Network Protectors, 216Y/125 V – 480Y/277 V

1. Scope

This standard covers the requirements for combination 216Y/125 V – 480Y/277 V, three-phase, submersible, transformer-mounted, roll out network protectors and accessories.

This standard applies to the following Seattle City Light (SCL) stock numbers:

Stock No.	Description
336205	1875 A network protector
336207	2825 A network protector

Fuses and relays are purchased and installed separately and are outside the scope of this standard.

2. Application

Network protectors are three-phase air circuit breakers installed in network transformer vaults to detect and isolate secondary network faults. Each network protector is mounted onto the secondary terminals of a network transformer. Network protectors are controlled both by internally mounted relays and the fire protection system cabinet installed in the vault.

3. Industry Standards

Network protectors shall meet the applicable requirements of the latest revision of the following industry standards:

IEEE C57.12.32-2002; “Submersible Equipment–Enclosure Integrity

IEEE C57.12.40-2011; “Network, Three-Phase Transformers, 2500 kVA and Smaller; High Voltage, 34 500 GrdY/19 920 and Below; Low Voltage, 600 V and Below; Subway and Vault Types (Liquid Immersed)”

IEEE C57.12.44-2014; “Requirements for Secondary Network Protectors”

4. Conflict

Where conflict exists, the following order of precedence shall apply:

1. Seattle City Light purchase order (PO)
2. City of Seattle General Terms and Conditions
3. This standard
4. Other industry standards

5. Requirements

5.1 General

Each unit shall be wired for a four-wire, solidly grounded neutral, and hard wired for 1-3-2 counterclockwise phase rotation.

Cables and terminal block shall be labeled to ensure correct phase rotation.

Each protector shall include 800/1200/1600:5 multiple rated current transformers.

The enclosure shall be submersible.

The interior shall be coated with white epoxy paint.

The door shall be constructed with hinges that allow for 160 degrees of opening when installed on either side.

The network protector shall be capable of interrupting a fault of the magnitude shown in the Fault Interrupting Rating column in Table 5.1 per IEEE C57.12.44 Section 9.2.

Table 5.1 Fault Current Interrupting Ratings

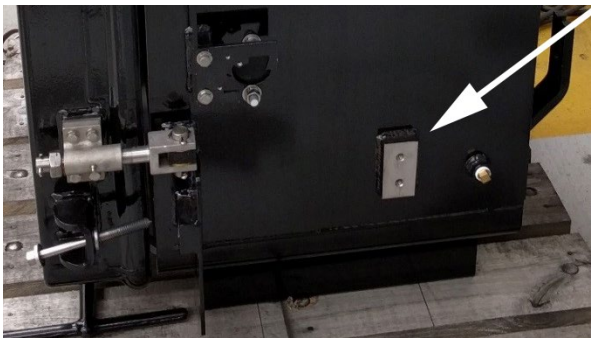
NP Current Rating (A)	NP Voltage Rating (V)	Close and Latch Rating (kA, symmetrical rms)	Fault Interrupting Rating (kA, symmetrical rms)
1875	216Y/125	25	30
1875	480Y/277	25	30
2825	216Y/125	40	60
2825	480Y/277	40	45

5.2 Ground Pad

An exterior ground pad shall be provided that meets the requirements of IEEE C57.12.44 Section 10.5.8.

Ground pad shall be installed on the lower portion of the protector right side wall. See Figure 5.2.

Figure 5.2. Network Protector with Exterior Ground Pad



5.3 Penetrations for Remote Monitoring Equipment

Two holes, with NPT threaded taps and plugs, 1/2 inch in diameter, shall be provided on the network protector case sides for routing remote monitoring equipment. Each hole shall be located on the side wall of the network protector case (not the door side or the transformer secondary terminal side), 6 inches up from the bottom of the case.

The right hand hole shall be a minimum of 3 inches away from the transformer secondary terminal side (back) of the case. See Figure 5.3a.

The left hand hole shall be a minimum of 3 inches away from the junction box. See Figure 5.3b.

The remote monitoring wiring harness is connected to one of the penetrations, depending on the layout of the vault. See Figure 5.3c.

