliary relay contacts:
  - Source 1 present 2NO and 2NC
  - Source 2 present 2NO and 2NC
- Switch position indication contacts:
  - Source 1 position 1NO and 1NC
  - Source 2 position 1NO and 1NC
- Source 1 and Source 2 sensing:
  - Undervoltage/underfrequency
  - Overvoltage/overfrequency
- Controller settings via jumpers located at the rear of the unit
- Mimic diagram with source available and connected LED indication
- Time-stamped history log
- System TEST pushbutton
- Selectable—OFF, daily, 7-, 14-, 28-day interval fixed run time 15 minutes no load/load with fail-safe
- Monitor utility and generator power source voltages and generator power source frequency
- Provide undervoltage protection of the utility and generator power sources
- Provide underfrequency and over-frequency protection of the utility and generator power source
- Permit easy customer setup
- Permit system testing
- Provide faceplate source status indications

Standards and Certifications

- UL listed component
- IEC 61000-4-2, 61000-4-3, 61000-4-4, 61000-4-5, 61000-4-6, 61000-4-11
- CISPR 11, Class B
- FCC Part 15, Class B

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Technical Data

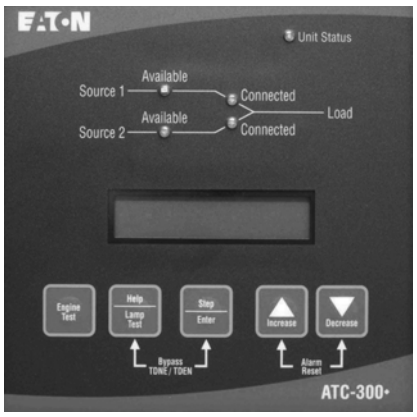
Table 25.4-3. ATC-100 Controller Specifications

Description	Specification
Input control voltage	95 to 145 Vac 50/60 Hz
Voltage measurements	Utility V_{AB} Generator V_{AB} Utility V_{BC} Generator V_{BC} Utility V_{CA} Generator V_{CA}
Voltage measurement range	0 to 575 Vac rms (50/60 Hz)
Voltage measurement accuracy	±1% of full scale
Frequency measurements of	Generator
Frequency measurement range	40 Hz to 70 Hz
Frequency measurement accuracy	±0.3 Hz over the measurement range
Operating temperature range	–20 to +70 °C (–4 to +158 °F)
Storage temperature range	0 to +85 °C (–22 to +185 °F)
Operating humidity	0 to 95% relative humidity (noncondensing)
Operating environment	Resistant to ammonia, methane, nitrogen, hydrogen and hydrocarbons
Generator start relay	5 A, 1/6 hp at 250 Vac 5 A at 30 Vdc with a 150 W maximum load
K1, K2 relays	10 A, 1–3 hp at 250 Vac 10 A at 30 Vdc
Enclosure compatibility	NEMA 1, NEMA 3R and NEMA 12 UV-resistant ATC-100 faceplate

Table 25.4-4. Adjustable Features with Range and Factory Default t

Set Point	Fixed/ Adjustable	Description	Range	Factory Default	
				Breakers	Contactors
TDES	Fixed	Time delay engine start	3 seconds	3 seconds	3 seconds
TDNE	Jumper-selectable	Time delay normal to emergency	2 or 15 seconds	15 seconds	15 seconds
TDEN	Fixed	Time delay emergency to normal	5 minutes	5 minutes	5 minutes
TDEC	Fixed	Time delay engine cool-off	1 minute	1 minute	1 minute
NOM FREQ	Jumper-selectable	Nominal frequency	50 or 60 Hz	As ordered	As ordered
NOM VOLTS	Jumper-selectable	Nominal voltage	120, 208, 220, 230, 240, 380 and 480 V	As ordered	As ordered
S1 UV DROP	Fixed	Utility undervoltage dropout	80% of NOMV	80% of NOMV in volts	80% of NOMV in volts
S2 UV DROP	Fixed	Generator undervoltage dropout	80% of NOMV	80% of NOMV in volts	80% of NOMV in volts
S1 UV PICK	Fixed	Utility undervoltage pickup	90% of NOMV	90% of NOMV in volts	90% of NOMV in volts
S2 UV PICK	Fixed	Generator undervoltage pickup	90% of NOMV	90% of NOMV in volts	90% of NOMV in volts
S2 UF DROP	Fixed	Utility underfrequency dropout	90% of NOMF	90% of NOMF in hertz	90% of NOMF in hertz
S2 UF PICK	Fixed	Generator underfrequency pickup	95% of NOMF	95% of NOMF in hertz	95% of NOMF in hertz
S2 OF DROP	Jumper-selectable	Generator overfrequency dropout	Off or 115% of NOMF (contactor)	Off	115%
S2 OF PICK	Jumper-selectable	Generator overfrequency pickup	Off or 110% of NOMF	Off	110%
Generator test	Jumper-selectable	Generator test programming	7-, 14- or 28-day	7-day	7-day
Test mode	Jumper-selectable	Test mode	Off, No Load, Load	Off	Off
TER	Fixed	Engine run test time	15 minutes	15 minutes	15 minutes
PHASES	Jumper-selectable	Three-phase or single-phase	1 or 3	As ordered	As ordered
TDEF	Fixed	Time delay emergency fail timer	6 seconds	6 seconds	6 seconds
TDN	Jumper-selectable	Time delay neutral	Disabled (0 seconds) or enabled (2 seconds)	Enabled (2 seconds)	Enabled (2 seconds)

ATC-300+ Controller



ATC-300+ Controller

General Description

Transfer switches are equipped with the high-performance ATC-300+ digital transfer controller, receive rock-solid monitoring, status reporting and transfer control operation. Its superior design and robust construction make the ATC-300+ the industry benchmark for critical and distributed power systems.

Application Description

Eaton's ATC-300+ controller-based automatic transfer switch is designed to provide unmatched performance, reliability and versatility for critical standby power applications.

Features, Benefits and Functions

Standard Features

- Auxiliary relay contacts:
  - Source 1 present 2NO and 2NC
  - Source 2 present 2NO and 2NC
- Switch position indication contacts:
  - Source 1 position 1NO and 1NC
  - Source 2 position 1NO and 1NC
- Source 1 and Source 2 sensing:
  - Undervoltage/underfrequency
  - Overvoltage/overfrequency
  - Three-phase rotation protection
  - Three-phase voltage unbalance
- Pre-transfer signal contacts 1NO/1NC
- Go to emergency (Source 2)
- Source-2 emergency inhibit contact
- Seven field-programmable time delays
- LCD-based display for programming, system diagnostic and Help message display
- Mimic diagram with source available and connected LED indication
- Time-stamped history log
- System TEST pushbutton
- Programmable plant exerciser—OFF, daily, 7-, 14-, 28-day interval selectable run time 0–600 minutes no load/load with fail-safe
- RS-485 communication capability

Optional Features

- Suitable for use as service equipment in the standard enclosure size when used with breaker-based design transfer switches
- Available UL 1449 3rd Edition compliant surge protection devices
- Integrated distribution panels
- Field-selectable multi-tap transformer panel permits operation on a wide range of system voltages
- Integral overcurrent protection available when used with breaker-based design transfer switches
- Space heater with thermostat
- Ammeter—load side
- Power quality metering
- Manual retransfer selector switch
- Stainless steel cover for controller
- Load shed/emergency inhibit
- Manual retransfer
- Communication via Modbus RTU—metering data, engine test, set point management system status
- Remote annunciator available

Standards and Certifications

- UL listed component
- Meets UL 1008
- Meets intent of UL 991
- Meets IEC 1000-4-2, 1000-4-3, 1000-4-4, 1000-4-5, 1000-4-6, 1000-4-11
- Meets CISPR 11, Class A
- Complies with FCC Part 15, Class A

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Technical Data

Table 25.4-5. ATC-300+ Controller Specifications

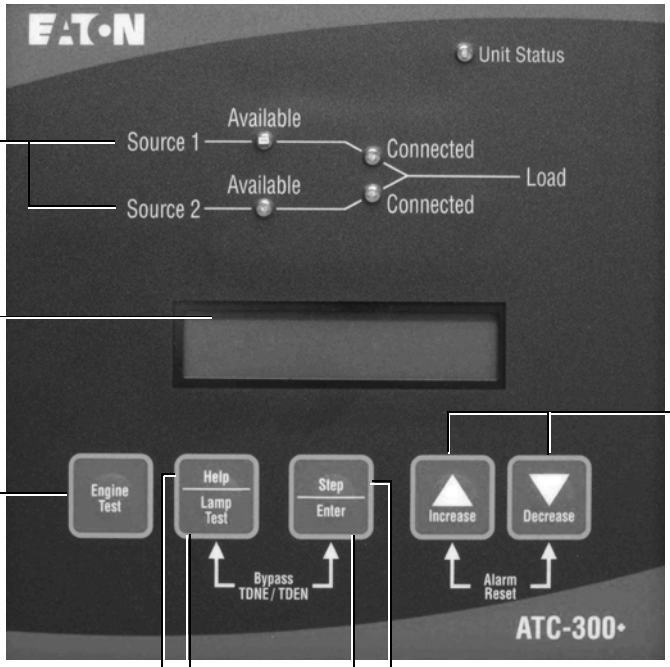
Description	Specification	
Input control voltage	65–145 Vac 50/60 Hz	
Voltage measurements	Source 1 V_{AB} Source 1 V_{BC} Source 1 V_{CA}	Source 2 V_{AB} Source 2 V_{BC} Source 2 V_{CA}
Voltage measurement range	0–790 Vac rms (50/60 Hz)	
Voltage measurement accuracy	±2% of nominal input voltage	
Frequency measurement	Source 1 and Source 2	
Frequency measurement range	40–70 Hz	
Frequency measurement accuracy	±0.3 Hz	
Undervoltage dropout range Breaker/switch style ATS Contactor style ATS	 50–97% of the nominal system voltage 78–97% of the nominal system voltage	
Undervoltage pickup range	(Dropout +2%) to 99% of the nominal system voltage	
Overvoltage dropout range Breaker/switch style ATS Contactor style ATS	 105–120% of the nominal system voltage 105–110% of the nominal system voltage	
Overvoltage pickup range	103% to (dropout –2%) of the nominal system voltage	
Underfrequency dropout range	90–97% of the nominal system frequency	
Underfrequency pickup range	(Dropout +1 Hz) to 99% of the nominal system frequency	
Overfrequency dropout range Breaker/switch style ATS Contactor style ATS	 103 to 110% of the nominal system frequency 103 to 105% of the nominal system frequency	
Overfrequency pickup range	101% to (dropout –1 Hz) of the nominal system frequency	
Operating temperature range	–20 to +70 °C (–4 to +158 °F)	
Storage temperature range	0 to +85 °C (–22 to +185 °F)	
Operating humidity	0–95% relative humidity (noncondensing)	
Operating environment	Resistant to ammonia, methane, nitrogen, hydrogen and hydrocarbons	
Generator start relay	5 A, 1/6 hp at 250 Vac/5 A at 30 Vdc with a 150W maximum load	
K1, K2, pre-transfer, alarm relays, K3, K4	10 A, 1–3 hp at 250 Vac/10 A at 30 Vdc	
Enclosure compatibility	NEMA 1, NEMA 3R and NEMA 12 UV-resistant ATC-300+ faceplate	

The following set points are programmable if the corresponding feature is programmed.

Table 25.4-6. ATC-300+ Programming Features/Set Points ①

Set Point	Set Point Units	Description	Range	Factory Default
TDES	Minutes: seconds	Time delay engine start	0–120 seconds	0:03
TDNE	Minutes: seconds	Time delay normal to emergency	0–1800 seconds	0:00
TDEN	Minutes: seconds	Time delay emergency to normal	0–1800 seconds	5:00
TDEC	Minutes: seconds	Time delay engine cool-off	0–1800 seconds	5:00
TDN	Minutes: seconds	Time delay neutral	0–120 seconds	0:00
PLANT EXER	Days	Plant exerciser programming	Off, daily, 7-day, 14-day or 28 day	Off
TEST MODE	—	Test Mode	0, 1 or 2 (0 = no load engine test, 1 = load engine test, 2 =disabled)	0
TER	Hours: minutes	Engine run test time	0–600 minutes	5:00
TPRE	Minutes: seconds	Pre-transfer delay timer	0–120 seconds	0:00
PHASES	—	Three-phase or single-phase	1 or 3	As ordered
VOLT UNBAL	Volts	Voltage unbalanced	0 or 1 (1 = enabled)	1
UNBAL DROP %	Percent	Percent for unbalanced voltage dropout	5–20% of phase voltage unbalance	20%
UNBAL PICK %	Percent	Percent for unbalanced voltage pickup	Dropout minus (UNBAL DROP % –2) to 3%	10%
UNBAL DELAY	Seconds	Unbalanced delay timer	10–30	0:20
TDEF	Seconds	Time delay emergency fail timer	0–6 seconds	6
PHASE REV	—	Phase reversal	OFF, ABC or CBA	OFF

① Complete list of programming selections found in IB01602009E.



Source 1, Source 2 and Load
Colored LED lights show status of both sources and load.

LED Display
Unit will provide LED readout showing actual metered values for Voltage, Frequency and Condition (including Normal, Undervoltage, Overvoltage and so on).

Engine Test Button
Pressing this button twice initiates an engine test.

Help
Pressing the Help button in any function mode will bring up display messages, explanations and prompts to assist the operator.

Lamp Test

Enter

Step Button
Shows multiple variables under each display select function.

Increase/Decrease
A detailed explanation of these buttons can be found in the Operation section.

Closed Transition ATC-300+ Front Panel Display and Button Functions

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ATC-900 Automatic Transfer Switch Controller

ATC-900 Automatic Transfer Switch Controller

General Description

Eaton's ATC-900 brings intelligence, adaptability, and enhanced supervisory and programming capabilities to Eaton's complete transfer switch product offering including contactor-, breaker- and Magnum-based transfer switches.

The one standard model concept offers a variety of monitoring and control features, selective load shedding, remote load testing, along with event logging/recording and Modbus communications. With configurable monitoring and control features and add-on accessory modules, the ATC-900 provides the flexibility to meet current and future system needs.

Application Description

High reliability makes the ATC-900 ideal for mission-critical installations in the health care, water, industrial and data center industries. An intelligent control architecture allows the ATC-900 to address virtually any system requirements. Typical applications include utility-to-utility, utility-to-generator and generator-to-generator transfer pairs, and advanced programming features provide for control of three-source systems. Design flexibility allows for operations with open, in-phase, delayed or closed transition platforms.

Features, Benefits and Functions

Ease of use is a major benefit of the ATC-900 controller. The simple yet powerful user interface includes many intuitive operating features. The color display and LED indications provide enhanced operator visibility of transfer switch status and system detail. Clear operational focus was achieved through design simplicity. Front arrow keys allow for quick screen navigation, removal of codes and abbreviations avoid potential confusion, and refined data screens provide for ease of viewing and edits.

Primary Functions

The ATC-900 Automatic Transfer Switch Controller offers these standard features:

- Monitor normal and emergency-source voltages and frequencies
- Provide transfer and retransfer control signals
- Provide engine/generator start and shutdown signals
- Permit user programming of operational set points
- Display real-time and historical information
- Permit system testing
- Store customer and factory-established parameters in nonvolatile memory
- Provide faceplate source status indication
- Provide an LCD for programming and status readouts

Features and Benefits

- LCD screen for system status, programming, system diagnostics, help, and troubleshooting
- Event logging and recording, 450 combined summary and step events
- 0–600 V field programmable system voltage flexible configuration with assignable inputs and outputs
- Three-source ATS control—master and slave controller functionality
- Selective, automatic load shedding
- Industry standard communication protocols—Modbus RTU and/or Modbus TCP/IP communications interface
- USB drive for uploading and downloading of event data
- USB drive for uploading and downloading programmed set points

Table 25.4-7. ATC-900 Features

Features	ATC-900
Hardware	
4.3-inch color TFT LCD display	■
UV-resistant faceplate	■
Mimic diagram and LED status indicators	■
Suitable for application over a wide range of environmental conditions	■
Positive feedback membrane pushbuttons for application in harsh environments	■
Help function for detailed description of displayed message	■
Password protected system test pushbutton	■
Bypass time delay pushbutton	■
Form C engine start contact for Source 1 and Source 2	■
S1 and S2 available Form C contacts	■
Self-diagnostic and system diagnostic functions with LED indication	■
DC power input	Optional
Metering	
True rms voltage sensing of Source 1, Source 2 and Load	■
Frequency sensing of Source 1, Source 2 and Load	■
Voltage unbalance and phase rotation sensing	■
Load current sensing	Optional
Sampling at 64 samples per cycle	■
Source 1 voltages (three-phase)	■
Source 2 voltages (three-phase)	■
Load voltages (three-phase)	■
Source 1 frequency	■
Source 2 frequency	■
Load frequency	■
Load currents (three-phase)	Optional
Load kW	Optional
Load kVAR	Optional
Load kVA	Optional
PF	Optional
Programming	
Programmable set points stored in nonvolatile memory	■
System monitoring with historical data storage and display	■
Digital set points for accurate and consistent performance	■
Password-protected access to control functions and set point programming	■
Four programmable control inputs	■
Four programmable control outputs	■
Expandable I/O modules (up to 20 I/O total)	Optional
Automatic plant exerciser—two plant exerciser schedules, Off, daily, 7-day, 14-day, 28-day, calendar, separate TDNE, TDEN, TDEC timers from normal operation, control input provided for remotely initiating an engine test	■
Communications	
Modbus RTU	■
Modbus TCP/IP	Optional
USB port for set point configuration and event-recording downloads	■
Event History	
100 summary events	■
350 time-stamped transfer step events	■
2 seconds of metered data stored before and after a transfer event	■

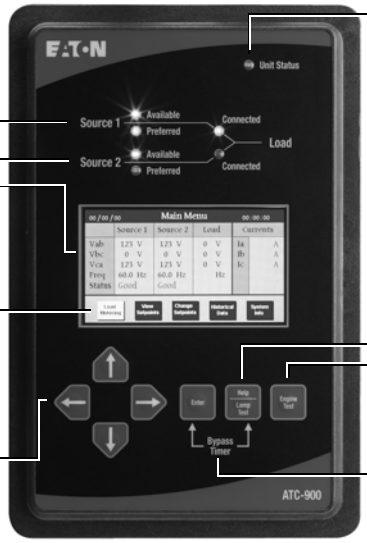
ATC-900 Automatic Transfer Switch Controller—Features, Benefits and Functions

LED Mimic Diagram
Source 1 and Source 2 color-coded LEDs provide Available and Connected status indication.

Status Screen
The ATC-900 Main Menu screen provides transfer switch status at a glance. Source 1, Source 2, and load-metering data are displayed as well as any active alarms.

