Supersedes SA 11844
pages 1-8, dated January 1995.

Bypass Isolation Transfer Switches 100-1000 Amperes

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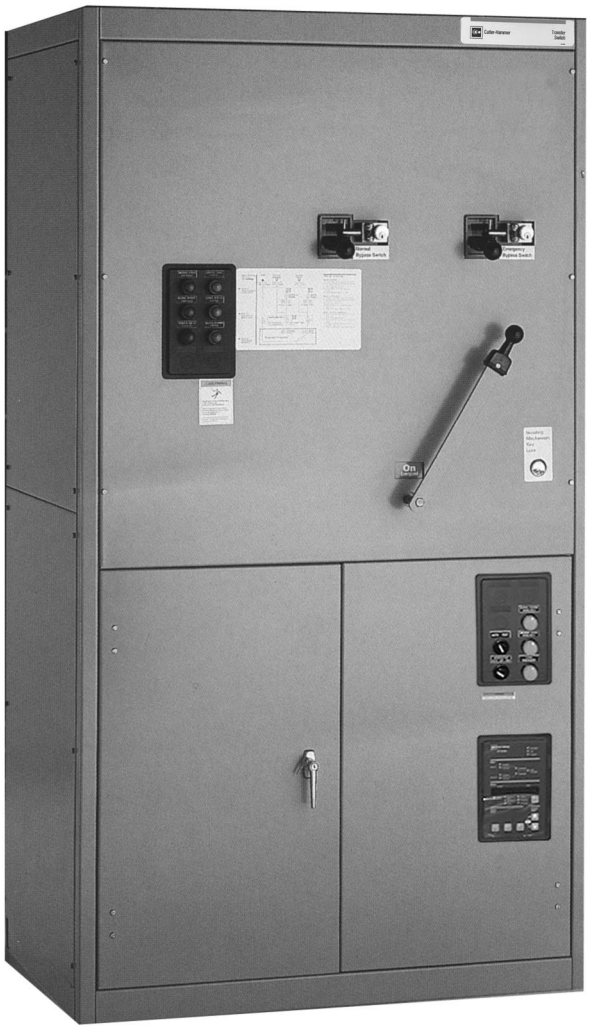
Combination Bypass Isolation and Automatic Transfer Switches 100-1000 Amperes

Proven switch designed to ensure reliable transfer from normal to auxiliary power sources – for rapid restoration of essential power in critical applications.



Introduction

Combination Bypass Isolation and Automatic Transfer Switches are designed for applications where preventive maintenance, inspection and testing must be accomplished while maintaining continuity of power to the load. This is typically required in critical life support systems and standby power situations that require safe maintenance of the system with no disruption of the power. Combination Bypass Isolation and Automatic 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. They also comply with emergency and standby system requirements as defined in NFPA 99 for health care facilities.

Design Highlights

- Overcurrent protection available
- UL 1008 service entrance available
- Simple test circuit
- Designed to safely withstand fault currents
- Seismic qualified for UBC Zone 4
- Manufactured in an ISO 9002/14001 facility and designed in an ISO 9001 facility

Switch Application Section

Transfer switch equipment offers flexibility and versatility to the system designer and user. All switches include the basic features necessary for normal operation as standard (see next page). Cutler-Hammer also offers an extensive array of optional features and accessories that permits the user to customize a new transfer switch to match the application. The customization process is simple. Select the appropriate catalog number for your application from the charts. Then choose any optional features or accessories needed to complete the project requirements.

Withstand, Closing and Interrupting Ratings

Switch Amperes	Number of Switched Poles	When Protected by MCCB's			When Protected by Fuses			
		Test Voltage						
		240V (kA)	480V (kA)	600V (kA)	Rating (kA)	Test Voltage	Fuse Type	Maximum Fuse Amperes
100	2, 3, 4	100	65	25	100 200 100	600 480 480	J, T J, T J, T	200 200 400
150-300	2, 3,	100	65	25	100 200 100	600 600 600	RK5 J, T J, T	400 400 600
400	2, 3, 4	100	65	25	100 200 100	600 600 600	RK5 J, T L	600 600 1200
600	2, 3 4	65 65	50 35	25 25	100 200 100 200	600 480 480 600	L L L L	800 800 1200 1600
800-1000	2, 3 4	65 65	50 35	25 25	200 200	600 600	L L	1600 1600

Note: Main Power Contacts of the Normal Bypass Switch, Emergency Bypass Switch, Positive Isolating Mechanism and Automatic Transfer Switch that make up the Combination Bypass Isolation and Automatic Transfer Switch have identical withstand, closing and interrupting ratings as shown above. On 4-pole units, the Switched Neutral Contacts have ratings identical to the Main Power Contacts.

