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7C Switch Rack Assemblies

Cl. I, Div. 1 & 2, Groups B,C,D
Cl. II, Div. 1, Groups E,F,G
Cl. II, Div. 2, Groups F,G
Cl. III
NEMA 3,4X,7BCD,9EFG,12

Explosionproof
Dust-Ignitionproof
Raintight
Wet Locations
Watertight

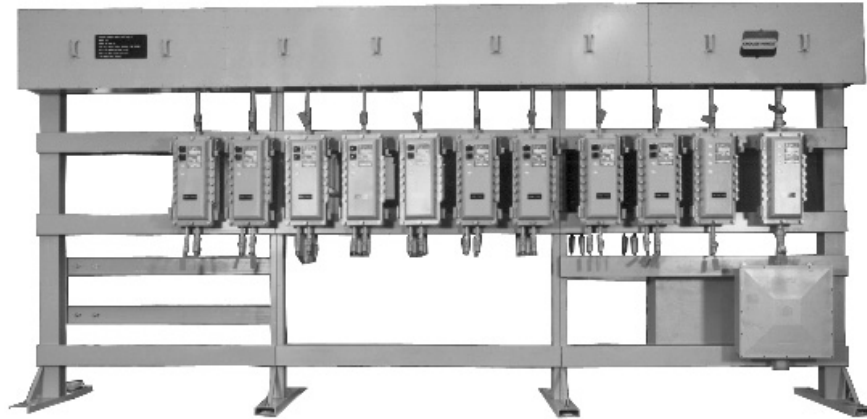
Application:

Free-standing switch rack assemblies are used:

- to provide a complete motor control center in one integrated package
- outdoors and indoors
- in damp, wet or corrosive locations such as sewage treatment plants, lumber mills, marine installations, and food preparation areas
- in areas made hazardous due to the presence of flammable vapors or gases, such as petroleum refineries, chemical and petrochemical plants, gas gathering plants, pipeline compressor stations, and drilling rigs, both onshore and offshore
- in areas where hazardous dusts are present, such as coal handling facilities, grain processing and handling plants, and certain food process industries.

Features:

- Complete factory assembled and wired switch racks
- Pre-drilled bus boxes allow for quick and easy changing or adding of components
- Complete assembly covered under one order, eliminates engineering costs, additional costs of placing separate orders with several vendors for various components, and assembly and scheduling problems at job site
- Wiring is simple. After switch rack is in place, feeders are connected to the main bus and connections made from starters to motors. No other field wiring is necessary
- Maintenance time and costs are reduced by having controls grouped. Work is performed in one location instead of moving from one control to another in various locations
- Major components are standard EBM, EPC, NMC, NMG, NCB, FLB, D2PB, EXD, D2D, EPL, and D2L enclosures featuring ready access to starters and breakers for inspection and maintenance.
- Custom built racks to meet your exact requirements are a Cooper Crouse-Hinds specialty. Complete quotations will be supplied for any job, large or small (38' length max)



Standard Materials:

- Rack frames – structural steel or aluminum channel members, bolted and welded
- Components – see sections A, C & N for material

Standard Finishes:

- Rack frame – hot dip galvanized steel or natural aluminum
- Components – see sections A, C & N for finishes

Options:

- Rack frame finish – corrosion resistant primer with air dry epoxy
- Options listed for individual components can be incorporated in complete switch racks

Certifications and Compliances:

- NEC:
 - Class I, Divisions 1 & 2, Groups C,D (Group B optional)
 - Class II, Division 1, Groups E,F,G
 - Class II, Division 2, Groups F,G
 - Class III
- NEMA: 3, 4X (optional), 7B (optional) CD, 9EFG, 12

Construction:

General:

- All construction to be in accordance with current *National Electrical Code*® (NEC), National Electrical Manufacturers' Association (NEMA), state and local standards as designated by the purchaser.
- All hazardous area enclosures for motor starters, combination motor starters, circuit breakers, motor circuit protectors, instrument enclosures, panelboards, main bus, fittings, receptacles, and lighting fixtures shall be made and supplied by the manufacturer.
- All explosion-proof threaded enclosures for combination starters, circuit breakers, motor circuit protectors, and starters shall be UL classified.
- All other standard hazardous area enclosures shall be UL listed or UL classified.
- Motor control racks shall be constructed by an approved union shop.
- Manufacturer shall retain permanent records of all motor control racks and shall have the capability of duplicating, or replacing, any fully-assembled rack or rack component.
- Manufacturer to assume responsibility for construction, purchase/manufacturer of components, complete circuit continuity testing, and testing of mechanical functions of components.