Display
The ATC-900 eliminates the use of codes and abbreviations for transfer switch functions. Data screens are grouped for ease of viewing and edits.

Arrow Key Navigation
Right and Left Arrow Keys are used to navigate menu options and Up and Down Arrow Keys are used to select and change set point values.



Unit Status Light
This LED blinks green indicating that the ATC-900 is operating and providing the transfer switch control function in keeping with programmed set points. If the LED is not lit or is on continuously, a problem may be indicated.

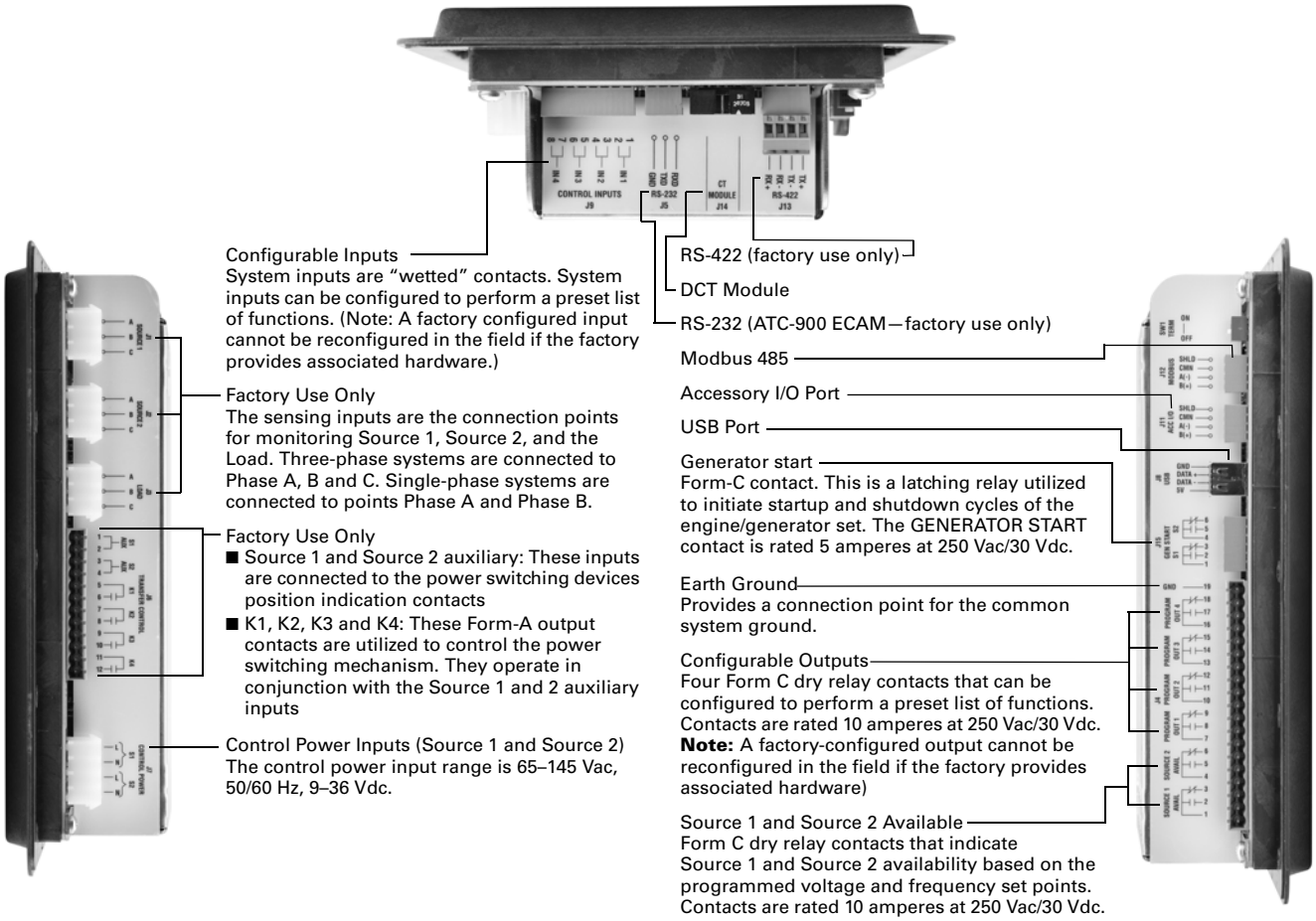
Help
Displays controller firmware version and user tips.

Lamp Test
Pressing the Lamp Test pushbutton lights all LEDs and then displays ATC-900 controller information.

Engine Test
Performs an engine test using the programmed engine run and cool down times. This is a password-protected feature.

Bypass Time Delays
Pressing the Enter and Help pushbuttons simultaneously reduces the active programmed time delay to zero to simplify test procedures.

ATC-900 User Interface



Configurable Inputs
System inputs are "wetted" contacts. System inputs can be configured to perform a preset list of functions. (Note: A factory configured input cannot be reconfigured in the field if the factory provides associated hardware.)

Factory Use Only
The sensing inputs are the connection points for monitoring Source 1, Source 2, and the Load. Three-phase systems are connected to Phase A, B and C. Single-phase systems are connected to points Phase A and Phase B.

Factory Use Only
- Source 1 and Source 2 auxiliary: These inputs are connected to the power switching devices position indication contacts
- K1, K2, K3 and K4: These Form-A output contacts are utilized to control the power switching mechanism. They operate in conjunction with the Source 1 and 2 auxiliary inputs

Control Power Inputs (Source 1 and Source 2)
The control power input range is 65–145 Vac, 50/60 Hz, 9–36 Vdc.

RS-422 (factory use only)

DCT Module

RS-232 (ATC-900 ECAM—factory use only)

Modbus 485

Accessory I/O Port

USB Port

Generator start
Form-C contact. This is a latching relay utilized to initiate startup and shutdown cycles of the engine/generator set. The GENERATOR START contact is rated 5 amperes at 250 Vac/30 Vdc.

Earth Ground
Provides a connection point for the common system ground.

Configurable Outputs
Four Form C dry relay contacts that can be configured to perform a preset list of functions. Contacts are rated 10 amperes at 250 Vac/30 Vdc. **Note:** A factory-configured output cannot be reconfigured in the field if the factory provides associated hardware)

Source 1 and Source 2 Available
Form C dry relay contacts that indicate Source 1 and Source 2 availability based on the programmed voltage and frequency set points. Contacts are rated 10 amperes at 250 Vac/30 Vdc.

ATC-900 Connections

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ATC-900 Programmable Set Points

Table 25.4-8 lists only controller features; switch features are not listed, as they are defined by switch construction. Transition settings are specific to the transfer switch construction.

Table 25.4-8. Features and Set Points

Option Number	Description	Range	Factory Default
General Settings			
—	Set new password	0000–9999	0900
—	Selected language	English	—
—	Nominal frequency	50 or 60 Hz	As ordered
—	Nominal voltage	110–600 V	As ordered
—	Number of phases	1 or 3	As ordered
—	Number of generators	0, 1 or 2	1
—	Preferred source	Source 1, Source 2, none or external	Source 1
—	PT ratio	2:1–500:1	As ordered
—	CT ratio	200–5000	—
—	Daylight saving time	On or Off	1
—	Operating mode	Stand-alone/master or slave	Master
—	Phase sequence check	ABC, CBA or Off	Off
—	Commitment to transfer in TDNE	Yes or no	No
—	Manual retransfer	Auto, manual or external	As ordered
—	Modbus address	1–247	1
—	Modbus baud rate	0 = 9600, 1, even	0
		1 = 9600, 1, odd	—
		2 = 9600, 2, none	—
		3 = 9600, 1, none	—
		4 = 19,200, 1, even	—
		5 = 19,200, 1, odd	—
		6 = 19,200, 2, none	—
		7 = 19,200, 1, none	—
Transition Settings			
47	Closed transition		
	Closed transition	Disabled, On to Alarm, On to Open	As ordered
	Closed voltage difference	1–5%	2%
	Closed frequency difference	0.0–0.3 Hz	0.3
32f/32d	Open—in-phase transition		
	In-phase	Disabled, On to Alarm, On to Open	As ordered
	In-phase frequency difference	0.0–3.0 Hz	1.0
—	Synchronization timer	1–60 minutes	5
32a/32d	Open—delayed transition		
	Time delay neutral	0–10 minutes	0
	Load voltage decay	2–30% of nominal voltage	6%
Time Delays			
1a	Time delay normal to emergency	0–9999 seconds	0:00
3a	Time delay emergency to normal	0–9999 seconds	5:00
35A	Time delay pre-transfer	0–120 seconds	0:01
35C	Time delay post-transfer	0–120 seconds	0:10
2A	Time delay engine 1 start	259 minutes ①	0:03
—	Time delay engine 2 start	259 minutes ①	0:03
4A	Time delay engine cool-off	0–9999 seconds	5:00
7A	Time delay engine fail timer	0–6 seconds	0:06
—	Voltage unbalance time delay	10–30 seconds	0:30

① Any TDES value above 2 minutes, with no power on the controller, will start the generator (fail-safe) after 2 minutes.

Table 25.4-8. Features and Set Points

Option Number	Description	Range	Factory Default
Source Settings			
26P	Source 1 undervoltage dropout	70–97% of nominal	80%
	Source 1 undervoltage pickup	(dropout + 2%) to 99% of nominal	90%
5P	Source 2 undervoltage dropout	70–97% of nominal	80%
	Source 2 undervoltage pickup	(dropout + 2%) to 99% of nominal	90%
26K	Source 1 overvoltage dropout	105–120% of nominal (0 = disabled)	115%
	Source 1 overvoltage pickup	103% of nominal to (dropout –2%) (0 = disabled)	105%
5K	Source 2 overvoltage dropout	105–120% of nominal (0 = disabled)	115%
	Source 2 overvoltage pickup	103% of nominal to (dropout –2%) (0 = disabled)	105%
26J	Source 1 underfrequency dropout	90–97% of nominal (0 = disabled)	94%
	Source 1 underfrequency pickup	(dropout + 1 Hz) to 99% of nominal (0 = disabled)	96%
5J	Source 2 underfrequency dropout	90–97% of nominal (0 = disabled)	94%
	Source 2 underfrequency pickup	(dropout + 1 Hz) to 99% of nominal (0 = disabled)	96%
26N	Source 1 overfrequency dropout	103–110% (0 = disabled)	106%
	Source 1 overfrequency pickup	101% to (dropout –1 Hz) (0 = disabled)	104%
5N	Source 2 overfrequency dropout	103–110% (0 = disabled)	106%
	Source 2 overfrequency pickup	101% to (dropout –1 Hz) (0 = disabled)	104%
26/5L	Source 1/2 percent for unbalanced voltage dropout	5–20% neg./pos. sequence voltage V2/V1 (0 = disabled)	12%
	Source 1/2 percent for unbalanced voltage pickup	3% to (dropout –2%) (0 = disabled)	10%
26/5M	Source 1/2 voltage phase loss dropout	20–60% V2/V1 (0 = disabled)	40%
	Source 1/2 voltage phase loss pickup	18% to (dropout –-2%) (0 = disabled)	30%
	Load current unbalance dropout	5–60% neg./pos. sequence current I2/I1 (0 = disabled)	12%
	Load current unbalance pickup	3% to (dropout –-2%) (0 = disabled)	10%
	Load current unbalance enable threshold	1–100% of rated current	10%
Engine Test/Plant Exerciser (PE1 and PE2 are independently programmable)			
6B	Engine test pushbutton on panel		
	Test mode	No load, load transfer, disabled	Load transfer
	Engine run test time	0–600 minutes	30 minutes
23M	PE time delay normal to emergency	0–9999 seconds	0:02
	PE time delay emergency to normal	0–9999 seconds	0:02
	PE time delay engine cooldown	0–9999 seconds	5 minutes
	PE1/PE2 test mode	No load, load transfer, disabled	Disabled
	PE1/PE2 run time	0–600 minutes	30 minutes
	PE1/PE2 schedule	Off, daily, 7-day, 14-day, 28-day or calendar date (up to 12 user-specified dates)	—
	PE1/PE2 calendar date	Month: 1–12; Day: 1–31	—
	PE1/PE2 day of week	1 Sunday, 2 Monday, 3 Tuesday, 4 Wednesday, 5 Thursday, 6 Friday or 7 Saturday	—
	PE1/PE2 plant start time	HH:MM AM/PM	—
Accessory I/O			
—	Accessory I/O modules	0–4	—

Flexible Configuration

Designed for scalability, the ATC-900 can be configured for a wide variety of applications. A mix-and-match approach to features allows the user to build a transfer switch controller that meets the precise application needs.

The ATC-900 controller includes four user configurable inputs and outputs. The inputs and outputs can be assigned functions from a predefined list of options either at the factory or in the field.

- Inputs
  - Monitor mode
  - Bypass timers
  - Lockout
  - Manual retransfer On or Off
  - Manual retransfer
  - Slave in
  - Remote engine test
  - Preferred source selection
  - Go to emergency
  - Emergency inhibit
  - ATS on bypass
  - Go to neutral
  - Source 2 permit
  - Disable (default setting)
- Outputs (control)
  - Load sequence
  - Selective load shed
  - Load bank control
  - Pre-/post-transfer
  - Pre-transfer
  - Post-transfer
  - User remote control
- Outputs (status/alarms)
  - Source 1 available (standard)
  - Source 2 available (standard)
  - Source 1 connected
  - Source 2 connected
  - ATS not in automatic
  - General alarm
  - ATS in test
  - Engine test aborted
  - Cooldown in process
  - Engine start contact status
  - Generator 1 start status
  - Generator 2 start status
  - Emergency inhibit on
  - ATS on bypass
  - Health
  - Disable (default setting)
  - Remote I/O (controllable by Modbus)

Additional I/O can be added at any time by adding an external I/O module. Each I/O module contains four inputs and outputs and up to four modules can be daisy chained to the ATC-900 controller.

I/O Module—The ATC-900 optional I/O module provides users with four additional assignable inputs and outputs. Up to four I/O modules can be added to an ATC-900 controller providing a total of 20 inputs and outputs.

DCT Module

DCT Module Attached

The DCT module serves a dual role of providing both a 24 Vdc input to the ATC-900 controller and also a current transformer interface, allowing current to be metered along with voltage and frequency. The DCT module mounts on the back of the controller and is ribbon connected to the controller.

The 24 Vdc input to the controller from a customer supplied source allows the controller to remain energized when either Source 1 or Source 2 is not available. A power buffer option 61F may be added to the DCT module that will provide a 20-second ride-through time if all power to the controller is lost.

ATC-900 Metering

ATC-900 Main Screen Shows Current Values

The DCT module incorporates a current transformer interface to the ATC-900, allowing current to be metered along with voltage and frequency. Combined with the ATC-900, the DCT module serves as a multi-function power meter and provides measurement of the listed electrical parameters. Readings are displayed on the ATC-900 controller display or can be monitored through Modbus 485.

Table 25.4-9. Current Voltage Frequency Metering Data

Metering	Units	Accuracy	Notes
Current			
IA, IB, IC	Amperes	±1% of reading	Accuracy range 5–100%
Voltage			
VAB, VBC, VCA	Volts	±1% of reading	Applicable to volt range of 34–721 Vac
Frequency			
Frequency	Hz	±0.2 Hz of reading	Range is 20–255 Hz

Table 25.4-10. Power and Energy Metering Data

Power Metering	Units	Accuracy	Notes
Power	kW	±2% of reading	Approx. 1-second update
kVA	kVA	±2% of reading	Approx. 1-second update
kVAR	kVAR	±2% of reading	Approx. 1-second update
PF (power factor)	—	0 to ±1.00	—

Table 25.4-11. Features

Feature Overview	Integrated ATC-900 Meter
Instrumentation	
Current, per phase	■
Current Demand	—
Voltage, per phase (L-L)	■
Min Max Readings	—
Frequency	■
Power	
Real, reactive and apparent power total (W,VAR,VA)	■
Power factor, total	■
Energy	
Real, reactive and apparent energy, total (Wh,VAR,VAh)	—
Communications	
RS-485, Modbus RTU, Modbus ASCII	■

Voltage Inputs (measurement category)

- ■ Range: universal, auto-ranging up to 416 Vac L–N, 721 Vac L–L
- ■ Supported hookups: 3-element wye or delta
- ■ Input impedance: 2 m ohm/phase
- ■ Burden: 0.0022 VA/phase at 120 V
- ■ Fault withstand: meets IEEE C37.90.1

Current Inputs

- ■ 5 A nominal, 10 A maximum
- ■ Burden: 0.005 VA per phase maximum at 11 A
- ■ Pickup current: 0.1% of nominal
- ■ Connections: screw terminals
- ■ Maximum input wire gauge: AWG #12/2.5 mm^2
- ■ Fault withstand: 100 A/10 seconds, 300 A/3 seconds, 500 A/1 second

Isolation

- ■ All inputs are isolated to 2600 Vac

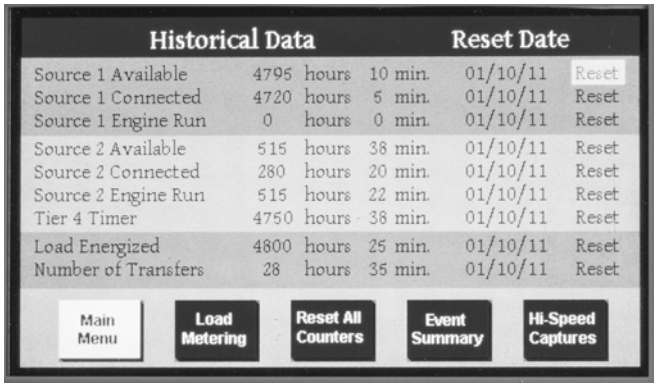
Measurement Methods

- ■ Voltage, current: true rms
- ■ Power: sampling at 64 samples per cycle on all channels measured readings simultaneously
- ■ A/D conversion: 16 simultaneous 12-bit analog to digital converters

Diagnostics and Troubleshooting

In a mission-critical application, a failure to transfer to the backup power system requires quick and decisive action. Eaton's ATC-900 controller provides users with the data required to quickly identify the root cause of a backup power system failure and minimize system downtime. This data allows the user to identify a specific event and obtain the detailed event information including a step by step breakdown of the transfer sequence.

Historical Data



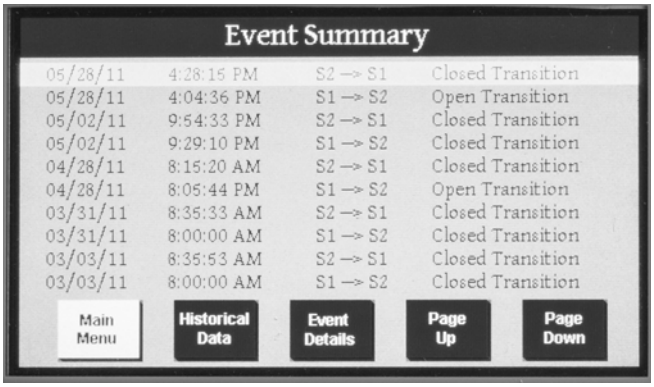
Historical Data Display

The historical data display indicates historical and cumulative counter values as follows:

- Source 1 available
- Source 1 connected
- Source 1 engine run
- Source 2 available
- Source 2 connected
- Source 2 engine run
- Tier IV timer
- Load energized
- Number of transfers

Historical counter resets are date and time-stamped events that are captured in the event log.

