DFS metal-enclosed drawout load-interrupter switchgear

up to 500 mva interrupting capacity • 2400 to 13800 volts
600 and 1200 amperes load interrupting • indoor and outdoor service

sample specifications

scope

These specifications cover (indoor) (outdoor) drawout metal-enclosed load-interrupter switchgear nominally rated (5 kv) (15 kv). The equipment shall have a (60 kv) (95 kv) BIL and shall be satisfactory for appliance on a _____ volt system with a _____ kva fault capability. The equipment shall consist of fused load-interrupter switches of the drawout design to facilitate fuse replacement and switch inspection.

stationary structure

The stationary structure shall be a free standing unit assembly consisting of a welded reinforced sheet steel enclosure for each drawout switch unit. Each unit will be built with sheet steel sides, top and removable panels so designed as to prevent distortion of unit under normal operating conditions including fault current interruption by fuses. The stationary structure shall be equipped with a hinged panel suitable for mounting instruments or meters. Interior barriers shall be provided to form a low voltage compartment completely isolated from high voltage circuits.

Protective doors shall be provided to prevent accidental contact with live parts when the drawout element is removed from cell. The doors shall close automatically as the drawout element is withdrawn and a positive latch shall hold the doors in the fully closed position. The latch shall be released automatically to allow entrance of drawout element when it is inserted in cell.

Sufficient space shall be provided for termination of (size) cables entering from (bottom) (top) and provision for cable clamps (pothead, stress cone, etc.) shall be included. Terminal blocks shall be located for convenient access for external connections.

Each circuit will be identified with engraved anodized aluminum nameplates. A nameplate with detailed operating instructions shall be provided on each unit.

buses and connections

The buses shall consist of flat copper or aluminum bar. The buses shall be non-insulated, mounted on track resistant bus supports designed so as to keep accumulation of contaminating material to a minimum. The contact surface for each bus joint shall be silver plated and tightly bolted to insure maximum conductivity.

A ground bus shall extend the width of each enclosure. Each stationary unit shall be bolted directly to the ground bus. The frame of each drawout element shall be grounded directly to ground bus by spring pressure finger contact at all times except when primary contacts are separated a safe distance.

Both main and ground bus shall have provisions for extension to adjoining unit for future additions.

removable element

The drawout removable element shall consist of Westinghouse type LCB three-pole disconnect switch and 3-type BA or BAL fuses assembled on single mobile frame. The element shall have four integral wheels that engage with guide rails in stationary structure. The removable element shall be designed to provide easy removal for switch inspection and fuse replacement. A safety interlock shall be included to prevent inserting or withdrawing removable element unless switch is in the open position. The removable element shall be effectively grounded before primary contacts engage.

The switch shall be operated by manually charged spring stored energy mechanism. The spring stored energy mechanism shall be utilized for high speed operation of switch independent of operator. The mechanism shall enable the switch to close against a fault equal to the momentary rating of the switch without affecting its continuous current carrying or load interrupting ability.

Load interruption shall be provided by a spring-loaded auxiliary quick-break blade which remains engaged until the main blade has been completely separated after which the auxiliary blade snaps open at high speed. The switches shall be capable of carrying continuously or interrupting (600 amperes) (1200 amperes) with a momentary rating of (60,000 amperes for 5 kv) (40,000 amperes for 15 kv).

disconnecting devices

Primary disconnect devices shall consist of silver plated finger contacts mounted on removable element. The finger contacts shall engage accurately located stationary contacts in cell. Contacts shall completely disengage as drawout element is removed from cell to insure safe fuse replacement and switch inspection.

A ground contact shall be provided to positively ground removable element before primary contacts engage. Stationary ground contact shall be directly connected to unit ground bus.

Secondary contacts when required shall be finger type mounted in stationary structure. The finger contacts shall engage solid flat contacts mounted on removable element. All contact surfaces shall be silver plated to provide low contact resistance.

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new information
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detailed bill of material

optional features

Optional features shall be provided as follows if specified.

1. electric operation

A motor operated charging attachment for the switch mechanism shall be provided to afford automatic charging of spring stored emergy mechanism. The mechanism shall be charged by a .... volt (a-c) (d-c) motor operating through a reducing gear. Electric release coils for the stored energy mechanism shall be provided to permit remote control. Manual operation of the load interrupter shall be retained to afford operation of the switch in case of control power failure.

2. automatic throwover scheme

a. Automatic transfer scheme to accomplish a "preferred-emergency" line transfer on loss of voltage on the preferred source and return to preferred source on restoration of voltage. This scheme requires:

2—Potential transformers, one on each line, basis single phase voltage detection.

2—Electrically operated stored energy mechanism on the DFS drawout elements including electric release coils.