Rack Frame Design:

Structure:

- Switch rack, either single or double face as required, shall be rigid, free-standing structures. Racks shall be factory-welded, assembled and fabricated from standard rolled structural steel or aluminum shapes.
 - Vertical risers will be 6" I-beam and horizontal members shall be 6-inch channel.
 - Mounting feet shall be 6-inch channel. Width of such feet for single-sided racks shall be 41 inches.
 - End mounting feet will be braced (welded) to the upright with 6" T member.
 - Mounting feet shall be anchored at the job site with 1-inch diameter bolts. Anchor bolts and mounting pads will be the responsibility of the user.
- Maximum horizontal spacing between mounting legs shall not exceed 6 feet. (Specific dimensions to be determined by the manufacturer.)
- Racks longer than 20 feet will be supplied as bolt-together sections. (Specific section dimensions to be determined by the manufacturer.)

Grounding:

- A pressure-type grounding lug with appropriate wire capacity will be provided at each end of frame.

Finish:

- Rack frame shall be hot-dip galvanized after fabrication or natural aluminum.

Main Bus Equipment:

Class I, Division 1:

- Main bus material shall be copper only and capable of withstanding up to 65K amps fault current. Cable bus will be wired to terminal blocks enclosed in cast, copper-free aluminum, explosion-proof junction boxes, Cooper Crouse-Hinds type EJB. Such junction boxes for incoming power and distribution wiring shall be provided at either the top or bottom of the rack. Enclosures shall be connected by rigid conduit with conduit seals installed in accordance with the NEC. Load conduit or cable will leave rack either below or above. Manufacturer shall provide conduit layouts.

Class I, Division 2:

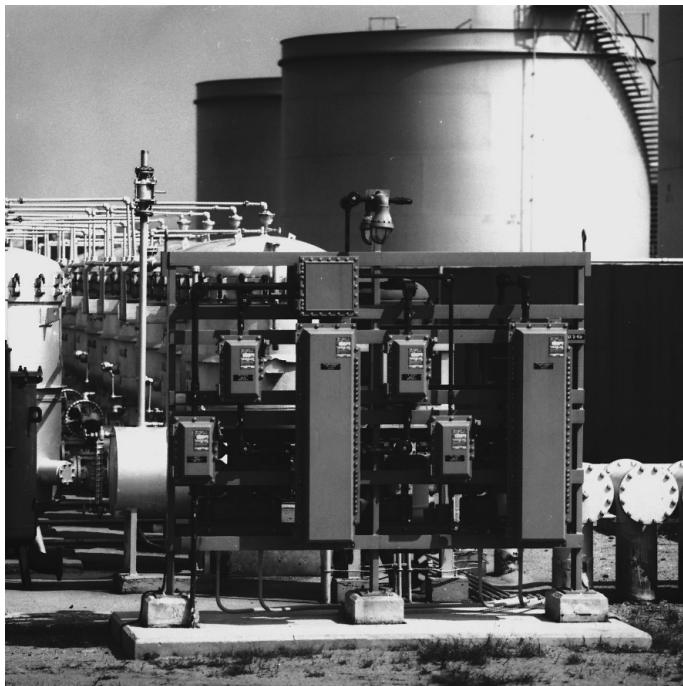
- Main bus material shall be copper only and capable of withstanding up to 65K amps fault current. Cable bus will be wired to terminal blocks enclosed in cast, copper-free aluminum weathertight junction boxes, Cooper Crouse-Hinds type WJB. Such junction boxes for incoming power and distribution wiring shall be provided at either the top or bottom of the rack. Enclosures shall be connected by rigid conduit with conduit seals installed as required by the NEC. Load conduit or cable will leave rack either below or above. Manufacturer shall provide conduit layouts.

