

600 A 35 kV class PUSH-OP® deadbreak connector



General

Eaton offers a complete threadless deadbreak, clampstick operable connection system with its Cooper Power™ series 600 A, 35 kV class PUSH-OP® deadbreak connector for terminating underground cables to transformers, switches, switchgear, and other apparatus. It is fully shielded, submersible, and meets the requirements of IEEE Std 386™-2006 standard – Separable Insulated Connector Systems.

The design employs a unique, 600 A rated, plated copper probe and mating PUSH-OP bushing utilizing a plated copper finger contact system. The PUSH-OP connector's stainless steel latching, linkage mechanism provides leverage for easy disconnection of the terminator and easy handling of heavy cable. The result is a one-person, clampstick operable connection system that is unequalled in ease of operation and time required to perform sectionalizing operations.

A coppertop compression connector is provided for terminating the conductor.

The 200 A three-phase rated loadbreak interface provides a means for obtaining a live test, visible ground and visible break using a clampstick. It also provides a convenient location for Eaton's Cooper Power series M.O.V.E. arrester or grounding elbow. The grounding elbow may be continuously connected to the PUSH-OP connector while moving it to and from an apparatus bushing.

Eaton offers an optional capacitive test point similar to test points on 200 A elbow connectors. This allows use of Eaton's Cooper Power series test point faulted circuit indicators.

The PUSH-OP connector also has a non-bolted connection that eliminates threading and its associated problems.

PUSH-OP connectors are designed for use on solid dielectric cable (XLPE or EPR) with extruded semi-conducting shields and concentric neutral, with or without jacket. Installation on jacketed concentric neutral cable may require additional sealing material. Cold shrinkable adapters are available for tape shield, linear corrugated and drain wire cable adaption for use with deadbreak connectors.

Installation

The T-body housing with stainless steel shroud is assembled onto prepared cable with a threaded coppertop spade lug compression connector. The loadbreak reducing tap plug is threaded into the connector and onto a probe using an alignment tool, installation torque tool, and T-wrench.

The assembled housing is then connected to a de-energized 600 A PUSH-OP type bushing interface and bracket using a clampstick without any threading operation. (See Table 5 for information on tools.) Refer to *Service Information S600-53-3 600 A 35 kV Class PUSH-OP Deadbreak Connector Installation Instructions* for details.

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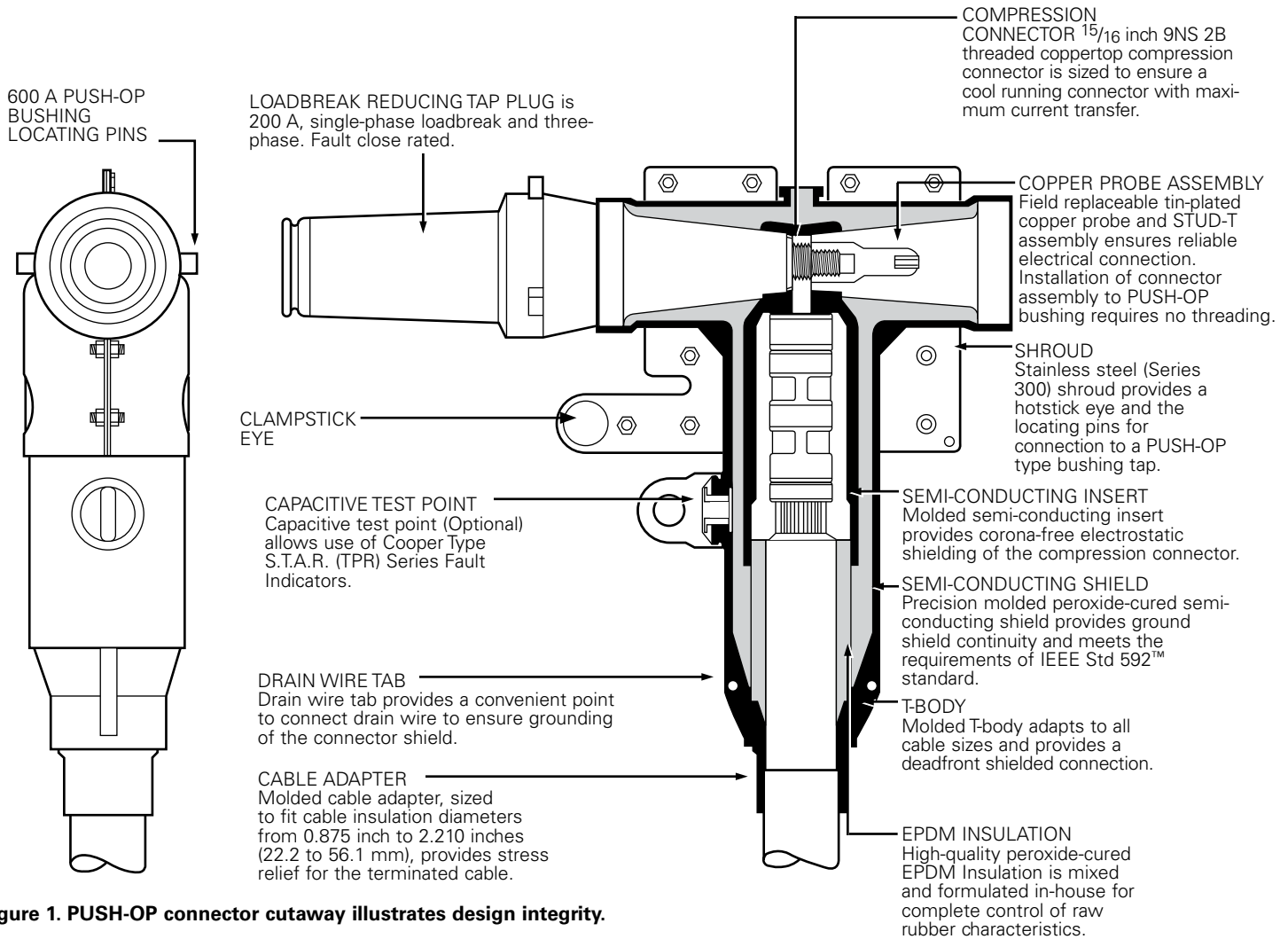


