Electricity Distribution

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Company Directive

STANDARD TECHNIQUE: SD5D/5

Relating to Arrangements for LV Cut-outs

Policy Summary

This Standard Technique specifies standard Low Voltage (LV) cut-out arrangements for metering purposes.

Author: **Seth Treasure**

Implementation Date: **May 2024**

Approved by:

Carl Ketley-Lowe
Head of Engineering Policy

Date: **10th May 2024**

Target Staff Group	**Staff involved in the design, installation, maintenance and operation of the LV system.**
Impact of Changes	**Amber - Changes affect staff involved in the design, installation, maintenance and operation of the LV system.**
Planned Assurance Checks	**Managers shall ensure that all staff involved in the design, installation, maintenance and operation of the LV system are familiar with, and follow, the requirements of this document.**

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IMPLEMENTATION PLAN

Introduction

This document specifies the standard LV cut-out arrangements used for metered connections and should be read in conjunction with ST: SD5A (*Design of Low Voltage Domestic Connections*), ST: SD5C (Low Voltage Connections to Multiple Occupancy buildings) and ST: SD5E (*Design for Low Voltage Commercial and Industrial Connections*).

Main Changes

This document has been updated to permit the installation of a 200A rated heavy duty cut-out for use with sufficiently rated whole current metering.

Impact of Changes

Staff involved in the design, installation, maintenance and operation of the LV system must be made aware of the latest amendments to this document.

Target Staff Group	**Staff involved in the design, installation, maintenance and operation of the LV system.**
Impact of Changes	**Amber - Changes affect staff involved in the design, installation, maintenance and operation of the LV system.**

Implementation Actions

The changes detailed within this document will be disseminated to the business via the 'Dissemination Engineers'.

Implementation Timetable

This Standard Technique shall be implemented with immediate effect, for any new or substantially modified connection. Connection designs created prior to the implementation of the document will be honoured, however, any requoted connections after the implementation date will have to comply with the noted amendments.

REVISION HISTORY

Document Revision & Review Table		
Date	**Changes / Comments**	**Author**
May 2024 Issue 5	• Requirement for 'Ultra Destruct' label to be installed at all termination points • Inclusion of HD cut-out arrangements with sufficiently rated whole current metering due to suppliers not following ELEXON BSCP516. • 3.9(i) – Meter positions to ideally not be within metallic structure (for smart meters) • Dimension requirements for HD cut-out and W/C metering arrangement • Dimensions of HD cut-out and metering	Seth Treasure
August 2023 Issue 4	• Changes made to detail standardisation of fusing • Definitions page added • Minor amendments made throughout • Removal of 2 x single phase loads fed via three phase cut-out.	Seth Treasure
November 2020 Issue 3	• Minor amendments to align policy document with POL: GE1. • Clauses 3.1 to 3.3 have been rearranged to start with three-phase and end with single-phase. • Figures 1A to 6E have been added to and reordered, to start with three-phase and end with single-phase. • Page 2 has been added, to include an Implementation Plan. • References to withdrawn document ST: SD6B have been replaced with references to ST: SD5E. • The labels, throughout this ST: SD5D have been revised. • References to SNE from a CNE main have been added. • Figures have been added to show SNE from a CNE main.	M. Pope
February 2013 Issue 2	• Requirements for multi-service distribution boards have been removed as these are now covered in ST: SD5C. • The arrangements described in section 3.1.3 and in figures 2A, 2B, 2C and 2D are only applicable where the mains cable or overhead line is single phase.	A. Hood

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1.0 Introduction

This document specifies the standard LV cut-out arrangements used for metered connections and should be read in conjunction with ST: SD5A (*Design of Low Voltage Domestic Connections*) and ST: SD5E (*Design for Low Voltage Commercial and Industrial Connections*).

Requirements for multi-service distribution boards are defined in ST: SD5C (*Low Voltage Connections to Multi-occupancy and Equivalent Buildings*).

Requirements for maximum permissible Earth Fault and Phase to Neutral Loop Impedance values can be found in ST: SD5R (*Earth Fault Loop Impedances and Phase to Neutral Loop Impedances*).

1.1 Definitions

- CT metering – A measuring device that is used to safely reproduce a low level current that accurately represents a higher current level e.g. 600/5 CT where the current flow of 300A in the primary circuit will be represented as 2.5A within the secondary circuit.

- Cyclic – Where the customers demand profile has a peak duration not exceeding eight hours of a day and with a lower demand duration which is 70% or lower than the peak demand period and which last for sixteen hours following the peak demand period.

- Polyphase – Where a connection incorporates more than one phase from a multiple phase network e.g. split phase, two phase or three phase.

- Sustained – Where a customer has a flat demand profile which is $\geq$ 70% of the capacity of the equipment.

- Single Phase – A conductor incorporating a single live conductor having a voltage of 230V (+ 10%, - 6%) when measured phase to neutral.

- Split phase – A conductor incorporating two live conductors having a voltage of 460V when measured phase to phase.

- Three phase – A conductor incorporating three live conductors having a voltage of 400V when measured phase to phase.

- Two phase – A conductor incorporating two live conductors having a voltage of 400V when measured phase to phase.

- Whole current metering – Where 100% of the current flow, ‘flows’ through the meter.

2.0 Policy

The document covers the following phase connections in order of preference:

- Three-phase
- Split-phase
- Two-phase (two phases of a three-phase system)
- Single-phase

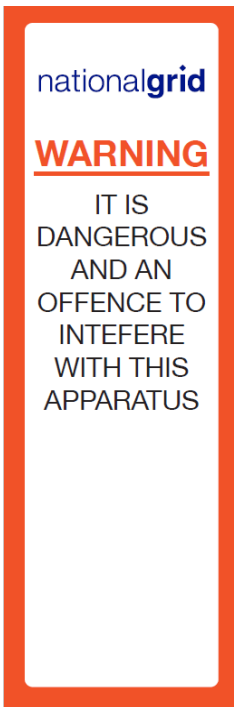
The arrangements and fuse sizes specified in this document are applicable to new or substantially modified installations.

Any single-phase, split-phase or two-phase installation that could be confused with a three-phase installation should carry a label, installed in a prominent position close to the cut-out/s. Labels are ordered using the order form available from the Corporate Print section within the Purchasing Catalogue.



Not Compatible Label
(NGED Ref. 400149)

At all termination positions the 'Ultra Destruct' warning label as shown below shall be installed on the cut-out.



NGED Ref. 400059

2.1 Standard fusing arrangements

The below chart details the typical fusing arrangement to be provided to varying connections.

Connection Use	Metered Phases		
	Single-Phase	Split / Two-Phase[1,2]	Three-Phase
Domestic	18.4kVA *(80A)*	36.8kVA *(80A)*	41.4kVA *(60A)*
Non-Domestic	18.4kVA *(80A)*	36.8kVA *(80A)*	55.2kVA *(80A)*
Vehicle Charger[1]	23kVA *(100A)*	46kVA *(100A)*	69kVA (100A)

Table 1 - Standard fusing arrangement for connections incorporating a domestic style cut-out

Notes:

[1] The primary purpose and majority of the capacity of the connection is for vehicle charging and the metering cubicle complies with the requirements as noted within this document.

2.2 Three phase connections

Three-phase connections are the preferred means of connection to one of NGED's distribution systems.

Where new or substantially modified connections are to be made onto a mains conductor with three phases available, these connections shall utilise three-phase conductors and terminations, in accordance with ST: SD5A.

2.2.1 Three phase loads of up to 55.2kVA (fusing at 60A or 80A per phase)

Three-phase connections of up to 80A per phase are derived from a 100A rated cut-out and three-phase service cable. The maximum cut-out fuse rating is 80A and the service cable must be rated at, or above, the cut-out fuse.

- Domestic connections shall typically be fused at 60A per phase.
- Non domestic connections shall be fused at 80A per phase.

Figure 1A, 1B, 1C and 1D show standard connection arrangements for PME, SNE and directly earthed installations. A typical metering arrangement is shown in Figure 1E.

Notes:

[1] Where more than two single phase connections are desired from a three phase cut-out, the use of a 7 way Multi Service Distribution Board (MSDB) is preferred due better isolation capabilities and availability of neutral connections.

2.2.2 Three phase loads greater than 55.2kVA and up to 69kVA (fusing at 80A per phase) – Cyclic load profile

Excluding connections primarily for vehicle chargers located in a free standing pillar positioned remote from a building.

Where a customer requests a supply capacity of up to 69kVA (request for cut-out fused at 100A) and where the demand profile is deemed to be cyclic in nature by the NGED planner or evidence is provided (proposals or historic) to confirm the cyclic load profile, a capacity of up to 69kVA will be provided with the following setup;

- 100A rated dough moulded clay (DMC) type cut-out is installed. This is the current grey-coloured cut-out purchased by NGED;
- Service cable is rated at 100A or above (e.g. 35mm^2 hybrid or 25mm^2 copper concentric cable);
- The cut-out is fused at 80A per phase
- The connection is to a non domestic installation

Where the demand profile cannot be deemed or proven to be cyclic in nature, the supply should be provided with a connection arrangement as detailed by one of the arrangements within the following sections or as noted within Standard Technique: SD5E.

2.2.3 Three phase loads of up to 69kVA – electric vehicle chargers (fusing at 100A per phase)

Where a customer requests a supply capacity of up to 69kVA and where the primary purpose of the connection is for electric vehicle charge points (or similar), the connection will be provided with the following setup;

- 100A rated dough moulded clay (DMC) type cut-out is installed. This is the current grey-coloured cut-out purchased by NGED;
- Service cable is rated at 100A or above (e.g. 35mm^2 hybrid or 25mm^2 copper concentric cable);
- The cut-out is fused at 100A per phase;
- The connection will be provided to a free standing pillar installed remotely from any building;
- The metering cubicle / free standing pillar will incorporate high and low ventilation;
- The installation will be located in a position free from accidental or malicious damage;
- The cubicle will have sufficient IP rating for the location in which it will be positioned;
- The installation will comply with the requirement noted within Standard Technique: SD5G part 1 section 10.
- The below label ‘100A rated’ (NGED reference 400189) shall be installed on the crutch cover to notify operators of the rating of the installation.



100A Label
(NGED Ref. 400189)

2.2.4 Three phase loads of up to 69KVA with a sustained load profile

Three phase loads of up to 100A where the demand profile has deemed to be sustained are normally derived from one of the following options and the maximum capacity provided will be 69kVA.

Option 1. Downgrade of supply only. Heavy duty cut-out & CT metering.

For a request to downgrade a supply where a Heavy duty cut-out and CT metering panel is already in-situ, NGED will initially request the customer to arrange with the supplier for the removal of the standing charges associated with the connection when the following apply;

- The fuses are downgraded to 100A
- The load profile is within the scope of Profile Class 3 or 4 i.e. the load does not exceed 100A.
- NGED provide a revised Line Loss Factor (LLF code).

The arrangement has been facilitated due to the change in ELEXON BSCP516 (allocation of profile classes).

However, where a supplier does not wish to comply with the change in legislation, NGED will provide a connection in accordance with option 2.

Option 2. Heavy duty cut-out & whole current metering

NGED are able to supply a sustained load of up to 69kVA via the following arrangement;

- The supply cable will as a minimum be 95mm² wavecon or equivalent
- The arrangement will utilise a Heavy duty cut-out rated at 200A as a minimum
- The terminals will be confirmed as able to accommodate the termination of 25mm² CU tails – the outgoing terminals may be required to be changed*.
- The supplier will provide a sufficiently rated whole current meter and metering tails
- The cut-out will utilise 100A J type fuses
- Mains cable entry requirements are specified in Section 3.10.;
- The below label ‘100A rated’ (NGED reference 400189) shall be installed on the crutch cover to notify operators of the rating of the installation.
- The space made available for the termination equipment shall permit the possible future augmentation to a full CT metered arrangement i.e. comply with Figure 9.



100A Label
(NGED Ref. 400189)

Figure 1F, 1G, 1H and 1I provide further information.

Where an existing combined cut-out and CT metering panel is in place, the CT metering panel may be removed and the existing cut-out left in-situ subject to appropriate works being undertaken to seal any gaps / holes created by the removal of the CT panel.

A guide to the works required for the removal of a Lucy CT metering panel for a combined arrangement is available <here>.

Notes;

*The present HD cut-outs available are capable of accepting 25mm² - 300mm² outgoing conductors but pre 2022 equipment will have to be assessed for the ability to terminate 25mm² CU tails.

2.2.5 Three phase loads greater than 69kVA – heavy duty cut-out & CT metering

Three phase loads in excess of 100A are normally derived from a three phase mains cable (e.g. Wavecon) and a combined Heavy duty cut-out/CT metering panel. The maximum capacity is dictated by cut-out and cable ratings.

- Mains cable entry requirements are specified in Section 3.10.;
- The cut-out fuse must be rated at, or below the rating of the cut-out and mains cable;
- CT metering is required where the load is greater than 100A per phase;

Figure 2A, 2B, 2C and 2D provide further information.

2.2.6 Conversion of single phase connections to three phase, for loads of up to 41.4kVA (fusing at 60A per phase)

Where an existing single-phase connection has previously been installed to a premises and the customer connection is required to be upgraded to a three-phase supply (e.g. due to the installation of Low Carbon Technologies), provided that there is sufficient space in the existing metering position, the existing single-phase cut-out and metering will be replaced with a 100A rated three-phase DMC cut-out, fused at 60A (13.8kVA) per phase – total combined capacity of 41.4kVA.

2.3 Split phase / two phase connections

Split-phase connections are derived from split phase transformers or in some cases from three phase transformers connected in a split phase configuration. The two phases operate with 180° phase displacement and therefore with balanced current flow on the two phases, no current will flow in the neutral.

Two phase connections are derived from two separate phases of a three phase system, typically where old direct current (DC) cables are operating with an alternating current (AC). In this case, the phases operate with 120° phase displacement and in a perfectly balanced arrangement the neutral current will be equal to that of each phase. As a result, there will be a neutral conductor voltage drop and therefore the configuration is not as desirable as a balanced split phase or three phase connection.

Two phase connections shall not be provided where the mains cable or overhead line has three phases available.

2.3.1 **Split phase and two-phase loads of up to 36.8kVA (fusing at 80A per phase)**

Split-phase and two-phase connections of up to 80A per phase are derived from a 3-phase service cable and 100A rated cut-out. The maximum cut-out fuse rating is 80A and the service is rated at, or above, the fuse size. Further information is provided in Figure 3A, 3B, 3C and 3D and a typical metering arrangement is shown in Figure 3E.

A 25mm^2 copper tail (minimum) is used to connect the third core to the neutral.

A 'Not Compatible Label' (NGED Ref. W400149) shall be installed adjacent to the cut-out to warn that 3 phases are not available.

The maximum number of single phase consumers that may be serviced from a standard 100A split or two-phase cut-out is two and the maximum number of split or two-phase consumers that may be connected is one[1] – i.e. Planners and Designers shall not design to allow shared fuses.

Notes:

[1] Where multiple single phase connections are desired from a three phase cut-out, the use of a 7 way Multi Service Distribution Board (MSDB) is preferred due better isolation capabilities and availability of neutral connections.

2.3.2 **Split phase and two-phase loads of up to 46kVA (fusing at 80A per phase)**

Excluding connections primarily for vehicle chargers located in a free standing pillar positioned remote from a building.

Where a customer requests a supply capacity of up to 46kVA (request for cut-out fused at 100A) and where the demand profile is deemed to be cyclic in nature by the NGED planner or evidence is provided (proposals or historic) to confirm the cyclic load profile, a capacity of up to 46kVA will be provided with the following setup;

- 100A rated dough moulded clay (DMC) type cut-out is installed. This is the current grey-coloured cut-out purchased by NGED;
- Service cable is rated at 100A or above (e.g. 35mm^2 hybrid or 25mm^2 copper concentric cable);
- The cut-out is fused at 80A per phase
- A 'Not Compatible Label' (NGED Ref. W400149) shall be installed adjacent to the cut-out to warn that 3 phases are not available.