1—Set of necessary voltage, timing, lockout and auxiliary relays for automatic transfer.

b. Automatic transfer scheme to accomplish a single transfer from "preferred-emergency" line on loss of voltage on the preferred source. This scheme requires manual charging of the stored energy mechanism for both "preferred" and "emergency" DFS switches. On loss of voltage on the "preferred" line, the electric release coils release the mechanism to open the "preferred" switch and close the "emergency" switch. This scheme requires manual return to "preferred" service. The required equipment is:

2—Potential transformers on the line side of the "preferred emergency" switches, basis of single phase voltage detection.

2—Manually operated stored energy mechanism on DFS drawout elements with electric release coils.

1—Set necessary voltage, timing and auxiliary relays for automatic transfer.

3. instrument transformers

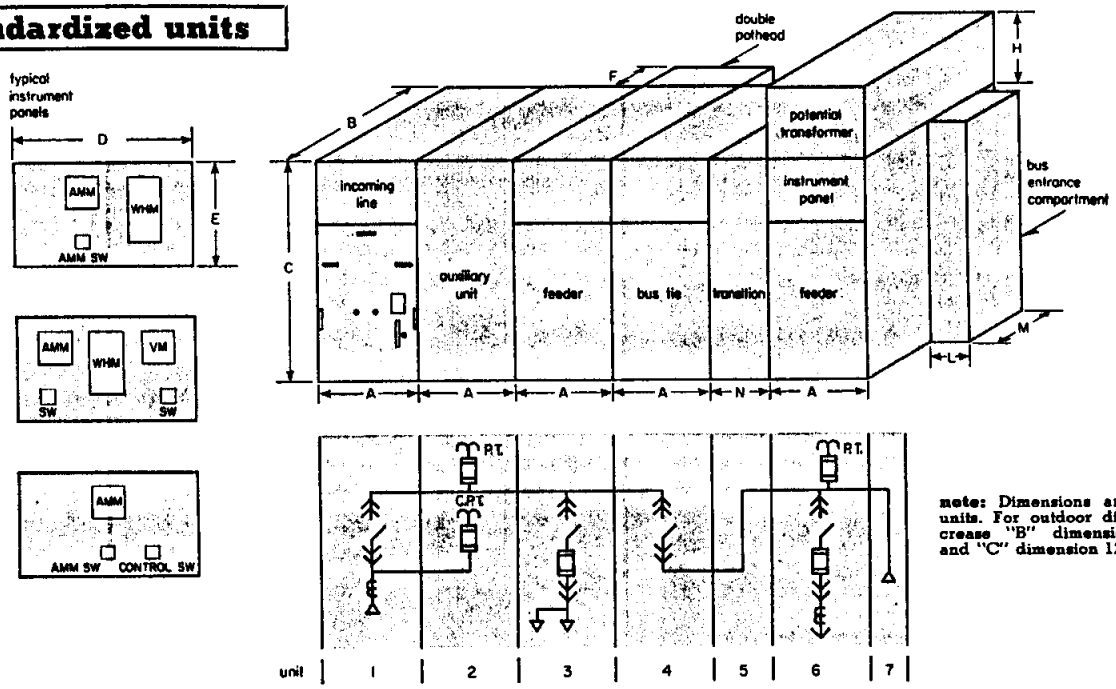
Potential transformers shall be type PT designed for metering applications. The transformers shall be stationary mounted with current limiting type primary fuses mounted on the primary bushings.

Current transformers shall be either type RCT ring type with insulated conductor passing through opening to form a single turn primary or type CT wound type. Accuracy classification shall be in accordance with NEMA Standards.

4. instruments and meters

Type K-221 indicating instruments and type CB-F meters shall be semi-flush mounted switchboard type with dull black cases. The dials will be white with black markings and black pointers. Instruments and meters shall be mounted or hinged panel and completely isolated from high voltage circuits.

standardized units



note: Dimensions are for indoor units. For outdoor dimensions, increase "B" dimension 6 inches and "C" dimension 12 inches.

dimensions in inches▲

voltage	A	B	C	D	E	F	H	L	M	N
5 kv	26	40	60	24	14	10	20	10	16	16
15 kv	36	60	75	34	21	12	26	16	25	20

▲ Refer to db 32-750 for section drawings and dimensions.

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typical units bill of material

unit 1 — incoming line

1—Incoming line main switch compartment approximately [(5 kv) 26″ wide x 40″ deep x 60″ high,] [(15 kv) 36″ wide x 60″ deep x 75″ high] in which is mounted the following:

a. 1—Drawout type DFS unfused load-interrupter switch element with (manually) (electrically) operated stored energy mechanism, 3-pole, single throw, (5 kv) (15 kv) (600 amps) (1200 amps) continuous. Switch shall be capable of interrupting (5 kv 600 amps, 500 times) (15 kv 600 amps, 100 times) (5 kv and 15 kv 1200 amps, 20 times) without replacement of parts and shall have a fault closing rating of (5 kv 60,000 amps) (15 kv 40,000 amps).

b. 3—Type RCT or CT current transformers . . . . /5. (if required.

c. 1—(set cable terminals) (5 kv) (15 kv) entering from (bottom) (top).

d. 1—Set 3 phase 1200 ampere, (5 kv) (15 kv) bare bus.