Figure 1. PUSH-OP connector cutaway illustrates design integrity.

Note: Dimensions given are for reference only.

Production tests

Tests conducted in accordance with IEEE Std 386™-2006 standard:

- ac 60 Hz 1 Minute Withstand
 - 50 kV
- Minimum Partial Discharge Extinction Voltage
 - 26 kV

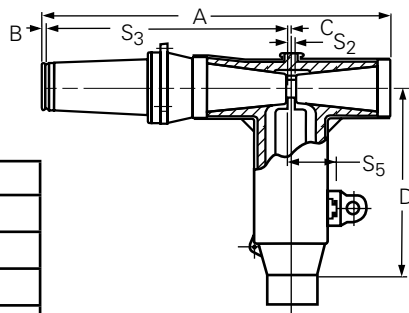
Tests conducted in accordance with Eaton requirements:

- Physical Inspection
- Periodic Dissection
- Periodic Fluoroscopic Analysis

Table 1. Voltage Ratings and Characteristics

Description	kV
Standard Voltage Class	35
Maximum Rating Phase-to-Phase (Bushing Insert Only)	36.6
Maximum Rating Phase-to-Ground	21.1
AC 60 Hz 1 Minute Withstand	50
DC 15 Minute Withstand	103
BIL and Full Wave Crest	150
Minimum Partial Discharge Extinction Voltage	26

Voltage ratings and characteristics are in accordance with IEEE Std 386™-2006 standard.



35 kV	
A	18.1" (460 mm)
B	0.25" (6 mm)
C	0.25" (7 mm)
D	12.1" (307 mm)
S2	0.50" (13 mm)
S3	12.5" (317 mm)
S5	2.9" (72.14 mm)

Figure 2. PUSH-OP connector stacking dimensions.

Note: Dimensions given are for reference only.

Table 2. Current Ratings and Characteristics

Description	Amperes
600 A Interface	
Continuous	600 A rms
24 Hour Overload	1,000 A rms
Short Time	40,000 A rms symmetrical for 0.17 s
	27,000 A rms symmetrical for 4.0 s
200 A Interface*	
Continuous	200 A rms
Switching**	10 operations at 200 A rms at 21.1 kV
Fault Closure	10,000 A rms symmetrical at 36.6 kV for 0.17 s after 10 switching operations
Short Time	10,000 A rms symmetrical for 0.17 s
	3,500 A rms symmetrical for 3.0 s

Current ratings and characteristics are in accordance with IEEE Std 386™-2006 standard.

* If available system fault current exceeds 10 kA, current limiting fusing must be used upstream. Otherwise fault close and short time ratings of the 200 A interface will be exceeded.

** Switching rated limited to Single-phase 21.1 kV.

Optional features

Insulated protective cap

200 A insulated protective cap fits over loadbreak reducing tap plug for deadfront shielding.

Capacitive test point

Capacitive test point, on molded T-body, with snap-on cap, provides a place to mount STVT, STLO and STHI test point faulted circuit indicators.

To order replacement compression connectors and cable adapters for a PUSH-OP connector, see Catalog CA650006EN, "Deadbreak Accessories, Tools and Replacement Parts".

Ordering information

Each PUSH-OP Connector kit contains:

- Molded Rubber T-body with stainless steel shroud
- Loadbreak Reducing Tap Plug
- Cable Adapter
- Probe
- Compression Connector
- Silicone Lubricant
- Installation Instruction Sheet
- Copper Alloy Stud

Catalog number selection

Use the following procedure to develop the correct part number for the desired PUSH-OP kit, based on cable size, conductor size and desired options.