Where the demand profile cannot be deemed or proven to be cyclic in nature, the supply should be provided with a connection arrangement as detailed by the following section and as noted within Standard Technique: SD5E. A larger connection arrangement may incorporate CT metering working as a whole current metering arrangement which excludes half hourly metering charges.

2.3.3 Split phase and two-phase loads of up to 46kVA – electric vehicle chargers (fusing at 100A per phase)

Where a customer requests a supply capacity of up to 46kVA and where the primary purpose of the connection is for electric vehicle charge points (or similar), the connection will be provided with the following setup;

- 100A rated dough moulded clay (DMC) type cut-out is installed. This is the current grey-coloured cut-out purchased by NGED;
- Service cable is rated at 100A or above (e.g. 35mm^2 hybrid or 25mm^2 copper concentric cable);
- The cut-out is fused at 100A per phase;
- The connection will be provided to a free standing pillar installed remotely from any building;
- The metering cubicle / free standing pillar will incorporate high and low ventilation;
- The installation will be located in a position free from accidental or malicious damage;
- The cubicle will have sufficient IP rating for the location in which it will be positioned;
- The installation will comply with the requirement noted within Standard Technique: SD5G part 1 section 10.
- The below label ‘100A rated’ (NGED reference 400189) shall be installed on the crutch cover to notify operators of the rating of the installation.



100A Label
(NGED Ref. 400189)

2.3.4 Split phase and two phase loads of up to 46KVA with a sustained load profile – heavy duty cut-out & whole current metering

Loads with a sustained load profile of up to 46kVA are normally derived from a three phase mains cable (e.g. Wavecon), heavy duty cut-out and sufficiently rated whole current metering. The connection will be provided with the following setup;

- The supply cable will as a minimum be 95mm² wavecon or equivalent
- The arrangement will utilise a Heavy duty cut-out rated at 200A as a minimum
- The supplier will provide a sufficiently rated whole current meter and metering tails
- The cut-out will utilise 100A J type fuses

- Mains cable entry requirements are specified in Section 3.10.;

- The below label ‘100A rated’ (NGED reference 400189) shall be installed on the crutch cover to notify operators of the rating of the installation.



100A Label
(NGED Ref. 400189)

Figure 4A, 4B, 4C and 4D provide further information.

2.3.5 Split phase and two-phase loads in excess of 46kVA – Heavy duty cut-out & CT metering

The maximum capacity for two-phase connections is 100A per phase. CT metering is not available for new or substantially modified two-phase installations.

The maximum capacity for split-phase connections is limited by mains cable and distribution transformer ratings. The largest split-phase transformer used as standard is 100kVA, although in South Wales Area larger three-phase transformers are sometimes connected in split-phase configuration to provide increased capacity.

CT metering is required for all split phase loads above 100A per phase.

Mains cable entry requirements are specified in Section 3.10.

The cut-out fuse size must be rated at, or below, the cut-out and mains cable ratings.

A ‘Not Compatible Label’ (NGED Ref. W400149) shall be installed adjacent to the cut-out to warn that 3 phases are not available.

Further information is provided in Figure 4E, 4F, 4G and 4H.

2.4 Single phase Connections

Where a single phase connection is provided, the standard arrangement will be to provide a connection capacity of up to 18.4kVA/80A. Where a customer requests a greater connection capacity the preferred option will be to utilise a three-phase or split-phase connection. If only single-phase mains conductors are available, for example, where a single phase transformer has been installed, connections of up to 160A/36.8kVA can be provided.

Consideration shall be given to the resultant neutral current and required cable to maintain thermal capacity of the neutral (the neutral current will equal the combined phase current).

CT metering shall not be provided for new or substantially modified single-phase connections. Single-phase supplies should only be provided to new connections to the distribution system where it has been determined that it would not be reasonably practicable to provide a connection consisting of multiple phases (i.e. three-phase, split-phase or two-phase, in that respective order of preference).

2.4.1 **Single phase loads of up to 18.4kVA (fusing at 80A)**

Single-phase connections are normally restricted to 80A to ensure that the temperature of the equipment is maintained to a value compliant with British Standards, irrespective of the locality of the equipment. The standard fuse rating shall be 80A, however, where appropriate, a lower rated fuse may be used to provide smaller capacity connections (e.g. street furniture or multiple occupancy building connections).

The following fuses are available for use with smaller capacity connections;

- 20A – item number 41930
- 30A – item number 31617
- 60A – item number 31618
- 80A – item number 31619

The service cable and the tails connected to the cut-out shall be rated at, or above, the cut-out fuse rating, taking account of the installation method.

Figure 5A, 5B, 5C and 5D show standard connection arrangements utilising three-phase cut-outs, with single-phase cut-out equivalents shown in Figures 5E, 5F, 5G and 5H. Typical metering arrangements are shown in Figures 5I and 5J.

Where a single-phase connection is derived from a three-phase cut-out with only a single fuse inserted (and empty cartridges within the remaining two fuse-ways), a suitable 'Connect to L*' label (Figure 5K) and 'Not Compatible Label' (NGED Ref. W400149) shall be installed adjacent to the cut-out to warn that 3 phases are not available.

The maximum number of single-phase consumers that may be serviced from a standard, 100A rated single-phase cut-out is one – i.e. Planners and Designers shall not design to allow shared fuses.

2.4.2 **Single phase loads of up to 23kVA (fusing at 80A)**

Excluding connections primarily for vehicle chargers located in a free standing pillar positioned remote from a building.

Where a customer requests a supply capacity of up to 23kVA (request for cut-out fused at 100A) and where the demand profile is deemed to be cyclic in nature by the NGED planner or evidence is provided (proposals or historic) to confirm the cyclic load profile, a capacity of up to 23kVA will be provided with the following setup;

- 100A rated dough moulded clay (DMC) type cut-out is installed. This is the current grey-coloured cut-out purchased by NGED;
- Service cable is rated at 100A or above (e.g. 35mm^2 hybrid or 25mm^2 copper concentric cable);
- The cut-out is fused at 80A per phase

Where the demand profile cannot be deemed or proven to be cyclic in nature, the supply should be provided with a connection incorporating multiple phases (preferably three phase or split phase).

2.4.3 Single phase loads of up to 23kVA – electric vehicle chargers (fusing at 100A per phase)

Where a customer requests a supply capacity of up to 23kVA and where the primary purpose of the connection is for electric vehicle charge points (or similar), the connection will be provided with the following setup;

- 100A rated dough moulded clay (DMC) type cut-out is installed. This is the current grey-coloured cut-out purchased by NGED;
- Service cable is rated at 100A or above (e.g. 35mm^2 hybrid or 25mm^2 copper concentric cable);
- The cut-out is fused at 100A per phase;
- The connection will be provided to a free standing pillar installed remotely from any building;
- The metering cubicle / free standing pillar will incorporate high and low ventilation;
- The installation will be located in a position free from accidental or malicious damage;
- The cubicle will have sufficient IP rating for the location in which it will be positioned;
- The installation will comply with the requirement noted within Standard Technique: SD5G part 1 section 10.
- The below label '100A rated' (NGED reference 400189) shall be installed on the crutch cover to notify operators of the rating of the installation.



100A Label
(NGED Ref. 400189)

2.4.4 Single-phase loads from 80A to 160A

These connections shall only be used where the mains cable or overhead line only has a single phase available. In all other cases a poly-phase (i.e. three-phase, split-phase or two-phase) connection shall be provided as this reduces the unbalance on the network. The connection is derived from 2 x single phase cables, 2 x single phase cut-outs and poly-phase metering. Further information is provided in Figure 6A, 6B, 6C and 6D.

The installation shall not be provided via a three phase cutout due to the concern that the neutral connector components of the cut-out will exceed that noted within the British Standard.

The maximum cut-out fuse used with this arrangement is 80A and the service cable rated at 80A per phase or higher.

A 25mm^2 copper tail (minimum) is used to connect together the two cores used for the neutral.

A ‘Not Compatible Label’ (NGED Ref. W400149) shall be installed adjacent to the cut-out to warn that 3 phases are not available.

The customer must split their load into two groups, each of which is connected to a separate cut-out. A typical arrangement is shown in Figure 6E.

2.5 Looped Services

In order to prevent cut-outs from overheating, service cables shall not normally be looped from the bottom of cut-outs.

Where multiple metered connections are required to be provided from one cut-out, the connections shall preferably be provided via a mini distribution board to ensure that sufficient neutral and phase connections are provided and that supplies can be disconnected independently without causing an interruption of supply to any other customer.

To access the neutral block the L3 fuse cartridge has to be withdrawn.

2.6 Bunching Service Cables

Standard split-phase, two phase and, in some cases, single-phase arrangements require the cores of three-phase cables to be bunched together. It can also be helpful to bunch cores together to reduce voltage drop on long service runs. In order to minimise the risk of confusion the following steps shall be taken:

- Bunching is normally only allowed above ground (i.e. where the connections can be visually inspected and removed if required, for example at pole terminations and cut-outs). The only exception is for split phase and two phase connections where a service cable is jointed to a mains cable that only has two phase conductors (i.e. historic DC cables).

- Bunching shall be noted on NGEDs maps.

- Incoming cables shall always be terminated colour true at each cut-out. Additional, adequately rated loops (between the bottom cut-out terminals) shall be installed where bunching is required.

A typical arrangement for the termination of a three-phase service cable into a single-phase cut-out (e.g. to reduce voltage drop over a long single-phase service) is shown in Figure 5L.

The general arrangement for bunching a three phase cable for a split phase arrangement is as follows;

Core	Phase
L1	L1
L2	L2
L3	N
N	N

2.7 Earthing

For each arrangement described, diagrams show PME, SNE and direct earthing arrangements. PME earthing is preferred where this can be provided economically and safely.

A suitable label (PME, SNE, TT, SNE derived from CNE main or direct earthing) shall be placed in a prominent position close to the cut-out. Standard labels are given below and can be ordered using the order form available from the Corporate Print section of the Purchasing Catalogue.

nationalgrid

The earthing facility provided with this supply is **PME (TN-C-S)**.

DO NOT connect the earthing conductor to this terminal unless the installation fully complies with the PME requirements of BS 7671 (IET Wiring Regulations).

PME Label
(NGED Ref. 400133)

nationalgrid

The earthing facility provided with this supply is **SNE, Cable Sheath Earth (TN-S)**.

DO NOT connect the earthing conductor to this terminal unless the installation fully complies with the TN-S requirements of BS 7671 (IET Wiring Regulations).

SNE / Cable Sheath Earth Label
(NGED Ref. 400171)

nationalgrid

National Grid Electricity Distribution **DO NOT** provide an earth terminal with this supply.

The installation is TT type to BS 7671 (IET Wiring Regulations)

Direct Earthing Label
(NGED Ref. 400188)

nationalgrid

The earthing facility provided with this supply is **SNE (TN-S) derived from a CNE (TN-C-S) network**.

DO NOT connect the customer earthing conductor to this terminal unless the installation fully complies with the PME (TN-C-S) requirements of BS 7671 (IET Wiring Regulations).

SNE From CNE Main Earth Label
(NGED Ref. 400134)

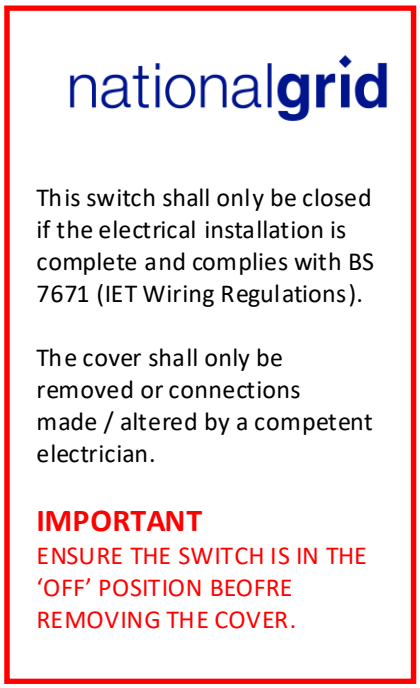
2.8 Isolation Switches

NGED shall not normally provide an isolator switch for new connections but, on request from a customer, may install them post-installation. It should, however, be noted that this service should ideally be provided by the customer's Supplier / Meter Operator.

Isolation switches are sometimes installed by NGED at existing installations at the request of the customer (for example, if we are requested to temporarily de-energise a connection).

The switch is inserted between the meter and the customer's equipment and isolates both phase/s and neutral.

The following label, which can be ordered from the Corporate Printing section of the Purchasing Catalogue shall be placed in a prominent position close to the isolation switch:



NGED REF. 400006

Three types of isolation switch are available as follows:

- 2 pole 100A isolator for standard single-phase connections.
- 4 pole 100A isolator for off peak (e.g. economy 7) connections.
- 4 pole 100A isolator for standard 3 phase connections.

The correct isolation switch (i.e. with appropriate terminal labelling) shall be installed for the application. Where a switch is fitted, it is essential that it disconnects all supplies at the exit point. For example, it is not acceptable to fit an isolation switch for the restricted (off peak) load only. Where all the supplies cannot be controlled by a single isolation switch it is acceptable to fit additional switches as long as they are all placed in close proximity to each other and they are clearly labelled (to identify their individual functions).

A Photograph of a single-phase and three-phase isolation switch is provided in Figure 7 and typical application is drawn in Figure 8.

2.9 **Service / Meter Positions**

For domestic installations external meter cabinets are preferred.

Where cut-outs, multi-service distribution boards and/or metering are installed within a building the installation should satisfy the following requirements:

a) Height of Equipment:
The installation must not be too low or too high. The Consolidated Metering Code of Practice (CoMCoP) requires the meter to be placed between 500mm and 1800mm above floor/ground level.

b) Access:
The installation must be easily accessible and free from obstructions. Access routes must be kept clear and be well lit.

c) Space:
Sufficient space shall be provided to allow for NGEDs equipment, the metering to be easily installed, maintained and replaced. For connections derived from single-phase or three-phase 100A rated cut-outs, wall space of 600mm high x 400mm wide, dedicated to NGED's cut-out, metering equipment and isolation switch should be provided. In addition there should be at least 1m of space in front of the equipment to allow a person to work comfortably.

Space requirements for heavy duty cut-outs, moulded case circuit breakers and CT metering are specified in ST: SD5E and, for multi-service distribution boards, multi-occupancy buildings are defined in ST: SD5C.

d) Environment:
The environment must be weather proof, dry, free from heavy condensation, fairly cool (normally between 5^{o}C and 20^{o}C and in no circumstances above 30^{o}C) and adequately ventilated. There must be no significant heat sources in the vicinity that could overheat the equipment. For example, it is not acceptable to install meters in a warm airing cupboard.

e) Proximity to Water:
Sources of water (e.g. taps, sink) must be kept well away from the installation to prevent water splashing the equipment or people with wet hands touching it. Cut-outs, meters and distribution boards shall not be installed within bathrooms, shower rooms, saunas or steam rooms.

f) Proximity to Gas:
Gas meters and pipes may be installed within the same room or enclosure as long as there is at least: 150mm between the electrical installation and the gas meter; and 25mm between the electrical installation and the gas pipes. The distance between the gas and electricity meters may be ignored where they are each placed within separate meter cabinets.

g) Vulnerability to Damage:
Equipment must not be placed where it may be exposed to accidental or malicious damage.

h) Fixing Arrangements:
The wall on which National Grid's equipment and the meter operator's equipment is to be fixed shall be suitable for fixing / supporting the weight of this equipment. The customer / developer shall install suitable boarding (e.g. chipboard or plywood) to the back wall of the service / metering area so that meters and cut-outs can be fixed.

i) Smart Meters:
Smart meters (therefore all metering locations) should not be installed within a metallic enclosure as the structure will restrict the communication ability of the meter. Meters also require 80mm clearance from other communication medium.