Bus Duct in Lieu of Junction Boxes (Optional):

- Cable bus will be wired to a weathertight bus duct provided at the top or bottom of the rack.

Canopy (Optional):

- Single- or double-pitched canopy shall have minimum 15-degree pitch with a minimum 7'6" ground clearance, and 2-foot overhang. Roofing material shall be corrugated aluminum. Canopy roof trusses, cross channels, roof material, and mounting hardware shall be shipped unassembled for quick assembly at the job site. All holes in structure shall be provided except for roof mounting holes which will be drilled in the field. Manufacturer will supply drawings and material for complete field assembly of canopy.



Cooper Crouse-Hinds switch rack installed in a fuel storage area.

Motor Control Components:

Explosion Proof Quick Opening Enclosures:

- All circuit breakers, motor circuit protectors and combination or across-the-line motor starters shall be enclosed in quick-opening enclosures (Cooper Crouse-Hinds types EBM or EPC).

Types:

- Ground joint bolted cover enclosure shall be Cooper Crouse-Hinds type EBM, Underwriters Laboratories inc. classified for use in class I, Groups C, D, Divisions 1 and 2, Class II, Groups E, F, G, Divisions 1 and 2 and Class III hazardous locations and shall also be suitable for type 3, 3R and/or type 4 (NEMA 3, 3R and 4) areas.
- All enclosures shall be cast of a corrosion-resistant copper-free aluminum alloy (less than 0.4% copper) and shall be of a semi clampshell design with external flange to promote ease of apparatus installation, adjustment and maintenance. Most importantly, enclosure inside dimensions shall conform to the wire bending space requirements of the National Electrical code NFPA70 paragraph 373-6. Enclosures with flat covers, internal flanges or those not conforming to NFPA70 paragraph 373-6 are not permitted.
- Covers shall be hinged on the left side and, when closed, shall be affixed top the body by multiple lead thread bolts to promote quick opening and closing of the enclosure.
- Cover bolts shall be hex head stainless steel without screwdriver slots, to promote the use of a socket or wrench for proper tightening. They shall be captive to the cover and stainless steel spring loaded to indicate the fully unthreaded position. Spring loading shall give visual indication that the bolts are free of the body when the cover is being opened. The cover flange ground joint shall have an integral gasket to prevent the entry of windblown dust, rain or sleet.
- All enclosures shall be fitted, as standard, with adjustable, extended, corrosion-resistant, copper-free aluminum hinges that shall allow the cover to swing away from the body when opened and shall permit unobstructed working space for maintenance, adjustment or replacement of the internal apparatus. Additionally these hinges shall allow minimum enclosure-to-enclosure spacing with little interference between an open cover and an adjacent enclosure. Enclosures with hinges fabricated from steel or aluminum stampings shall not be permitted.

- All enclosures shall be provided with drilled, tapped and plugged conduit entrances suitably sized for the electrical application. Power conduit entrances shall be located 1 (or 2) each on (or equally spaced from) the enclosure vertical centerline at top and bottom. A single, plugged 1" entrance for a control conduit shall be provided at the bottom of the enclosure. (Some enclosures can also be provided with a plugged 1" entrance for control conduit at the top.)
- All conduit entrances shall be furnished with removable copper-free aluminum reducers, each with integral wire pulling bushing. All conduit entrances shall be located the same distance from the enclosure mounting surface to facilitate conduit run layout and/or stub up construction.
- All enclosures shall have rugged, cast copper-free aluminum circuit breaker and motor starter overload reset operating handles located on the right side of the enclosure. These handles shall operate the internal mechanisms via stainless steel, gasketed shafts and bearings through the side wall of the body. Correct circuit breaker and overload reset operation shall be visually confirmed with the cover open.
- Circuit breaker handles shall be padlockable in either the "OFF" or "ON" position, and shall be trip-free of the circuit breaker itself. An attached indicating plate shall give clear, visual confirmation of the circuit breaker status.
- Adjustable circuit breaker handle stops shall be provided to ensure full operation of the circuit breaker and to prevent handle overthrow that could damage the circuit breaker toggle.
- Motor starter overload reset operating mechanisms shall be field adjustable.
- Threaded construction enclosures shall be Cooper Crouse-Hinds type EPC, Underwriters Laboratories, Inc. classified for use in Class I, Groups C,D, Divisions 1 and 2, Class II, Groups E,F,G Divisions 1 and 2 and Class III hazardous locations and shall also be suitable for Type 3, 3R and/or Type 4 (NEMA 3, 3R and 4) areas.
- All enclosures shall be cast of a corrosion-resistant copper-free aluminum alloy (less than 0.4% copper) and shall be of a three section design. Multiple-start straight buttress threads between the covers and the body shall ensure quick access to the interior in less than two full turns of the covers. A system of stops shall prevent overtightening and thread seizing. A system of locks shall prevent covers from loosening due to external vibration.