Event Summary



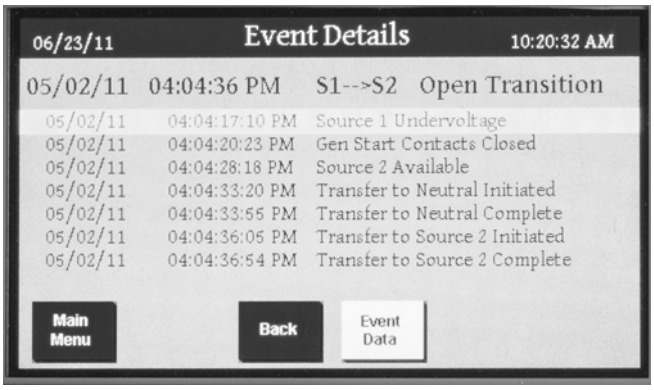
Event Summary Display

The ATC-900 controller stores 100 transfer summaries, 350 transfer details, 100 alarms and 20 time adjustments.

Events include:

- Actions of the transfer sequence
- Alarms
- Changes to the set points
- Changes to the time/date
- Resetting a historical counter
- Engine run test
- Time-stamping resolution of 1 second.

Event Details

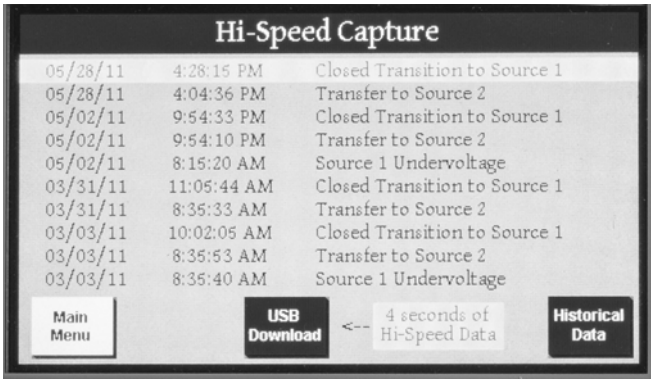


Event Details Display

Each transfer event can be exploded to view a step by step, time stamped, sequence of operation for a transfer event. All metered values are also logged for each event and can be viewed on the event data screen. Time stamping resolution of 0.1 seconds.

25

Hi-Speed Capture



High Speed Capture Display, Pre and Post Event

The ATC-900 stores metered data updated on a continuous 20 millisecond basis for specific events. The data is captured 2 seconds before and 2 seconds after the event (except for a power failure, which is 4 seconds before). Oscillographic data for 10 events is stored in the controller and may be downloaded over USB or displayed graphically.

Events include:

- Source unavailability actions that initiate a transfer sequence (undervoltage, overvoltage, etc.)
- Successful transfers (at the point of breaker/contactor closure)
- Unsuccessful transfers (at the point of breaker/contactor failure to close or open)

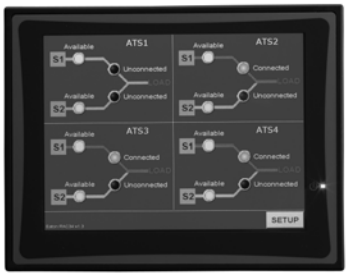
Industry Standard Communication Protocol

Every ATC-900 controller includes a standard Modbus RTU communications interface with an option to upgrade to Modbus TCP/IP.

The ATC-900 is also compatible with Eaton's Power Xpert Gateway for web-based monitoring, Modbus TCP/IP, SNMP, or BACnet/IP. The Power Xpert Gateway can be used to consolidate data from up to 64 devices, including communications ready transfer switch controllers, trip units and meters, as well as other Eaton devices. Versions of the Power Xpert Gateway include email event notification and data-logging functionality.

HMi Remote Annunciator and Controller

The HMi Remote Annunciator and Controller monitors and controls up to eight transfer switches on a 7-inch LCD touch screen. It is compatible with either Modbus RTU or Modbus TCP/IP protocols. A basic mimic bus for each transfer switch displays source availability, source connected and preferred source. Users can drill down to metered source values and event history for each transfer switch. All control features are password-protected and include engine test, transfer to emergency (peak shaving), manual retransfer and bypass time delays.



HMi Remote Annunciator and Controller

USB Programming Port

Every ATC-900 transfer switch includes a front panel, NEMA 4X rated USB port for use in configuring set points or downloading event data to a USB flash drive. To reduce the time spent on site for commissioning, set points can be configured at a PC using the ATC-900 configuration software and saved to a USB flash drive to be uploaded to one or multiple controllers. Set points are also easily copied from one controller to another.

Downloading event capture data provides the user the ability to more thoroughly analyze high-speed capture data using a PC, or data can be emailed to Eaton's Technical Support Team when off site troubleshooting support is required.

USB Programming Port

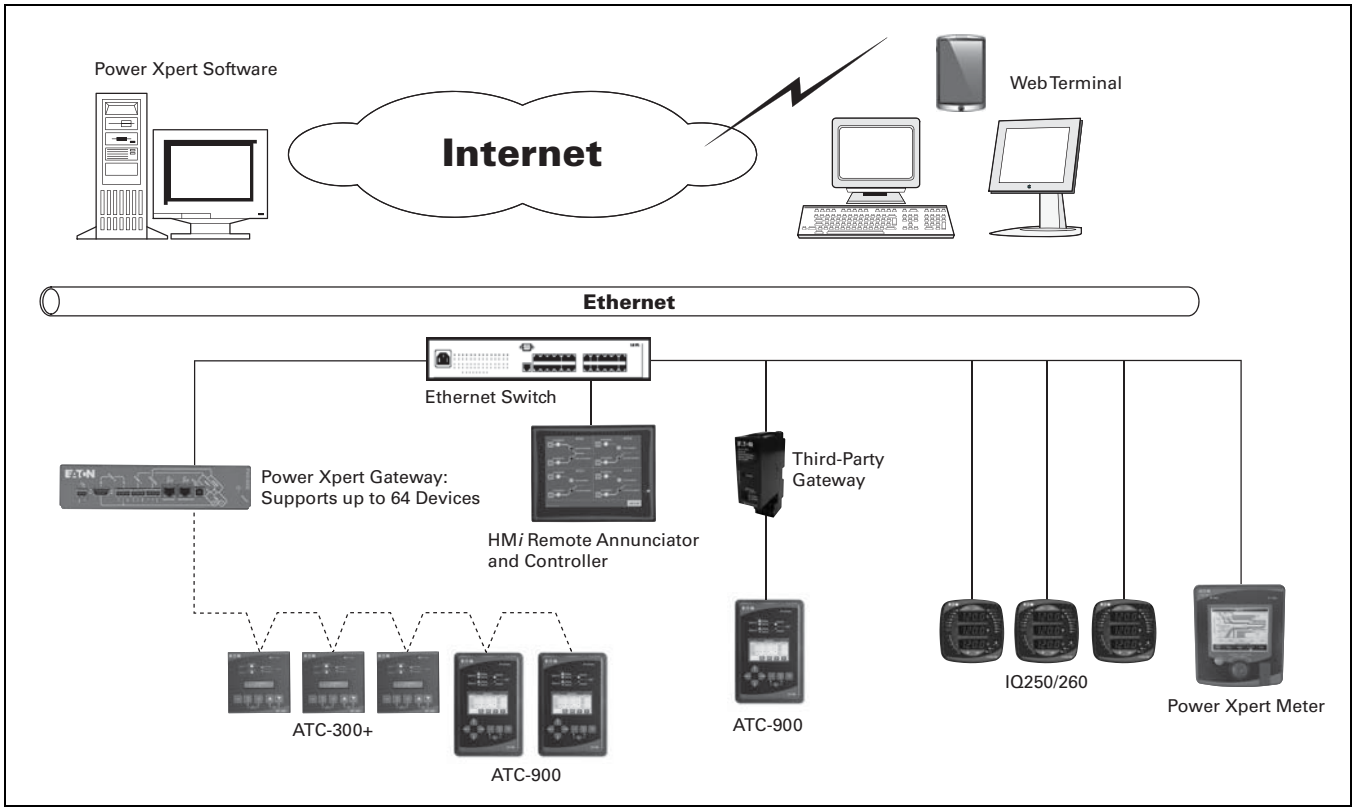


Figure 25.4-11. Power Xpert Architecture with ATC-900

Special Applications

Three-Source ATS Control

The ATC-900 Master/Slave controller functionality provides the user with the ability to use two independent transfer switches in three-source systems consisting of a utility and two generator sources. In a three-source system, the Master ATS controls the engine starting and stopping of the Slave ATS.

In the event of a Source 1 power failure, the Master ATS engine start relay closes signaling the Slave ATS to start both generators. (Note: The Slave ATS requires continuous power using either the DCT Module for a DC power input or a UPS input.) The Master ATS handles all transfer time delays between the utility to generator transfer. If the preferred generator does not start within the programmed time delay, the Slave ATC-900 will initiate a transfer to the non-preferred generator. If "None Preferred" is selected, then both generators will start and the Slave ATS will transfer to the first generator source available. The ATC-900 will sense the load is connected to a good source and shut down the second generator.

Load Management

The ATC-900 includes several features to enhance the user's ability to manage load while on the alternate source.

- Integrated load metering: provides metering data that allows the user to monitor energy utilization and manage system loading
- Selective load shedding: selectively drop non-essential loads when a user-defined kW level is reached. The transfer switch remains on generator
- Load shed to neutral (where ATS construction allows): provides the ability to load shed to a neutral position from a generator source
- Pre-/post-transfer signals: provides the ability to stop select loads during the transfer process
- Load bank disable output: disengages a load bank if utility power is lost during an engine test

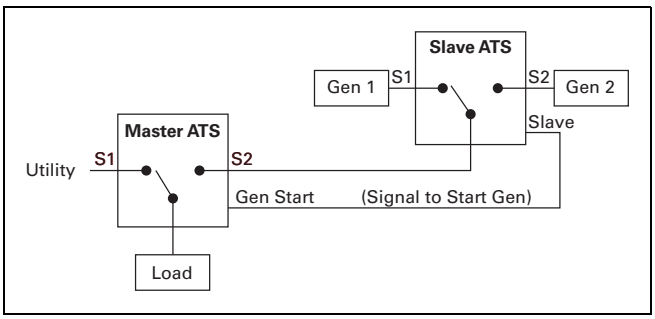


Figure 25.4-12. Three-Source Transfer Switch Arrangement

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Technical Data

Table 25.4-12. Technical Specifications

Parameter	Specification
Control power	120 Vac (50/60 Hz) (operating range 65–160 Vac) or 24 Vdc (±10%) with DCT module
Power consumption	18 VA
Environmental conditions	
Operating temperature	–4.0 to +158 °F (–20 to +70 °C)
Operating humidity	Up to 90% relative humidity (noncondensing)
Enclosure compatibility	NEMA 12 (standard mounting) NEMA 4/4X (mounted with gasket between panel and device faceplate) NEMA 3R (outdoor) UV resistant ATC-900 faceplate
System voltage application	120–600 Vac (50/60 Hz) (single- or three-phase)
Voltage measurements	Source 1, Source 2 and Load (VAB, VBC, VCA for three-phase system)
Voltage measurement range	0–700 Vac
Voltage measurement accuracy	±1% of reading
Frequency measurements	Source 1 and Source 2
Frequency measurement range	40–80 Hz
Frequency measurement accuracy	±0.1 Hz
Applicable testing	UL recognized component 2009 IBC, 2010 CBC and OSHPD certified in ATS assemblies Complies with UL 991 environmental tests Complies with IEC 61000-4-2, 61000-4-3, 61000-4-4, 61000-4-5, and 61000-4-6 Complies with CISPR 11, Class A Complies with FCC Part 15, Subpart B, Class A
CSA conformance	C22.2 No. 178-1978 (reaffirmed 1992)
CE mark	European standards conformance

Dimensions

Dimensions in Inches (mm)

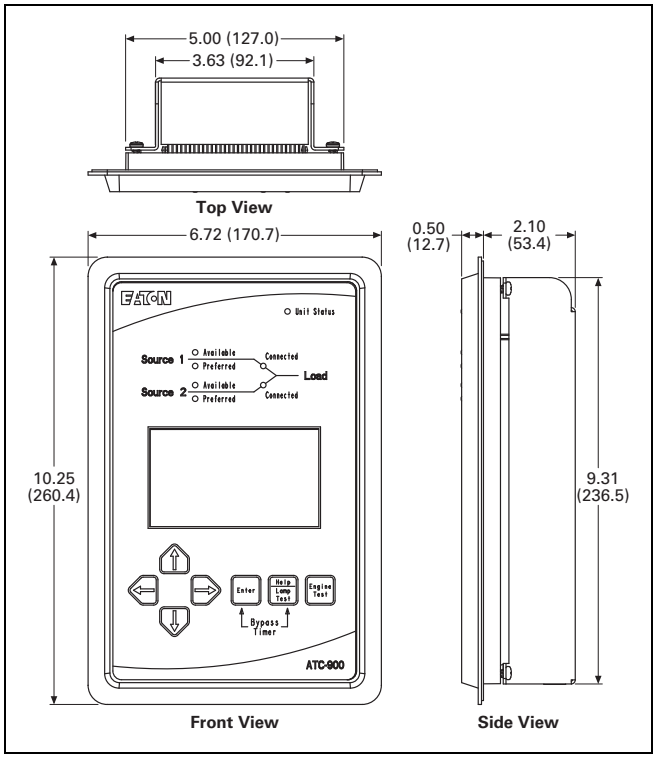

Figure 25.4-13. ATC-900

Additional Information

Instruction bulletin: IB01602088E

Web-based demo: www.eaton.com/ats

Standard and Optional Features

Table 25.5-1. Contactor-Based—Automatic Transfer Switch Features

Feature Number	Description	Open Transition									
		RLC1	ATC1	ATC3			ATC9			NTCE	
		C2	C2	C2	C3	C5	C2	C3	C5	C2	C3
Timers											
1	Time delay normal to emergency (TDNE) fixed 2 or 15 seconds	S	S	—	—	—	—	—	—	—	—
1A	Adjustable 0–1800 seconds	—	—	S	S	S	—	—	—	—	—
1B	Adjustable 0–166 minutes	—	—	—	—	—	S	S	S	—	—
2	Time delay engine start (TDES) fixed 3 seconds	S	S	—	—	—	—	—	—	—	—
2A	Adjustable 0–120 seconds	—	—	S	S	S	S	S	S	—	—
3	Time delay emergency to normal (TDEN) fixed 5 minutes	S	S	—	—	—	—	—	—	—	—
3A	Adjustable 0–1800 seconds	—	—	S	S	S	—	—	—	—	—
3B	Adjustable 0–166 minutes	—	—	—	—	—	S	S	S	—	—
4	Time delay engine cooldown (TDEC) fixed 5 minutes	S	S	—	—	—	—	—	—	—	—
4A	Adjustable 0–1800 seconds	—	—	S	S	S	—	—	—	—	—
4B	Adjustable 0–166 minutes	—	—	—	—	—	S	S	S	—	—
Emergency (S2) Source Sensing											
5H	Phase reversal protection	—	—	S	S	S	S	S	S	—	—
5J	All phase undervoltage/underfrequency	S	S	S	S	S	S	S	S	—	—
5K	All phase overvoltage/overfrequency	—	—	S	S	S	S	S	S	—	—
5L	All phase voltage unbalance and phase loss	—	—	—	—	—	O	O	O	—	—
5L	All phase voltage unbalance	—	—	S	S	S	S	S	S	—	—
5N	All phase overfrequency	—	—	—	—	—	S	S	S	—	—
System or Engine Test											
6B	Engine test pushbutton	S	S	S	S	S	S	S	S	—	—
6C	Remote engine test input	—	—	—	—	—	C	C	C	—	—
6D	Maintained 2-position test switch	—	—	—	—	—	O	O	O	—	—
6H	Maintained 4-position test switch	—	—	—	—	—	O	O	O	—	—
7	Time delay emergency fail (TDEF) fixed 6 seconds	S	S	—	—	—	—	—	—	—	—
7A	Adjustable 0–6 seconds	—	—	S	S	S	S	S	S	—	—
Pushbutton Bypass											
8C	Bypass TDEN	—	—	S	S	S	S	S	S	—	—
8D	Bypass TDNE	—	—	S	S	S	S	S	S	—	—
8E	Bypass TDNE/TDEN (input)	—	—	—	—	—	C	C	C	—	—
Maintenance Selector Switch											
9B	Electrical operator isolator switch	—	—	O	O	O	O	O	O	—	—
Preferred Source Selector											
	Preferred source selector (programmed)	—	—	—	—	—	S	S	S	—	—
10A	Preferred source selector input	—	—	—	—	—	C	C	C	—	—
10C	Preferred source selector with selector switch	—	—	—	—	—	O	O	O	—	—
10B	Utility to utility or utility to generator	—	—	—	—	—	S	S	S	—	—
10D	Generator to generator	—	—	—	—	—	S	S	S	—	—
Indicating Lights/LEDs											
12C	Normal (S1) source connected	S	S	S	S	S	S	S	S	S	S
12D	Emergency (S2) source connected	S	S	S	S	S	S	S	S	S	S
12G	Normal (S1) source available	S	S	S	S	S	S	S	S	S	S
12H	Emergency (S2) source available	S	S	S	S	S	S	S	S	S	S
12L	Normal (S1) source tripped (requires feature 16)	—	—	—	—	—	—	O	O	—	—
12M	Emergency (S2) source tripped (requires feature 16)	—	—	—	—	—	—	O	O	—	—
Source Available Contacts											
14C	Normal (S1) source available 4 Form C	—	—	O	O	O	O	O	O	O	O
14D	Emergency (S2) source available 4 Form C	—	—	O	O	O	O	O	O	O	O
14E	Normal (S1) source available 1 Form C	—	—	—	—	—	S	S	S	—	—
14F	Emergency (S2) source available 1 Form C	—	—	—	—	—	S	S	S	—	—
14G	Normal (S1) source available 2 Form C	—	S	S	S	S	O	O	O	S	S
14H	Emergency (S2) source available 2 Form C	—	S	S	S	S	O	O	O	S	S

Note: S = Standard, O = Optional, C = Configurable

Table 25.5-1. Contactor-Based—Automatic Transfer Switch Features (Continued)