2.10 Mains Cable Entry Requirements

General installation data for National Grid low voltage cables are given in Table 1, below. Cable de-rating factors are specified in ST: SD8B.

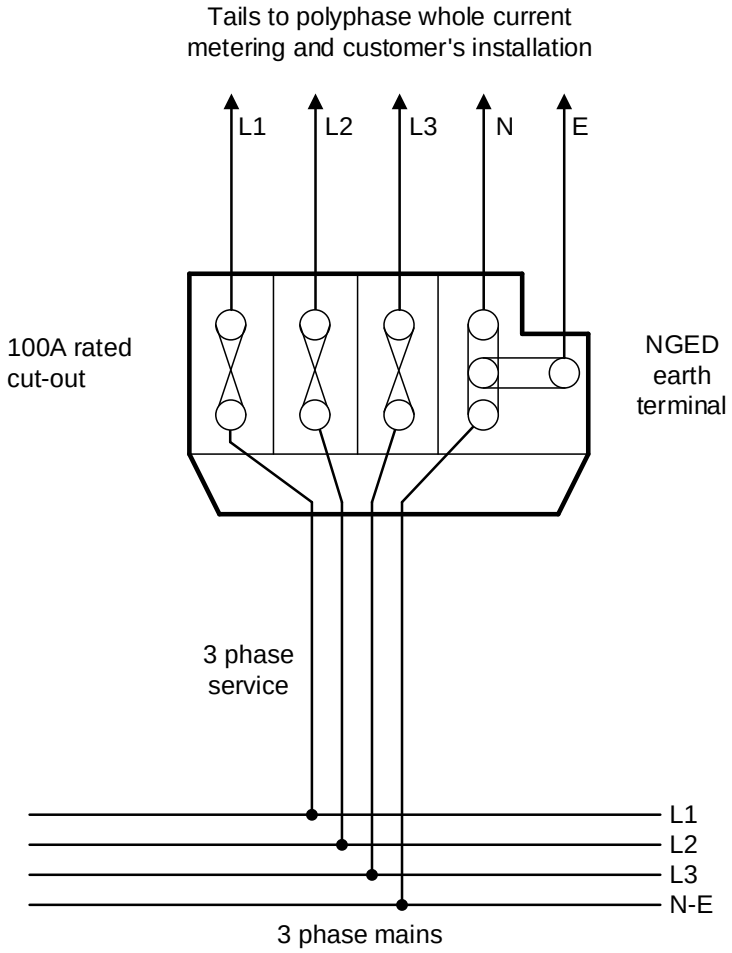
Figure 9 and 10 show two cable entry methods for Wavecon cable, one using a draw pit and another using a duct with a slow bend. The slow bend duct option is only suitable for 95mm^2 Wavecon cables.

Table 1 National Grid Cable Installation Data

Cable Type	Minimum Bending Radius (mm)	
	Single Phase	**3 Phase**
Service Cables:		
16mm^2 Copper Concentric	100	200
25mm^2 Copper Concentric	125	200
35mm^2 Copper Concentric	160	-
25mm^2 Hybrid	125	200
35mm^2 Hybrid	135	250
16mm^2 Copper Split Conc.	125	-
25mm^2 Copper Split Conc.	150	250
Mains Cables:		
95mm^2 Wavecon (3 core)	-	550
185mm^2 Wavecon (3 core)	-	700
300mm^2 Wavecon (3 core)	-	850
95mm^2 Wavecon (4 core)	-	600
185mm^2 Wavecon (4 core)	-	800
300mm^2 Wavecon (4 core)	-	1000

FIGURE 1A **Three phase PME Connection Arrangement;**

Sustained capacity of 55.2kVA, with cyclic capacity of up to 69kVA



Notes:

1) Standard fuse rating of 80A per phase;

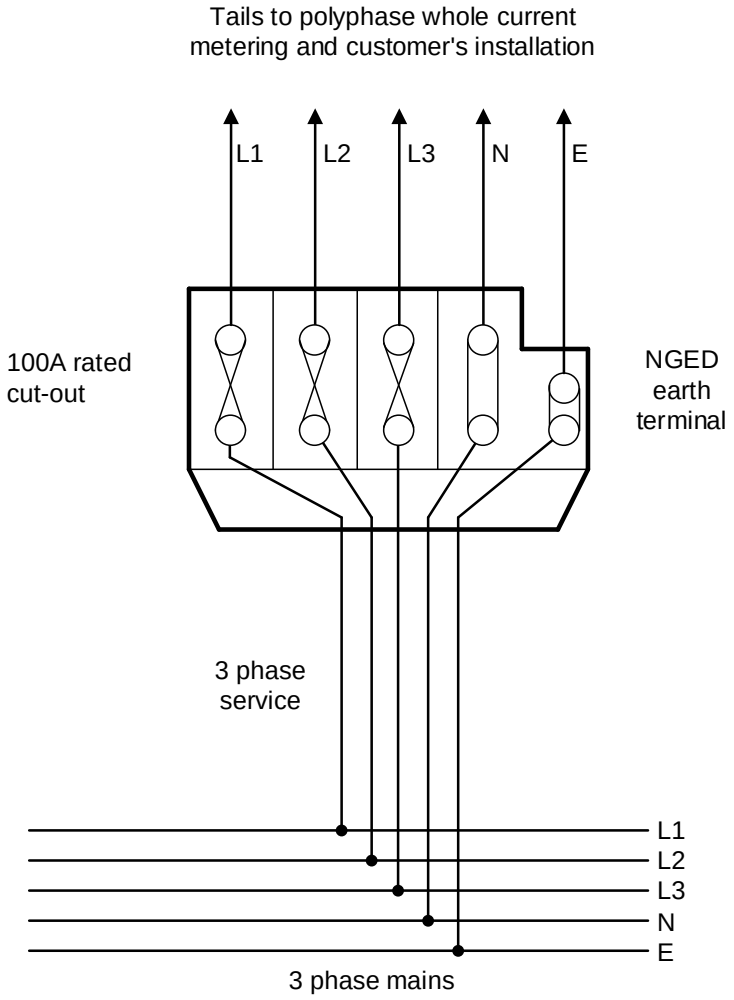
2) Cut-out fuse rating and maximum load may be increased to 100A / 69kVA for electric vehicle charger points where the installation complies with the requirements of 3.2.3;

3) Service cable must have a continuous rating at or above the cut-out fuse size;

4) PME label shall be placed adjacent to the cut-out.

FIGURE 1B **Three phase SNE Connection Arrangement;**

Sustained capacity of 55.2kVA, with cyclic capacity of up to 69kVA



Notes:

1) Standard fuse rating of 80A per phase;

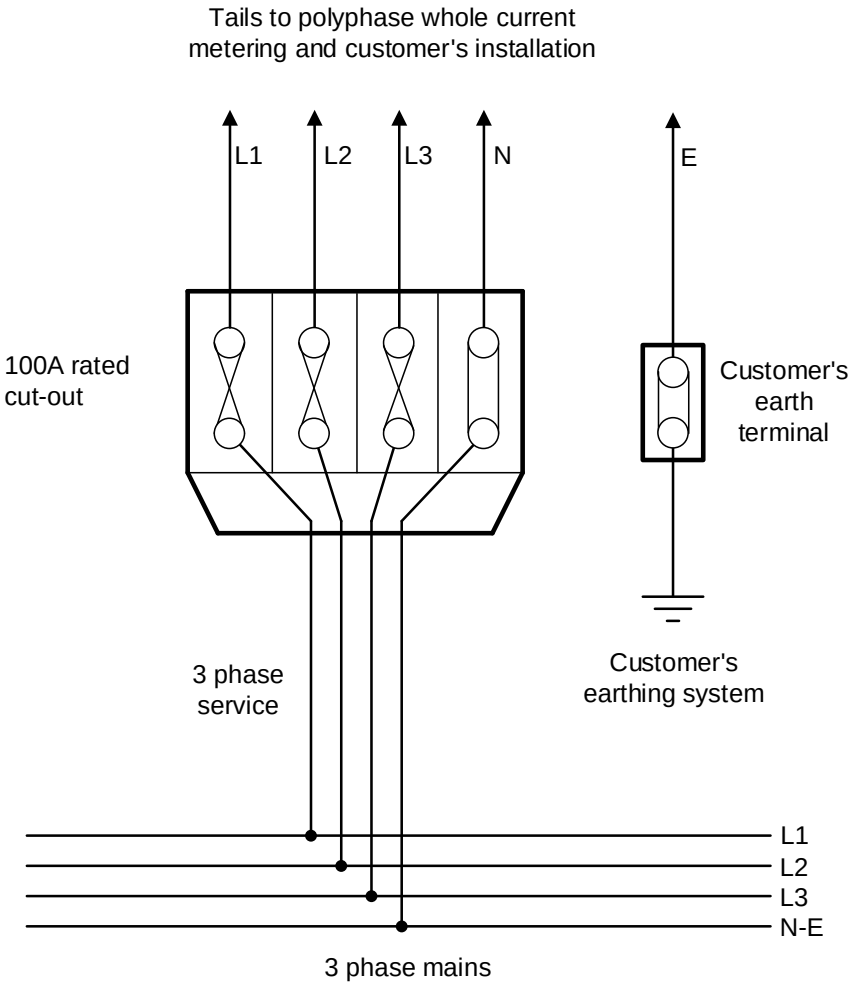
2) Cut-out fuse rating and maximum load may be increased to 100A / 69kVA for electric vehicle charger points where the installation complies with the requirements of 3.2.3;

3) Service cable must have a continuous rating at or above the cut-out fuse rating;

4) SNE label shall be placed adjacent to cut-out.

FIGURE 1C **Three phase Directly Earthed Connection Arrangement;**

Sustained capacity of 55.2kVA, with cyclic capacity of up to 69kVA



Notes:

1) Standard fuse rating of 80A per phase;

2) Cut-out fuse rating and maximum load may be increased to 100A / 69kVA for electric vehicle charger points where the installation complies with the requirements of 3.2.3;

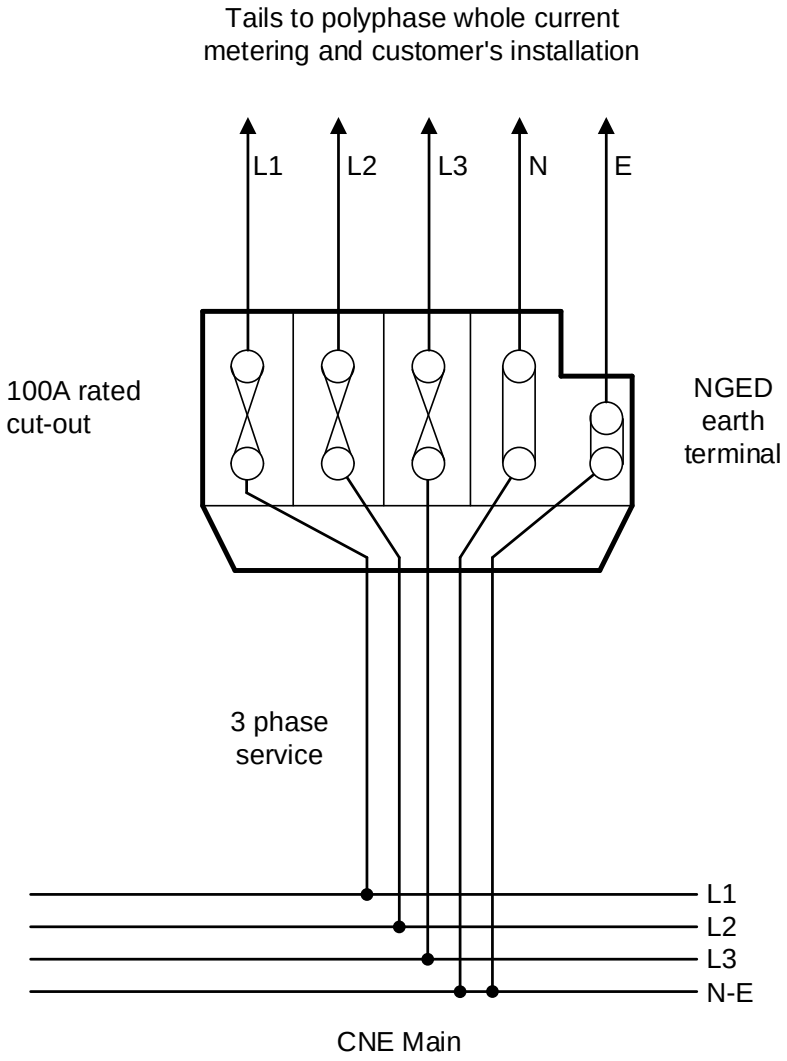
3) Service cable must have a continuous rating at or above the cut-out fuse rating;

4) Customer provides own earthing system and earthing terminal;

5) A direct earthing label shall be placed adjacent to cut-out.

FIGURE 1D **Three phase SNE from CNE main Connection Arrangement;**

Sustained capacity of 55.2kVA, with cyclic capacity of up to 69kVA



Notes:

1) Standard fuse rating of 80A per phase;

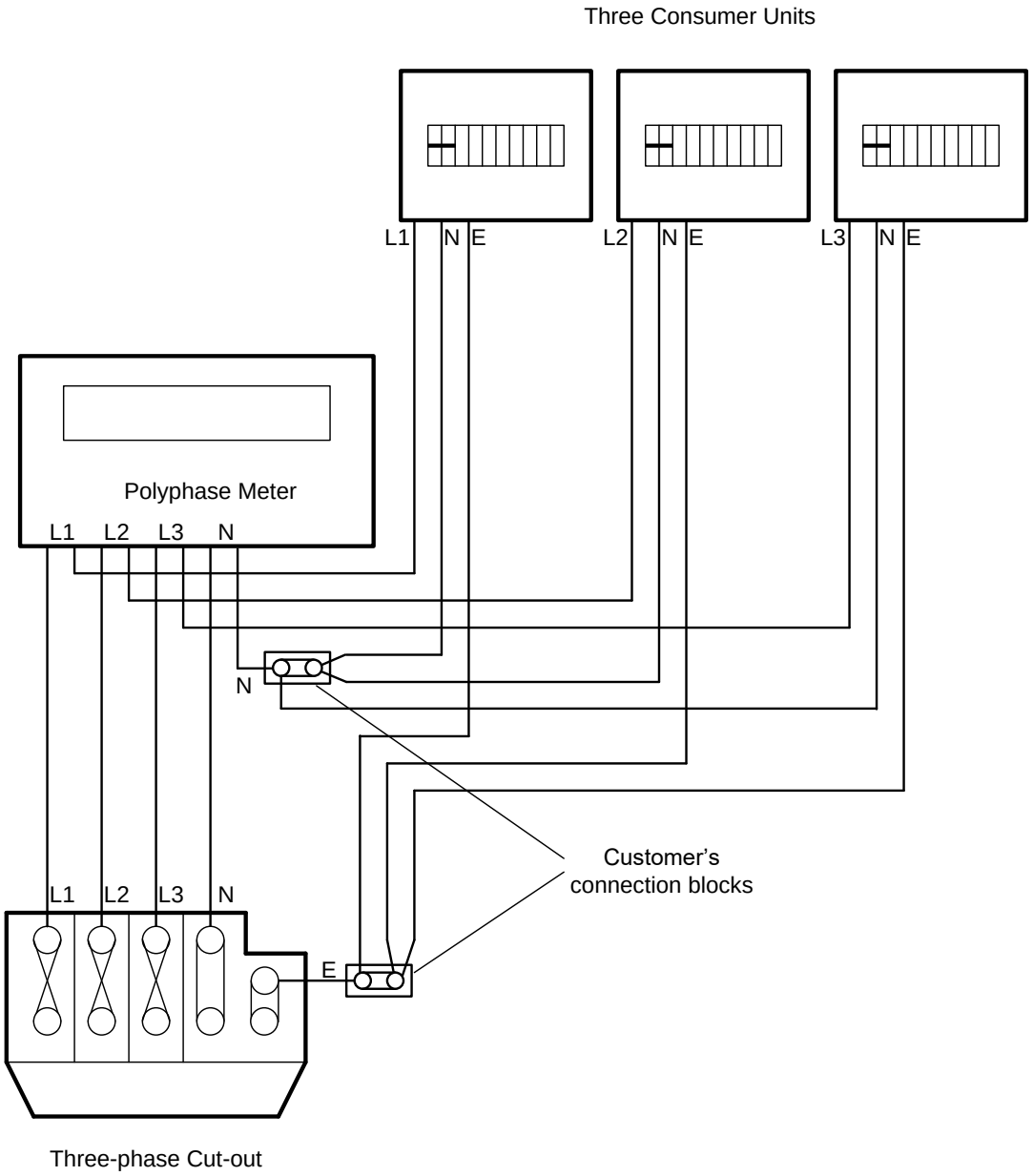
2) Cut-out fuse rating and maximum load may be increased to 100A / 69kVA for electric vehicle charger points where the installation complies with the requirements of 3.2.3;

3) Service cable must have a continuous rating at or above the cut-out fuse rating;

4) SNE from CNE main label shall be placed adjacent to cut-out.