Features, Benefits and Accessories

Superior Main Contact Structure

The Combination Bypass Isolation and Automatic Transfer Switch meets or exceeds the standards set forth in UL 1008 and UL 489. No other transfer switch manufacturer has meet the rigid testing requirements of this combination of standards. Completely enclosed contacts provide both safety and reliability. They also ensure the integrity of the contact assemblies and minimize the need for periodic maintenance of the contacts, reducing downtime and maintenance time.

Long-Life Design

Main contacts employ developed DE-ION® arc quenchers and contact arcing horns for extended in-service life and reduced pitting and burning of contact services.

Simple, Reliable Operation

The automatic transfer switch is operated by a single, unidirectional gear motor transfer mechanism that receives its power from the source to which it is being transferred. Bypass and Isolating Mechanisms are manually operated by handles which ensure true quick-break, quick-make operation under full load conditions.

Secure Isolation

Triple interlocking of ATS main contacts (2 mechanical, 1 electrical) ensure that both power sources cannot be simultaneously connected to the load. Bypass switches are key interlocked to prevent paralleling of sources.

Versatile Control

Control Logic Panel interconnects with Power Switching Panel via insulated keyed plug connectors to permit total isolation of controls for routine maintenance.

Engine Starting Contact

Provides a 10 ampere, 30 Vdc contact closure to initiate engine starting upon failure of the Normal Power Source. This feature, specifically designed for low current applications, is wired to red terminal blocks on the control panel for ease of identification and maintenance.

Full Phase Protection

Provides phase failure protection on each phase of the Normal Power Source. Should the voltage drop below a pre-selected, fully adjustable value on any phase, a signal is sent to initiate engine start.

Time Delay Normal to Emergency

Provides a delay, adjustable 0-30 minutes, when transferring from the Normal Power Source to the Emergency Power Source. This accessory does not affect the engine starting circuit. Timing begins when emergency/standby voltage begins.

Time Delay engine Start

This accessory is for use when the Emergency Power Source is an engine generator. It delays initiation of the engine start circuit for 0-120 seconds (adjustable) in order to override momentary power outages or voltage fluctuations of the Normal Power Source.

Time Delay Emergency to Normal

Delays the retransfer from the Emergency/Standby Power Source to the Normal Power Source to permit stabilization of the Normal Power source before retransfer is made. Timing is adjustable 0-30 minutes and begins when the Normal Power Source appears. If the Emergency/Standby Power Source fails during timing, retransfer to the Normal Power Source is immediate, overviding the time delay.

Time Delay Engine Cooldown

Permits the engine to continue to run unloaded after retransfer to the Normal Power Source has been made. Timing is adjustable 0-30 minutes and begins when retransfer is completed.

Fully Rated Neutral

Provides a fully rated solid neutral for all 2- and 3-pole switches. All 4-pole switches are supplied with switched neutral contacts of identical construction and rating as the power poles and are mounted on the power contact shaft, integral to the completely enclosed contact assemblies.

Multi-Tap Voltage Selection

Provides line voltage selection of 208, 220, 240, 380, 415, 480 or 600 Vac, 50 to 60 Hz by proper insertion of voltage selection plug.

Emergency/Standby Source Monitoring

Relay monitor prevents transfer from the Normal Power Source to the Emergency/Standby Power Source until that source has attained 90% of nominal voltage and frequency. In addition, when the switch is in the Emergency/Standby position and that source falls outside the monitored parameters, a load retransfer is initiated to the Normal Power Source if it is present.

Indicating Lights

Indicate switch position. Green for Normal position, red for Emergency/Standby position.

Relay Auxiliary Contacts

Provides three Form C contacts for each source. On the Normal Power Source, energized when normal voltage is present. On the Emergency/Standby Power Source, energized whenever emergency/standby voltage is present.

Description

Switch Operation

Bypass to Normal

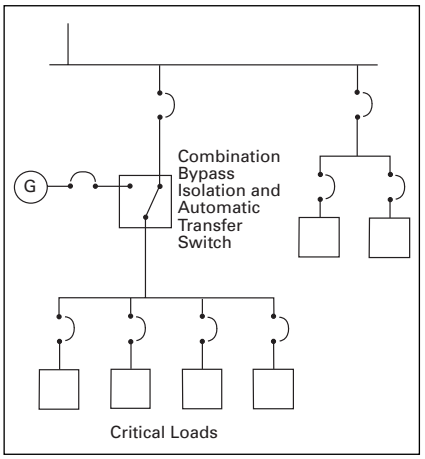
- Turn "Generator" switch to "OFF"
- Place isolating mechanism handle in "OFF" position
- Turn and remove key
- Place key in "NORMAL BYPASS" lock
- Turn "NORMAL BYPASS" to "ON"