Feature Number	Description	Open Transition									
		RLC1	ATC1	ATC3			ATC9			NTCE	
		C2	C2	C2	C3	C5	C2	C3	C5	C2	C3
Position Contacts											
15E	Normal (S1) source position 1 Form C	—	S	S	S	S	S	S	S	S	S
15F	Emergency (S2) source position 1 Form C	—	S	S	S	S	S	S	S	S	S
15G	Normal (S1) source position 3 Form C	—	O	O	O	O	O	O	O	O	O
15H	Emergency (S2) source position 3 Form C	—	O	O	O	O	O	O	O	O	O
15M	Emergency load shed contacts 4 Form C (must order as a separate field installed kit) (not in IES)	O	—	—	—	—	—	—	—	—	—
15R	Normal (S1) source position 1 Form C (relay OUTPUT)	—	—	—	—	—	C	C	C	—	—
15S	Emergency (S2) source position 1 Form C (relay OUTPUT)	—	—	—	—	—	C	C	C	—	—
Integral Overcurrent Protection											
16N	Normal (S1) switch only	—	—	—	—	—	—	—	—	—	—
16E	Emergency (S2) switch only	—	—	—	—	—	—	—	—	—	—
16B	Normal (S1) and emergency (S2) switches	—	—	—	—	—	—	—	—	—	—
16S	Service equipment/overcurrent protection normal (S1) and emergency (S2)	O	—	—	—	—	—	—	—	—	—
Breaker with Overcurrent Trip											
17N	Normal (S1) breaker only with 100% load rating	—	—	O	O	O	O	O	O	—	—
Metering (Specify normal (S1), emergency (S2) or load side for 18A thru E)											
18	Integrated load metering (DCT module)	—	—	—	—	—	O	O	O	—	—
18A	IQ 250/260	—	O	O	O	O	O	O	O	O	O
18B	PX4000/6000/8000	—	—	—	—	—	—	—	—	—	—
18D	IQ 130/140/150	—	O	O	O	O	O	O	O	O	O
18E	PXM2250/2260/2270	—	O	O	O	O	O	O	O	O	O
18O	IQ Analyzer normal (S1)	—	—	O	O	O	O	O	O	O	O
18P	IQ Analyzer emergency (S2)	—	—	O	O	O	O	O	O	O	O
18Q	IQ Analyzer switch selectable (S1) and (S2)	—	—	O	O	O	O	O	O	O	O
18V	IQ Analyzer load side	—	—	O	O	O	O	O	O	O	O
18R	DP-4000 normal (S1)	—	—	O	O	O	O	O	O	O	O
18S	DP-4000 emergency (S2)	—	—	O	O	O	O	O	O	O	O
18T	DP-4000 switch selectable (S1) and (S2)	—	—	O	O	O	O	O	O	O	O
18U	DP-4000 load side	—	—	O	O	O	O	O	O	O	O
21A	Non-standard terminals	—	—	—	—	—	—	—	—	—	—
22	Ground bus	—	—	S	S	S	S	S	S	S	S
22C	Special ground bar—contact factory	—	—	—	—	—	—	—	—	—	—
22D	16 conductor ground bus 500 or 750 kcmil	—	—	—	—	—	—	—	O	—	—
Plant Exerciser											
23A	Selectable—disabled/7-, 14-, 28-day interval, fixed 15 minutes load/no load, with fail-safe	S	S	—	—	—	—	—	—	—	—
23K	Selectable—disabled 7-, 14-, 28-day interval, 0–600 minutes load/no load, with fail-safe	—	—	S	S	S	—	—	—	—	—
23L	24-hour, 7-day, 365-day programmable plant exerciser	—	—	O	O	O	—	—	—	—	—
23M	Selectable—disabled 7-, 14-, 28-, 365-day interval, 0–600 minutes load/no load, with fail-safe	—	—	—	—	—	S	S	S	—	—
Normal (S1) Source Sensing											
26D	Go to emergency (S2) input	—	—	S	S	S	C	C	C	—	—
26E	Go to emergency (S2) input with selector switch ①	—	—	—	—	—	—	O	O	—	—
26H	Phase reversal protection	—	—	S	S	S	O	S	S	—	—
26J	All phase undervoltage/underfrequency	—	—	S	S	S	S	S	S	—	—
26K	All phase overvoltage/overfrequency	—	—	S	S	S	S	S	S	—	—
26L	All phase voltage unbalance and phase loss	—	—	—	—	—	S	O	O	—	—
26L	All phase voltage unbalance	—	—	S	S	S	O	S	S	—	—
26M	Allows operation with generator with utility sensing (available only through a field installed kit) (not in IES)	O	O	—	—	—	S	—	—	—	—
26P	All phase undervoltage	S	S	—	—	—	—	—	—	—	—
Alternative Transfer Modes of Operation											
29G	Selector switch for auto or non-auto operation ①	—	—	O	O	O	O	O	O	—	—
29J	Manual (pushbutton) transfer E to N; automatic N to E ①	—	—	O	O	O	O	O	O	—	—
29L	Manual retransfer on/off input	—	—	—	—	—	C	C	C	—	—
29M	Manual retransfer on/off input with selector switch ①	—	—	—	—	—	O	O	O	—	—
29K	Manual retransfer input	—	—	—	—	—	C	C	C	—	—

① When these options are selected with the ATC-900 controller, the associated input or output will be factory fixed and cannot be reconfigured by the user.

Note: S = Standard, O = Optional, C = Configurable

Table 25.5-1. Contactor-Based—Automatic Transfer Switch Features (Continued)

Feature Number	Description	Open Transition									
		RLC1	ATC1	ATC3			ATC9			NTCE	
		C2	C2	C2	C3	C5	C2	C3	C5	C2	C3
Open Transfer Operation Modes											
32A	Time delay neutral adjustable 0–120 seconds (delayed transition)	—	—	—	S	—	—	C	C	—	—
32B	Load voltage decay adjustable 2–30% nominal voltage	—	—	—	—	—	—	C	C	—	—
32C	In-phase transition defaults to load voltage decay	—	—	—	—	—	—	C	C	—	—
32D	In-phase transition defaults to time delay neutral	—	—	—	—	S	—	—	—	—	—
32E	Delay transition timer adjustable 3–60 seconds	—	—	—	—	—	—	—	—	—	—
32F	In-phase transition	S	S	S	—	—	S	—	—	—	—
32G	Time delay neutral fixed 0 or 2 seconds (delayed transition)	—	—	—	—	—	—	—	—	—	—
Logic Extender Cable (Open Enclosures Only)											
34A	48 inches (1219 mm)	—	—	—	—	—	—	—	—	—	—
34C	96 inches (2438 mm)	—	O	O	O	O	—	—	—	O	O
34E	144 inches (3658 mm)	—	—	—	—	—	—	—	—	—	—
34F	100 inches (2540 mm) (fixed mount only)	—	—	—	—	—	—	—	—	—	—
35A	Pre-transfer signal contacts 1 Form C	—	—	S	S	S	C	C	C	—	—
35B	Pre-/post-transfer signal	—	—	—	—	—	C	C	C	—	—
36	Load shed from emergency (S2 inhibit)	—	—	—	S	S	C	C	C	—	—
36A	Load shed—S2 inhibit with keyed switch (INPUT)	—	—	—	—	—	O	O	O	—	—
37	Go to “isolated” position (not SE rated)	—	—	—	—	—	C	C	C	—	—
Suitable for Use as Service Equipment Requires 16B, N or S											
37A	Without ground fault protection	—	—	O	O	O	O	O	O	—	—
37B	With ground fault protection required at 1000 A or more if the electrical service is a solidly grounded wye system of more than 150V to ground but not exceeding 600V phase to phase	—	—	O	O	O	O	O	O	—	—
Stainless Steel Device Covers											
38A	SS cover for device plate or SE disconnect	—	—	O	O	O	O	O	O	O	O
38B	SS cover for controller	—	O	O	O	O	O	O	O	—	—
Space Heater with Thermostat											
41A	100 watts	—	O	O	O	O	O	O	O	O	O
41E	375 watts	—	—	—	—	—	—	—	—	—	—
42	IBC/CBC seismic qualified	S	S	S	S	S	S	S	S	S	S
Load Management Contacts											
45A–K	Load sequencing contacts (1)	—	—	—	—	—	C	C	—	—	—
45L	Selective load shed (assignable to multiple out put contacts)	—	—	—	—	—	C	C	C	—	—
Communications											
48D	Ethernet communications (Gateway)	—	—	O	O	O	O	O	O	—	—
48F	Modbus—MPONI module (PONI not required with ATC-300+)	—	—	O	O	O	—	—	—	—	—
48F	Modbus communication—no PONI required	—	—	S	S	S	S	S	S	—	—
48G	Modbus TCP/IP gateway	—	—	—	—	—	O	O	O	—	—
48P	Power supply for remote annunciator	—	—	O	O	O	O	O	O	—	—
48RAC	Remote annunciator with control (includes Modbus)	—	—	O	O	O	O	O	O	—	—
48MRAC	Remote annunciator with control multi-switch (includes Modbus)	—	—	O	O	O	—	—	—	—	—
48U	USB port	—	—	—	—	—	S	S	S	—	—
49A	Sensing isolation transformer Magnum	—	—	—	—	—	O	O	O	—	—
49B	Sensing isolation transformer	—	—	O	O	O	O	O	O	—	—
49C	Multi-tap voltage transformer (non AG only)	—	S	S	S	S	S	S	S	S	S
49C	Multi-tap voltage transformer (option only on fixed)	—	—	—	—	—	—	—	—	—	—

Note: S = Standard, O = Optional, C = Configurable

Table 25.5-1. Contactor-Based—Automatic Transfer Switch Features (Continued)

Feature Number	Description	Open Transition									
		RLC1	ATC1	ATC3			ATC9			NTCE	
		C2	C2	C2	C3	C5	C2	C3	C5	C2	C3
TVSS up to 480V (Connected to Normal)											
51D1	50 kA—CVX	—	—	O	O	O	O	O	O	O	O
51F1	100 kA—CVX	—	—	O	O	O	O	O	O	O	O
Surge Protection Device with 12 ft Cable (on Normal)											
51S1	50 kA—SPD ②	—	—	—	—	—	—	—	—	—	—
51S2	80 kA—SPD ②	—	—	—	—	—	—	—	—	—	—
51S3	100 kA—SPD ②	—	—	—	—	—	—	—	—	—	—
51S4	120 kA—SPD ②	—	—	—	—	—	—	—	—	—	—
51S5	160 kA—SPD ②	—	—	—	—	—	—	—	—	—	—
51S6	200 kA—SPD ②	—	—	—	—	—	—	—	—	—	—
51S7	250 kA—SPD ②	—	—	—	—	—	—	—	—	—	—
51S8	300 kA—SPD ②	—	—	—	—	—	—	—	—	—	—
51S9	400 kA—SPD ②	—	—	—	—	—	—	—	—	—	—
52B	24V generator battery power	—	—	—	—	—	—	—	—	—	—
52C	24V onboard power supply (charger and batteries)	—	—	—	—	—	—	—	—	—	—
54B	Upgrade to 316 stainless steel	—	—	O	O	O	O	O	O	O	O
60	Control power transformer (240/120 V single-phase and 208 V only)	—	O	O	—	—	—	—	—	—	—
61A	UPS device	—	—	—	—	—	—	—	—	—	—
61B	UPS 120 Vac terminal block input	—	—	—	—	—	—	—	—	—	—
80A	Emergency (S2) inhibit contact	—	—	—	O	O	C	C	C	—	—
Monitoring Outputs											
81A	General alarm indication contact	—	—	—	—	—	C	C	C	—	—
81B	ATS not in automatic	—	—	—	—	—	C	C	C	—	—
81C	ATS in test	—	—	—	—	—	C	C	C	—	—
81D	Engine test aborted	—	—	—	—	—	C	C	C	—	—
81E	Cooldown in process	—	—	—	—	—	C	C	C	—	—
81F	Engine start contact status	—	—	—	—	—	C	C	C	—	—
81G	Emergency inhibit on	—	—	—	—	—	C	C	C	—	—
81GL	Emergency inhibit on with white indicating light ①	—	—	—	—	—	O	O	O	—	—
81H	ATS on bypass	—	—	—	—	—	C	C	C	—	—
Inputs											
81J	Lockout	—	—	—	—	—	C	C	C	—	—
81K	Monitor mode	—	—	—	—	—	C	C	C	—	—
81L	Remote load test	—	—	—	—	—	C	C	C	—	—
Three Source ATS Control (Master/Slave)											
90A	Master control output	—	—	—	—	—	C	C	C	—	—
90B	Slave input	—	—	—	—	—	C	C	C	—	—

① When these options are selected with the ATC-900 controller, the associated input or output will be factory fixed and cannot be reconfigured by the user.

② Add feature package B or C (e.g., 51S4B).
B: LED indication and audible alarm, Form C contact, EMI/RFI filtering (standard)
C: B and surge counter with Reset button (standard with surge)

Note: S = Standard, O = Optional, C = Configurable

Table 25.5-1. Contactor-Based—Automatic Transfer Switch Features (Continued)

Feature Number	Description	Open Transition				Closed Transition		
		BIC3	BIC3	BIC9	BIC9	CBC9	CBC9	CTC9
		C	D	C	D	C	D	C3
Timers								
1A	Adjustable 0–1800 seconds	S	S	—	—	—	—	—
1B	Adjustable 0–166 minutes	—	—	S	S	S	S	S
2A	Adjustable 0–120 seconds	S	S	S	S	S	S	S
3A	Adjustable 0–1800 seconds	S	S	—	—	—	—	—
3B	Adjustable 0–166 minutes	—	—	S	S	S	S	S
4A	Adjustable 0–1800 seconds	S	S	—	—	—	—	—
4B	Adjustable 0–166 minutes	—	—	S	S	S	S	S
Emergency (S2) Source Sensing								
5H	Phase reversal protection	S	S	S	S	S	S	S
5J	All phase undervoltage/underfrequency	S	S	S	S	S	S	S
5K	All phase overvoltage/overfrequency	S	S	S	S	S	S	S
5L	All phase voltage unbalance and phase loss	—	—	O	O	O	O	O
5L	All phase voltage unbalance	S	S	S	S	S	S	S
5N	All phase overfrequency	—	—	S	S	S	S	S
System or Engine Test								
6B	Engine test pushbutton	S	S	S	S	S	S	S
6C	Remote engine test input	—	—	C	C	C	C	C
6D	Maintained 2-position test switch	—	—	O	O	O	O	O
6H	Maintained 4-position test switch	—	—	O	O	O	O	O
7A	Adjustable 0–6 seconds	S	S	S	S	S	S	S
Pushbutton Bypass								
8C	Bypass TDEN	S	S	S	S	S	S	S
8D	Bypass TDNE	S	S	S	S	S	S	S
8E	Bypass TDNE/TDEN (input)	—	—	C	C	C	C	C
Maintenance Selector Switch								
9B	Electrical operator isolator switch	O	O	O	O	O	O	O
Preferred Source Selector								
	Preferred source selector (programmed)	—	—	S	S	S	S	S
10A	Preferred source selector input	—	—	C	C	C	C	C
10C	Preferred source selector with selector switch	—	—	O	O	O	O	O
10B	Utility to utility or utility to generator	—	—	S	S	S	S	S
10D	Generator to generator	—	—	S	S	S	S	S
Indicating Lights/LEDs								
12C	Normal (S1) source connected	S	S	S	S	S	S	S
12D	Emergency (S2) source connected	S	S	S	S	S	S	S
12G	Normal (S1) source available	S	S	S	S	S	S	S
12H	Emergency (S2) source available	S	S	S	S	S	S	S
12L	Normal (S1) source tripped (requires feature 16)	—	—	O	O	O	O	O
12M	Emergency (S2) source tripped (requires feature 16)	—	—	O	O	O	O	O
Source Available Contacts								
14C	Normal (S1) source available 4 Form C	O	O	O	O	O	O	O
14D	Emergency (S2) source available 4 Form C	O	O	O	O	O	O	O
14E	Normal (S1) source available 1 Form C	—	—	S	S	S	S	S
14F	Emergency (S2) source available 1 Form C	—	—	S	S	S	S	S
14G	Normal (S1) source available 2 Form C	S	S	O	O	O	O	O
14H	Emergency (S2) source available 2 Form C	S	S	O	O	O	O	O

Note: S = Standard, O = Optional, C = Configurable

Table 25.5-1. Contactor-Based—Automatic Transfer Switch Features (Continued)

Feature Number	Description	Open Transition				Closed Transition		
		BIC3	BIC3	BIC9	BIC9	CBC9	CBC9	CTC9
		C	D	C	D	C	D	C3
Position Contacts								
15E	Normal (S1) source position 1 Form C	S	S	S	S	S	S	S
15F	Emergency (S2) source position 1 Form C	S	S	S	S	S	S	S
15G	Normal (S1) source position 3 Form C	O	O	O	O	O	O	O
15H	Emergency (S2) source position 3 Form C	O	O	O	O	O	O	O
15R	Normal (S1) source position 1 Form C (relay OUTPUT)	—	—	C	C	C	C	C
15S	Emergency (S2) source position 1 Form C (relay OUTPUT)	—	—	C	C	C	C	C
Integral Overcurrent Protection								
16N	Normal (S1) switch only	—	—	—	—	—	—	—
16E	Emergency (S2) switch only	—	—	—	—	—	—	—
16B	Normal (S1) and emergency (S2) switches	—	—	—	—	—	—	—
16S	Service equipment/overcurrent protection normal (S1) and emergency (S2)	—	—	—	—	—	—	—
Metering (Specify normal (S1), emergency (S2) or load side for 18A thru E)								
18	Integrated load metering (DCT module)	—	—	O	O	O	O	O
18A	IQ 250/260	O	O	O	O	O	O	O
18B	PX4000/6000/8000	—	O	—	—	—	—	—
18D	IQ 130/140/150	O	O	O	O	O	O	O
18E	PXM2250/2260/2270	O	O	O	O	O	O	O
20A	Rear bus connections	—	—	—	—	—	—	—
21A	Non-standard terminals (optional in IES for centers)	—	—	—	—	—	—	—
22	Ground bus	S	S	—	—	—	—	—
22C	Special ground bar—contact factory	—	—	—	—	—	—	—
22D	16 conductor ground bus 500 or 750 kcmil	O	O	O	O	O	—	—
Plant Exerciser								
23A	Selectable—disabled 7-, 14-, 28-day interval, fixed 15 minutes load/no load, with fail-safe	—	—	—	—	—	—	—
23K	Selectable—disabled 7-, 14-, 28-day interval, 0–600 minutes load/no load, with fail-safe	S	S	—	—	—	—	—
23L	24-hour, 7-day, 365-day programmable plant exerciser	O	O	—	—	—	—	—
23M	Selectable—disabled 7-, 14-, 28-, 365-day interval, 0–600 minutes load/no load, with fail-safe	—	—	S	S	S	S	S
Normal (S1) Source Sensing								
26D	Go to emergency (S2) input	S	S	C	C	C	C	C
26E	Go to emergency (S2) input with selector switch ①	—	—	O	O	O	O	O
26H	Phase reversal protection	S	S	S	S	S	S	S
26J	All phase undervoltage/underfrequency	S	S	S	S	S	S	S
26K	All phase overvoltage/overfrequency	S	S	S	S	S	S	S
26L	All phase voltage unbalance and phase loss	—	—	O	O	O	O	O
26L	All phase voltage unbalance	S	S	S	S	S	S	S
Alternative Transfer Modes of Operation								
29D	Dual ATS bypass	S	S	S	S	S	S	—
29G	Selector switch for auto or non-auto operation ①	O	O	O	O	O	O	O
29J	Manual (pushbutton) transfer E to N; automatic N to E ①	O	O	O	O	O	O	O
29L	Manual retransfer on/off input	—	—	C	C	C	C	C
29M	Manual retransfer on/off input with selector switch ①	—	—	O	O	O	O	O
29K	Manual retransfer input	—	—	C	C	C	C	C

① When these options are selected with the ATC-900 controller, the associated input or output will be factory fixed and cannot be reconfigured by the user.