FIGURE 1E **Typical Metering / Customer Arrangement;**

Three phase connection with poly-phase metering and with a maximum sustained load normally limited to 55.2kVA / 80A per phase



Notes:

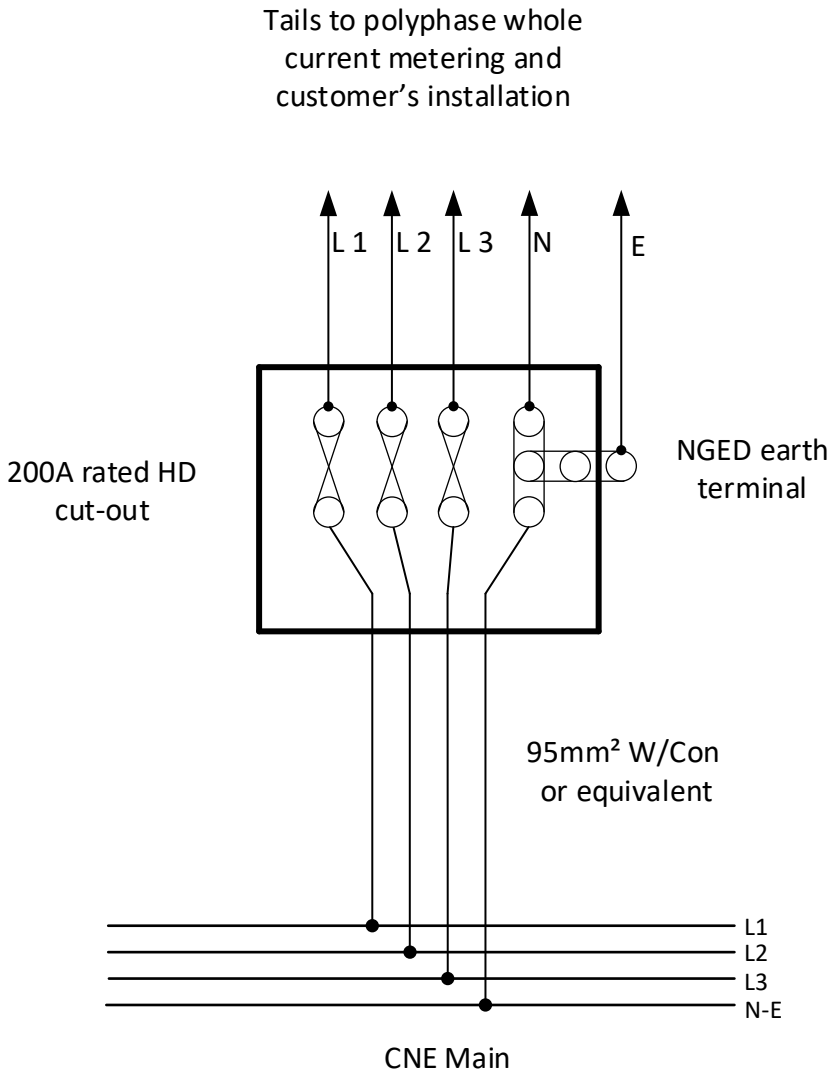
1) The above arrangement utilising three consumer units is only suitable if all the load is single-phase. If a multiphase load is installed (e.g. three-phase motor) the tails must be terminated in a three-phase main switch so that all phases are switched together.

2) A customer can utilise a three phase consumer unit if desired

3) For installations to multiple connections, refer to Standard Technique: SD5C.

FIGURE 1F **Three phase PME Connection Arrangement;**

Sustained capacity of up to 69kVA.



Notes:

1) Maximum fuse rating of 100A per phase (J type)

2) Minimum HD cut-out rating of 200A – outgoing terminals assessed for acceptance of 25mm² CU tails.

3) Minimum requirement of 95mm² W/Con mains cable

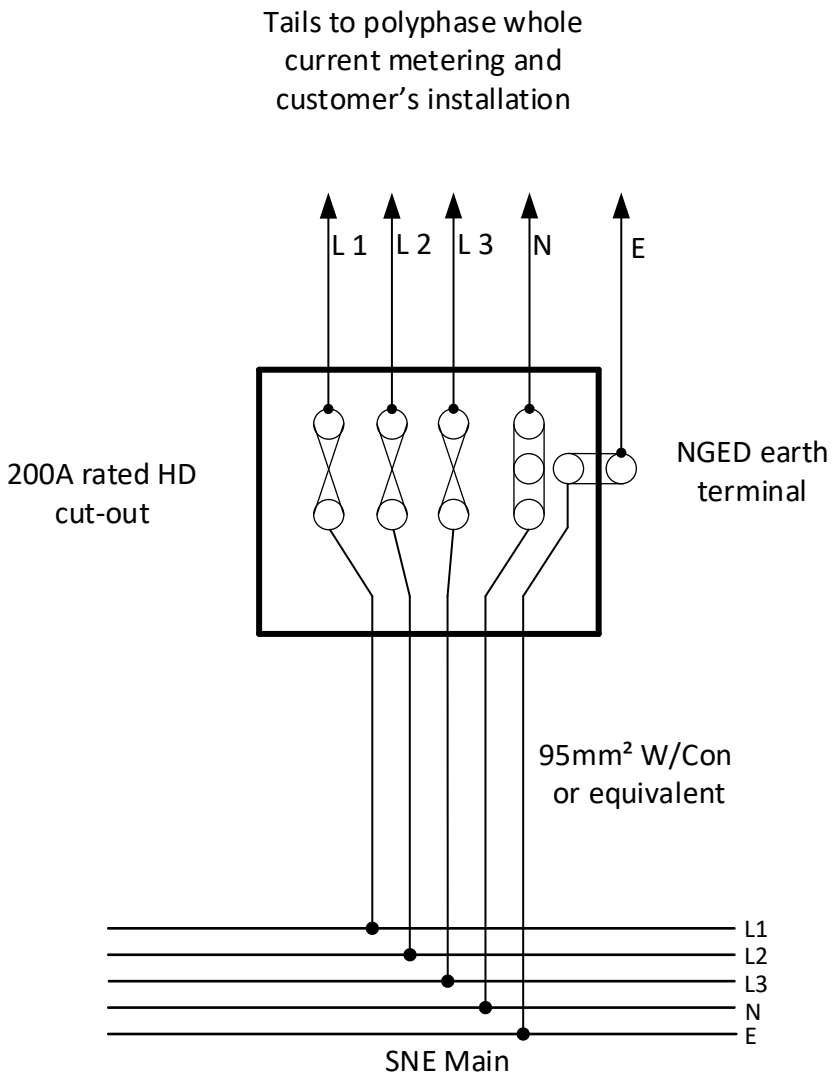
4) 100A rated warning label installed on the crutch cover, NGED reference 400189.

5) PME earthing arrangement label shall be placed adjacent to the cut-out.

6) Supplier to provide sufficiently rated whole current metering and tails

FIGURE 1G **Three phase SNE Connection Arrangement;**

Sustained capacity of up to 69kVA.



Notes:

1) Maximum fuse rating of 100A per phase (J type)

2) Minimum HD cut-out rating of 200A – outgoing terminals assessed for acceptance of 25mm² CU tails.

3) Minimum requirement of 95mm² W/Con mains cable

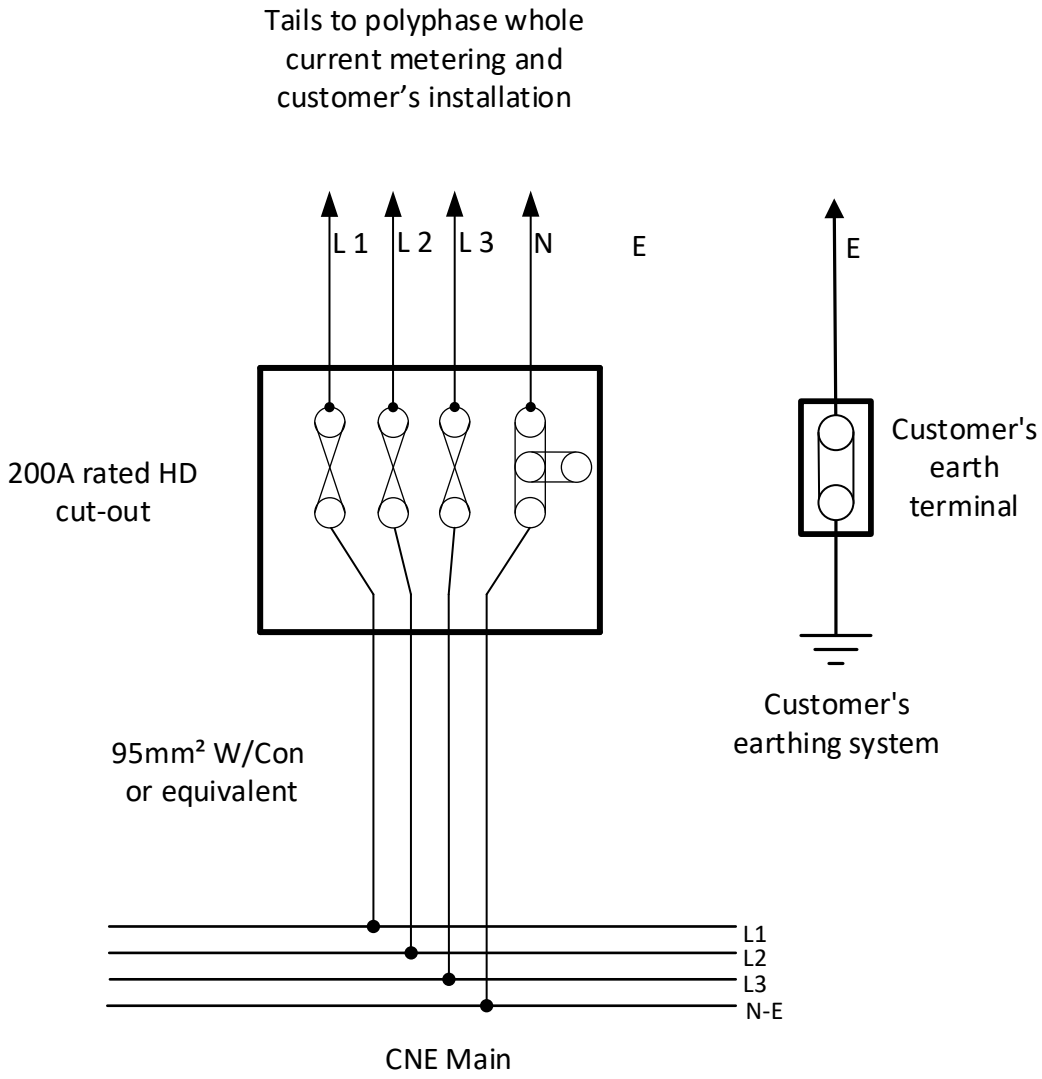
4) 100A rated warning label installed on the crutch cover, NGED reference 400189.

5) SNE earthing arrangement label shall be placed adjacent to the cut-out.

6) Supplier to provide sufficiently rated whole current metering and tails

FIGURE 1H **Three phase TT Connection Arrangement;**

Sustained capacity of up to 69kVA.



Notes:

1) Maximum fuse rating of 100A per phase (J type)

2) Minimum HD cut-out rating of 200A – outgoing terminals assessed for acceptance of 25mm² CU tails.

3) Minimum requirement of 95mm² W/Con mains cable

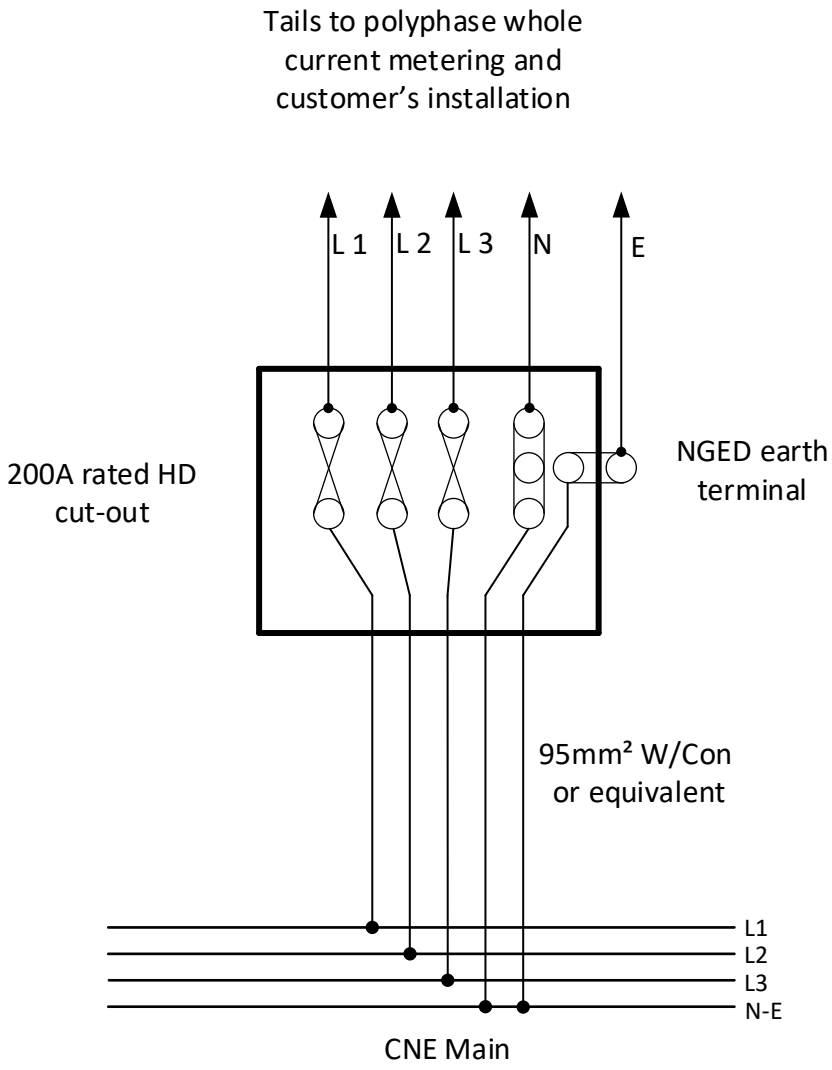
4) 100A rated warning label installed on the crutch cover, NGED reference 400189.