Bypass to Emergency

- Turn "Generator" switch to "Run"
- Place isolating mechanism handle in "OFF" position
- Turn and remove key
- Place key in "EMERGENCY BYPASS" lock
- Turn "EMERGENCY BYPASS" to "ON"

Return to Normal Operation

- Place appropriate bypass in "OFF" position
- Turn and remove key
- Place key in isolating mechanism lock
- Place isolating mechanism handle in "ON" position
- Turn "Generator" switch to "AUTO"



Typical Application

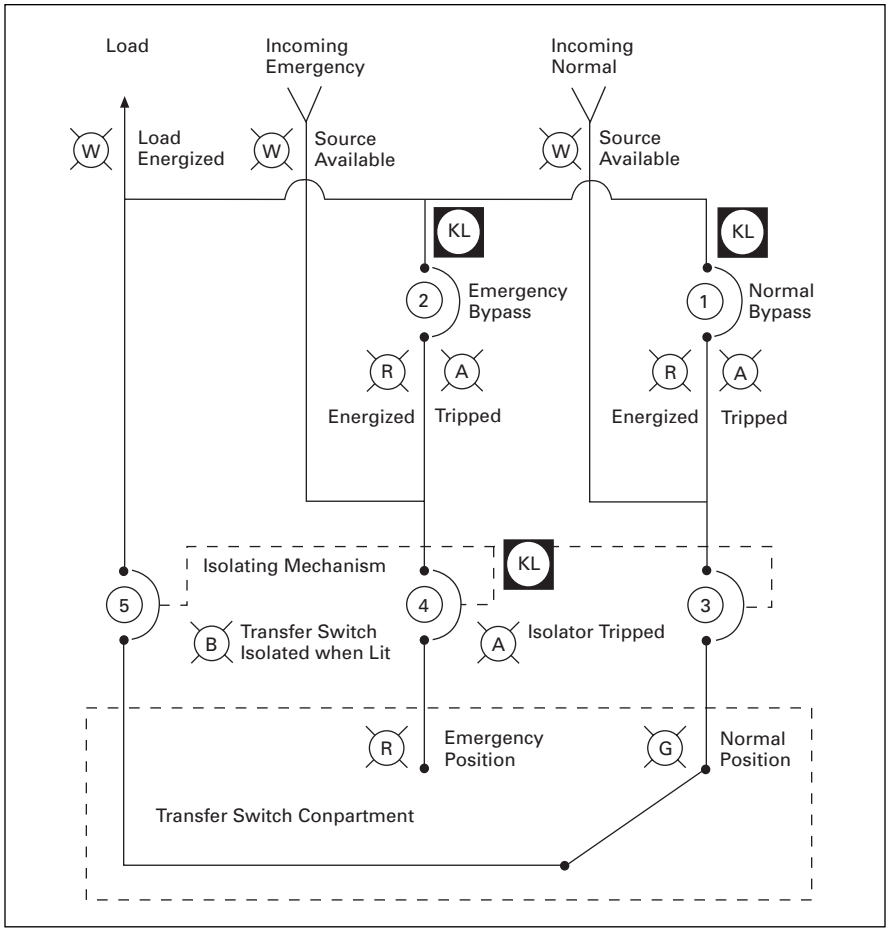
Description, *Continued*

Benefits

The Combination Bypass Isolation and Automatic Transfer Switch eliminates all of the complicated drawout mechanisms required on competitive products for total isolation of the transfer switch, and instead utilizes foolproof mechanical Kirk Key interlocking combined with a positive Total Isolation Mechanism. The result is the safest, easiest-to-operate bypass isolation switch available in the marketplace today.

When the transfer switch is in the Isolated position, complete testing of the ATS can be accomplished via a special insulated keyed connector. This allows the operator to completely test the entire operating sequence of the ATS while maintaining power to the connected load.

The Combination Bypass Isolation and Automatic Transfer Switch utilizes modified molded case switches, designed specifically for high duty repetitive load transfer, as a means to bypass and totally isolate the transfer switch. This device provides for a reliable, rugged installation that can withstand very high level short circuits. In addition, 100-400 ampere units utilize Series C Technology that offers the highest Withstand, Closing and Interrupting Rating available in the marketplace today.