- Female threads on the top cover with male threads on the bottom cover shall ensure inherent water and rain shedding.
- All exposed screws, bolts and hardware shall be stainless steel.
- The external circuit breaker operating handle affixed to a stainless steel shaft, shall be padlockable in either the "ON" or "OFF" position with up to three padlocks. Circuit breaker mechanisms shall be trip-free of the circuit breaker itself to allow the circuit breaker to open under overload conditions even if it is locked in the "ON" position.
- The mounting bracket shall provide a three-point suspension system for quick installation and adjustment.
- Conduit entrances shall have integral wire pulling bushings and conduit stops. These openings shall be arranged two at the top and two at the bottom and shall be sized for power and control requirements.

General

- All enclosures shall be bolted to the horizontal frame members on either the front or back or both front and back. Enclosures shall be connected to the main bus via conduit seals. (To be field poured). All hardware used to mount the enclosures shall be stainless steel.

Lighting Panelboards:

Class I, Division 1:

● Panelboards shall be Cooper Crouse-Hinds type, factory-sealed EXD or EPL as specified and shall meet the following electrical ratings:

EPL – 1, 2 or 3 pole, 240 volt maximum, 100 amp maximum branch trip rating, 10,000 AIC.

EXD – 1, 2 or 3 pole, 600 volt maximum, 100 amp maximum branch trip rating.

Class I, Division 2:

Lighting panelboard shall be Cooper Crouse-Hinds type D2L factory-sealed, 120/240 volt panelboards and be provided with single-pole, two-pole, or three-pole branch circuit breakers with up to 100 amp trip rating; main breaker ranging to 225 amp. Similarly, lighting panelboard shall be type D2PB factory-sealed, 120/240 volt panelboards and be provided with single-pole or two-pole factory sealed circuit breakers with 15, 20 or 30 amp trip ratings and maximum 10,000 AIC. Power panelboards type D2D factory-sealed, up to 600 volt are provided with single-pole, two-pole, or three-pole branch circuit breakers with up to 100 amp trip ratings; main breaker rating to 225 amp.

NEMA 4X Option:

● All bus boxes, control enclosures and lighting panelboards will be made of *KRYDON*® material to meet NEMA 4X requirements.

Fittings:

All fittings shall be made and provided by the manufacturer. Seals and unions will be provided for each incoming and outgoing conduit as required. All interconnections between components shall be done by the manufacturer with galvanized rigid conduit, and conduit fittings as required to meet the hazardous classification. Interconnecting conduits to be provided with conduit seals as required. All incoming and outgoing rack conduit entrances shall include conduit seals as required by the hazardous location specified. Such seals will be provided by the manufacturer and will not be filled where field wiring is to be introduced.

Conduit Boxes, Outlet Boxes, Device Boxes:

● Conduit boxes, outlet boxes, and device boxes shall be Cooper Crouse-Hinds *Condulet*® fittings.

Seals:

● Seals will be standard Cooper Crouse-Hinds type *Condulet* EYS. (Cooper Crouse-Hinds *Condulet* EYD drains to be specified as required.)

Unions:

● Unions will be Cooper Crouse-Hinds UNY.