5) TT earthing arrangement label shall be placed adjacent to the cut-out.

6) Supplier to provide sufficiently rated whole current metering and tails

FIGURE 1I **Three phase SNE from CNE Connection Arrangement;**

Sustained capacity of up to 69kVA.



Notes:

1) Maximum fuse rating of 100A per phase (J type)

2) Minimum HD cut-out rating of 200A – outgoing terminals assessed for acceptance of 25mm² CU tails.

3) Minimum requirement of 95mm² W/Con mains cable

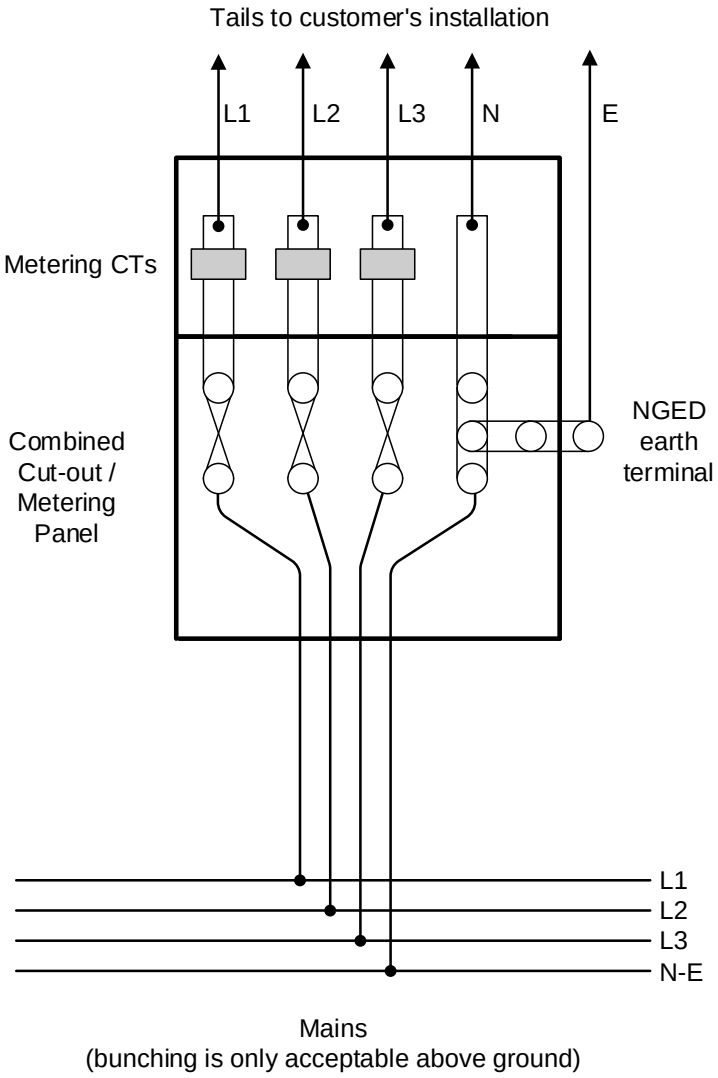
4) 100A rated warning label installed on the crutch cover, NGED reference 400189.

5) SNE derived from CNE earthing arrangement label shall be placed adjacent to the cut-out.

6) Supplier to provide sufficiently rated whole current metering and tails

FIGURE 2A **Three phase PME Connection Arrangement;**

Sustained loads above 100A per phase



Notes:

1) Drawing is based on a combined cut-out / CT metering panel;

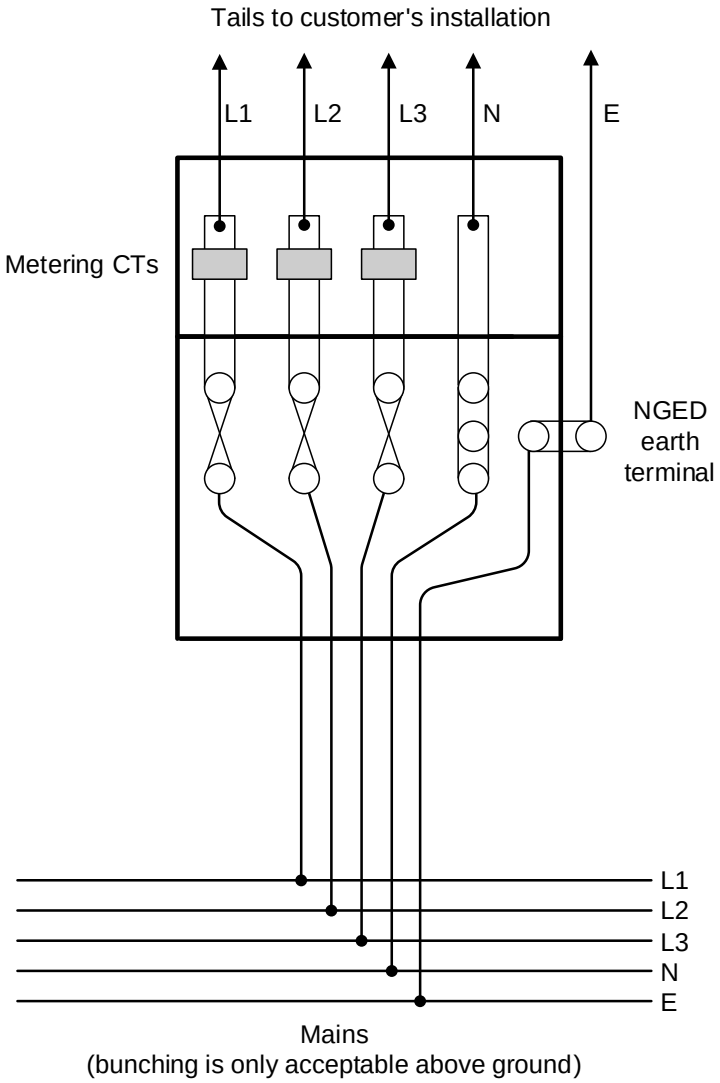
2) CT metering is required for cyclic or sustained loads above 100A per phase;

3) Incoming cable and meter tails must have a continuous rating at or above the cut-out fuse rating;

4) PME label shall be placed adjacent to cut-out.

FIGURE 2B **Three phase SNE Connection Arrangement;**

Sustained loads above 100A per phase



Notes:

1) Drawing is based on a combined cut-out / CT metering panel;

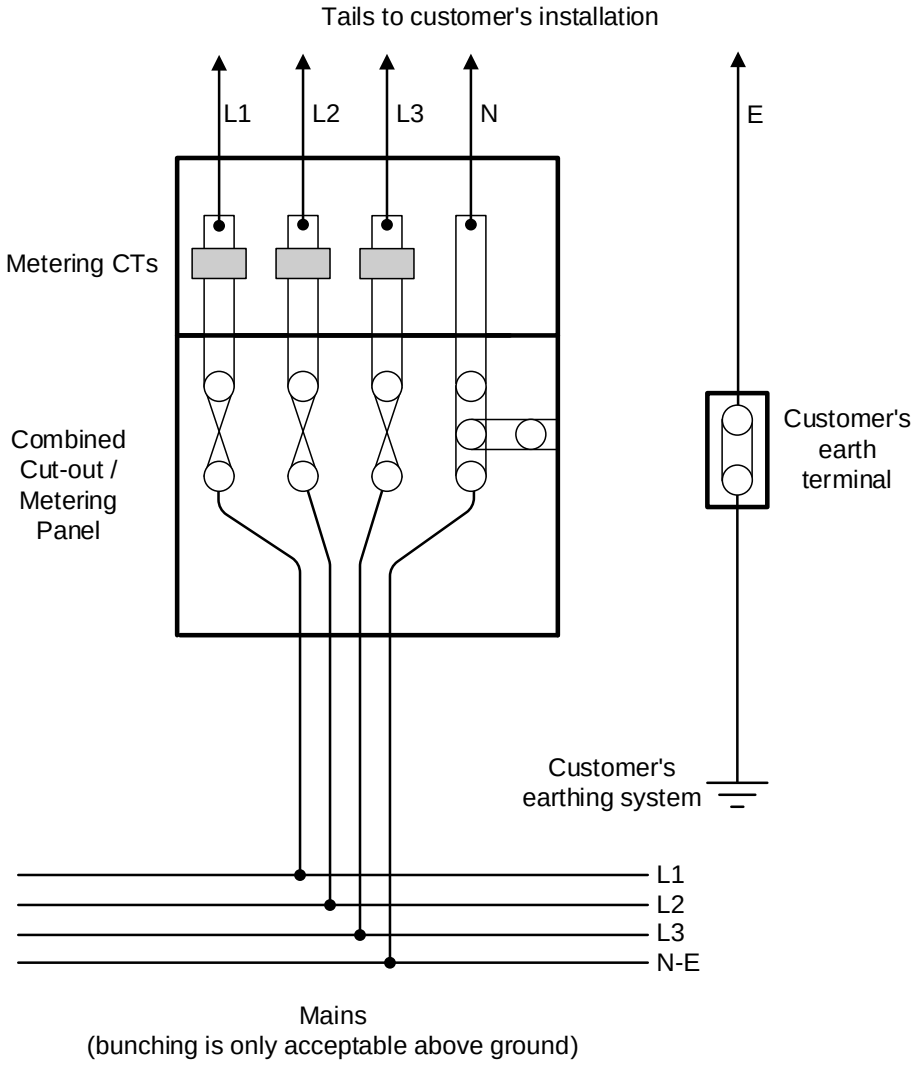
2) CT metering is required for cyclic or sustained loads above 100A per phase;

3) Incoming cable and meter tails must have a continuous rating at or above the cut-out fuse rating;

4) SNE label shall be placed adjacent to cut-out.

FIGURE 2C **Three phase Directly Earthed Connection Arrangement;**

Sustained loads above 100A per phase



Notes:

1) Drawing is based on a combined cut-out / CT metering panel;

2) CT metering is required for cyclic or sustained loads above 100A per phase;

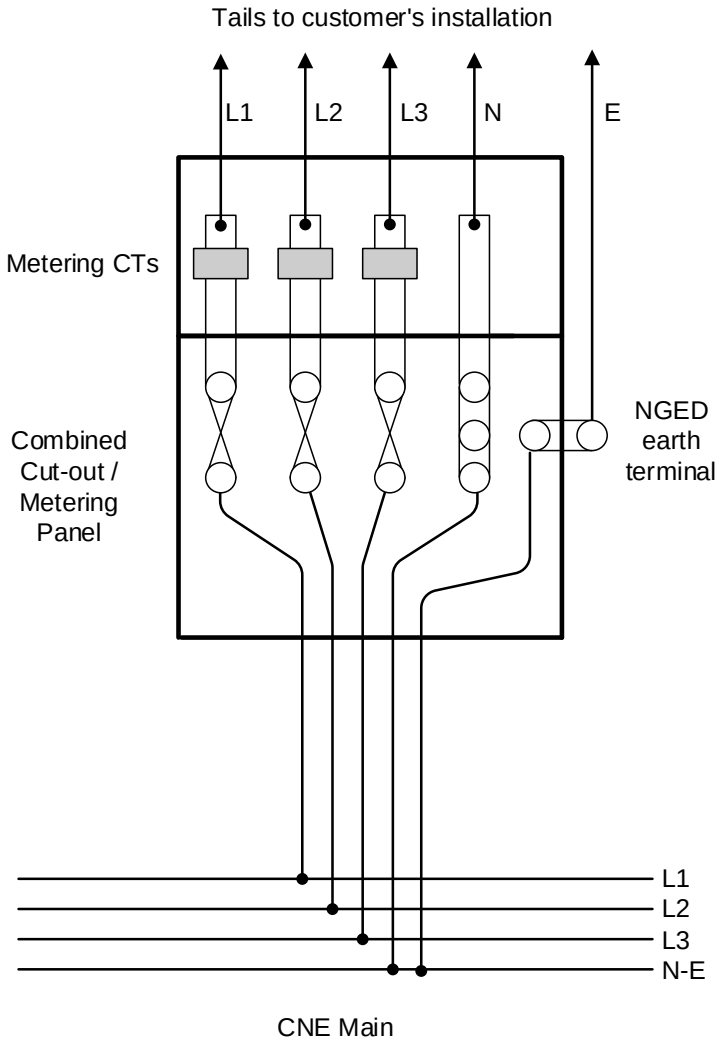
3) Incoming cable and meter tails must have a continuous rating at or above the cut-out fuse rating;

4) Customer provides own earthing system and earthing terminal;

5) A direct earthing label shall be placed adjacent to cut-out.

FIGURE 2D **Three phase SNE from CNE main Connection Arrangement;**

Sustained loads above 100A per phase



Notes:

1) Drawing is based on a combined cut-out / CT metering panel;

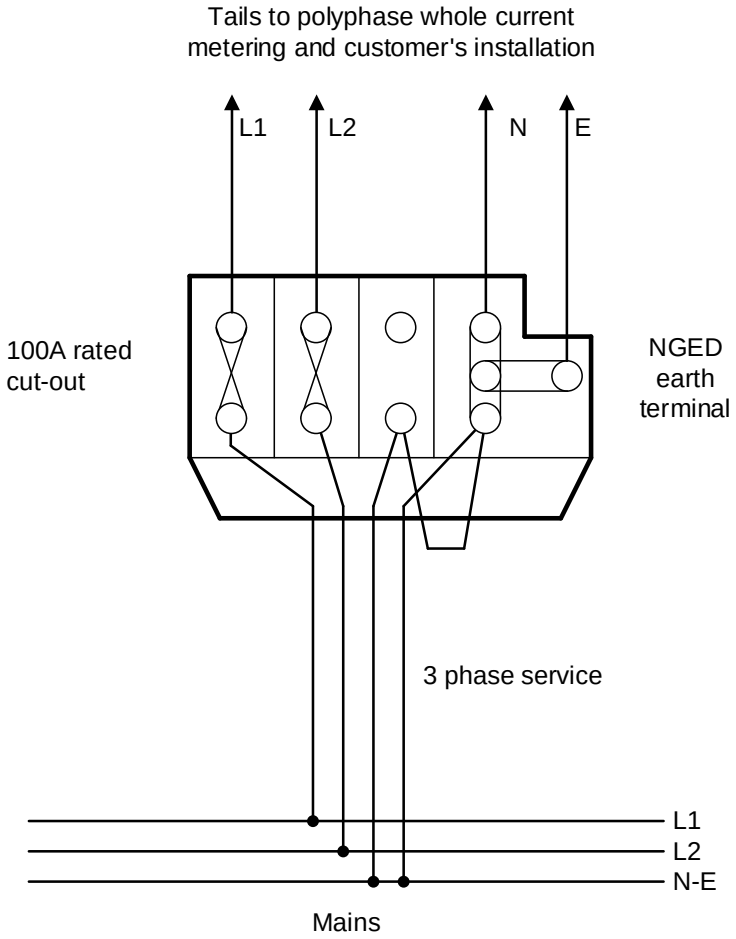
2) CT metering is required for cyclic or sustained loads above 100A per phase;

3) Incoming cable and meter tails must have a continuous rating at or above the cut-out fuse rating;

4) SNE from CNE main label shall be placed adjacent to cut-out.