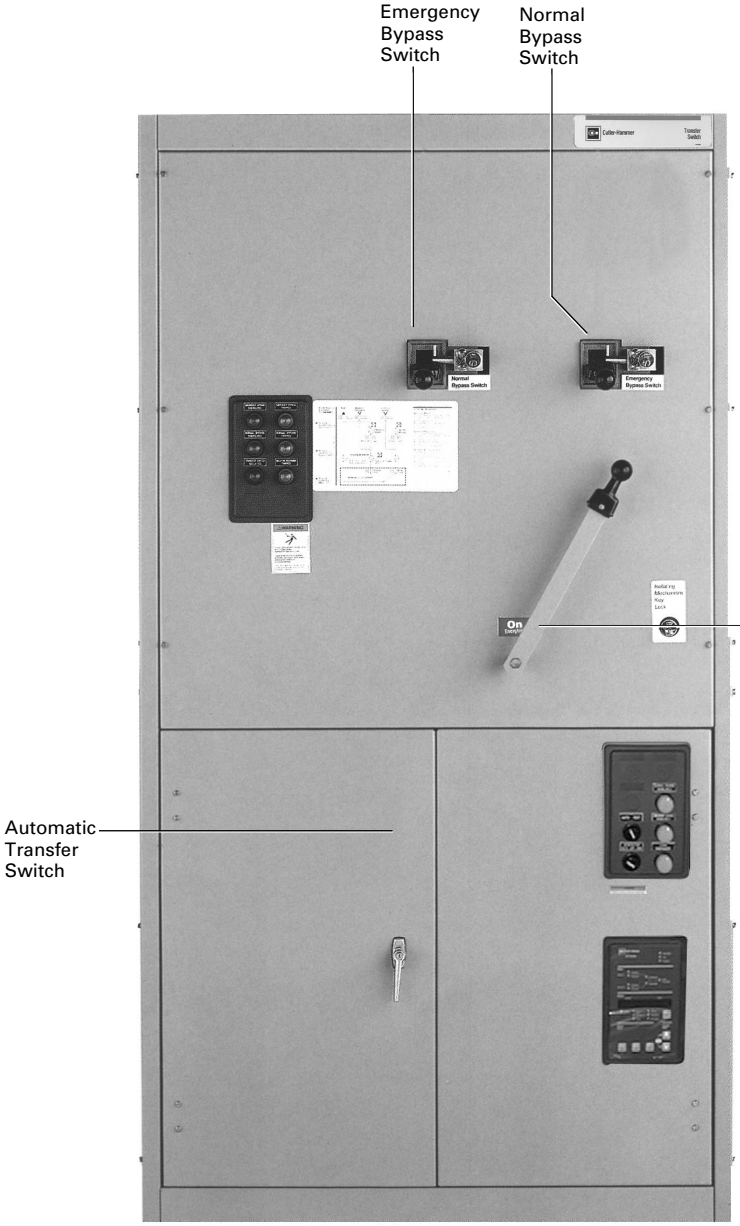
Single-Line Diagram – Typical Configuration

Functional and Operational Capabilities

Our overall design criteria is to provide you with a Combination Bypass Isolation and Automatic Transfer Switch that offers the utmost in flexibility, reliability and value. The long list of standards and codes below illustrates the versatility of our unit. The Combination Bypass Isolation and Automatic Transfer Switch meets or exceeds many national and international standards. It is also designed and built in accordance with the following:

- **UL 1008** – Standard for safety for Automatic Transfer Switches
- **UL 489** – Standard for Circuit Breakers
- **NEC** – Articles 517, 700, 701, 702
- **ANSI/NFPA** – 70
- **NFPA 110** – Emergency and Standby Power Systems
- **EGSA** – Standard for Transfer Switches
- **NEMA** – ICS 10
- **UBC** – Uniform Building Code for Seismic Zone 4
- **ISO 9000** – International Organization for Standards
- **ISO 14001** – Manufacturing Facility

Basic Switch Design
Combination Bypass Isolation and Automatic Transfer Switches consist of a Normal Bypass Switch, Emergency Bypass Switch, a Positive Isolating Mechanism and an Automatic Transfer Switch. All subassemblies are tested individually, and the complete assembly is subjected to full operational testing before shipment from Cutler-Hammer's Transfer Switch manufacturing facility located in Beaver, PA.