Note: S = Standard, O = Optional, C = Configurable

Table 25.5-1. Contactor-Based—Automatic Transfer Switch Features (Continued)

Feature Number	Description	Open Transition				Closed Transition		
		BIC3	BIC3	BIC9	BIC9	CBC9	CBC9	CTC9
		C	D	C	D	C	D	C3
Open Transfer Operation Modes								
32A	Time delay neutral adjustable 0–120 seconds (delayed transition)	S	S	C	C	—	—	—
32B	Load voltage decay adjustable 2–30% nominal voltage	—	—	C	C	—	—	—
32C	In-phase transition defaults to load voltage decay	—	—	—	—	—	—	—
32D	In-phase transition defaults to time delay neutral	—	—	—	—	—	—	—
32E	Delay transition timer adjustable 3–60 seconds	—	—	—	—	—	—	—
32F	In-phase transition	—	—	—	—	—	—	—
32G	Time delay neutral fixed 0 or 2 seconds (delayed transition)	—	—	—	—	—	—	—
Load Control								
35A	Pre-transfer signal contacts 1 Form C	S	S	C	C	C	C	C
35B	Pre-/post-transfer signal	—	—	C	C	C	C	C
36	Load shed from emergency (S2 inhibit)	S	S	C	C	C	C	C
36A	Load shed—S2 inhibit with keyed switch (INPUT)	—	—	O	O	O	O	O
37	Go to “isolated” position (not SE rated)	—	—	C	C	C	C	C
Suitable for Use as Service Equipment Requires 16B, N or S								
37A	Without ground fault protection	—	—	—	—	—	—	—
37B	With ground fault protection required at 1000 A or more if the electrical service is a solidly grounded wye system of more than 150 V to ground but not exceeding 600 V phase to phase	—	—	—	—	—	—	—
Stainless Steel Device Covers								
38A	SS cover for device plate or SE disconnect	O	O	O	O	O	O	O
38B	SS cover for controller	O	O	O	O	O	O	O
Space Heater with Thermostat								
41A	100 watts	O	O	O	O	O	O	O
41E	375 watts	—	—	—	O	—	O	—
42	IBC/CBC seismic qualified	S	S	S	S	S	S	S
Load Management Contacts								
45A–K	Load sequencing contacts (1)	—	—	C	C	C	C	C
45L	Selective load shed (assignable to multiple out put contacts)	—	—	C	C	C	C	C
Closed Transition Operational Modes (User Must Specify)								
47C	Closed/in-phase transition default to load voltage decay	—	—	—	—	—	—	—
47D	Closed transition	—	—	—	—	C	C	C
47E	Closed/in-phase transition default to time delay neutral	—	—	—	—	—	—	—
47F	Closed transition load voltage decay	—	—	—	—	C	C	C
47G	Closed transition time delay neutral	—	—	—	—	C	C	C
47H	Parallel limit timer	—	—	—	—	—	—	—
Communications								
48A	INCOM—IPONI module	—	—	—	—	—	—	—
48D	Ethernet communications (Gateway)	O	O	O	O	O	O	O
48F	Modbus—MPONI module (PONI not required with ATC-300+)	O	O	—	—	—	—	—
48F	Modbus communication—no PONI required	S	S	S	S	S	S	S
48G	Modbus TCP/IP gateway	O	O	O	O	O	O	O
48P	Power supply for remote annunciator	O	O	O	O	O	O	O
48RAC	Remote annunciator with control (includes Modbus)	O	O	O	O	O	O	O
48MRAC	Remote annunciator with control multi-switch (includes Modbus)	—	—	—	—	—	—	—
48R	Remote annunciator	—	—	S	S	S	S	S
48U	USB port	—	—	—	—	—	—	—
49A	Sensing isolation transformer Magnum	—	—	O	O	O	O	O
49B	Sensing isolation transformer	—	—	O	O	O	O	O
49C	Multi-tap voltage transformer (non AG only)	—	—	—	—	—	—	S
49C	Multi-tap voltage transformer (option only on fixed)	S	S	S	S	S	S	—

Note: S = Standard, O = Optional, C = Configurable

Table 25.5-1. Contactor-Based—Automatic Transfer Switch Features (Continued)

Feature Number	Description	Open Transition				Closed Transition		
		BIC3	BIC3	BIC9	BIC9	CBC9	CBC9	CTC9
		C	D	C	D	C	D	C3
TVSS up to 480V (Connected to Normal)								
51D1	50 kA—CVX	O	—	O	—	O	—	O
51F1	100 kA—CVX	O	—	O	—	O	—	O
Surge Protection Device with 12 ft Cable (on Normal)								
51S1	50 kA—SPD ②	—	O	—	O	—	O	—
51S2	80 kA—SPD ②	—	O	—	O	—	O	—
51S3	100 kA—SPD ②	—	O	—	O	—	O	—
51S4	120 kA—SPD ②	—	O	—	O	—	O	—
51S5	160 kA—SPD ②	—	O	—	O	—	O	—
51S6	200 kA—SPD ②	—	O	—	O	—	O	—
51S7	250 kA—SPD ②	—	—	—	—	—	—	—
51S8	300 kA—SPD ②	—	—	—	—	—	—	—
51S9	400 kA—SPD ②	—	—	—	—	—	—	—
52B	24V generator battery power	—	—	—	—	—	—	—
52C	24V onboard power supply (charger and batteries)	—	—	—	—	—	—	—
54A	Front access cabinet	—	—	—	—	—	—	—
54B	Upgrade to 316 stainless steel	O	O	O	O	O	O	—
59A	Silver-plated bus	S	S	—	S	—	S	—
59B	Tin-plated bus	O	O	—	—	—	—	—
61A	UPS device	O	O	—	—	—	—	—
61B	UPS 120 Vac terminal block input	S	S	—	—	—	—	—
80A	Emergency (S2) inhibit contact	S	S	C	C	C	C	C
Monitoring Outputs								
81A	General alarm indication contact	—	—	C	C	C	C	C
81B	ATS not in automatic	—	—	C	C	C	C	C
81C	ATS in test	—	—	C	C	C	C	C
81D	Engine test aborted	—	—	C	C	C	C	C
81E	Cooldown in process	—	—	C	C	C	C	C
81F	Engine start contact status	—	—	C	C	C	C	C
81G	Emergency inhibit on	—	—	C	C	C	C	C
81GL	Emergency inhibit on with white indicating light ①	—	—	O	O	O	O	O
81H	ATS on bypass	—	—	C	C	C	C	C
Inputs								
81J	Lockout	—	—	C	C	C	C	C
81K	Monitor mode	—	—	C	C	C	C	C
81L	Remote load test	—	—	C	C	C	C	C
Three Source ATS Control (Master/Slave)								
90A	Master control output	—	—	C	C	C	C	C
90B	Slave input	—	—	C	C	C	C	C

① When these options are selected with the ATC-900 controller, the associated input or output will be factory fixed and cannot be reconfigured by the user.

② Add feature package B or C (e.g., 51S4B).
B: LED indication and audible alarm, Form C contact, EMI/RFI filtering (standard)
C: B and surge counter with Reset button (standard with surge)

Note: S = Standard, O = Optional, C = Configurable

Table 25.5-2. Breaker-Based—Automatic Transfer Switch Features

Feature Number	Description	Open Transition					Closed Transition
		ATH1	ATH3	ATH9	NTHE	MTHX	MBHE
		ATV1	ATV3	ATV9	NTVE	MTVX	
Timers							
1	Time delay normal to emergency (TDNE) fixed 2 or 15 seconds	S	—	—	—	—	—
1A	Adjustable 0–1800 seconds	—	S	—	—	—	—
1B	Adjustable 0–166 minutes	—	—	S	—	—	—
2	Time delay engine start (TDES) fixed 3 seconds	S	—	—	—	—	—
2A	Adjustable 0–120 seconds	—	S	S	—	—	—
3	Time delay emergency to normal (TDEN) fixed 5 minutes	S	S	—	—	—	—
3A	Adjustable 0–1800 seconds	—	—	—	—	—	—
3B	Adjustable 0–166 minutes	—	—	S	—	—	—
4	Time delay engine cooldown (TDEC) fixed 5 minutes	S	—	—	—	—	—
4A	Adjustable 0–1800 seconds	—	S	—	—	—	—
4B	Adjustable 0–166 minutes	—	—	S	—	—	—
Emergency (S2) Source Sensing							
5H	Phase reversal protection	—	S	S	—	—	—
5J	All phase undervoltage/underfrequency	S	S	S	—	—	—
5K	All phase overvoltage/overfrequency	—	S	S	—	—	—
5L	All phase voltage unbalance and phase loss	—	—	O	—	—	—
5L	All phase voltage unbalance	—	S	S	—	—	—
5N	All phase overfrequency	S	—	S	—	—	—
System or Engine Test							
6B	Engine test pushbutton	S	S	S	—	—	—
6C	Remote engine test input	—	—	C	—	—	—
6D	Maintained 2-position test switch	—	—	O	—	—	—
6H	Maintained 4-position test switch	—	—	O	—	—	—
7	Time delay emergency fail (TDEF) fixed 6 seconds	S	—	—	—	—	—
7A	Adjustable 0–6 seconds	—	S	S	—	—	—
Pushbutton Bypass							
8C	Bypass TDEN	—	S	S	—	—	—
8D	Bypass TDNE	—	S	S	—	—	—
8E	Bypass TDNE/TDEN (input)	—	—	C	—	—	—
Maintenance Selector Switch							
9B	Electrical operator isolator switch	—	O	O	—	—	—
Preferred Source Selector							
	Preferred source selector (programmed)	—	—	S	—	—	—
10A	Preferred source selector input	—	—	C	—	—	—
10C	Preferred source selector with selector switch	—	—	O	—	—	—
10B	Utility to utility or utility to generator	—	—	S	—	—	—
10D	Generator to generator	—	—	S	—	—	—
Indicating Lights/LEDs							
12C	Normal (S1) source connected	S	S	S	S	—	S
12D	Emergency (S2) source connected	S	S	S	S	—	S
12G	Normal (S1) source available	S	S	S	S	—	—
12H	Emergency (S2) source available	S	S	S	S	—	—
12L	Normal (S1) source tripped (requires feature 16)	—	O	O	O	—	—
12M	Emergency (S2) source tripped (requires feature 16)	—	O	O	O	—	—
Source Available Contacts							
14C	Normal (S1) source available 4 Form C	—	O	O	O	—	—
14D	Emergency (S2) source available 4 Form C	—	O	O	O	—	—
14E	Normal (S1) source available 1 Form C	—	—	S	—	—	—
14F	Emergency (S2) source available 1 Form C	—	—	S	—	—	—
14G	Normal (S1) source available 2 Form C	S	S	O	O	—	—
14H	Emergency (S2) source available 2 Form C	S	S	O	O	—	—

Note: S = Standard, O = Optional, C = Configurable

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Table 25.5-2. Breaker-Based—Automatic Transfer Switch Features (Continued)

Feature Number	Description	Open Transition					Closed Transition
		ATH1	ATH3	ATH9	NTHE	MTHX	MBHE
		ATV1	ATV3	ATV9	NTVE	MTVX	
Position Contacts							
15E	Normal (S1) source position 1 Form C	S	S	S	—	—	—
15F	Emergency (S2) source position 1 Form C	S	S	S	—	—	—
15G	Normal (S1) source position 3 Form C	O	O	O	—	—	—
15H	Emergency (S2) source position 3 Form C	O	O	O	—	—	—
15R	Normal (S1) source position 1 Form C (relay OUTPUT)	—	—	C	—	—	—
15S	Emergency (S2) source position 1 Form C (relay OUTPUT)	—	—	C	—	—	—
Integral Overcurrent Protection							
16N	Normal (S1) switch only	—	O	O	O	O	—
16E	Emergency (S2) switch only	—	O	O	O	O	—
16B	Normal (S1) and emergency (S2) switches	—	O	O	O	O	—
Metering (Specify normal (S1), emergency (S2) or load side for 18A thru E)							
18	Integrated load metering (DCT module)	—	—	—	—	—	—
18A	IQ 250/260	O	O	O	O	—	—
18B	PX4000/6000/8000	—	—	—	—	—	—
18D	IQ 130/140/150	O	O	O	O	—	—
18E	PXM2250/2260/2270	O	O	O	O	—	—
20A	Rear bus connections	—	O	O	O	O	—
21A	Non-standard terminals (optional in IES for centers)	O	O	O	O	O	O
22	Ground bus with provisions to attach to neutral	—	—	O	—	—	—
Plant Exerciser							
23A	Selectable—disabled 7-, 14-, 28-day interval, fixed 15 minutes load/no load, with fail-safe	S	—	—	—	—	—
23K	Selectable—disabled 7-, 14-, 28-day interval, 0–600 minutes load/no load, with fail-safe	—	S	—	—	—	—
23L	24-hour, 7-day, 365-day programmable plant exerciser	—	O	—	—	—	—
23M	Selectable—disabled 7-, 14-, 28-, 365-day interval, 0–600 minutes load/no load, with fail-safe	—	—	S	—	—	—
Normal (S1) Source Sensing							
26D	Go to emergency (S2) input	—	S	C	—	—	—
26E	Go to emergency (S2) input with selector switch ①	—	—	O	—	—	—
26H	Phase reversal protection	—	S	S	—	—	—
26J	All phase undervoltage/underfrequency	—	S	S	—	—	—
26K	All phase overvoltage/overfrequency	—	S	S	—	—	—
26L	All phase voltage unbalance and phase loss	—	—	O	—	—	—
26L	All phase voltage unbalance	—	S	S	—	—	—
26M	Allows operation with generator with utility sensing	O	—	—	—	—	—
26P	(available only through a field installed kit) (not in IES)	S	—	—	—	—	—
Alternative Transfer Modes of Operation							
29G	Selector switch for auto or non-auto operation ①	—	O	O	—	—	—
29J	Manual (pushbutton) transfer E to N; automatic N to E ①	—	O	O	—	—	—
29L	Manual retransfer on/off input	—	—	C	—	—	—
29M	Manual retransfer on/off input with selector switch ①	—	—	O	—	—	—
29K	Manual retransfer input	—	—	C	—	—	—

① When these options are selected with the ATC-900 controller, the associated input or output will be factory fixed and cannot be reconfigured by the user.

Note: S = Standard, O = Optional, C = Configurable

Table 25.5-1. Breaker-Based—Automatic Transfer Switch Features (Continued)

Feature Number	Description	Open Transition					Closed Transition
		ATH1	ATH3	ATH9	NTHE	MTHX	MBHE
		ATV1	ATV3	ATV9	NTVE	MTVX	
Open Transfer Operation Modes							
32A	Time delay neutral adjustable 0–120 seconds (delayed transition)	—	S	C	—	—	—
32B	Load voltage decay adjustable 2–30% nominal voltage	—	—	C	—	—	—
32C	In-phase transition defaults to load voltage decay	—	—	—	—	—	—
32D	In-phase transition defaults to time delay neutral	—	—	—	—	—	—
32E	Delay transition timer adjustable 3–60 seconds	—	—	—	S	—	—
32F	In-phase transition	—	—	—	—	—	—
32G	Time delay neutral fixed 0 or 2 seconds (delayed transition)	S	—	—	—	—	—
Logic Extender Cable (Open Enclosures Only)							
34A	48 inches (1219 mm)	—	—	O	O	—	—
34C	96 inches (2438 mm)	—	—	O	O	—	—
34E	144 inches (3658 mm)	—	—	O	O	—	—
34F	100 inches (2540 mm) (fixed mount only)	—	—	—	—	—	—
35A	Pre-transfer signal contacts 1 Form C	—	S	C	—	—	—
35B	Pre-/post-transfer signal	—	—	C	—	—	—
36	Load shed from emergency (S2 inhibit)	—	O	C	—	—	—
36A	Load shed—S2 inhibit with keyed switch (INPUT)	—	—	O	—	—	—
37	Go to “isolated” position (not SE rated)	—	—	C	—	—	—
Suitable for Use as Service Equipment Requires 16B, N or S							
37A	Without ground fault protection	—	O	O	O	—	—
37B	With ground fault protection required at 1000 A or more if the electrical service is a solidly grounded wye system of more than 150 V to ground but not exceeding 600 V phase to phase	—	O	O	O	—	—
Stainless Steel Device Covers							
38A	SS cover for device plate or SE disconnect	—	O	O	O	—	—
38B	SS cover for controller	O	O	O	—	—	—
Distribution Panel (For 240/120 V Only)							
39A	225 A with (2) 200 A feeders	—	O	—	—	—	—
39B	300 A with (3) 200 A feeders	—	O	—	—	—	—
39C	400 A with (4) 200 A feeders	—	O	—	—	—	—
Space Heater with Thermostat							
41A	100 watts	O	O	O	O	O	O
42	IBC/CBC seismic qualified	S	S	S	S	S	S
Load Management Contacts							
45A–K	Load sequencing contacts (1)	—	—	C	—	—	—
45L	Selective load shed (assignable to multiple out put contacts)	—	—	C	—	—	—
Communications							
48D	Ethernet communications (Gateway)	—	O	O	—	—	—
48F	Modbus communication—no PONI required	—	—	S	—	—	—
48G	Modbus TCP/IP gateway	—	—	O	—	—	—
48P	Power supply for remote annunciator	—	O	O	—	—	—
48RAC	Remote annunciator with control (includes Modbus)	—	O	O	—	—	—
48MRAC	Remote annunciator with control multi-switch (includes Modbus)	—	O	—	—	—	—
48U	USB port	—	—	S	—	—	—
49B	Sensing isolation transformer	—	O	O	—	—	—
49C	Multi-tap voltage transformer ①	S	S	S	S	S	—
49C	Multi-tap voltage transformer (option only on fixed)	—	—	—	—	—	—

① On dedicated voltage 240 V or 208 V, multi-tap transformer is not included as standard.