Breathers and Drains:

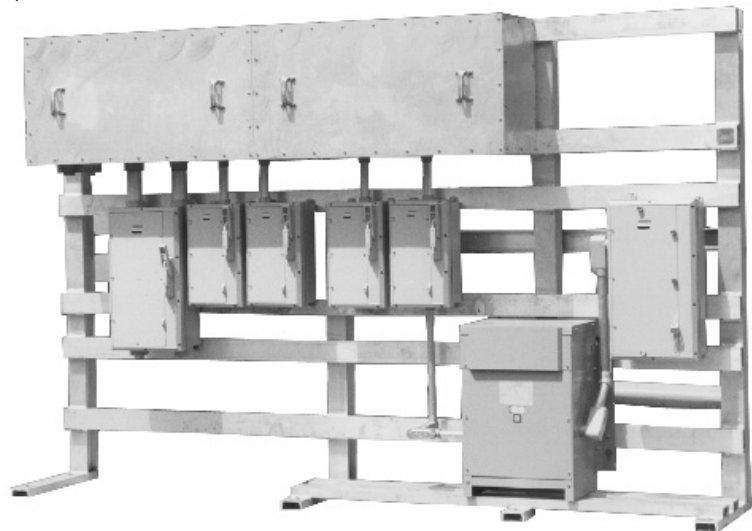
● Breathers and drains shall be Cooper Crouse-Hinds ECD.

Wiring:

- Standard wire shall be copper only, 600 volt, 75°C minimum rating, UL listed.
- No power wire less than 12AWG shall be used.
- Control wire shall be 14AWG minimum, 7 strands, THW minimum.
- Wiring shall be sized in accordance with the NEC requirements.

Drawings:

● Standard drawings supplied for customer approval shall include complete rack wiring diagram, component data, nominal weight of the rack, and overall rack dimensions.



Application:

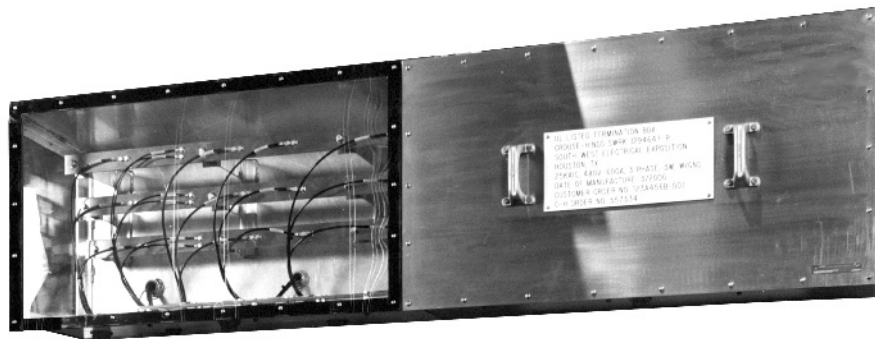
Cooper Crouse-Hinds is now offering NEMA 3R, UL Listed Bus Duct (Termination Box) Assemblies as standard product. Up to 600V, three-phase, 3 or 4 wire, 400Amp or 600Amp service with short circuit ratings of 25K or 50K.

Bus ducts or termination boxes provide a means of tapping feeder circuits for power distribution on outdoor switchrack assemblies or indoor wall-mounted applications.

Typical application is primarily for bus replacements on existing switchrack installations. New applications may include on-site construction of switchracks or indoor feeder distribution points due to space confinements making local installation more practical.