150-1000 Ampere Combination Bypass Isolation and Automatic Transfer Switch Shown

Logic

Application Versatility

Whether the application calls for open or closed transition, manual or automatic operation, Cutler-Hammer has the right logic controller for the task. IQ Transfer (ATC-600) has set a new standard for transfer switch technology featuring:

- Microprocessor-based logic
- Digital display
- Field set point programmability
- Transfer history
- PowerNet Communications capability
- Voltmeter and frequency meter
- True rms voltage sensing
- Mimic BUS/LED display
- Load voltage decay delayed transition capability
- In-phase monitor capability
- Field upgrade capability

Automatic Transfer Open Transition

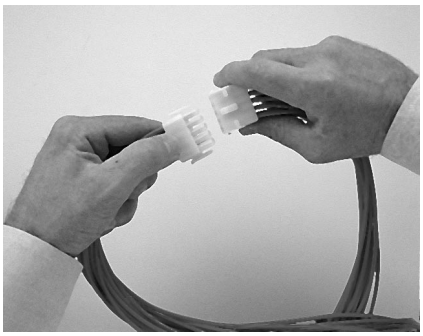
IQ Transfer (ATC-600)

Open transition type SPB transfer switches utilize the Cutler-Hammer programmable IQ Transfer microprocessor-based logic controller.

Available with:

- Time delayed neutral
- Delayed transition-load voltage decay
- In-phase Motor

Ease of Maintenance

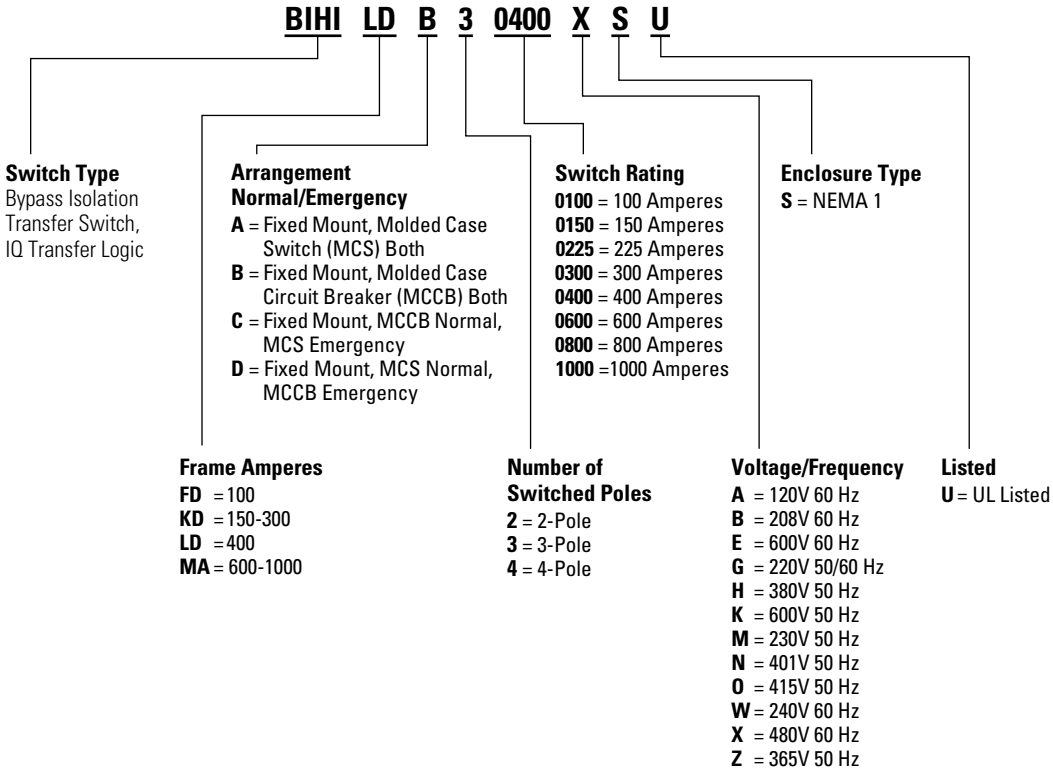


Logic Disconnect Plugs

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.

Catalog Number Selection Guide



Catalog Number System

Sample shows Catalog Number BIHILDB30400XSU with optional features 16B, 23J, 42.

The example would specify the following:

- Bypass Isolation Transfer Switch
- 480 volts
- 3-phase
- 4-wire
- 3-pole
- 400 ampere, LD frame
- Integral overcurrent protection both sources
- IQ Transfer
- NEMA 1 enclosure
- UL listed to UL1008 standard
- Plant exerciser
- Seismic Zone 4 certified
- Feature Group 9 included