FIGURE 3A **Split phase or Two-phase PME Connection Arrangement;**

Sustained capacity of 36.8kVA, with cyclic capacity of up to 46kVA



Notes:

1) Standard fuse rating of 80A per phase;

2) Cut-out fuse rating and maximum load may be increased to 100A / 46kVA for electric vehicle charger points where the installation complies with the requirements of 3.3.3;

3) Service cable must have a continuous rating at or above the cut-out fuse size

4) A sign shall be placed at cut-out position reading “Warning this installation is not compatible with three-phase equipment”.

5) Service cable must have a continuous rating above the associated cut-out fuse rating.

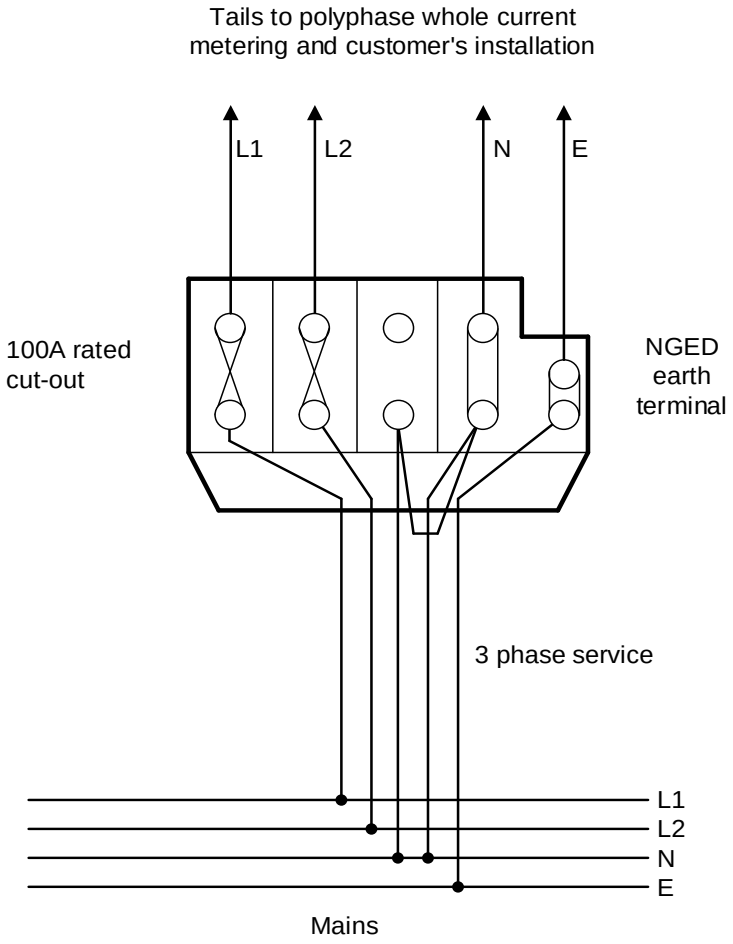
6) The third core of the service cable is bunched with the neutral to minimise loop impedance. 25mm^2 copper blue PVC/PVC cable is used to connect these cores together at the cut-out. Where the mains cable only has two phase conductors the third core and neutral of the service cable may be bunched in the service joint. In all other cases bunching may only be carried out above ground.

7) A PME label shall be placed adjacent to cut-out.

8) An empty Fuse carrier shall be inserted in the spare fuse-way.

FIGURE 3B **Split phase or Two-phase SNE Connection Arrangement;**

Sustained capacity of 36.8kVA, with cyclic capacity of up to 46kVA



Notes:

1) Standard fuse rating of 80A per phase;

2) Cut-out fuse rating and maximum load may be increased to 100A / 46kVA for electric vehicle charger points where the installation complies with the requirements of 3.3.3;

3) Service cable must have a continuous rating at or above the cut-out fuse size

4) A sign shall be placed at cut-out position reading “Warning this installation is not compatible with three-phase equipment”.

5) Service cable must have a continuous rating above the associated cut-out fuse rating.

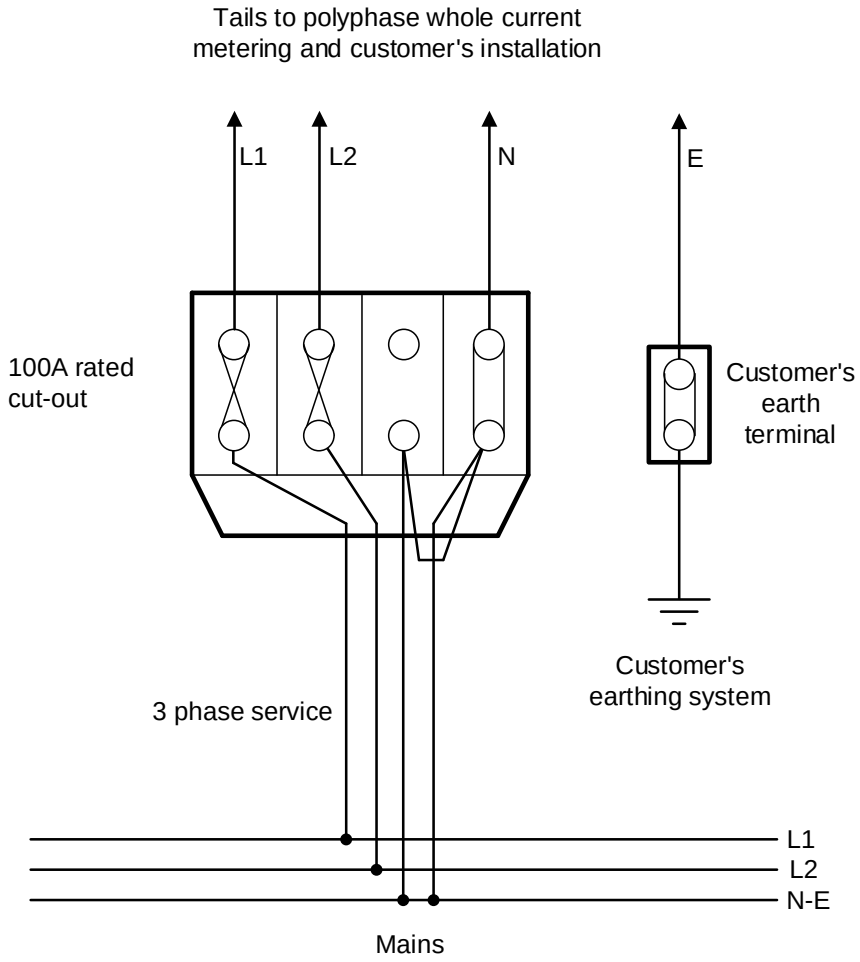
6) The third core of the service cable is bunched with the neutral to minimise loop impedance. 25mm^2 copper PVC/PVC cable is used to connect these cores together at the cut-out. Where the mains cable only has two phase conductors the third core and neutral of the service cable may be bunched in the service joint. In all other cases bunching may only be carried out above ground.

7) A SNE label shall be placed adjacent to cut-out.

8) An empty Fuse carrier shall be inserted in the spare fuse-way.

FIGURE 3C **Split phase or Two-phase Directly Earthed Connection Arrangement;**

Sustained capacity of 36.8kVA, with cyclic capacity of up to 46kVA



Notes:

1) Standard fuse rating of 80A per phase;

2) Cut-out fuse rating and maximum load may be increased to 100A / 46kVA for electric vehicle charger points where the installation complies with the requirements of 3.3.3;

3) Service cable must have a continuous rating at or above the cut-out fuse size

4) A sign shall be placed at cut-out position reading “Warning this installation is not compatible with three-phase equipment”.

5) Service cable must have a continuous rating above the associated cut-out fuse rating.

6) The third core of the service cable is bunched with the neutral to minimise loop impedance. 25mm^2 copper PVC/PVC cable is used to connect these cores together at the cut-out. Where the mains cable only has two phase conductors the third core and neutral of the service cable may be bunched in the service joint. In all other cases bunching may only be carried out above ground.

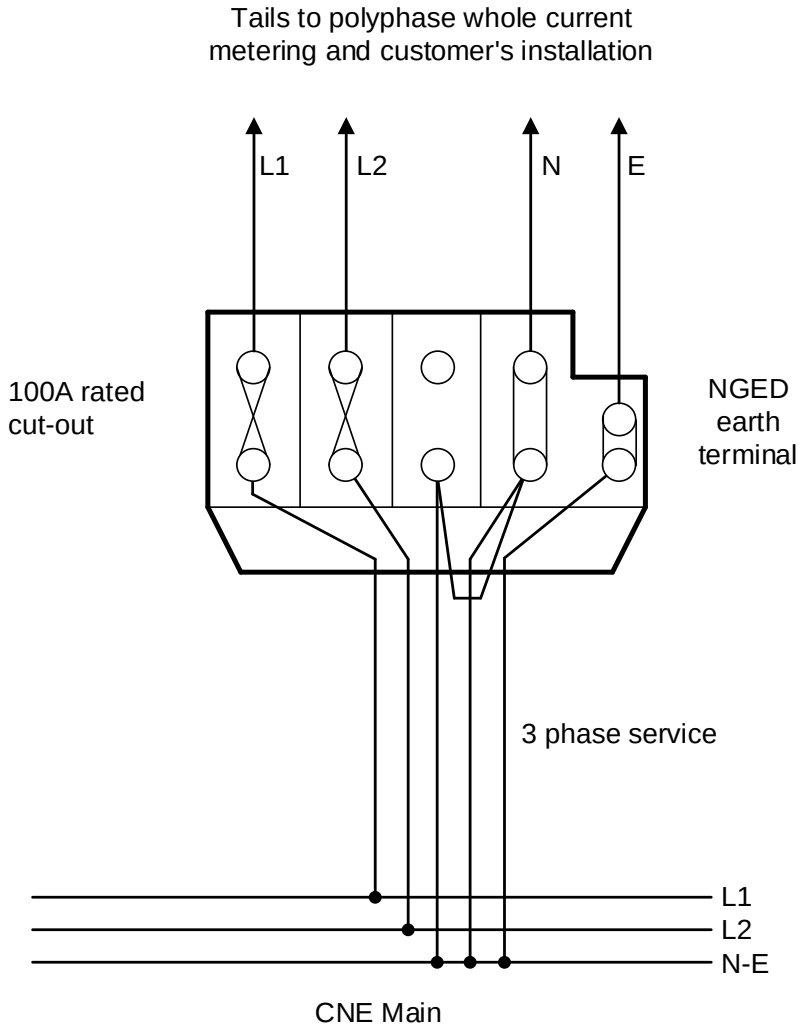
7) Customer provides own earthing system and earthing terminal;

8) A direct earthing label shall be placed adjacent to cut-out;

9) An empty Fuse carrier shall be inserted in the spare fuse-way.

FIGURE 3D **Split phase or Two-phase SNE from CNE main Connection Arrangement;**

Sustained capacity of 36.8kVA, with cyclic capacity of up to 46kVA



Notes:

1) Standard fuse rating of 80A per phase;

2) Cut-out fuse rating and maximum load may be increased to 100A / 46kVA for electric vehicle charger points where the installation complies with the requirements of 3.3.3;

3) Service cable must have a continuous rating at or above the cut-out fuse size

4) A sign shall be placed at cut-out position reading “Warning this installation is not compatible with three-phase equipment”.

5) Service cable must have a continuous rating above the associated cut-out fuse rating.

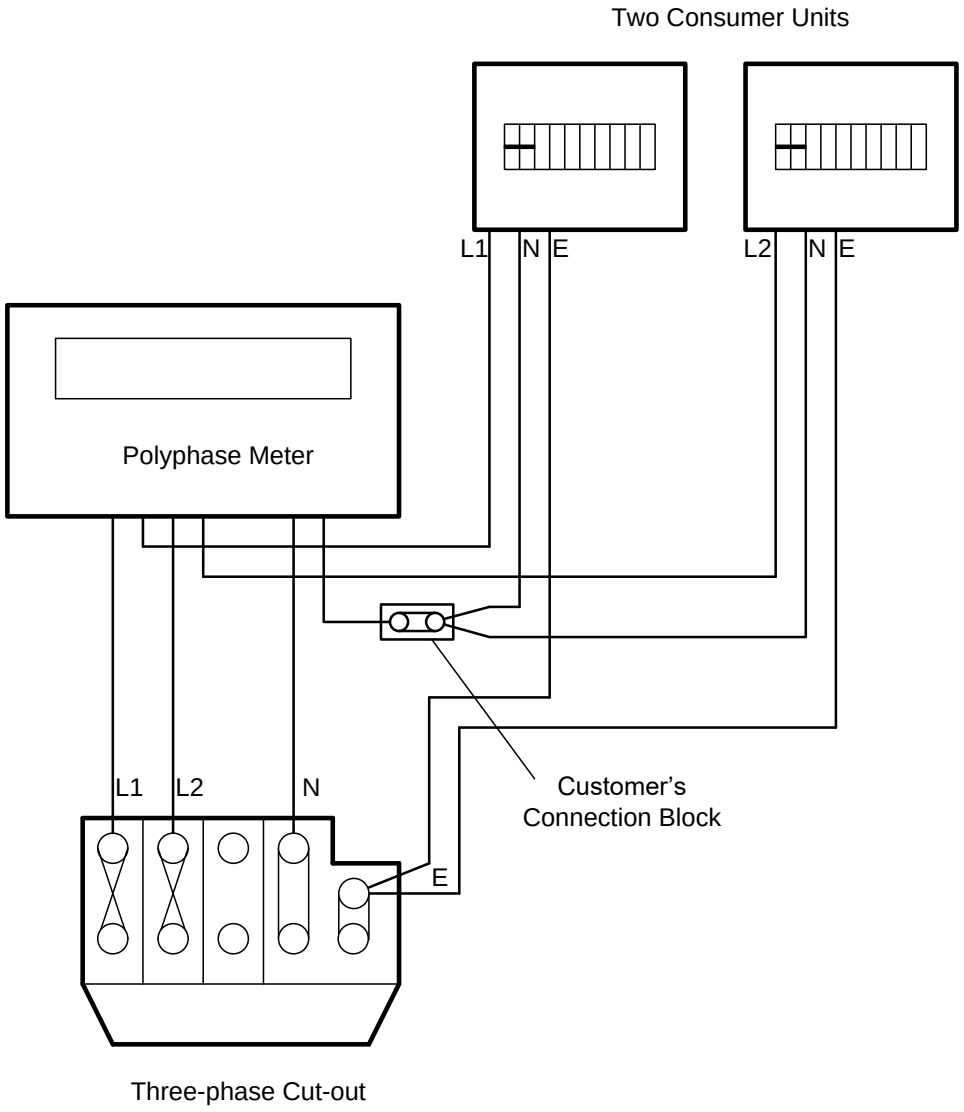
6) The third core of the service cable is bunched with the neutral to minimise loop impedance. 25mm^2 copper PVC/PVC cable is used to connect these cores together at the cut-out. Where the mains cable only has two phase conductors the third core and neutral of the service cable may be bunched in the service joint. In all other cases bunching may only be carried out above ground.

7) A SNE from CNE main label shall be placed adjacent to cut-out.

8) An empty Fuse carrier shall be inserted in the spare fuse-way.