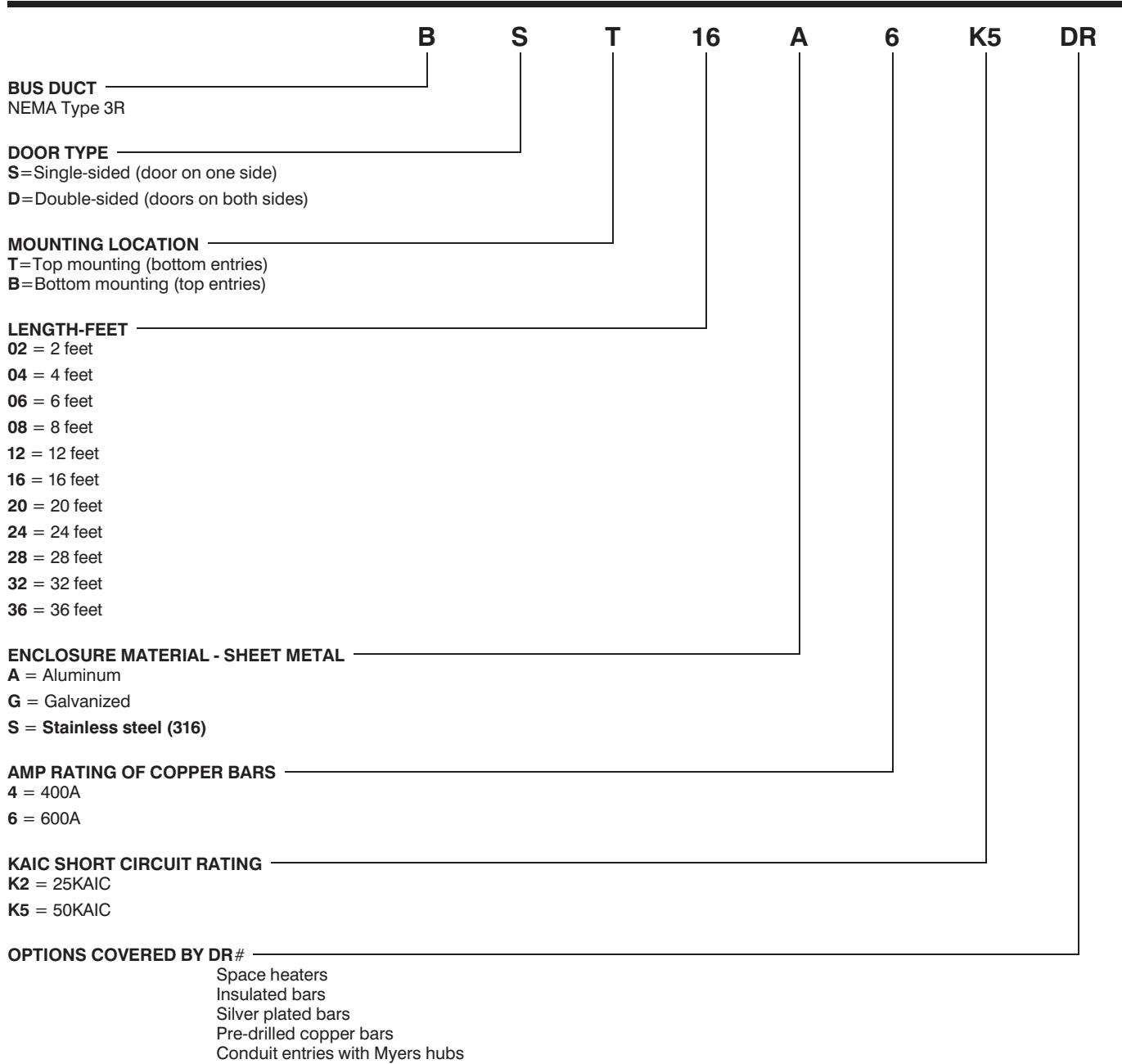
Features:

- U.L Listed.
- NEMA 3R.
- Maximum Voltage rating 600V.
- 400Amp or 600Amp @ 25KAIC or 50KAIC.
- External flange on bus duct enclosure and lip on covers prevents water leakage and allows covers to hang freely for ease of installation and maintenance.
- 3 degree pitch at top, for water run-off, on all flush mounted bottom entry designs.
- Chorosulfonated polyethylene (Hypalon®) gasket material at all bus box section joints, covers and end plates.
- Standoff (Glastic) insulators moulded of (UL) recognized flame-resistant fiberglass-reinforced thermoset polyester moulding compound.
- Bus bar sizing and bracing complies to UL857 requirements.
- All welded construction - sheet aluminum, sheet steel (galvanized), or stainless steel
- Stainless-steel hardware throughout.
- Two hole compression lugs at all power phase connectors attached with stainless steel hardware.
- One (1) drain is standard per bus duct section (typical 4 foot sections).
- Solid copper bus bars (tin, silver plated and/or insulated - optional per customer request).
- Solid copper ground bar - standard.
- Incoming main lugs - supplied size and location specified with customer.
- Space heaters - optional per customer request.
- Pre-drilled copper bars (when specified by customer).
- Conduit entries for Myers hubs - optional per customer request.