Note: S = Standard, O = Optional, C = Configurable

Table 25.5-2. Breaker-Based—Automatic Transfer Switch Features (Continued)

Feature Number	Description	Open Transition					Closed Transition
		ATH1	ATH3	ATH9	NTHE	MTHX	MBHE
		ATV1	ATV3	ATV9	NTVE	MTVX	
TVSS up to 480V (Connected to Normal)							
51D1	50 kA—CVX	—	O	O	O	O	—
51F1	100 kA—CVX	—	O	O	O	O	—
Surge Protection Device with 12 ft Cable (on Normal)							
51S1	50 kA—SPD ②	—	—	—	—	—	—
51S2	80 kA—SPD ②	—	—	—	—	—	—
51S3	100 kA—SPD ②	—	—	—	—	—	—
51S4	120 kA—SPD ②	—	—	—	—	—	—
51S5	160 kA—SPD ②	—	—	—	—	—	—
51S6	200 kA—SPD ②	—	—	—	—	—	—
51S7	250 kA—SPD ②	—	—	—	—	—	—
51S8	300 kA—SPD ②	—	—	—	—	—	—
51S9	400 kA—SPD ②	—	—	—	—	—	—
52B	24 V generator battery power	—	—	—	—	—	—
52C	24 V onboard power supply (charger and batteries)	—	—	—	—	—	—
54A	Front access cabinet	—	—	—	—	—	—
54B	Upgrade to 316 stainless steel	—	O	O	O	O	—
55B	Source swap (normal—bottom / emergency—top)	—	—	—	—	—	—
60	Control power transformer (240/120 V single-phase and 208 V only)	O	O	—	—	—	—
61A	UPS device	—	—	—	—	—	—
61B	UPS 120 Vac terminal block input	—	—	—	—	—	—
80A	Emergency (S2) inhibit contact	—	O	C	—	—	—
Monitoring Outputs							
81A	General alarm indication contact	—	—	C	—	—	—
81B	ATS not in automatic	—	—	C	—	—	—
81C	ATS in test	—	—	C	—	—	—
81D	Engine test aborted	—	—	C	—	—	—
81E	Cooldown in process	—	—	C	—	—	—
81F	Engine start contact status	—	—	C	—	—	—
81G	Emergency inhibit on	—	—	C	—	—	—
81GL	Emergency inhibit on with white indicating light ①	—	—	O	—	—	—
81H	ATS on bypass	—	—	C	—	—	—
Inputs							
81J	Lockout	—	—	C	—	—	—
81K	Monitor mode	—	—	C	—	—	—
81L	Remote load test	—	—	C	—	—	—
Three Source ATS Control (Master/Slave)							
90A	Master control output	—	—	C	—	—	—
90B	Slave input	—	—	C	—	—	—

① When these options are selected with the ATC-900 controller, the associated input or output will be factory fixed and cannot be reconfigured by the user.

② Add feature package B or C (e.g., 51S4B).
B: LED indication and audible alarm, Form C contact, EMI/RFI filtering (standard)
C: B and surge counter with Reset button (standard with surge)

Note: S = Standard, O = Optional, C = Configurable

Table 25.5-3. Magnum-Based—Automatic Transfer Switch Features

Feature Number	Description	Open Transition			Closed Transition	
		ATV9	NTVE	BIV9	CTV9	CBV9
		MG	MG	MG	MG	MG
Timers						
1B	Adjustable 0–166 minutes	S	—	S	S	S
2A	Adjustable 0–120 seconds	S	—	S	S	S
3A	Adjustable 0–1800 seconds	—	—	—	—	—
3B	Adjustable 0–166 minutes	S	—	S	S	S
4A	Adjustable 0–1800 seconds	—	—	—	—	—
4B	Adjustable 0–166 minutes	S	—	S	S	S
Emergency (S2) Source Sensing						
5H	Phase reversal protection	S	—	S	S	S
5J	All phase undervoltage/underfrequency	S	—	S	S	S
5K	All phase overvoltage/overfrequency	S	—	S	S	S
5L	All phase voltage unbalance and phase loss	O	—	O	O	O
5L	All phase voltage unbalance	S	—	S	S	S
5N	All phase overfrequency	S	—	S	S	S
System or Engine Test						
6B	Engine test pushbutton	S	—	S	S	S
6C	Remote engine test input	C	—	C	C	C
6D	Maintained 2-position test switch	O	—	O	O	O
6H	Maintained 4-position test switch	O	—	O	O	O
7A	Adjustable 0–6 seconds	S	—	S	S	S
Pushbutton Bypass						
8C	Bypass TDEN	S	—	S	S	S
8D	Bypass TDNE	S	—	S	S	S
8E	Bypass TDNE/TDEN (input)	C	—	C	C	C
Maintenance Selector Switch						
9B	Electrical operator isolator switch	O	—	O	O	O
Preferred Source Selector						
	Preferred source selector (programmed)	S	—	S	S	S
10A	Preferred source selector input	C	—	C	C	C
10C	Preferred source selector with selector switch	O	—	O	O	O
10B	Utility to utility or utility to generator	S	S	S	S	S
10D	Generator to generator	S	S	S	S	S
Indicating Lights/LEDs						
12C	Normal (S1) source connected	S	S	S	S	S
12D	Emergency (S2) source connected	S	S	S	S	S
12G	Normal (S1) source available	S	S	S	S	S
12H	Emergency (S2) source available	S	S	S	S	S
12L	Normal (S1) source tripped (requires feature 16)	O	O	O	O	O
12M	Emergency (S2) source tripped (requires feature 16)	O	O	O	O	O
Source Available Contacts						
14C	Normal (S1) source available 4 Form C	O	O	O	O	O
14D	Emergency (S2) source available 4 Form C	O	O	O	O	O
14E	Normal (S1) source available 1 Form C	S	—	S	S	S
14F	Emergency (S2) source available 1 Form C	S	—	S	S	S
14G	Normal (S1) source available 2 Form C	O	—	O	O	O
14H	Emergency (S2) source available 2 Form C	O	—	O	O	O

Note: S = Standard, O = Optional, C = Configurable

Table 25.5-3. Magnum-Based—Automatic Transfer Switch Features (Continued)

Feature Number	Description	Open Transition			Closed Transition	
		ATV9	NTVE	BIV9	CTV9	CBV9
		MG	MG	MG	MG	MG
Position Contacts						
15E	Normal (S1) source position 1 Form C	S	—	S	S	S
15F	Emergency (S2) source position 1 Form C	S	—	S	S	S
15G	Normal (S1) source position 3 Form C	O	—	O	O	O
15H	Emergency (S2) source position 3 Form C	O	—	O	O	O
15R	Normal (S1) source position 1 Form C (relay OUTPUT)	C	—	C	C	C
15S	Emergency (S2) source position 1 Form C (relay OUTPUT)	C	—	C	C	C
Integral Overcurrent Protection						
16N	Normal (S1) switch only	O	O	O	O	O
16E	Emergency (S2) switch only	O	O	O	O	O
16B	Normal (S1) and emergency (S2) switches	O	O	O	O	O
Metering (Specify normal (S1), emergency (S2) or load side for 18A thru E)						
18	Integrated load metering (DCT module)	O	—	O	O	O
18A	IQ 250/260	O	O	O	O	O
18B	PX4000/6000/8000	—	O	—	—	—
18D	IQ 130/140/150	O	O	O	—	—
18E	PXM2250/2260/2270	O	O	O	—	—
20A	Rear bus connections	O	O	O	O	O
21A	Non-standard terminals (optional in IES for centers)	O	O	O	O	O
22	Ground bus with provisions to attach to neutral	O	S	O	O	O
22A	18 conductor ground bus 500 or 750 kcmil	S	O	S	S	S
22B	30 conductor ground bus 500 or 750 kcmil	O	O	O	O	O
22C	Special ground bar—contact factory	O	O	O	O	O
22D	16 conductor ground bus 500 or 750 kcmil	—	—	—	—	—
Plant Exerciser						
23M	Selectable—disabled 7-, 14-, 28-, 365-day interval, 0–600 minutes load/no load, with fail-safe	S	—	S	S	S
Normal (S1) Source Sensing						
26D	Go to emergency (S2) input	C	—	C	C	C
26E	Go to emergency (S2) input with selector switch ①	O	—	O	O	O
26H	Phase reversal protection	S	—	S	S	S
26J	All phase undervoltage/underfrequency	S	—	S	S	S
26K	All phase overvoltage/overfrequency	S	—	S	S	S
26L	All phase voltage unbalance and phase loss	O	—	O	O	O
26L	All phase voltage unbalance	S	—	S	S	S
Alternative Transfer Modes of Operation						
29D	Dual ATS bypass	—	—	—	—	—
29G	Selector switch for auto or non-auto operation ①	O	—	O	O	O
29J	Manual (pushbutton) transfer E to N; automatic N to E ①	O	—	O	O	O
29L	Manual retransfer on/off input	C	—	C	C	C
29M	Manual retransfer on/off input with selector switch ①	O	—	O	O	O
29K	Manual retransfer input	C	—	C	C	C

① When these options are selected with the ATC-900 controller, the associated input or output will be factory fixed and cannot be reconfigured by the user.

Note: S = Standard, O = Optional, C = Configurable

Table 25.5-3. Magnum-Based—Automatic Transfer Switch Features (Continued)

Feature Number	Description	Open Transition			Closed Transition	
		ATV9	NTVE	BIV9	CTV9	CBV9
		MG	MG	MG	MG	MG
Open Transfer Operation Modes						
32A	Time delay neutral adjustable 0–120 seconds (delayed transition)	C	—	C	C	C
32B	Load voltage decay adjustable 2–30% nominal voltage	C	—	C	C	C
32C	In-phase transition defaults to load voltage decay	C	—	C	C	C
32D	In-phase transition defaults to time delay neutral	C	—	C	C	C
Logic Extender Cable (Open Enclosures Only)						
34F	100 inches (2540 mm) (fixed mount only)	O	O	—	—	—
35A	Pre-transfer signal contacts 1 Form C	C	—	C	C	C
35B	Pre-/post-transfer signal	C	—	C	C	C
36	Load shed from emergency (S2 inhibit)	C	—	C	C	C
36A	Load shed—S2 inhibit with keyed switch (INPUT)	O	—	O	O	O
37	Go to “isolated” position (not SE rated)	C	—	C	C	C
Suitable for Use as Service Equipment Requires 16B, N or S						
37A	Without ground fault protection	O	O	O	O	O
37B	With ground fault protection required at 1000 A or more if the electrical service is a solidly grounded wye system of more than 150 V to ground but not exceeding 600 V phase to phase	O	O	O	O	O
Stainless Steel Device Covers						
38A	SS cover for device plate or SE disconnect	O	O	O	O	O
38B	SS cover for controller	O	O	O	O	O
Space Heater with Thermostat						
41A	100 watts	—	—	—	—	—
41E	375 watts	O	O	O	O	O
42	IBC/CBC seismic qualified	S	S	S	S	S
Load Management Contacts						
45A–K	Load sequencing contacts (1)	C	—	C	C	C
45L	Selective load shed (assignable to multiple out put contacts)	C	—	C	C	C
Closed Transition Operational Modes (User Must Specify)						
47C	Closed/in-phase transition default to load voltage decay	—	—	—	C	C
47D	Closed transition	—	—	—	C	C
47E	Closed/in-phase transition default to time delay neutral	—	—	—	C	C
47F	Closed transition load voltage decay	—	—	—	—	—
47G	Closed transition time delay neutral	—	—	—	—	—
47H	Parallel limit timer	—	—	—	S	S
Communications						
48D	Ethernet communications (Gateway)	O	—	O	O	O
48G	Modbus TCP/IP gateway	O	—	O	O	O
48P	Power supply for remote annunciator	O	—	O	O	O
48RAC	Remote annunciator with control (includes Modbus)	O	—	O	O	O
48MRAC	Remote annunciator with control multi-switch (includes Modbus)	O	—	O	O	O
48U	USB port	S	—	S	S	S
49A	Sensing isolation transformer Magnum	O	—	O	O	O
49B	Sensing isolation transformer	O	—	O	O	O
49C	Multi-tap voltage transformer (non AG only)	S	S	S	S	S

Note: S = Standard, O = Optional, C = Configurable

Table 25-5-3. Magnum-Based—Automatic Transfer Switch Features (Continued)

Feature Number	Description	Open Transition			Closed Transition	
		ATV9	NTVE	BIV9	CTV9	CBV9
		MG	MG	MG	MG	MG
Surge Protection Device with 12 ft Cable (on Normal)						
51S1	50 kA—SPD ②	O	O	O	O	O
51S2	80 kA—SPD ②	O	O	O	O	O
51S3	100 kA—SPD ②	O	O	O	O	O
51S4	120 kA—SPD ②	O	O	O	O	O
51S5	160 kA—SPD ②	O	O	O	O	O
51S6	200 kA—SPD ②	O	O	O	O	O
51S7	250 kA—SPD ②	O	O	O	O	O
51S8	300 kA—SPD ②	O	O	O	O	O
51S9	400 kA—SPD ②	O	O	O	O	O
52B	24 V generator battery power	—	—	—	—	—
52C	24 V onboard power supply (charger and batteries)	—	—	—	—	—
54A	Front access cabinet	O	O	O	O	O
54B	Upgrade to 316 stainless steel	—	—	—	—	—
55B	Source swap (normal—bottom / emergency—top)	O	O	O	O	O
57A	Magnum breaker lift device (1) NEMA 1 only	O	O	—	—	—
57B	Magnum breaker lift device bypass (2) NEMA 1 only	—	—	O	O	O
58A	Shutterless cassette (drawout only)	S	S	S	S	S
58B	Shuttered cassette (drawout only)	O	O	O	O	O
59A	Silver-plated bus	S	S	S	S	S
59B	Tin-plated bus	O	O	O	O	O
61A	UPS device	—	O	—	—	—
61B	UPS 120 Vac terminal block input	—	O	—	—	—
80A	Emergency (S2) inhibit contact	C	—	C	C	C
Monitoring Outputs						
81A	General alarm indication contact	C	—	C	C	C
81B	ATS not in automatic	C	—	C	C	C
81C	ATS in test	C	—	C	C	C
81D	Engine test aborted	C	—	C	C	C
81E	Cooldown in process	C	—	C	C	C
81F	Engine start contact status	C	—	C	C	C
81G	Emergency inhibit on	C	—	C	C	C
81GL	Emergency inhibit on with white indicating light ①	O	—	O	O	O
81H	ATS on bypass	C	—	C	C	C
Inputs						
81J	Lockout	C	—	C	C	C
81K	Monitor mode	C	—	C	C	C
81L	Remote load test	C	—	C	C	C
Three Source ATS Control (Master/Slave)						
90A	Master control output	C	—	C	C	C
90B	Slave input	C	—	C	C	C

① When these options are selected with the ATC-900 controller, the associated input or output will be factory fixed and cannot be reconfigured by the user.

② Add feature package B or C (i.e., 51S4B).
B: LED indication + audible alarm, Form C contact, EMI/RFI filtering (standard)
C: B + surge counter with Reset button (standard with surge)

Note: S = Standard, O = Optional, C = Configurable

Feature Description

Timers

1. Time Delay Normal to Emergency (TDNE)

Provides a time delay to allow for the generator to warm up before transferring the load to the emergency source. Timing begins only after the Emergency Source becomes available and is deemed good based on the programmable voltage and frequency set points in the controller.

2. Time Delay Engine Start (TDES)

Provides a time delay before initiating the generator start cycle. This is to account for momentary power outages or voltage fluctuations of the normal source. Provides a Form C contact to the generator starter circuit.

3. Time Delay Emergency to Normal (TDEN)

Provides a time delay of the retransfer operation to permit stabilization of the normal source. Timing begins only after the normal source becomes available and is deemed good based on the programmable voltage and frequency set points in the controller. This function is fail-safe protected.

4. Time Delay Engine Cooldown (TDEC)

Provides a time delay before initiating the generator stop cycle after the retransfer operation. This allows the generator to cool down by running unloaded. Timing begins on completion of the retransfer cycle.

Source 2 Sensing

5. Source 2—Monitoring and Protection

Provides monitoring and protection based on the Source 2 voltage and/or frequency set points. All **Feature 5** monitoring and protection functions are fail-safe operations.

5H. Three-Phase Rotation Protection

Provides three-phase reversal sensing in order to protect against transferring to an out-of-phase source. The controller will treat the opposite source as unavailable if the sources are out of phase, based on programmable set points in the controller.

5J. All-Phase Undervoltage/ Underfrequency Protection

Provides undervoltage/underfrequency monitoring and protection based on programmable set points in the controller.

5K. All-Phase Overvoltage/ Overfrequency Protection

Provides overvoltage/overfrequency monitoring and protection based on programmable set points in the controller.

5L. Three-Phase Voltage Unbalance/ Phase Loss

Provides phase loss detection from blown fuses on the Source 2 supply circuit.

5M. All Phase Voltage Phase Loss

Provides phase loss detection on the Source 2 supply circuit.

6B. Test Operators

Automatic transfer switches are provided with a controller faceplate test pushbutton that simulates a loss of the Source 1 as standard. All programmed time delays (TDNE, TDEN, etc.) will be performed as part of the test. Engine run time of the test is equal to the plant exerciser programmed set point. All tests are fail-safe protected.

6C. Remote Engine Test (INPUT)

Provides an input to initiate a test to simulate a loss of the Source 1 as standard. All programmed time delays (TDNE, TDEN, etc.) will be performed as part of the test. Engine run time of the test is equal to the plant exerciser programmed set point. All tests are fail-safe protected. The test is initiated via remote momentary contact closure.

6D. Maintained 2 Position Test Switch

Provides a door-mounted 2-position test switch marked "Auto" and "Test." Available with ATC-900 controller only.

6H. 4-Position Test Selector Switch (FPSS)

Provides a door-mounted 4-position, maintained contact selector switch marked "Auto," "Test," "Engine Start," and "Off." The FPSS is fail-safe protected, except for the "Off Position." Transfer switch operation is determined by the switch position. Transfer switch operations are as follows:

"Auto"—Automatic operation mode.

"Test"—A load test is performed until the switch is moved to another position.

"Engine Start"—A no-load test is performed until the switch is moved to another position.

"Off"—The automatic transfer controller and engine start contact are disabled. A white pilot light is provided to indicate that the FPSS is in the "Off" position.

7. Time Delay Emergency Fail (TDEF)

Provides a time delay that prevents a connected emergency source from being declared "unavailable" based on the customer's set points. This is to account for momentary generator fluctuations. If the Source 2 remains in a failed state, then 0.5 seconds after the TDEF timer expires the transfer switch will proceed with the programmed sequence for retransfer if Source 1 is available. This time delay is only implemented when Source 2 is a generator.