Figure 5.3a. Penetration on NP Right Hand Side for Remote Monitoring Equipment

Figure 5.3b. Penetration on NP Left Hand Side for Remote Monitoring Equipment

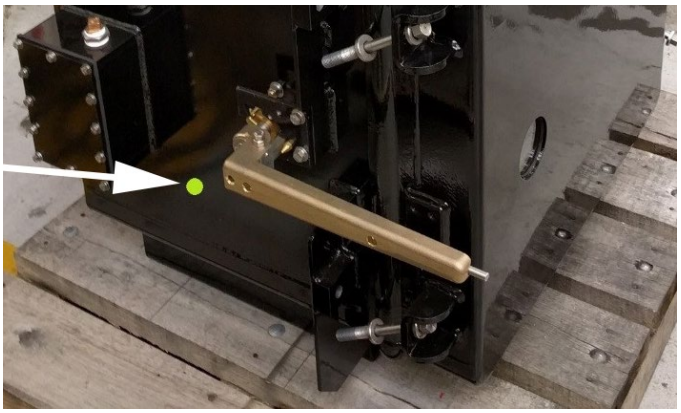
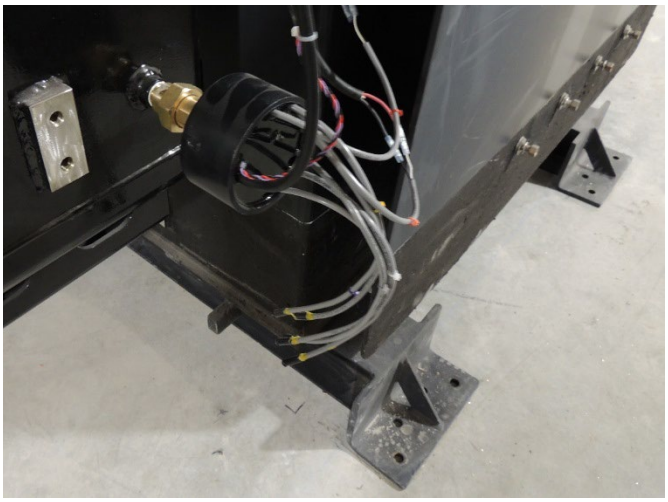


Figure 5.3c. Remote Monitoring Wiring Harness mounted on NP Right Hand Side



5.4 External Pilot Lights

A nominal 125 V to neutral (ground) single-phase circuit shall be provided from the transformer side of the breaker for external pilot lights. This 125 V circuit may also be used for motor, control, or relay circuits as required. The external pilot load will not exceed 100 W at 125 V. Transformer supplying this circuit shall not exceed 140°F when subjected to testing under no load.

Two spark plug insulated bushings shall be installed on the side of the enclosure for the installation of external pilot lights. See Figure 5.4.

Two stages (one "a" and one "b") on the auxiliary switch shall be wired for external pilot light control with a common point of the two stages connected to the 125-volt source (Section 5.2) and the "a" and "b" terminals connected to the spark plug bushings.

One "b" stage on the auxiliary switch will be wired in series between the network side of the breaker and the spark plug bushing in the throat of the transformer by Seattle City Light. The manufacturer shall supply a coil of wire of sufficient length to make this connection. One end of the coil shall be connected to the "b" stage of the auxiliary switch.

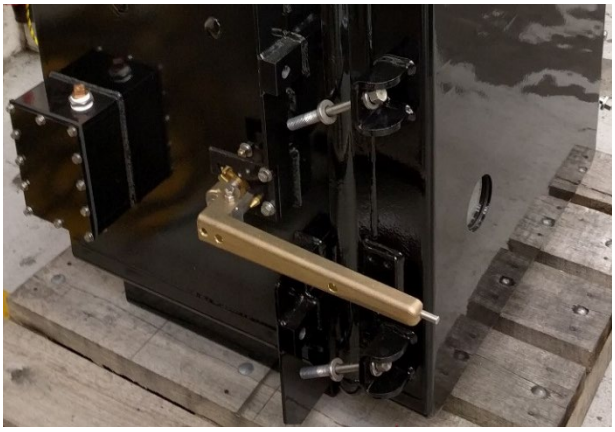
Figure 5.4. Spark Plug Bushings

5.5 External Trip and Lockout Circuits

All protectors shall have provisions for external trip and lockout circuits, including two normally closed lockout terminals and two normally open trip terminals. Their external connections shall be made through a submersible connector or connectors on the side of the case. The two external contacts for the lockout circuit shall come jumpered outside the case. The protector shall be configured such that, when the trip terminals are externally connected, the protector trips and blocks the closing circuit (locked out).

The external terminals of the waterproof connectors that penetrate the case shall be covered by a welded-on waterproof junction box with two 3/4-inch threaded taps and plugs; one tap and plug is located on the top of the junction box and the other tap and plug is on the bottom of the box. The four trip and lockout terminals shall be labeled. See Figure 5.5.

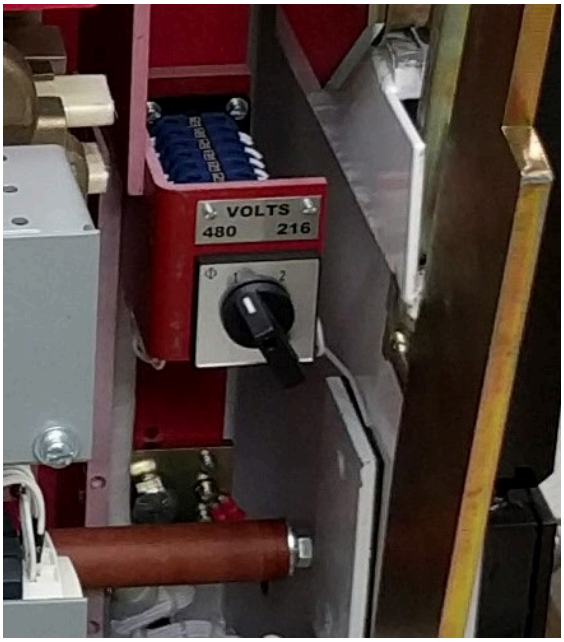
Figure 5.5. Junction Box on NP Left Hand Side



5.6 Voltage Selection Switch

Each network protector will be supplied with a voltage selection switch. See Figure 5.6.