Switch and Feature Selection

Feature Number	Description	BIHI Series C Combination Bypass IQ Transfer Logic
Available Options		
OG9	Includes the most often selected options (1-2B-3-4-5B-12C-12D-14C-14D) listed below	–
OG9 for IQ Transfer (ATC-600)	Includes the most often selected options (1-2-3-4-5B/5J-12C-12D-12G-12H-14C-14D) listed below	S
1	Time Delay Normal to Emergency (TDNE)	S
2	Time Delay Engine Start (TDES)	
	Adjustable 0-120 seconds (IQ Transfer Only)	–
2B	Adjustable .5-15 seconds	S
2C	Adjustable 4-120 seconds	O
3	Time Delay Emergency to Normal (TDEN)	S
4	Time Delay Engine Cool-off (TDEC)	S
5	Emergency Source Sensing	
5B	1-Phase Under Voltage/Under Frequency	–
5C	1-Phase Over Voltage/Over Frequency	O
5D	1-Phase Under Voltage	–
5E	1-Phase Over Voltage	O
5F	3-Phase Under Voltage	–
5G	3-Phase Over Voltage	O
5H	Phase Reversal	O
5J	3-Phase Under Voltage/Under Frequency	S
5K	3-Phase Over Voltage/Over Frequency	O
6	Alternate Test Operators/Momentary Test Pushbutton	
6D	Maintained 2-Position Test Switch	O
6H	Maintained 4-Position Test Switch	O
7	Time Delay Emergency Fail	S
8	Pushbutton Bypass of Time Delays	
8C	Bypass TDEN (Feature 3 Required)	O
8D	Bypass TDNE (Feature 1 Required)	O
9	Maintenance Selector Switch	
9B	Permits Isolation of Electric Operator	O
10	Preferred Source Selector Switch	
10B	Utility to Utility or Utility to Generator	O
10D	Generator to Generator	O
12	Pilot Lights	
12C	Normal Position	S
12D	Emergency Position	S
12G	Normal Source Available	S
12H	Emergency Source Available	S
12L	Normal Tripped (Requires Feature 16)	–
12M	Emergency Tripped (Requires Feature 16)	–
14	Auxiliary Relay Contacts	
14C	Normal Source Available 4NO/4NC	S
	Emergency Source Available 4NO/4NC	–
14D	2NO/2NC on SPB Switches only	S
16	Integral Overcurrent Protection	
16N	Normal Side Only	–
	30-150A	O
	225-300A	O
	400A	O
	600A	O
	800-1000A	O
	1200-2000A	–
	2500-4000A	–
16E	Emergency Side Only (Same price as 16N)	–
	Both Normal and Emergency Sides	–
16B	(Double Price of 16N)	–
17	High Withstand Rating	
17C	100 kA at 480 Vac	–

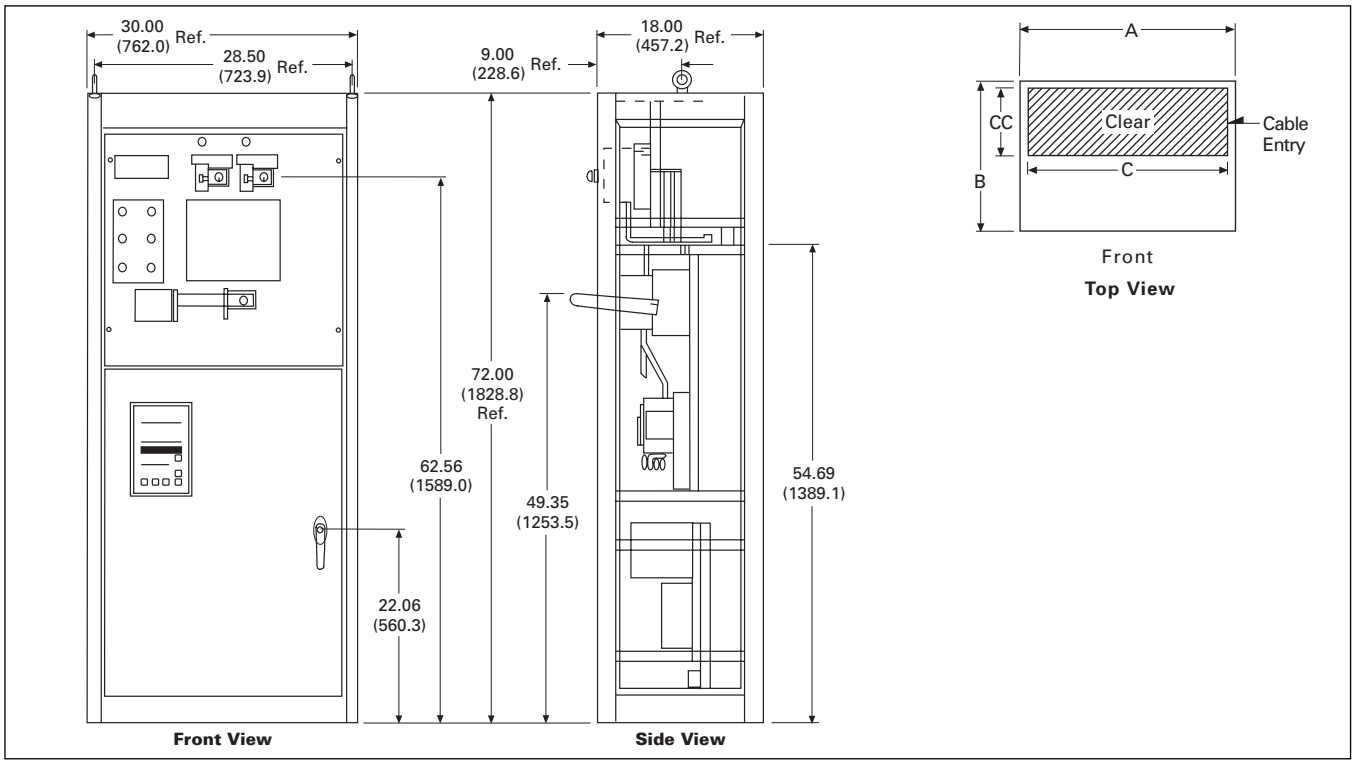
O = Optional Feature; S = Standard Feature; TBA = Availability to be Announced – Call Factory