Bus Duct (Termination Box) Catalog Numbering System

7C



One (1) drain is standard per bus duct (termination box) section.

*For pricing and lead times, contact Cooper Crouse-Hinds at 315 477-5241 or fax to 315 477-5118.

7C Switch Rack Assemblies Selection Guide

Cl. I, Div. 1 & 2, Groups B,C,D Explosionproof
 Cl. II, Div. 1, Groups E,F,G Dust-Ignitionproof
 Cl. II, Div. 2, Groups F,G Raintight
 Cl. III Wet Locations
 NEMA 3,4X,7BCD,9EFG,12 Watertight

Customer: _____ Engineering Firm: _____
 Project: _____ Location: _____
 Prepared By: _____ Date: _____
 Quotation For: Estimate/Budget Bid Immediate Buy
 Quotation Required By (Date) _____ Material Required By (Date) _____

Interested in a highly reliable, comprehensive communications that will improve the operating efficiency of your facility? See additional information at the end of this guide.

Is a current copy of plant STDS/SPECS available to Cooper Crouse-Hinds? _____

7C Switch Rack Assemblies

Area Classification:

HAZARDOUS - Circle All that apply:

- Class I
 Div. 1 or 2, Grps B,C & D
 Class II
 Div. 1 or 2, Grps E,F & G
 Class III

NON-HAZARDOUS

- Ordinary Locations
 NEMA 3R, 4, 4X (Circle One)

Structural Frame:

MATERIAL

- Steel
 Aluminum
 Single Face
 (Components on ONE side only)
 Double Face
 (Components on BOTH sides)
 Other _____
 Percent Spare Space _____ %

FINISH

- Hot Dip Galvanized
 Painted

Roof Canopy:

- Yes No
 Corrugated Aluminum
 Corrugated Fiberglass

Enclosure Type:

- Bolted Threaded
 Krydon Epoxy Coated

Dimension Restrictions:

- Length _____ Height _____

Service System: (i.e. 480V, 3PH, 3W, 60HZ)

_____ VOLT _____ PH _____ W _____ HZ

Incoming Feeder Requirements:

- _____ # Conductors/Phase
 _____ # AWG/MCM
 _____ # Inch Conduit (Size)
 Top Entry Bottom Entry

Main Bus Enclosure:

MATERIALS

- Steel
 Aluminum
 Other (Specify) _____
 Bus Location - Top of Rack
 Bus Location Bottom of Rack
 Bus Bracing _____ (25 KAIC Standard)
 Bus Amps _____
 Other - Customer to Specify

FINISH

- Hot Dip Galv.
 Painted

MAIN BUS CHARACTERISTICS

- Copper Bars
 Bare (Standard) Power Distr. Block
 Insulated Ground Bus in Enclosure
 Silver Plated
 Tin Plated

Switch Rack Assemblies

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Explosionproof
 Dust-Ignitionproof
 Raintight
 Wet Locations
 Watertight

7C

7C Switch Rack Assemblies

Main Breaker/Disconnect: (3C,N)

None Molded Case Breaker

AIC Rating _____

Amp Trip (AT)/ _____ Amp Frame (AF) _____

Disconnect Switch _____ Amps

Fused Non-Fused

Equipment Requirements:

COMBINATION MOTOR STARTERS (1C, N)

FVNR, Reversing, 2-speed (circle one)
 Qty. _____

_____ NEMA Size 0 with _____ AT/ _____ AF, _____ MCP

_____ NEMA Size 1 with _____ AT/ _____ AF, _____ MCP

_____ NEMA Size 2 with _____ AT/ _____ AF, _____ MCP

_____ NEMA Size 3 with _____ AT/ _____ AF, _____ MCP

_____ NEMA Size 4 with _____ AT/ _____ AF, _____ MCP

_____ NEMA Size 5 with _____ AT/ _____ AF, _____ MCP

_____ NEMA Size 6 with _____ AT/ _____ AF, _____ MCP

Refer to Cooper Crouse-Hinds catalog for suggested breaker or motor circuit protector sizing if not specified above, Cooper Crouse-Hinds will size accordingly.