FIGURE 3E **Typical Metering / Customer Arrangement;**

Split phase or two-phase phase connection with poly-phase metering and with a Sustained capacity of 36.8kVA, with cyclic capacity of up to 46kVA



Notes:

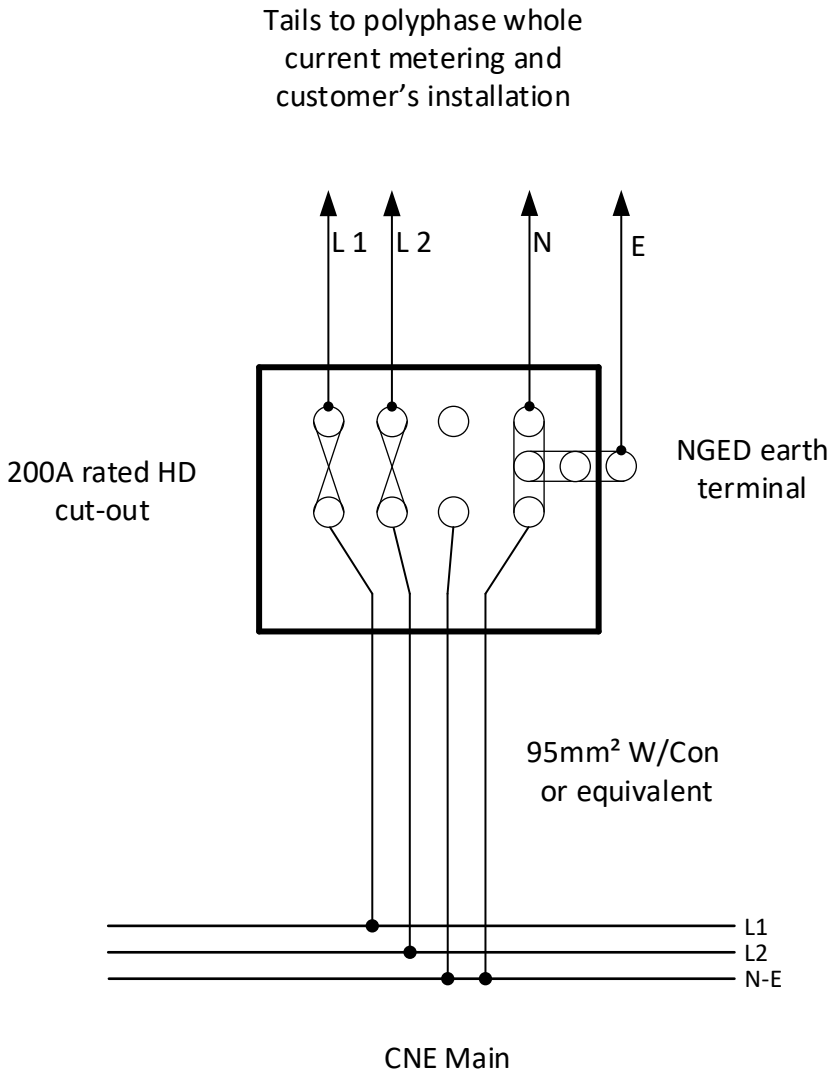
1) The above arrangement utilising two consumer units is only suitable if each item of load is single-phase. If a multi-phase load is installed (e.g. a split-phase motor) the tails must be terminated within a multiphase main switch so that both phases are switched / isolated together;

2) Customers may choose to have a consumer unit with a single enclosure that houses two separate din rails, one for each phase.

3) An empty Fuse carrier shall be inserted in the spare fuse-way.

FIGURE 4A Split phase PME Connection Arrangement;

Sustained capacity of up to 46kVA



Notes:

1) Maximum fuse rating of 100A per phase (J type)

2) Minimum HD cut-out rating of 200A – outgoing terminals assessed for acceptance of 25mm² CU tails.

3) Minimum requirement of 95mm² W/Con mains cable

4) 100A rated warning label installed on the crutch cover, NGED reference 400189.

5) Sign to be placed at cut-out position reading "Warning this installation is not compatible with three-phase equipment";

6) Spare fuse-way shall be shrouded;

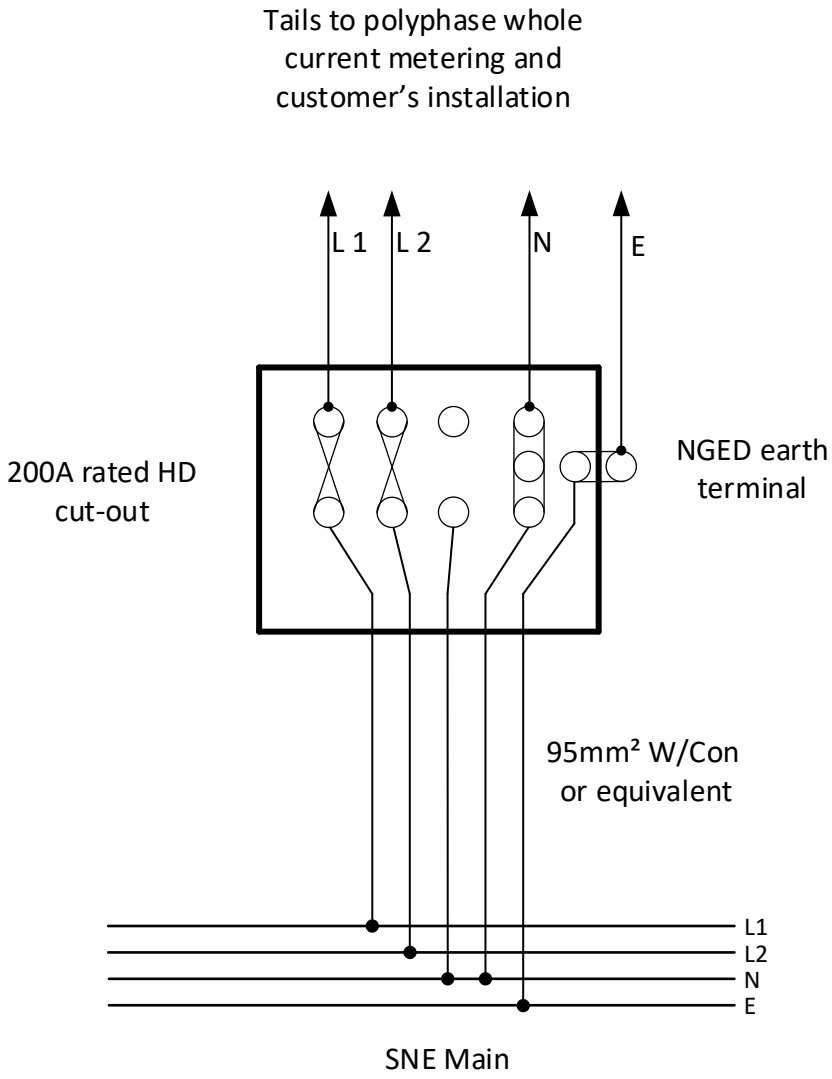
7) PME earthing arrangement label shall be placed adjacent to the cut-out.

8) Supplier to provide sufficiently rated whole current metering and tails

9) Where the mains cable only has two phase conductors the third core and neutral of the service cable may be bunched in the service joint. In all other cases bunching may only be carried out above ground.

FIGURE 4B Split phase SNE Connection Arrangement;

Sustained capacity of up to 46kVA



Notes:

1) Maximum fuse rating of 100A per phase (J type)

2) Minimum HD cut-out rating of 200A – outgoing terminals assessed for acceptance of 25mm² CU tails.

3) Minimum requirement of 95mm² W/Con mains cable

4) 100A rated warning label installed on the crutch cover, NGED reference 400189.

5) Sign to be placed at cut-out position reading "Warning this installation is not compatible with three-phase equipment";

6) Spare fuse-way shall be shrouded;

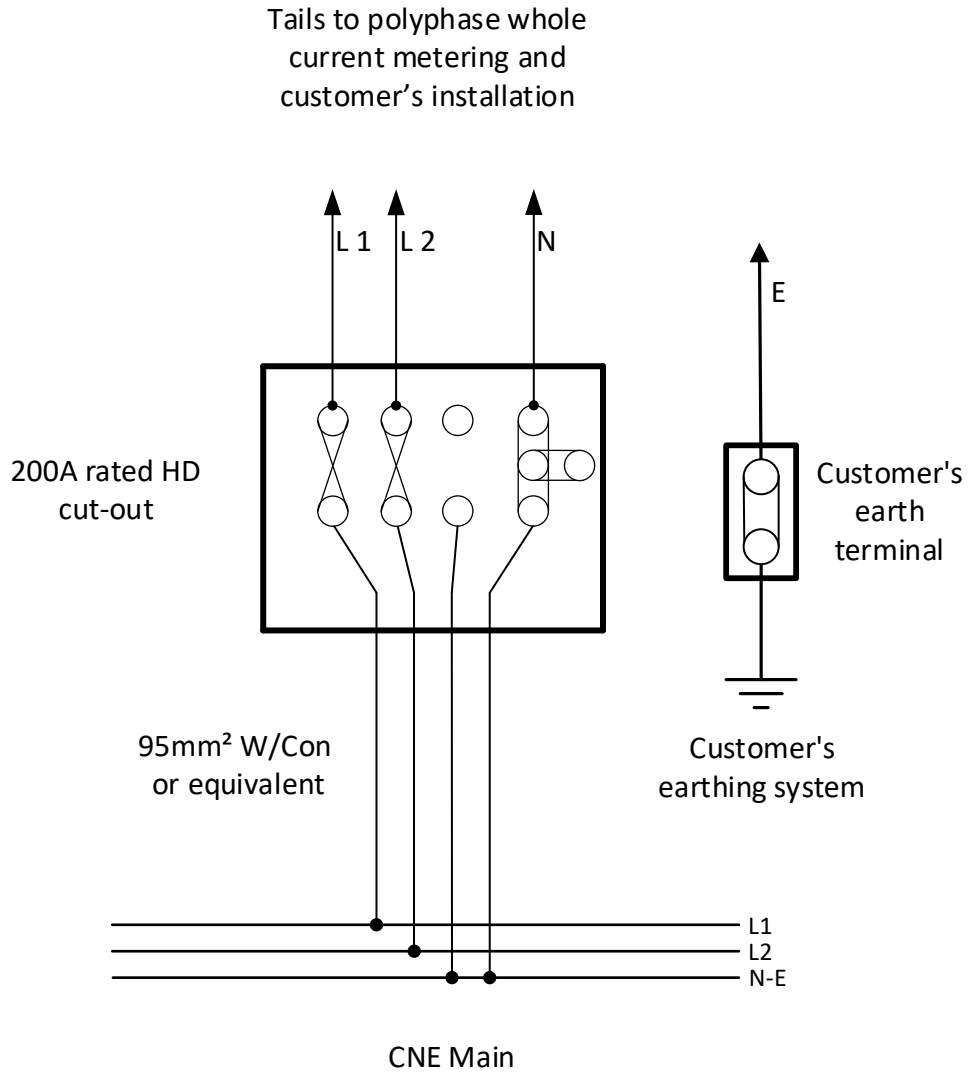
7) SNE earthing arrangement label shall be placed adjacent to the cut-out.

8) Supplier to provide sufficiently rated whole current metering and tails

9) Where the mains cable only has two phase conductors the third core and neutral of the service cable may be bunched in the service joint. In all other cases bunching may only be carried out above ground.

FIGURE 4C Split phase TT Connection Arrangement;

Sustained capacity of up to 46kVA



Notes:

1) Maximum fuse rating of 100A per phase (J type)

2) Minimum HD cut-out rating of 200A – outgoing terminals assessed for acceptance of 25mm² CU tails.

3) Minimum requirement of 95mm² W/Con mains cable

4) 100A rated warning label installed on the crutch cover, NGED reference 400189.

5) Sign to be placed at cut-out position reading "Warning this installation is not compatible with three-phase equipment";

6) Spare fuse-way shall be shrouded;

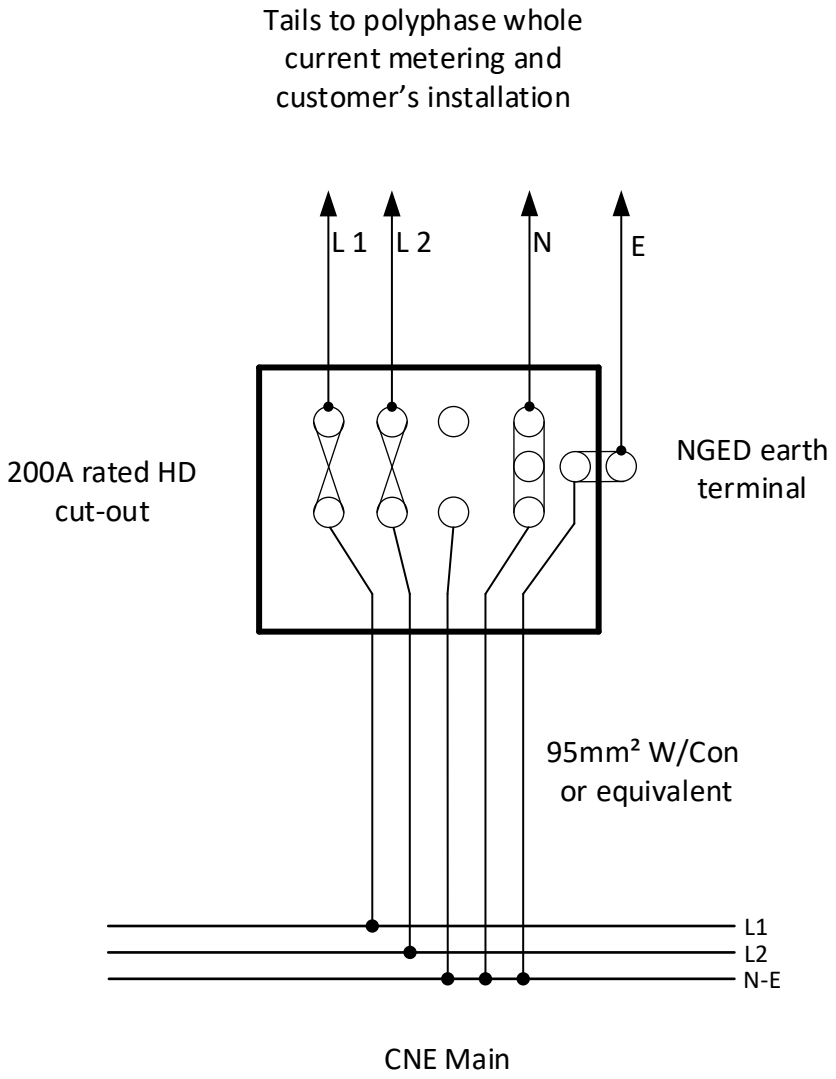
7) TT earthing arrangement label shall be placed adjacent to the cut-out.

8) Supplier to provide sufficiently rated whole current metering and tails

9) Where the mains cable only has two phase conductors the third core and neutral of the service cable may be bunched in the service joint. In all other cases bunching may only be carried out above ground.

FIGURE 4D Split phase SNE from CNE Connection Arrangement;

Sustained capacity of up to 46kVA



Notes:

1) Maximum fuse rating of 100A per phase (J type)

2) Minimum HD cut-out rating of 200A – outgoing terminals assessed for acceptance of 25mm² CU tails.

3) Minimum requirement of 95mm² W/Con mains cable

4) 100A rated warning label installed on the crutch cover, NGED reference 400189.