Switch and Feature Selection, *Continued*

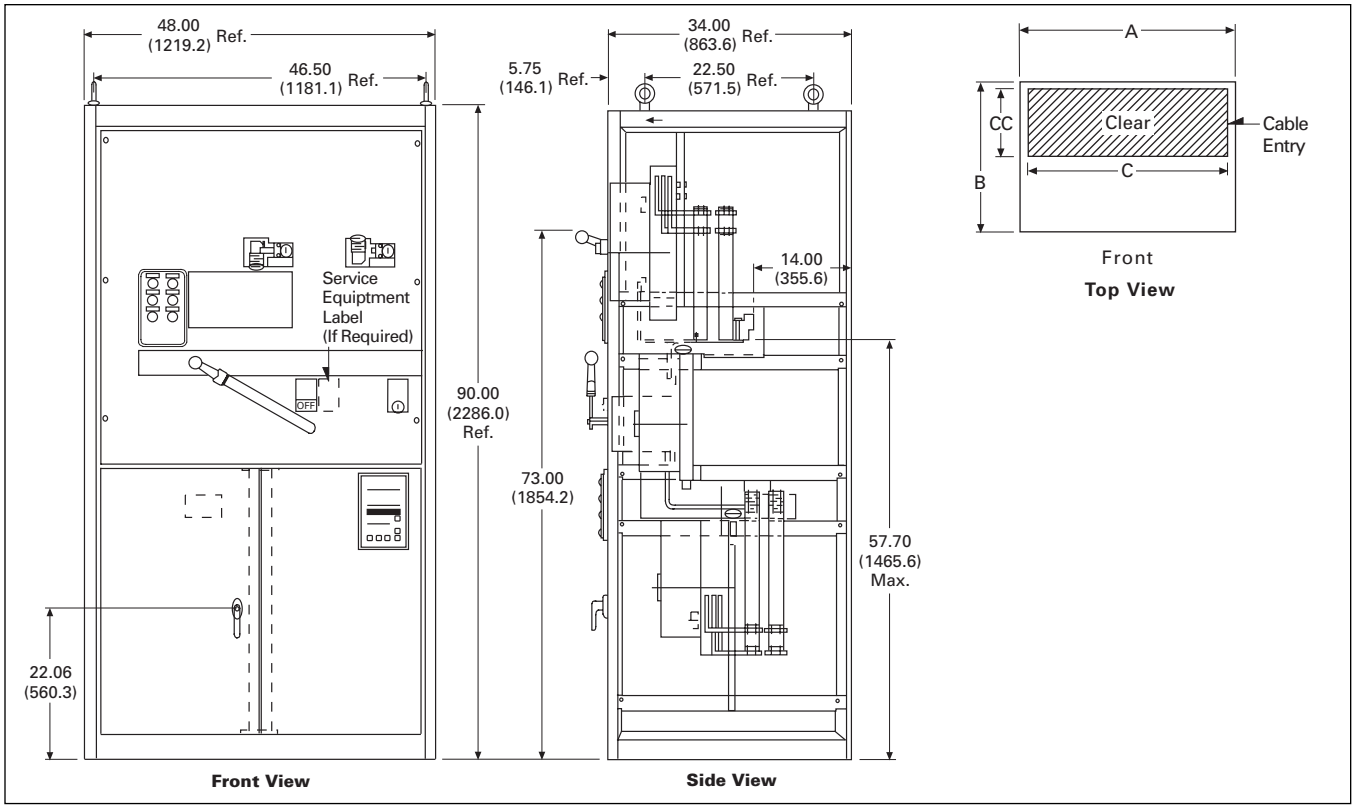
Feature Number	Description	BIHI
		Series C Combination Bypass IQ Transfer Logic
Available Options		
18	IQ Metering	
18I	IQ Generator – Normal Only	O
18J	IQ Generator – Emergency Only	O
18K	IQ Generator – Selectable, Normal or Emergency	O
18O	IQ Analyzer – Normal Only	O
18P	IQ Analyzer – Emergency Only	O
18Q	IQ Analyzer – Selectable, Normal or Emergency	O
18R	DP4000 – Normal Only	O
18S	DP4000 – Emergency Only	O
18T	DP4000 – Selectable, Normal or Emergency	O
20A	Rear Bus Connections	
21A	Non-Standard Lugs Series C	O
	SPB	–
23	Automatic Plant Exerciser Timer	
23C	No Load Exercise	O
23D	Load Exercise	O
23G	Selectable Load/No Load Exercise	O
23I	Same as 23D with Fail-safe	O
23J	Same as 23G with Fail-safe	O
24	Self-Contained Battery Charger	
24C	120 Vac Input, 12 Vdc Output	O
24D	120 Vac Input, 24 Vdc Output	O
26	Normal Source Sensing	
	All Phases Under Voltage	S
	1-Phase Under Voltage	–
26C	All Phases Over Voltage	O
26D	Go to Emergency Contact (Area Protection)	O
26E	Under Frequency	O
26F	Over Frequency	O
26H	Phase Reversal	O
29	Alternate Modes of Operation	
29E	Automatic N to E – Pushbutton Return to N	O
29G	Selectable Automatic or Pushbutton Operation	–
	Switch Cannot be UL listed with this Feature	–
29J	Selectable Automatic E or N or Pushbutton E to N – Auto N-E	O
30A	Cranking Limiter	O
32	Delayed Transition Operation Modes	
32A	Time Delay Neutral Timer	–
32B	Load Voltage Decay	–
32C	In-phase Monitor/Load Voltage Decay	–
32D	In-phase Monitor/Time Delay Neutral Timer	–
