

Network Protectors, 480Y/277 V and Accessories



1. Scope

This standard covers the requirements for 480Y/277 V, three-phase, submersible, transformer-mounted, dead front, drawout network protectors and accessories. This standard applies to the following Seattle City Light (SCL) stock numbers:

Stock No.	Description
337205	1875 A network protector
337207	2825 A network protector
337209	3500 A network protector
337210	4500 A network protector
013532	Network protector remote control box

2. Application

Network protectors are three-phase air circuit breakers installed onto network transformer secondary terminals to detect and isolate secondary network faults. These 480 V network protectors are purchased with arc flash mitigation features because these hazards are greater than at 216 V.

Dead front gear ensures that no live parts are exposed when the door is open. Drawout gear indicates that the breaker can be racked out without unbolting an electrical connection.

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3. Industry Standards

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

IEEE C57.12.32-2002; IEEE Standard for Submersible Equipment—Enclosure Integrity

IEEE C57.12.40-2011; IEEE Standard for 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; IEEE Standard 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
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5. Requirements

5.1 General

The network protector shall be constructed of all new materials, no used, refurbished, or rebuilt parts, pieces, or other apparatus shall be used.

The network protector shall be a fully interlocked, dead front, four (4) position drawout design with externally mounted fuses for easy removal of the unit from the enclosure for maintenance and inspection.

The network protector shall have a standard spring-close mechanism or stored-energy mechanism. This mechanism shall be controlled by a toggle-cam device that will not allow closure of the contacts until the springs contain sufficient energy to close and latch the contacts into a fault rated as shown in the Close and Latch Rating column in Table 5.1.

The network protector shall be capable of interrupting a fault of the magnitude shown in the Fault Interrupting Rating column in Table 5.1.

Table 5.1. Fault Current Interrupting Ratings

NP Current Rating (A)	Close and Latch Rating (kA, symmetrical rms)	Fault Interrupting Rating (kA, symmetrical rms)
1875	35	42
2825	45	65
3500	65	85
4500	65	85

All harness wiring within the protector shall be Teflon insulated 1000 V, #16 AWG, 200°C.

The network protector shall have three Eaton-type NPL current limiting fuses having an interrupting capacity of 150,000 A (symmetrical rms) at 600 V on the network side connection of the network protector (one per phase in individual housings) as backup protection in the event of network protector mis-operation.

Interlocks shall be provided to prevent the protector from being moved into or out of its connected position in the housing unless the protector is open.

Auxiliary contacts and control wiring shall be included for use with remote pilot devices (four-wire) to provide remote trip and lockout. Three Form C spare auxiliary contacts shall be included.

A non-corrosive external handle shall be mounted on the enclosure to open or close the protector without opening the enclosure.

An arc flash reduction module (NPARMS: protective device which will open the network protector to limit the available fault current when working on an adjacent network protector) shall be provided with each 480Y/277 V network protector. This device shall have the following characteristics:

- Analog protective scheme that can sense and trip in 4 μ S
- Does not require power for protection circuit (power harvested from fault current)
- Non-directional
- Communications ready for activation and alarm on fault

The breaker shall have the ability to be remotely racked from the connected position to the test position via a communications or external pendant all while the protector door is closed. Electrical interlocks shall be in place to prevent remote racking operation unless the breaker is open.

Indicator lights via a stack light shall be mounted on the exterior of the tank to provide visible indication of the breaker status, NPARMS status, and breaker position.

The breaker shall have a diagnostic module to illustrate key failed components (Motor, Trip Circuit, and Spring Release Coil). This information shall also be available via communication alarms.

Each unit shall be wired for a four-wire, solidly grounded neutral, and hardwired for a 1-3-2 counterclockwise phase rotation 480Y/277 V system.

The enclosure shall be submersible.

The interior shall be coated with white epoxy paint.

The door shall be constructed with hinges that allow for 120 degrees of opening when installed on either side.

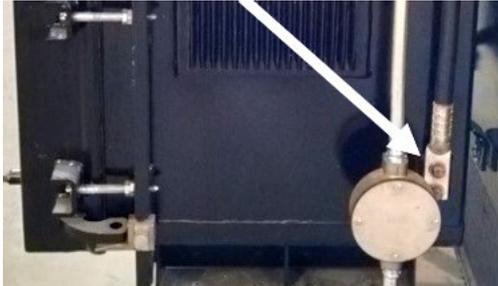
Fuses shall be installed external to the breaker compartment. Each fuse shall have a viewing window.

Relays shall be purchased and installed separately.

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

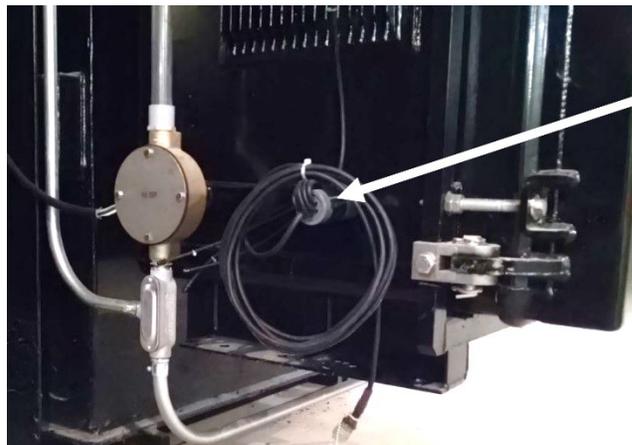
Two holes, with NPT threaded taps and plugs, 1/2 inch in diameter, shall be provided on the network protector case sides for routing remote monitoring equipment. See Figure 5.3.