OPTIONS REQUIRED

*Unless specified differently *options furnished standard

	Yes	No
*Fused Control Transformer Suffix FTPS	_____	_____
Space Heaters Suffix R11, R22, R44	_____	_____
Start/Stop Pushbuttons Suffix PB23	_____	_____
Hand-Off Auto Selection Switch Suffix RR3	_____	_____
Red Indicating Light Suffix J1	_____	_____
Green Indicating Light Suffix J3	_____	_____
*Auxiliary Contacts: (2 N.O./2NC) Suffix S782	_____	_____
Control Relay Suffix S787	_____	_____
*Breather/Drain Suffix S198V/S756V	_____	_____
*12 Point Terminal Block Other - Specify Suffix S786	_____	_____

Feeder Circuit Breaker: (3C, N)

AIC Rating _____

Qty _____	(AT) _____	(Specify) _____
_____	_____	/100/150 AF
_____	_____	/100/150 AF
_____	_____	/225/250 AF
_____	_____	/400 AF
_____	_____	/800 AF
_____	_____	Other _____

Component Preference:

Cutler-Hammer SQD A-B GE

(Cutler-Hammer will be used if no preference is indicated.)

Distribution Transformers:

_____ KVA _____ PH _____ Volt-Pri _____ / _____ Volt-Sec

_____ KVA _____ PH _____ Volt-Pri _____ / _____ Volt-Sec

Copper Windings Stainless Steel Enclosure

Panelboards: (1A, N)

Power (480V) (D2D EXD)

Single Phase Three Phase

Main Breaker _____ Pole _____ AT

Branch Circuits

Qty _____	AT _____	No. Poles (i.e. '2P' = 2 Pole) _____
_____	_____	_____
_____	_____	_____

LIGHTING/HEAT TRACING

(240/120V) (D2L, EPL, D2PB)

Single Phase Three Phase

Main Breaker _____ Pole _____ AT

Branch Circuits

Qty _____	(AT) _____	No. Poles (i.e. '2P' = 2 Pole) _____
_____	_____	_____
_____	_____	_____

‡ GFI (5mA) _____ AMP _____
 (No. Req'd) _____ Rating _____

‡ EPD (30mA) _____ AMP _____
 (No. Req'd) _____ Rating _____

‡ Not available with D2PB panelboards

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Explosionproof
 Dust-Ignitionproof
 Raintight
 Wet Locations
 Watertight

Lighting Contactor:

Yes No

No. Poles _____ Amp Rating _____

Control Power Transformer
 Suffix FTFS

Hand-Off-Auto Selector Switch
 Suffix RR3

Conduit Fittings, Seals, Unions:

Plant Standard _____ (i.e."Form 7")

Iron Aluminum

Type Seals
 (Note seals not poured at factory)

EYD EYS EZD

Other (specify) _____

Photocell:

Yes No

Lighting Fixtures: (1L, 2L, 3L)

Quantity _____ Type _____

Wattage _____ Voltage _____

Receptacles:

Convenience Receptacle
 Amps _____ Poles _____ Volts _____

Welding Receptacle
 Amps _____ Poles _____ Volts _____

Integral Circuit Breaker Yes No

Conduit:

Rigid Galv. Steel Aluminum

PVC Coated

Wiring:

RHW/RHH THWN/THHN (C-H Std)

THW XHHW

Other Insulation - Specify _____

Shop Inspection & Tests:

Mfr. Standard Tests

Customer In Plant Final Inspection

Yes No

*Utilizing Standard Cooper Crouse-Hinds NEMA 7 Enclosures with specified internal components (mounted on your switchrack) this state-of-the-art technology is available today. IMPACC (Integrated Monitoring Protection and Control Communications), by Cutter-Hammer/Westinghouse is a unique high frequency-based communications system specially designed for electrical distribution and control applications. Providing real time information, with an "open" protocol, allows you to manage and operate your entire electrical system including remote hazardous areas without leaving your office or motor control centre. For more information, contact us.

Special Requirements: _____

7C Switch Rack Assemblies