Note: This feature is also enabled when large loads cause generator output to drop below customer set points.

8. Time Delay Bypass Pushbutton

Provides a momentary contact push-button to bypass the TDNE (**Feature 1**) and/or TDEN (**Feature 3**) time delays. The Time Delay Bypass Pushbutton contact, when closed, will reduce any or all of the programmed time delay to zero. Must be executed when TDNE or TDEN timer is displayed on the controller.

8C. Bypass Time Delay Emergency to Normal (TDEN)

8D. Bypass Time Delay Normal to Emergency (TDNE)

8E. Bypass TDNE/TDEN (INPUT)

Provides input to bypass the TDNE (**Feature 1**) and/or TDEN (**Feature 2**) time delays. The Time Delay Bypass Pushbutton contact, when closed, will reduce any or all of the programmed time delay to zero. Must be executed when TDNE or TDEN timer is displayed on the controller. The bypass time delay feature is initiated via remote momentary contact closure.

8F. Bypass Timers—External Pushbutton Input

Provides an input from a customer supplied external pushbutton to bypass or reduce the programmed time delays to zero for TDEN and TDNE.

9B. Maintenance Selector Switch (MSS)

Provides a 2-position, maintained contact selector switch marked "Operate" and "Disable." When the MSS is placed in the "Disable" position, the controller logic will be disconnected from the transfer motor circuit. The MSS is placed in the "Operate" position for normal automatic operation.

Feature Description (Continued)

9C. Monitor Mode Selector Switch
Provides a 2-position selector switch to enable/disable Monitor Mode on the controller. When enabled, the controller will monitor the availability, connected state and voltage conditions and will initiate a transfer.

10. Preferred Source Selector
Provides a means to designate either Source 1 or Source 2 as the "Preferred" source. The "Preferred" source is the source that the transfer switch will connect the load to if it is available.

Note: This is a programmable software feature not an actual switch.

10A. Preferred Source Selector (INPUT)
Provides a means to designate either Source 1 or Source 2 as the "Preferred" source using a remote contact or device panel mounted contact closure. The "Preferred" source is the source that the transfer switch will connect the load to if it is available.

10B. Preferred Source Selector
Provides a programmable source selector for use on systems comprised of dual utility or utility and engine/generator power sources.

10C. Preferred Source Selector with Selector Switch
Provides a means to designate either Source 1 or Source 2 as the "Preferred" source via device panel mounted selector switch control. The "Preferred" source is the source that the transfer switch will connect the load to if it is available.

10D. Preferred Source Selector
Provides a programmable source selector for use on systems comprised of dual engine/generator power sources. (Dual engine starting circuits are provided.)

12C. Source 1—Load Connected
Provides a green indication that indicates the load is connected to Source 1 when lit.

12D. Source 2—Load Connected
Provides a red indication that indicates the load is connected to Source 2 when lit.

12G. Source 1—Present
Provides a white or amber indication "Depending on the Controller" that Source 1 has power; however, this does not indicate whether Source 1 is acceptable.

12H. Source 2—Present
Provides an amber indication that Source 2has power; however, this does not indicate whether Source 2 is acceptable.

Overcurrent Trip Indication
Available only with integral overcurrent protection (**Feature 16**) (shown on automatic transfer controller display).

12L. Source 1 Trip Indication
The automatic transfer controller display will read "Lockout" if the Source 1 circuit breaker is in the "tripped" position.

12M. Source 2 Trip Indication
The automatic transfer controller display will read "Lockout" if the Source 2 circuit breaker is in the "tripped" position.

14. Relay Auxiliary Contacts

14C. Source 1 Present
Provides 4 Form C relay auxiliary contacts. The relay is energized when Source 1 is present.

14D. Source 2 Present
Provides 4 Form C relay auxiliary contacts. The relay is energized when Source 2 is present.

14E. Source 1 Available
Provides 1 Form C relay auxiliary contact. The relay is energized when Source 1 is available and within the controller's programmable set points.

14F. Source 2 Available
Provides 1 Form C relay auxiliary contact. The relay is energized when Source 2 is available and within the controller's programmable set points.

14G. Source 1 Present
Provides 2 Form C relay auxiliary contacts. The relay is energized when Source 1 is present.

14H. Source 2 Present
Provides 2 Form C relay auxiliary contacts. The relay is energized when Source 2 is present.

14J. Source 1 Present
Provides 4 Form C relay auxiliary contacts. The relay is energized when Source 1 is present.

14K. Source 2 Present
Provides 4 Form C relay auxiliary contacts. The relay is energized when Source 2 is present.

14L. Source 1 Present
Provides 2 Form C relay auxiliary contacts. The relay is energized when Source 1 is present.

14M. Source 2 Present
Provides 2 Form C relay auxiliary contacts. The relay is energized when Source 1 is present.

15. Switch Position Indication Contact
Provides a contact that indicates if the power switching device is in the "open" or "closed" position.

15E. Source 1 Position Indication Contact
Provides 1 Form C contact that indicates the position of the Source 1 power switching device.

15F. Source 2 Position Indication Contact
Provides 1 Form C contact that indicates the position of the Source 2 power switching device.

15G. Source 1 Position Indication Contact
Provides 3 Form C contact that indicates the position of Source 1 power switching device.

15H. Source 2 Position Indication Contact
Provides 3 Form C contact that indicates the position of Source 1 power switching device.

15K. Normal (S1) Breaker Position Indication 1 Form C (Output)
Provides 1 Form C contact of the breaker indicating the breaker position.

15L. Normal (S1) Breaker Position Indication 2 Form C (Output)
Provides 2 Form C contact of the breaker indicating the breaker position.

15M. Source 2 Load Shed Contacts
Provides 4 Form C contacts to initiate a load circuit disconnect while on Source 2. This gives the user the capability of selectively choosing not to run certain loads while on Source 2.

15R. Normal (S1) Source Position 1 Form C (Relay OUTPUT)
Provides 1 Form C relay contact that indicates the position of the Source 1 power switching device.

15S. Emergency (S2) Source Position 1 Form C (Relay OUTPUT)
Provides 1 Form C relay contact that indicates the position of the Source 2 power switching device.

Feature Description (Continued)

16B. Integral Overcurrent Protection on Both Power Source Switching Devices
Provides integral overcurrent protection on both Source 1 and Source 2 power switching devices.

16E. Integral Overcurrent Protection on the Source 2 Power Switching Device
Provides integral overcurrent protection on the Source 2 power switching device.

16N. Integral Overcurrent Protection on the Source 1 Power Switching Device
Provides integral overcurrent protection on the Source 1 power switching device.

16S. External Overcurrent Protection on the Source 1 Power Switching Device
Provides overcurrent protection on the Source 1 power switching device.

17. Breaker with an Overcurrent Trip Unit

17H. Padlockable Handle Lock Hasp
Provides a means to padlock the breaker supplied only on a service entrance rated contactor based design. The padlock kit is provided as a ship loose item and able to be customer mounted as a mechanical means to lock out the breaker.

17N. Normal (S1) Breaker with Eaton 310+ Trip Unit
The UL 1008 integrated service entrance rated contactor design has a 100% load rating.

18. Metering
The ATS controller provides voltage and frequency readings. If additional metering functions are required, Eaton offers a series of digital meters that may be added to the ATS. The meter type can provide simple current and voltage readings or more capable meters providing Power, Demand and energy readings.

Available with an optional communications interface. (See **Feature 48**—Communications for available communication modules.)

Feature 18 metering options include all required external devices (CTs, etc.) for a fully functioning metering system.

18J. Integrated Metering (LOAD Side)
This metering option incorporates basic load metering into the ATC-900 using the add-on DCT module. In addition to the standard voltage and frequency metering, the DCT module adds current, real power, reactive power, apparent power, and power factor. This option also enables the selective load shed feature (option 45L).

IQ 130/140/150 (Option 18d)

IQ 130
This digital meter provides basic current and voltage per phase (L-L, L-N) and min./max. readings (I, V). Optional communication RS-485, Modbus RTU.

IQ 140
In addition to basic current and voltage, will provide frequency, power measurements real, reactive and apparent power, total (W, VAR, VA). Optional communication RS-485, Modbus RTU.

IQ 150
In addition to basic current/voltage/frequency and power readings, will provide Energy Real reactive and apparent (Wh, VAR, VAh). Optional communication RS-485, Modbus RTU.

IQ 250/260 (Option 18a)

IQ 250
This digital meter provides current per phase and current demand, voltage (L-L, L-N) and frequency. Power, energy and demand readings. Real, reactive and apparent power and energy, power factor. RS-485 communications, Modbus RTU or ASCII. Optional I/O slots available.

IQ 260
In addition to all of the features of the IQ 250, power quality analysis is available with THD voltage and current per phase.

Power Xpert 2000 (Option 18e)

Provides either a Power Xpert PXM 2250, PXM 2260 or PXM 2270 meter.

Power Xpert 4000, 6000, 8000 (Option 18b)

Provides one of the Power Xpert Meters with or without graphic displays.

20A. Rear Bus Provisions
Provides Source 1, Source 2 and Load Circuit rear accessible bus stabs with provision for bus bar connection. Eaton transfer switches are provided with either front or rear (dependent on switch type) connected solderless screw-type terminals for power cable connection as standard.

21A. Optional Power Cable Connection Terminals
Eaton transfer switches are provided as standard with Source 1, Source 2 and load circuit solderless screw-type terminals for power cable connection. Alternate terminal wire sizes, and compression lug provisions may be available dependent on transfer switch type and ampere rating.

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Plant Exerciser

23A. Plant Exerciser With Fail-Safe
Provides a means for automatic testing of the engine generator set or standby power system. All programmed time delays in the controller will be performed during plant exerciser operations.

Programmable set points for test intervals are start time, either disabled, daily, 7, 14 or 28 days.

15-minute fixed engine test time.

Test may be performed with or without load transfer. Test may be manually cancelled during the operation. This function is fail-safe protected.

23K. Plant Exerciser With Fail-Safe
Provides a means for automatic testing of the engine generator set or standby power system. All programmed time delays in the controller will be performed during plant exerciser operations.

Programmable set points for test intervals are start time, either disabled, daily, 7, 14 or 28 days, engine test time.

Test may be performed with or without load transfer. Test may be manually cancelled during the operation. This function is fail-safe protected.

23M. Selectable—Disabled, 7, 14, 28 or Day Interval, or Calendar Date, 0–600 Minutes, Load/No Load, with Fail-safe
Provides a means for automatic testing of the engine generator set or standby power system. All programmed time delays in the controller will be performed during plant exerciser operations. Programmable set points for test intervals are start time, engine test time and either disabled, daily, 7, 14 or 28 days or up to 12 specific calendar dates. Test may be performed with or without load transfer. Test may be manually cancelled during the operation. This function is fail-safe protected. This feature includes independent time delays for time delay normal to emergency, time delay emergency to normal and time delay for engine cooldown.

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Source 1 Sensing

26. Source 1—Monitoring and Protection

Provides Source 1 monitoring and protection functions. If Source 1 fails, then the automatic transfer controller will begin the sequence of operations necessary to transfer the load to Source 2. All **Feature 26** monitoring and protection functions are fail-safe operations.

26D. Go to Emergency (Source 2)

Provides the capability for an external contact closure to initiate a transfer to the Source 2 power source. This includes starting the generator, performing the programmed time delays and the transfer operation. Retransfer will occur when the external contact is opened. This is a fail-safe function.

26E. Go to Emergency (S2) Input with Selector Switch

Provides a device panel mounted selector switch labeled, "Auto/Go to Source 2", to initiate a transfer to the Source 2 power source. This includes starting the generator, performing the programmed time delays and the transfer operation. Retransfer will occur when the external contact is opened. This is a fail-safe function.

26H. Three-Phase Rotation Protection

Provides three-phase reversal sensing in order to protect against transferring to an out-of-phase source. The controller will treat the opposite source as unavailable if the sources are out of phase, based on programmable set points in the controller.

26J. All-Phase Undervoltage/ Underfrequency Protection

Provides all-phase undervoltage/ underfrequency monitoring and protection based on programmable set points in the controller.

26K. All-Phase Overvoltage/ Overfrequency Protection

Provides all-phase overvoltage/ overfrequency monitoring and protection based on programmable set points in the controller.

26L. Three-Phase Voltage Unbalance/ Phase Loss

Provides phase loss detection from blown fuses on the Source 1.

26M. All Phase Voltage Phase Loss

Provides phase loss detection on the Source 1 supply circuit.

26N. All-Phase Undervoltage Protection

Provides undervoltage protection for Source 1 (ATC-100 Controller only).

29. Transfer Operation Modes

Provides standard or optional transfer modes, mode selection devices and operational methods for transfer switches.

29D. Dual ATS Bypass

Provides an active controller while the bypass isolation switch is in the bypass mode.

29G. Automatic/Manual Operation With Selector Switch

Provides 2-position selector switch (labeled Auto/manual) that permits selection of the automatic or manual transfer. When in the "Auto" position, the transfer switch operates with fully automatic transfer, retransfer and generator startup and shutdown operations. When in the "Manual" position, manual operation is required to initiate the generator startup or retransfer with generator shutdown operations.

Note: Transfer switches with **Feature 29** must be labeled as non-automatic transfer switch equipment.

29J. Automatic Transfer or Automatic Transfer With Non-Automatic Retransfer Operation

Provides a field-selectable programmable set point that permits the transfer switch to operate in one of the following two transfer modes (A or B):

A. Fully automatic operation.

B. Automatic engine/generator startup and automatic transfer operation from Source 1 to Source 2. Manual pushbutton operation is required to initiate the retransfer operation and engine/generator shutdown. The pushbutton for manual retransfer operation is included. This is fail-safe protected.

29K. Manual Retransfer (INPUT)

Provides an input to remotely initiate a manual retransfer from Source 2 to Source 1.

29L. Manual Retransfer On/Off (INPUT)

Provides an input to remotely enable or disable the manual retransfer feature.

29M. Manual Retransfer On/Off Input with Selector Switch

Provides a device panel mounted selector switch to enable or disable the manual retransfer feature. Selection of this option automatically adds option 29J.

32. Delayed Transition Transfer Modes for Open Transition Transfer Switches

Provides delayed transition transfer modes for an open transition transfer switch. Often used in systems with inductive loads, a delayed transition transfer switch may prevent or reduce inrush currents due to out-of-phase switching of inductive loads.

32A. Time Delay Neutral

Provides a time delay in the neutral position during the transfer and retransfer operations during which both Source 1 and Source 2 are disconnected from the load circuit. This allows inductive loads time to reach a safe voltage and eliminate back EMF. The time delay is programmable and is the same for both transfer and retransfer operations. This is a passive feature that requires the consulting engineer/installer to determine the settings based on how the user will operate the facility. Adjustable 0–120 seconds.

32B. Load Voltage Decay

Provides load voltage measurement to sense back EMF that is generated when the transfer switch is the neutral position. It provides a delay in transfer in either direction if an unacceptable level is sensed as established by a programmed set point. This is an active feature that adapts to how the facility is operating in order to minimize neutral position wait time, but ensure safety. Adjustable 2–30% of nominal voltage.

32C. In-Phase Transition With Default to Load Voltage Decay

Provides in-phase transition, which is a feature that will permit a transfer or retransfer between two available sources that have a phase angle difference near zero. The in-phase transition feature includes permissible frequency difference and synchronization time set points. In the event Source 1 and Source 2 fail to synchronize within the permitted frequency difference and time, then the controller defaults to the load voltage decay operation as described in **Feature 32B**. Adjustable frequency difference 0.0–3.0 Hz. Adjustable synchronization time allowance 1–60 minutes.

Feature Description (Continued)

32D. In-Phase Transition With Default to Time Delay Neutral

Provides in-phase transition, which is a feature that will permit a transfer or retransfer only between two available sources that have a phase angle difference near zero. The in-phase transition feature includes permissible frequency difference and synchronization time set points. In the event Source 1 and Source 2 fail to synchronize within the permitted frequency difference and time, then the controller defaults to the time delay neutral operation as described in **Feature 32A**. Adjustable frequency difference 0.0–3.0 Hz. Adjustable synchronization time allowance 1–60 minutes.

32E. Delayed Transition

The transfer and retransfer operations during which both Source 1 and Source 2 are disconnected from the load circuit. The time delay is programmable and the same for both transfer and retransfer operation. Adjustable 3–60 seconds.

32F. In-Phase Transition

Provides in-phase transition, this feature will permit a transfer or retransfer between two available sources that have a phase angle difference of 8 degrees or less. The in-phase transition feature includes permissible frequency difference and synchronization time set points. In the event Source 1 and Source 2 fail to synchronize within the permitted frequency difference and time, the Alarm relay will energize and "Failed to Sync" will be displayed on Line 1 of the controller. After resetting the alarm, another in-phase transition may be attempted or a non-synchronized transfer may be initiated by failing the connected source. The adjustable frequency difference is 0.0 to 3.0 Hz. If the synchronization does not occur within a specified amount of time, the Alarm relay will energize and the failure will be logged into the transfer history as either "Sync Fail - Freq" or "Sync Fail - Phase" depending on whether the frequency difference or the phase difference was excessive.

32G. Time Delay Neutral

This feature provides a time delay in the neutral position during the transfer and retransfer operations during which both the utility source and the generator source are disconnected from the load circuit. TDN cannot be implemented on a transfer switch using a 2-position contactor.

Jumper selectable at disable (0 seconds) or enable (2 seconds).

Logic Extender Cable

34A. 48 Inches (1219 mm)

Provides logic extension cable with connectors.

34C. 96 Inches (2438 mm)

Provides logic extension cable with connectors.

34E. 144 Inches (3658 mm)

Provides logic extension cable with connectors.

34F. 100 Inches (2540 mm)

Provides logic extension only for open Magnum ATS.

35A. Pre-Transfer Signal with 1 Form C Contact

Provides a signal prior to the transferring of the load. Will not transfer until the programmable delay set point in the controller is reached. The pre-transfer time delay option, if both sources are not available, will ignore the time delay set in the controller.

35C. Pre-/Post-Transfer Signal (OUTPUT)

Provides a Form C contact signal prior to and after a transfer from S1 to S2 or S2 back to S1. Will not transfer until the programmable delay set point in the controller is reached. If both sources are not available, this option will ignore the time delay set in the controller. The time delay is programmable for 0–120 seconds pre transfer and 0–120 seconds post transfer.

35D. Post-Transfer Signal with 1 Form C Contact

Provides a Form C output from the ATC-900 to signal that the switch did transfer. The time delay is programmable for 0–120 seconds but does not start to count down until connected to the new source.