Mounted on hinged instrument panel:

e. 1—Type K-221 ammeter O-. . . . scale. (if required)

f. 1—Type W ammeter transfer switch. (if required)

g. 1—Type K-221 voltmeter O-. . . . volts. (if required)

h. 1—Type W voltmeter transfer switch. (if required)

i. 1—Type W control switch with red and green indicating lights for electric operation of interrupter switch (if required)

unit 2 — auxiliary unit

1—Auxiliary unit compartment approximately [(5 kv) 26″ wide x 40″ deep x 60″ high,] [(15 kv) 36″ wide x 60″ deep x 75″ high] in which is mounted the following:

a. 2—Type PT potential transformers . . . . /120 volts stationary mounted with primary fuses.

b. 1—Control power transformer to provide power for motor charging mechanism with primary fuses.

unit 3 — feeder unit

1—Feeder switch and fuse compartment approximately [(5 kv) 26″ wide x 40″ deep x 60″ high,] [(15 kv) 36″ wide x 60″ deep x 75″ high] in which is mounted the following:

a. 1—Drawout type DFS load-interrupter switch and fuse element with (manually) (electrically) operated stored energy mechanism, 3-pole, single throw, (5 kv) (15 kv) (600 amps) (1200 amps) continuous. Switch shall be capable of interrupting (5 kv 600 amps, 500 times) (15 kv 600 amps, 100 times) (5 kv and 15 kv 1200 amps, 20 times) without replacement of parts and shall have a fault closing rating of (5 kv 60,000 amps) (15 kv 40,000 amps). Fuses shall be rated . . . . E amperes and of the current limiting type BAL of the boric acid type BA with . . . . kva interrupting capacity at . . . . volts.

b. 2—Three conductor pothead (5 kv) (15 kv) entering from (bottom) (top).

c. 1—Set 3 phase 1200 amps (5 kv) (15 kv) bare bus.

unit 4 — bus tie unit

1—Bus tie switch compartment [(5 kv) 26″ wide x 40″ deep x 60″ high,] [(15 kv) 36″ wide x 60″ deep x 75″ high] in which is mounted the following:

a. 1—Drawout type DFS unfused load-interrupter switch element with (manually) (electrically) operated stored energy mechanism, 3-pole, single throw, (5 kv) (15 kv) (600 amps) (1200 amps) continuous. Switch shall be capable of interrupting (5 kv 600 amps, 500 times) (15 kv 600 amps, 100 times) (5 kv and 15 kv 1200 amps, 20 times) without replacement of parts and shall have a fault closing rating of (5 kv 60,00 amps) (15 kv 40,000 amps).

b. 1—Set 3 phase 1200 amps (5 kv) (15 kv) bare bus.

unit 5 — transition unit

1—Bus transistion compartment approximately [(5 kv) 16″ wide 40″ deep and 60″ high,] [(15 kv) 20″ wide, 60″ deep and 75″ high, and including

a. 1—Set transistion 1200 amps bare bus (5 kv) (15 kv).

unit 6 feeder unit

1—Feeder compartment approximately [(5 kv) 26″ wide x 40″ deep x 60″ high,] [(15 kv) 36″ wide x 60″ deep x 75″ high] in which is mounted the following:

a. 1—Drawout type DFS load-interrupter switch and fuse element with (manually) (electrically) operated stored energy mechanism, 3-pole, single throw, (5 kv) (15 kv) (600 amps) (1200 amps) continuous. Switch shall be capable of interrupting (5 kv 600 amps, 500 times) (15 kv 600 amps, 100 times) (5 kv and 15 kv 1200 amps, 20 times) without replacement of parts and shall have a fault closing rating of (5 kv 60,000 amps) (15 kv 40,000 amps). Fuses shall be rated .... E amperes and of the current limiting type BAL or the Boric acid type BA with .... kva interrupting capacity at .... volts.

b. 1—Set 3 phase 1200 amps (5 kv) (15 kv) bare bus.

b. 3—Type RCT or CT current transformers . . /5. (if required)

c. 1—(set cable terminals) (5 kv) (15 kv) entering from (bottom) (top).

d. 2—Potential transformer ..../120 volt ratio mounted in a super-structure.

Mounted on hinged instrument panel.

e. 1—Type K-221 voltmeter O-.... scale. (if required)

f. 1—Type W voltmeter transfer switch. (if required)

g. 1—Type CB-F watthour meter (2) (3) element. (if required)

h. 1—Type W control switch with red and green indicating lights for electric operation of interruption switch.

unit 7 bus entrance

1—Bus entrance compartment mounted on the (left) (right) of the assembly and will provide an enclosure for incoming cables connected directly to the bus.

a. 1—Three conductor pothead (5 kv) (15 kv) entering from (bottom) (top).

further information

description: db 32-750

prices: price list 32-720

power fuses: ad 33-660, db 36-300, db 36-340

disconnecting switches: db 36-150

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