Figure 5.6. Voltage Selection Switch



6. Testing

Manufacturer shall perform all tests as outlined in IEEE C57.12.44, sections 5 and 6.

Test results shall be provided upon request.

7. Design Changes

Manufacturer shall inform SCL in writing of all design changes that could affect the understood or published capabilities of the product.

8. Packaging

Each protector shall be supplied on its own pallet.

The pallet and all pallet accessories shall be constructed of unpainted wood and suitable for yard storage through all weather conditions.

The pallet shall be 4 inches high to accommodate lifting by both forklifts and pallet jacks. The most central pallet stringer shall be centered and a maximum of 7 inches wide to insure picking by pallet jacks.

Each protector shall be centered on pallet and banded to pallet via its lifting lugs. Protector shall be oriented on the pallet to prevent accessories (terminals, etc.) from coming into contact with pallet moving equipment or otherwise shall be enclosed by protective devices to prevent damage.

9. Shipping

Protectors may be delivered on enclosed, covered, or flatbed trucks. If protectors are delivered on flatbed trucks, they shall be side-loaded. Because Washington State law requires a 10-inch minimum side board when driving a forklift or pallet jack onto the bed of a truck or trailer, most flatbed trucks or trailers must be side-loaded to ease off-loading.

10. Seattle City Light Processes

10.1 Bid Process

Bid process details are available at www.seattle.gov.

Bids shall include details demonstrating conformance to this standard. Order of submittal details shall follow same as is presented in this standard.

Any exceptions taken to the standard shall be summarized in an attached letter, complete with section number in this standard to which exception relates. Requests for approved equal components must be submitted with first bid documents; all subsequent requests will be rejected.

10.2 Bid Completion

Upon completion of the bidding process, the successful bidder shall submit in a single electronic file the following:

- All product dimensions, including construction and mounting dimensions
- Nameplate drawing including network protector weight
- Instructional materials demonstrating the proper installation, connection, operation, and maintenance of the equipment
- Certified test report data for all factory tests
- Parts catalog including renewal parts for the protectors and accessories

10.3 Inspection and Electrical Testing

Upon delivery, all protectors will be tested and inspected by SCL. Protectors that fail to pass the tests will be returned to the manufacturer. The cost of retesting protectors that have been returned to the manufacturer for correction of defects will be charged to the manufacturer.

10.4 Guarantee

Any protector failing, due to defective design, material, and/or workmanship, within twelve months after being energized or eighteen months after delivery, whichever comes first, shall be replaced or repaired without cost to the City of Seattle. Any defect in design, material, and/or construction discovered within this period shall be corrected on all units furnished on this order, at the manufacturer's expense, either by repair or replacement.

11. Issuance

Stock Unit: EA

12. Approved Manufacturers

Stock No.	Description	Richards Model No.	Cooper Power Systems Model No.
336205	1875 A network protector	313NP	CM22 8231A75G23
336207	2825 A network protector	313NP	CM22 8231A75G24

13. Accessories

Item	Stock No.	Manufacturer	Part No.	Description	Figure
Motor relay assembly with bracket	014411	Richards	313-0007-10	Motor relay assembly for replacement of Richards assembly.	13a
Y-type fuse	683471	Burndy	Y-25	Silver-plated copper for network protectors with two-bolt fuse mountings. Y-25 style.	13b
		Eaton	8313A25H12		
		Richards	NPF-25-L		
Z-type fuse	013857	Eaton	8313A25H04	Pure copper, Z-25 style.	13c
		Richards	NPF-25-Q (1333 FLA)		
	683472	Eaton	8313A25H08	Pure copper, Z-37.5 style.	13c
		Richards	NPF-37.5-Q (2000 FLA)		
Lead alloy fuse	683480	Eaton	1254872	Laminated type, standard speed for use in 480 Y / 277 V network protectors.	13d
		Richards	312-3251-00		
	683481	Eaton	1300550		
		Richards	312-3252-00		

Figure 13a. Motor Relay Assembly with Bracket

Figure 13b. Y-Type Fuse

Figure 13c. Z-Type Fuse

Figure 13d. Lead Alloy Fuse

14. Sources

Hanson, Brett; SCL Standards Engineer, subject matter expert, and originator of 4382.16

Mahar, Charles; Network Crew Chief and subject matter expert for 4382.16

Ratsavong, Virakone; Network Protector Supervisor, subject matter expert for 4382.16

SCL Material Standard 4381.36 (canceled); “Protector, Secondary Network, Transformer-Mounted, Submersible”