Step 1 – Determine the cable’s diameter over the electrical insulation as shown in Figure 3 (including tolerances). Then identify a cable range from Table 3 that brackets the minimum and maximum insulation diameters. Select the correct CABLE RANGE CODE.

Step 2 – Identify the conductor size and type in Table 4 and select the CONDUCTOR CODE from the far right column.

Step 3 – For a PUSH-OP kit with a capacitive test point and protective cap, order:



For a PUSH-OP kit without a capacitive test point or protective cap, order:



EXAMPLE: To select a PUSH-OP kit without a capacitive test point, with a protective cap for a 250 kcmil compressed cable with a nominal insulation diameter of 1.16".

Step 1 – Nominal diameter over the insulation is 1.16" ± .030"
 minimum diameter = 1.16 - .030 = 1.13"
 maximum diameter = 1.16 + .030 = 1.19"

From Table 3 identify the cable range 1.13" - 1.19" and select the "H" Cable Range Code.

Step 2 – The conductor size is a 250 kcmil compressed. From Table 4, under the column "Concentric or Compressed," identify 250 kcmil and select the "17" conductor code.

Step 3 – Order catalog number:

POP635H17C

Table 3. Cable Diameter Range

Inches	mm	Cable Range Code	Inches	mm	Cable Range Code
0.875-0.985	22.2-25.0	D	1.355-1.520	34.4-38.6	M
0.930-1.040	23.6-26.4	E	1.485-1.595	37.7-40.5	N
0.980-1.115	24.9-28.3	F	1.530-1.640	38.9-41.7	P
1.040-1.175	26.4-29.8	G	1.575-1.685	40.0-42.8	Q
1.095-1.240	27.8-31.5	H	1.665-1.785	42.3-45.3	R
1.160-1.305	29.5-33.1	J	1.755-1.875	44.6-47.9	S
1.220-1.375	31.0-34.9	K	1.845-1.965	46.9-50.0	T
1.285-1.395	32.5-35.4	L	1.960-2.210	49.8-56.1	U

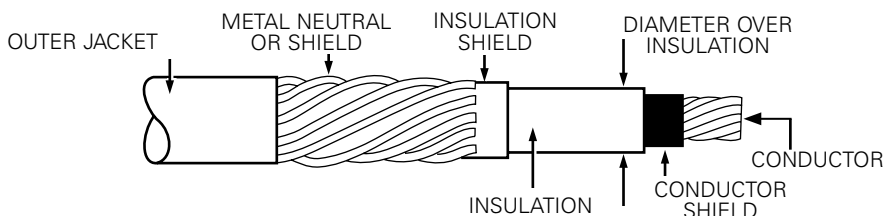


Figure 3. Illustration showing typical construction of medium voltage underground cable.

Table 4. Conductor Size and Type

Concentric or Compressed		Compact or Solid		CONDUCTOR CODE
AWG or kcmil	mm ²	AWG or kcmil	mm ²	
No Connector				
3	–	2	–	10
2	–	1	–	11
1	–	1/0	–	12
1/0	50	2/0	70	13
2/0	70	3/0	–	14
3/0	–	4/0	95	15
4/0	95	250	120	16
250	120	300	–	17
300	150	350	–	18
350	–	400	185	19
400	185	450	–	20
450	–	500 ^a	240	21
500	240	600	300	22
600	300	700	–	23
650 ^b	–	750 ^c	–	24
750 ^d	400	900	–	25
900	–	1000	500	26
1000	500	–	–	27
1250	630	–	–	28

- a. Also accepts 550 kcmil compact conductor.
- b. Also accepts 700 kcmil compressed conductor.
- c. Also accepts 800 kcmil compact conductor.
- d. Also accepts 700 kcmil concentric conductor.

Table 5. Replacement Parts and Tools

Description	Catalog Number
T-body without Test Point with shroud	PDT635
T-body with Test Point with shroud	PDT635T
Loadbreak Reducing Tap Plug (includes Built-In Alignment Tool)	L RTP635
Probe and STUD-T Assembly	2638894B01B
200 A, 35 kV Class Insulated Protective Cap	LPC235
Installation Torque Wrench	TQHD635
5/16 inch T-Wrench	TWRENCH

See Catalog CA650006EN for replacement compression connectors, cable adapters and additional information on tools.



Figure 4. Catalog Number TWRENCH
The T-Wrench is used to install the loadbreak reducing tap plug into the compression connector and T-body.



Figure 5. Catalog Number TQHD635
The Torque Tool is required to assemble a 35 kV Class PUSH-OP deadbreak connector. It is precision calibrated and hotstick operable.

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