Each hole shall be located on the side wall of the network protector case (not the door side or the transformer secondary terminal side) per Table 5.3.

Table 5.3. Hole Locations for Monitoring Equipment

Stock No.	Distance from Transformer Case (in)	Distance from Bottom of Network Protector (in)
337205	15	6
337207	17	6
337209	17	6
337210	17	6

Figure 5.3. Left Hand-Side Penetration for Remote Monitoring Equipment



5.4 Penetrations for Viewing Contacts

Two windows shall be provided on the network protector case sides for viewing the breaker contacts. Windows shall be positioned to allow technicians to view contacts and confirm that contacts are fully engaged. See Figure 5.4.

Figure 5.4. Left Hand-Side Penetration for Viewing Contacts



5.5 Network Protector Operating Buttons

Buttons for operating network protector shall be permanently labeled and color coded. If sticker-type labels are used, additional phenolic nameplates shall be supplied below the buttons. See Figure 5.5.

Figure 5.5. Operating Buttons



5.6 Remote Racking Module

A remote racking module shall be provided with updated firmware. The module shall maintain remote racking memory and the previous network protector state in the event that power is disconnected.

5.7 Remote Racking Cable Routing

Remote racking cable shall be routed through the side of the cable housing and sufficient cable length provided to prevent dislocation of cable bundle during all racking operations including when the racking system is in full disconnect position. See Figure 5.7.

Labels shall be provided on the remote racking system and stack light fuses.

Figure 5.7. Remote Racking System Cables



5.8 Labeling

Each cable shall be labeled as follows: remote racking power wire shall be black; remote racking ground wire shall be green or white with green stripe.

Cables shall be labeled and routed at Indicating Diagnostic Module to insure correct phase rotation. See Figure 5.8a.

Figure 5.8a. Cable Labels at Indicating Diagnostic Module



Cables and terminal block shall be labeled to ensure correct phase rotation. See Figure 5.8b.

Figure 5.8b. Labels at Terminal Block



6. Testing

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

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 the pallet and banded to the pallet via its lifting lugs. Protectors 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.

Bid documentation shall be submitted with 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
- 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. 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

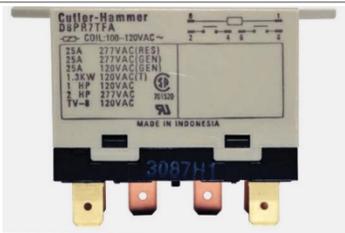
Stock Unit: EA

12. Approved Manufacturers

Stock No.	Description	Manufacturer	Model
337205	1875 A network protector	Eaton	CM52
337207	2825 A network protector	Eaton	CM52
337209	3500 A network protector	Eaton	CM52
337210	4500 A network protector	Eaton	CM52
013532	Network protector remote control box	Eaton	NAS0520G20

13. Accessories

Table 13. Network Accessories

Item	Stock No.	Eaton Part No	Notes	Figure
Motor and operator assembly	014620	NKB4001G05		
Indicating diagnostic module	014621	70C1554G01	Includes ARMS	
BF motor control relay	014622	D8PR7TFA		
BF relay anti-close	014623	KUP-11A55F-120		
Trip actuator	014624	2C12491G11		
Spring release 120 Vac closing coil	014625	2A11792G21		
Auxiliary switch	014626	NKB4003G03	4 form C, Pos 1 Breaker trip and close controls	

Item	Stock No.	Eaton Part No	Notes	Figure
Auxiliary switch	014627	NKB4003G11	4 Form C, Pos 4 indicators	
Counter kit	014628	2A10890G03-N		
LS1 switch	014629	X-10GW22-B		
NP ARMS kit	014630	NAS0427G03	Complete kit, without latching relay, with IDM	
NP ARMS power supply	014631	NAS0426G01		
480 V control power transformer	014632	C36030FB		

Item	Stock No.	Eaton Part No	Notes	Figure
1875 A fuse	014085	140D318G01	Eaton NPL current-limiting fuse	
2825 A fuse	014086	140D318G02	Eaton NPL current-limiting fuse	
3500 A fuse	014087	140D318G08	Eaton NPL current-limiting fuse	
4500 A fuse	014088	5982C64G02	Eaton NPL current-limiting fuse	
Stack light	None 014633	SSL-100-5 SSL-100-5-71	5-color, 50-inch height, PVC pole 5-color, 71-inch height, PVC pole	
Remote racking device	014634	NWB2048G05	Rem-Rack	
Control pendant	None	NWA9004G03	4-button pendant for operating NP Arms and Remote racking via a cable. Do not ship with each unit.	

14. Sources

Hanson, Brett; SCL Standards Engineer, subject matter expert, and originator of 4384.80

Hornbeck, Trenton; Network Crew Chief and subject matter expert for 4384.80

Mahar, Charles; Network Crew Chief and subject matter expert for 4384.80

Ratsavong, Virakone; Network Protector Supervisor, subject matter expert for 4384.80