36. Load Shed From Emergency

Provides the capability for an external NC contact to initiate a load circuit disconnection from the Source 2 power source. If the load circuit is connected to Source 2 and the contact is opened, then a retransfer to Source 1 is completed if Source 1 is available. If Source 1 is not available, then the transfer switch will transfer to neutral. If the load circuit is connected to Source 1 and the contact is open, then a transfer Source 2 is prohibited.

36A. Load Shed—S2 Inhibit with Keyed Switch (INPUT)

Provides a device panel mounted selector switch to initiate a load circuit disconnection from the Source 2 power source. If the load circuit is connected to Source 2 and the selector switch is switched to the "S2 Inhibit/ Enabled" position, then a retransfer to Source 1 is completed if Source 1 is available. If Source 1 is not available, then the transfer switch will transfer to neutral. If the load circuit is connected to Source 1 and the switch is in the "S2 Inhibit" position, then a transfer Source 2 is prohibited.

37. Go to Neutral (not SE Rated) (INPUT)

Provides an input to transfer a three-position transfer switch from either of the connected sources to the off or neutral position. This features applies only to those transfer switches with three-position power device using a remote contact closure. When the signal is removed, the transfer switch will transfer back to the available, preferred source.

Service Equipment Rated Transfer Switch

Provides the label "suitable for use as service equipment" and the features necessary to meet the requirements for the label. Includes service disconnect with visible indication and neutral assembly with removable link. **Feature 16B** or **16N** must be selected separately for a molded case or power case switch design and 17N for a service rated contactor design.

37A. Service Equipment Rated Transfer Switch Without Ground Fault Protection

Provides service equipment rating for an application that does not require ground fault protection.

Feature Description (Continued)

37B. Service Equipment Rated Transfer Switch With Ground Fault Protection

Provides service equipment rating for an application that requires ground fault protection.

38. Steel Cover

Provides protection for a device panel as option 38a and protection for the controller as option 38b.

39. Distribution Panel

The distribution panel feature uses a panelboard design with bolt-on circuit breakers type EHD. Bolt-on breakers are designed to hold up to the changes in temperature and humidity that an industrial application calls for. (240/120 Vac single-phase systems only.)

39A. 225 A With (2) 200 A Feeders

39B. 300 A With (3) 200 A Feeders

39C. 400 A With (4) 200 A Feeders

41. Space Heater With Thermostat

Provides a space heater and adjustable thermostat. External control power is not required. Availability is dependent on transfer switch type.

41A. Space Heater With Thermostat—100 Watt

Provides 100-watt space heater with an adjustable thermostat.

41E. Space Heater With Thermostat—375 Watt

Provides 375-watt space heater with an adjustable thermostat.

42. Seismic Qualification

45. Load Sequencing Capability

Provides the capability for sequential closure of up to 10 addressable relays after a transfer. Each addressable relay provides (1) Form C contact. A single adjustable time delay between each of the relay closures is provided. Operates via a sub-network. Adjustable 1–120 seconds.

45A-J. Load Sequencing Contacts (1–10) (OUTPUT)

Provides the capability for sequential contact closure of up to 10 contacts after a transfer. A single adjustable time delay between each of the relay closures is provided. Operates using the configurable output contacts (Form C). Adjustable 0–120 seconds. Each individual configurable contact has its own adjustable time delay. When more than one contact is supplied, they start the timing sequence at the same time.

45L. Selective Load Shed

Provides an output contact that opens to shed a customer load if the measured kW value exceeds the load shed kW set point value. The load will be picked up if the load restore set point is attained.

47. Transfer Modes for Closed Transition Transfer Switches

Provides available transition transfer modes for a closed transition transfer switch. Closed transition is a "make before break" transfer and retransfer scheme that will parallel (a maximum of 100 ms) Source 1 and Source 2 providing a seamless transfer when both sources are available. The closed transition feature includes permissible voltage difference frequency difference and synchronization time allowance set points. The phase angle difference between the two sources must be near zero for a permitted transfer. These are all programmable set points in the controller.

47C. Closed Transition With Default to In-Phase Transition With Default to Load Voltage Decay

Provides a closed transition transfer as the primary transfer mode. In the event Source 1 and Source 2 fail to synchronize within the permitted voltage difference, frequency difference, phase angle difference and time, then the controller defaults to the in-phase transition with default to load voltage decay operations as described in **Feature 32C** and **32B**. Adjustable frequency difference 0.0–0.3 Hz. Adjustable voltage difference 1–5% volts. Adjustable synchronization time allowance 1–60 minutes.

47D. Closed Transition

Provides a closed transition transfer as the primary transfer mode. Only under a fail-safe condition (i.e., loss of the connected source) will the controller transfer to the alternate source using the load voltage decay operation as described in **Feature 32B**. Adjustable frequency difference 0.0–0.3 Hz. Adjustable voltage difference 1–5% V.

47E. Closed Transition With Default to In-Phase Transition With Default to Time Delay Neutral

Provides a closed transition transfer as the primary transfer mode. In the event Source 1 and Source 2 fail to synchronize within the permitted voltage difference, frequency difference, phase angle difference and time, then the controller defaults to the in-phase transition with default to time delay neutral operation as described in **Features 32D** and **32A**. Adjustable frequency difference 0.0–0.3 Hz. Adjustable voltage difference 1–5 percent volts. Adjustable synchronization time allowance 1–60 minutes.

47F. Closed/Load Voltage Decay

Controllers equipped with Feature Set 47F will perform a closed transition when both sources are synchronized in frequency, phase and voltage. Failure to synchronize will result in an open transition Time Delay Load Voltage Decay transfer. Time Delay Load Voltage Decay uses the load voltage measurements to sense back EMF that is generated when the transfer switch is in the Neutral position.

It provides a delay in transfer in either direction if an unacceptable level is sensed as established by a customer programmed level. The transfer will not take place until the back EMF decays below the acceptable programmed level. This feature has a separate setting of enabling or disabling the operation. If disabled, the transfer switch will not delay in the Neutral position and will transfer between the sources as fast as possible. This feature is not available with the Time Delay Neutral Optional **Feature 32A**.

47G. Closed/Time Delay Neutral

Controllers equipped with Feature Set 47F will perform a closed transition transfer when both sources are synchronized in frequency, phase and voltage. Failure to synchronize will result in an open transition Time Delay Neutral transfer. Time Delay Neutral provides a time delay in the transfer switch neutral position when both sources are open. This delay takes place when the load is transferred in either direction to prevent excessive in-rush currents due to out-of-phase switching of large motor loads.

Feature Description (Continued)

47H. Parallel Limit Timer
Provides an independent timing relay with NO contact (watchdog timer) activated only during a closed transition transfer. The timing is set to 100 ms per code requirements and will initiate a contact closure that can be used by the end user to annunciate an alarm or to trip an upstream breaker.

48. Communication Modules
Provides communications modules for the transfer switch controllers.

48D. Ethernet

Communication (PXG900 Gateway)
Translates Modbus RTU, QCPort or INCOM to Modbus TCP. The PXG900 Gateway includes embedded Web server monitoring of up to 64 connected devices.

48F. Modbus

Communication (MPONI)
Provides Modbus RTU protocol via communications module.

48G. Modbus TCP/IP
Provides a third-party device for Modbus 485 to Modbus TCP/IP pass through.

48M1-48M4. I/O Module
Each I/O module provides four additional user configurable inputs and outputs. Up to four additional I/O modules can be added, either by the factory or in the field.

48MRAC. Multi-view Remote Annunciator with Control
Provides remote monitoring of source availability, source position and test status for up to eight transfer switches with the ATC-300+ or ATC-900 controller. Operates using Modbus protocol.

48P. Remote Annunciator Power Supply
Provides a remote mounted power supply providing DC power to the remote annunciator.

48RAC. Remote Annunciator with Control
Provides remote monitoring and control via a color touch screen display for the controllers. Operates using Modbus protocol (MPONI required for the ATC-600/800).

48U. USB Port for Memory Stick
Provides a device panel mounted USB port for uploading or downloading controller set points and for downloading event history.

49. Sensing Isolation Transformer
Provides a set of control power transformers that converts the delta system sensing to a wye sensing input to the controller. The sensing isolation transformer is recommended for high resistance grounded systems and for grounded delta systems.

49A. Sensing Isolation Transformer
Option 49A is available for Magnum ATSs.

49B. Sensing Isolation Transformer
Option 49B is available for MCCB and contactor transfer switches.

49C. Multi-Tap Control Power Transformer
The multi-tap control power transformer is used to step-down voltage to 120 Vac for the transfer switch control circuit. Incoming voltage can be adjusted by moving the tap on the primary side from 208 V, 240 V or 480 V for 60 Hz applications or 220 V, 380 V, 415 V, 600 V for 50 Hz applications.

Option 51. Surge Protection Device
Two types of surge protection devices are used in Eaton automatic transfer switches. Both types meet the requirements for UL 1449 3rd Edition for surge suppression devices and are CE marked. The type CVX is used on Eaton wallmount ATS designs and the Eaton type SPD are used on floor-standing designs.

CVX
The CVX device features a Thermally Protected Metal Oxide Varistor technology and comes with high intensity LED phase status indicators.

SPD
The SPD features a Thermally Protected Metal Oxide Varistor technology. It comes with dual-colored protection status indicators for each phase and for neutral-ground protection mode. It comes with an audible alarm with silence button and a Form C contact.

An optional SPD with surge counter feature package is available. This provides six-digit surge counter with reset button.

51S1B. 50 kA—SPD standard source 1

51S2B. 80 kA—SPD standard source 1

51S3B. 100 kA—SPD standard source 1

51S4B. 120 kA—SPD standard source 1

51S5B. 160 kA—SPD standard source 1

51S6B. 200 kA—SPD standard source 1

51S7B. 250 kA—SPD standard source 1

51S8B. 300 kA—SPD standard source 1

51S9B. 400 kA—SPD standard source 1

51S1C. 50 kA—SPD standard with surge counter source 1

51S2C. 80 kA—SPD standard with surge counter source 1

51S3C. 100 kA—SPD standard with surge counter source 1

51S4C. 120 kA—SPD standard with surge counter source 1

51S5C. 160 kA—SPD standard with surge counter source 1

51S6C. 200 kA—SPD standard with surge counter source 1

51S7C. 250 kA—SPD standard with surge counter source 1

51S8C. 300 kA—SPD standard with surge counter source 1

51S9C. 400 kA—SPD standard with surge counter source 1

51SC8. Remote display panel (8 feet standard)

51SC12. Remote display panel (12 feet)

51SC4. Remote display panel (4 feet)

54. Front Access
54A. Front access cabinet available for all Magnum products. This option will add an additional pull section mounted on the side of the switch.

54B. Upgrade to 316 Stainless Steel
Provides a stainless enclosure with 316 grade. Contact plant for availability.

55B. Source Swap (Normal Bottom/ Emergency Top)
Provides ability to designate the Normal Source to be physically located at the bottom of the structure and the Emergency Source to be at the top of the structure. Contact plant for availability.

59a. Silver-Plated Bus
Silver-plated bus is a standard feature for all Magnum-based designs.

59b. Tin-Plated Bus
Tin-plated bus is available as an option for Magnum-based designs.

Feature Description (Continued)

60. Dedicated Voltage Control Power Transformer

The dedicated voltage control power transformer can be selected for 208/240 V systems where an added buffer is preferred between the incoming power and the micro-processor controller's control power input.

61A. UPS Device with Terminal Block Input

Provides a factory mounted and wired UPS sized to provide power to the ATC controller and the bypass isolation logic controller. Inputs to the UPS are wired out to a terminal block.

61B. UPS 120 Vac Ready, Terminal Block Input

Provides a terminal block input only for customer supplied external mounted UPS that provides power to the logic controller supplied in bypass isolation switches.

61C. Power Loss Buffer for ELC

Provides ride-through power for the ELC contained in automatic transfer switches with bypass isolation. This feature does not provide continuous power for microprocessor controller.

61D. UPS 120 Vac Ready, Terminal Block Ready

Provides a terminal block input only for customer supplied external mounted UPS that provides power to the ATC controller.

61E. 24 Vdc Ready, Terminal Block Ready

Provides a terminal block input only for customer supplied external 24 Vdc power to the ATC900 controller (requires the DCT Module).

61F. Power Loss Buffer ATC Comm (Requires DCT Module)

Provides ride-through power for the ATC-900 controller to maintain communications during a power loss. The power loss buffer provides 24 Vdc to the controller (requires the DCT module).

81A. General Alarm Contact (OUTPUT)

Provides a remote indication that an alarm condition exists on the ATC-900. Remains on until all alarms are resolved and reset at the controller.

81B. ATS Not in Automatic (OUTPUT)

Provides remote indication that the ATS is not in automatic mode.

81C. ATS in Test (OUTPUT)

Provides remote indication that the ATS is currently running a test. The test could be initiated by the device panel engine test pushbutton or automatically using the programmed engine exerciser.

81D. Engine Test Aborted (OUTPUT)

Provides remote indication that an engine test has been aborted. The ATC-900 event log contains detailed event information that can help assess the reason the test was aborted.

81E. Cooldown in Process (OUTPUT)

Provides remote indication that an engine cooldown is in progress.

81F. Engine Start Contact Status (OUTPUT)

Provides remote indication that the engine start contact is calling for the generator to start.

81G. LOAD SHED—S2 Inhibit On (OUTPUT)

Provides remote indication that the emergency inhibit is on.

81GL. LOAD SHED—S2 Inhibit On with White Indicating Light

Provides a 30 mm pilot light on the transfer switch device panel to indicate that S2 Inhibit is on.

81H. ATS on Bypass (OUTPUT)

Provides remote indication that the bypass switch is carrying the load.

81J. Lockout

Provides an input to temporarily disable automatic control. This feature is used to indicate a tripped breaker in a breaker-based transfer switch. It is treated as an alarm and the alarm must be reset to continue automatic operation.

81K. Monitor Mode

Provides an input to disable automatic control in the ATC-900 controller. This function is used for when manual operation is required. The controller continues to accurately monitor source status and set points can be changed; however, no action will be initiated by the controller.

81L. Remote Load Test

Provides an input to initiate a system test using a remote contact closure. The test will run based on the programmed engine test settings in the controller. The settings include with or without load, engine run time, and independent test time delays.

81M. Load Bank Control (OUTPUT)

Provides a remote output to disconnect a load bank if Source 1 fails while the load bank is running. The load bank control output is turned on when an unloaded engine test is in process and the load is connected to the source that is not under test. It is off at all other times. If, while an engine test is in process, the non-test source fails (i.e., Source 1), the test is aborted, which will cause load bank control relay to turn off in anticipation of transferring load to the generator.

81N. Health (OUTPUT)

Provides a remote indication that an alarm condition or loss of control power exists on the ATC-900. Remains on until an alarm condition occurs or control power is lost.

90A. Master Control (OUTPUT)

Provides the user with the ability to use two independent transfer switches in three source systems consisting of a utility and two generator sources. In a three-source system, the Master ATS controls the engine starting and stopping of the Slave ATS. The slave input receives the engine start signal from the Master controller.

90B. Slave Input (INPUT)

The ATC-900 Master/Slave controller functionality provides the user with the ability to use two independent transfer switches in three source systems consisting of a utility and two generator sources. In a three-source system, the Master ATS controls the engine starting and stopping of the Slave ATS. The slave input receives the engine start signal from the Master controller.

Glossary

With respect to their use in this document and as they relate to switch operation, the following terminology is defined:

Available—A source is defined as "available" when it is within its under-voltage/overvoltage/underfrequency/ overfrequency (if applicable) set point ranges for the nominal voltage and frequency setting.

Fail-safe—A feature that prevents disconnection from the only available source and will also force a transfer or retransfer operation to the only available source.

Retransfer—Retransfer is defined as a change of the load connection from the secondary to primary source.

Source 1—is the primary source or normal source or normal power source or normal. (Except when Source 2 has been designated the "Preferred Source.")

Source 2—is the secondary source or emergency source or emergency power source or emergency or standby or backup source. (Except when Source 2 has been designated the "Preferred Source.")

Source 1—Failed or fails—Source 1 is defined as "failed" when it is outside of its undervoltage or overvoltage or underfrequency or overfrequency (if applicable) set point ranges for the nominal voltage and frequency setting.

Source 2—Failed or fails—Source 2 is defined as "failed" when it is outside of its undervoltage or overvoltage or under-frequency or overfrequency (if applicable) set point ranges for the nominal voltage and frequency setting for a time exceeding 0.5 seconds after the time delay emergency fail (TDEF) time delay expires.

Transfer—"Transfer" is defined as a change of the load connection from the primary to secondary source except when specifically used as "Transfer to Neutral."

Transfer to Neutral—"Transfer to Neutral" is defined as when the load circuits are disconnected from both Source 1 and Source 2.

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Appendix A—kW Conversion Chart

Table 25.5-4. kW to Ampere Conversion Chart

Three-Phase Ampere Table at Common Line-to-Line Voltage											
kW ①	200 V	208 V	220 V	230 V	240 V	380 V	400 V	415 V	460 V	480 V	600 V
5.0	18	17	16	16	15	9	9	9	8	8	6
7.5	27	26	25	24	23	14	13	13	12	11	9
10.0	36	34	33	31	30	19	18	17	16	15	12
15.0	54	52	49	47	45	28	27	26	24	23	18
20.0	72	69	66	63	60	38	36	35	31	30	24
25.0	90	87	82	78	75	47	45	43	39	38	30
30.0	108	104	98	94	90	57	54	52	47	45	36
40.0	144	139	131	126	120	76	72	70	63	60	48
50.0	180	173	164	157	150	95	90	87	78	75	60
60.0	217	208	197	188	180	114	108	104	94	90	72
75.0	271	260	246	235	226	142	135	130	118	113	90
80.0	289	278	262	251	241	152	144	139	126	120	96
100.0	361	347	328	314	301	190	180	174	157	150	120
125.0	451	434	410	392	376	237	226	217	196	188	150
150.0	541	520	492	471	451	285	271	261	235	226	180
175.0	631	607	574	549	526	332	316	304	275	263	210
200.0	722	694	656	628	601	380	361	348	314	301	241
250.0	902	867	820	784	752	475	451	435	392	376	301
300.0	1083	1041	984	941	902	570	541	522	471	451	361
350.0	1263	1214	1148	1098	1052	665	631	609	549	526	421
400.0	1443	1388	1312	1255	1203	760	722	696	628	601	481
500.0	1804	1735	1640	1569	1504	950	902	870	784	752	601
600.0	2165	2082	1968	1883	1804	1140	1083	1043	941	902	722
700.0	2526	2429	2296	2197	2105	1329	1263	1217	1098	1052	842
800.0	2887	2776	2624	2510	2406	1519	1443	1391	1255	1203	962
900.0	3248	3123	2952	2824	2706	1709	1624	1565	1412	1353	1083
1000.0	3609	3470	3280	3138	3007	1899	1804	1739	1569	1503	1203

① At 0.8 power factor.