33	Shunt Trips for Customer Connectors	
33A	Normal Side – 120 Vac	O
33B	Emergency Side – 120 Vac	O
34	Logic Extender Cable — Specify Length: 48, 72, 96, 120, or 144-inch	–
35A	Pretransfer Signal Contacts 2 NO/NC	O
36	Load Shed from Emergency from Remote Set	–
37	Rated as Suitable for Use as Service Equipment	
	Requires Feature 16B or 16N	–
37A	Without Ground Fault Protection	–
	100-1000 Amperes	O
	1200-4000 Amperes	–
37B	With Ground Fault	–
	400-1000 Amperes	O
	1200-4000 Amperes	–
	GFP Required if 1000A and above if 480 Vac	–
41	Space Heater with Thermostat	
41A	100 Watts	O
41B	200 Watts	O
41C	400 Watts	O
42	Siesmic Zone 4 Certified	O
45	Load Sequencing Contacts	O
47	Closed Transition Feature Sets	
47C	Closed/In-phase/Load Voltage Decay	–
47D	Closed Transition Only	–

O = Optional Feature; S = Standard Feature; TBA = Availability to be Announced – Call Factory

Transfer Switch Dimensions in Inches (mm)



100 Ampere Enclosure Dimensions



150-1000 Ampere Enclosure Dimensions

Dimensions are approximate in inches (mm) and should not be used for construction purposes.

Dimensions and Weights

Transfer Switch Ampere Rating		Dimensions and Conduit Openings in Inches (mm)			CC Cable Space Depth	Weight Lbs. (kg)
		A Width	B Depth	C		
100	Fixed	30 (762.0)	18 (457.2)	25 (635.0)	10 (254.0)	600 (273)
150-300	Fixed	48 (1219.2)	34 (863.6)	43 (109.2)	13 (330.2)	1300 (590)
400	Fixed	48 (1219.2)	48 (1219.2)	48 (1219.2)	48 (1219.2)	1400 (636)
600	Fixed	48 (1219.2)	48 (1219.2)	48 (1219.2)	48 (1219.2)	1600 (726)
800-1000	Fixed	48 (1219.2)	48 (1219.2)	48 (1219.2)	48 (1219.2)	1800 (817)

Notes

TD15A12TE