5) Sign to be placed at cut-out position reading "Warning this installation is not compatible with three-phase equipment";

6) Spare fuse-way shall be shrouded;

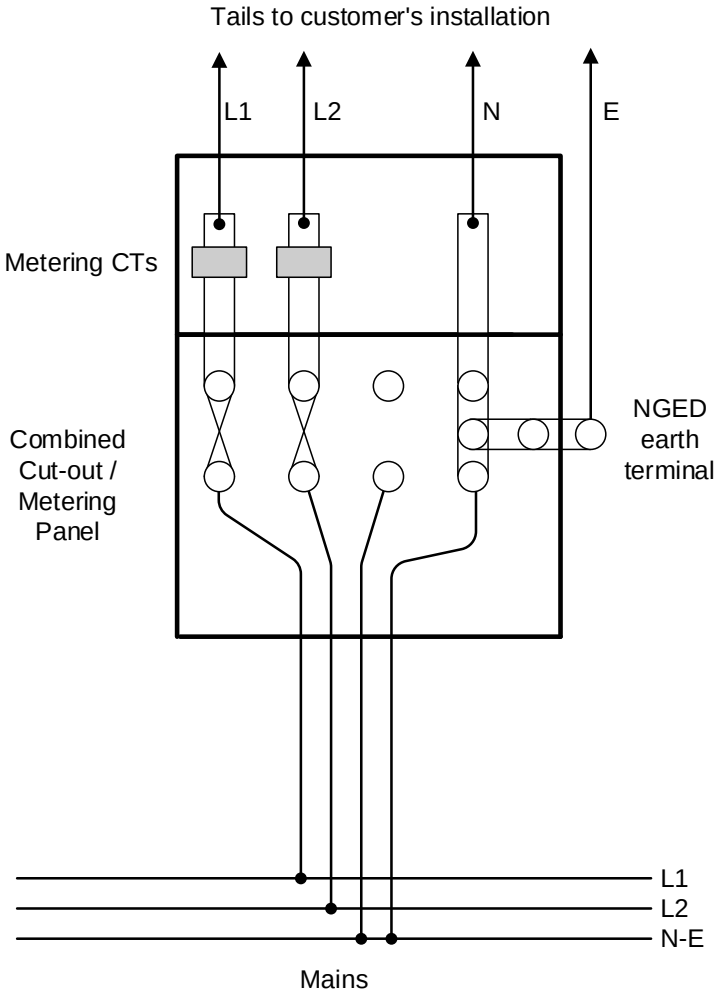
7) TT earthing arrangement label shall be placed adjacent to the cut-out.

8) Supplier to provide sufficiently rated whole current metering and tails

9) Where the mains cable only has two phase conductors the third core and neutral of the service cable may be bunched in the service joint. In all other cases bunching may only be carried out above ground.

FIGURE 4E **Split phase PME Connection Arrangement;**

Sustained loads above 100A per phase



Notes:

1) Drawing is based on a combined cut-out / CT metering panel;

2) Polyphase whole current metering may be used for cyclic loads up to 100A per phase. CT metering (as shown above) is required for sustained loads at or above 100A per phase;

3) Incoming cable and meter tails must have a continuous rating above the cut-out fuse rating;

4) Sign to be placed at cut-out position reading “Warning this installation is not compatible with three-phase equipment”;

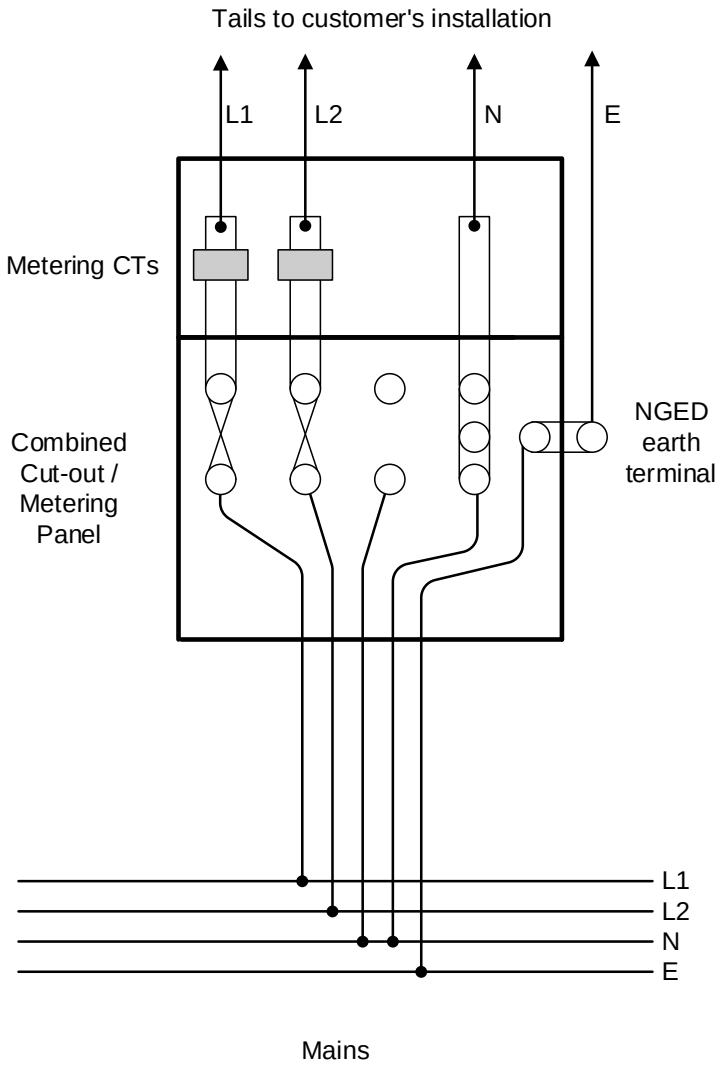
5) A PME label shall be placed adjacent to cut-out;

6) Spare fuse-way shall be shrouded;

7) Where the mains cable only has two phase conductors the third core and neutral of the service cable may be bunched in the service joint. In all other cases bunching may only be carried out above ground.

FIGURE 4F **Split-phase SNE Connection Arrangement;**

Sustained loads above 100A per phase



Notes:

1) Drawing is based on a combined cut-out / CT metering panel;

2) Polyphase whole current metering may be used for cyclic loads up to 100A per phase. CT metering (as shown above) is required for sustained loads at or above 100A per phase;

3) Incoming cable and meter tails must have a continuous rating above the cut-out fuse rating;

4) Sign to be placed at cut-out position reading “Warning this installation is not compatible with three-phase equipment”;

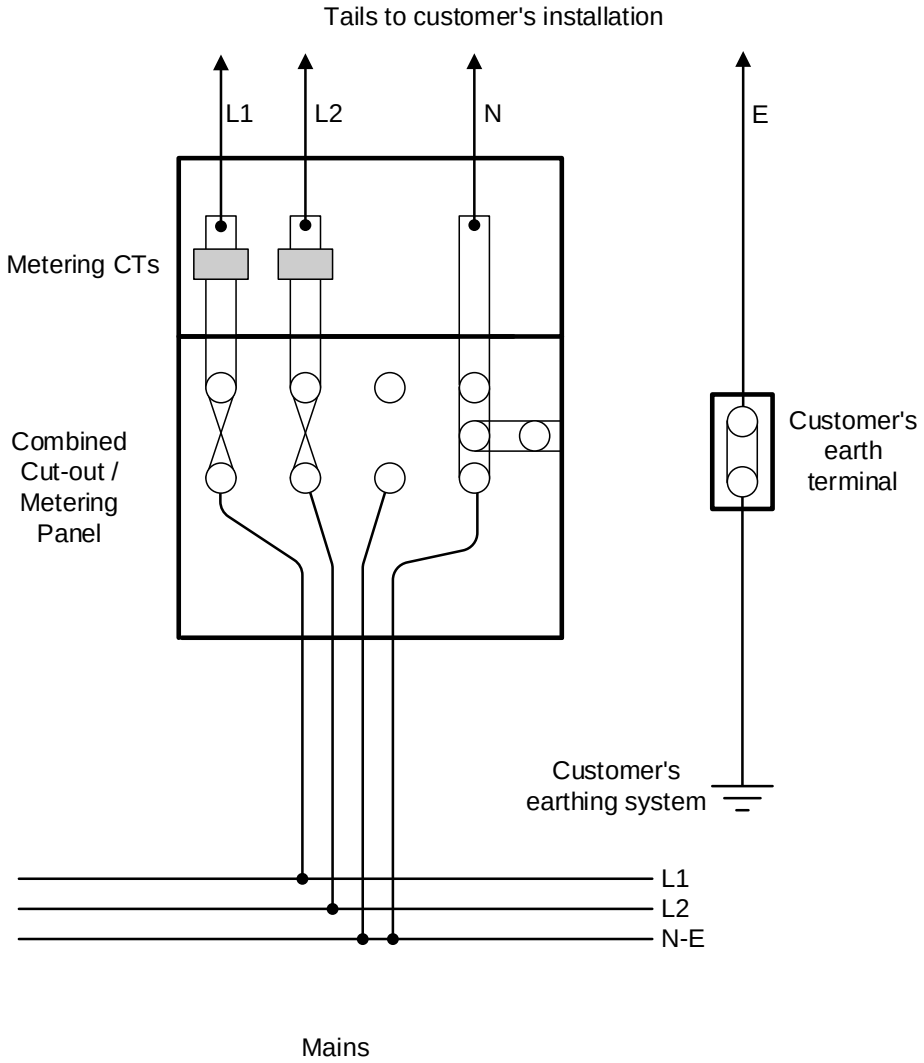
5) A SNE label shall be placed adjacent to cut-out;

6) Spare fuse-way shall be shrouded;

7) Where the mains cable only has two phase conductors the third core and neutral of the service cable may be bunched in the service joint. In all other cases bunching must be carried out above ground.

FIGURE 4G **Split-phase Directly Earthed Connection Arrangement;**

Sustained loads above 100A per phase



Notes:

1) Drawing is based on a combined cut-out / CT metering panel;

2) Polyphase whole current metering may be used for cyclic loads up to 100A per phase. CT metering (as shown above) is required for sustained loads at or above 100A per phase;

3) Incoming cable and meter tails must have a continuous rating above the cut-out fuse rating;

4) Sign to be placed at cut-out position reading “Warning this installation is not compatible with three-phase equipment”;

5) Customer provides own earthing system and earthing terminal;

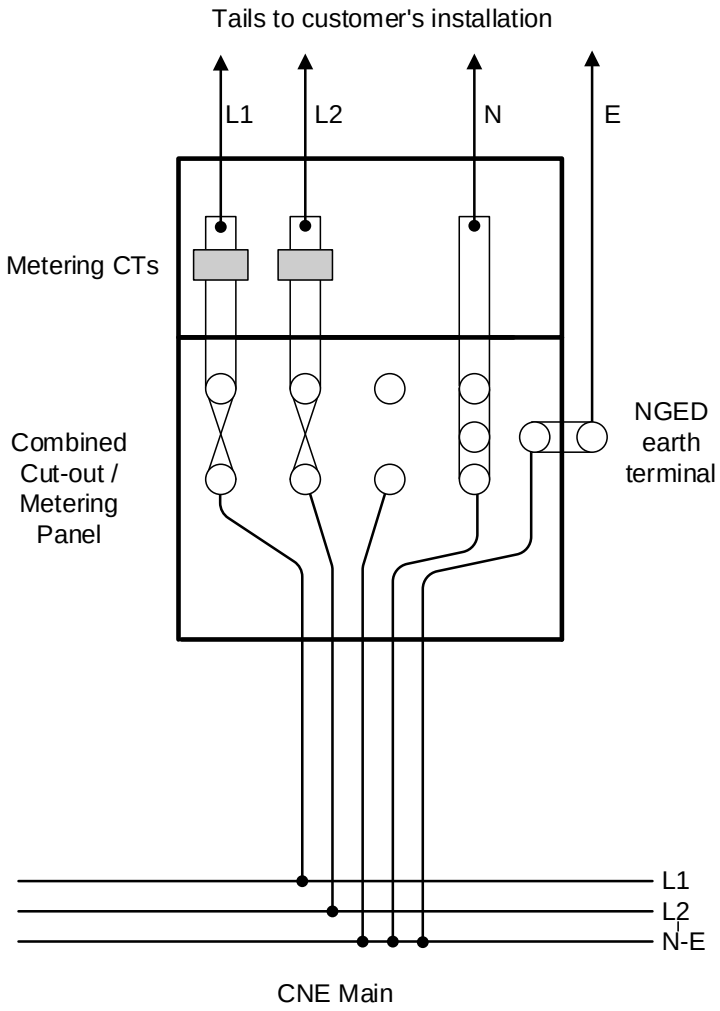
6) A direct earthing label shall be placed adjacent to cut-out;

7) Spare fuse-way shall be shrouded;

8) Where the mains cable only has two phase conductors the third core and neutral of the service cable may be bunched in the service joint. In all other cases bunching must be carried out above ground.

FIGURE 4H **Split-phase SNE from CNE main Connection Arrangement;**

Sustained loads above 100A per phase



Notes:

1) Drawing is based on a combined cut-out / CT metering panel;

2) Polyphase whole current metering may be used for cyclic loads up to 100A per phase. CT metering (as shown above) is required for sustained loads at or above 100A per phase;

3) Incoming cable and meter tails must have a continuous rating above the cut-out fuse rating;

4) Sign to be placed at cut-out position reading “Warning this installation is not compatible with three-phase equipment”;

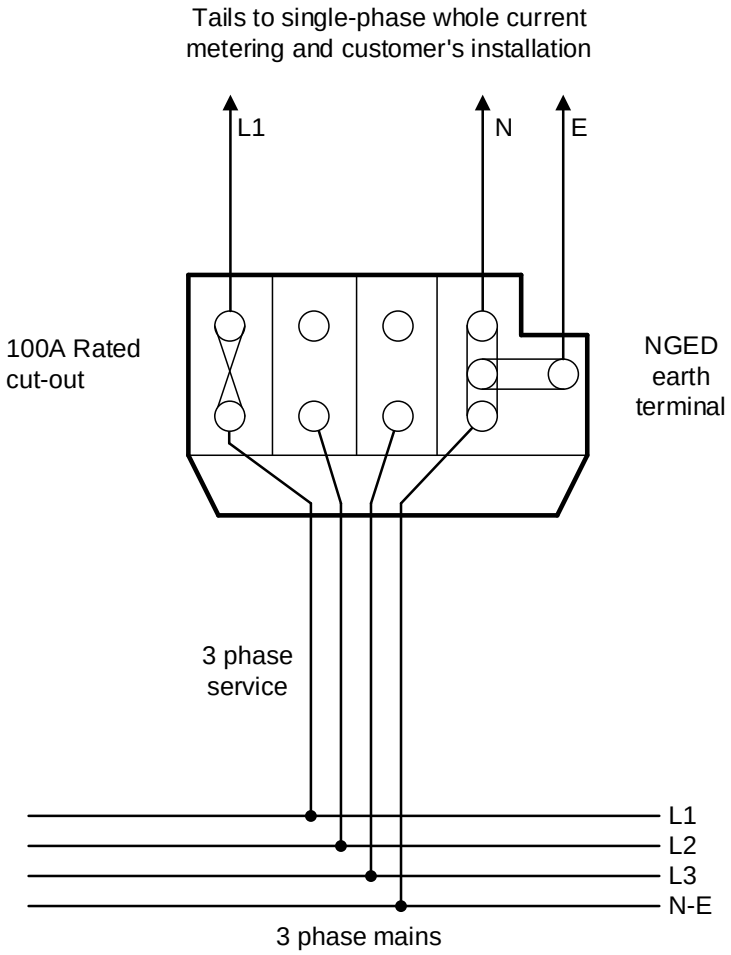
5) A SNE from CNE main label shall be placed adjacent to cut-out;

6) Spare fuse-way shall be shrouded;

7) Where the mains cable only has two phase conductors the third core and neutral of the service cable may be bunched in the service joint. In all other cases bunching must be carried out above ground.

FIGURE 5A **Single-phase PME Connection Arrangement (Three-phase Cut-out);**

Sustained capacity of up to 18.4kVA only



Notes:

1) Standard fuse rating of 80A per phase;

2) If a customer requests a capacity greater than 80A/18.4kVA, the customer will be required to connect the additional load to one or more of the spare fuse ways;

3) Service cable must have a continuous rating above the cut-out fuse size;

4) PME label shall be placed adjacent to cut-out;

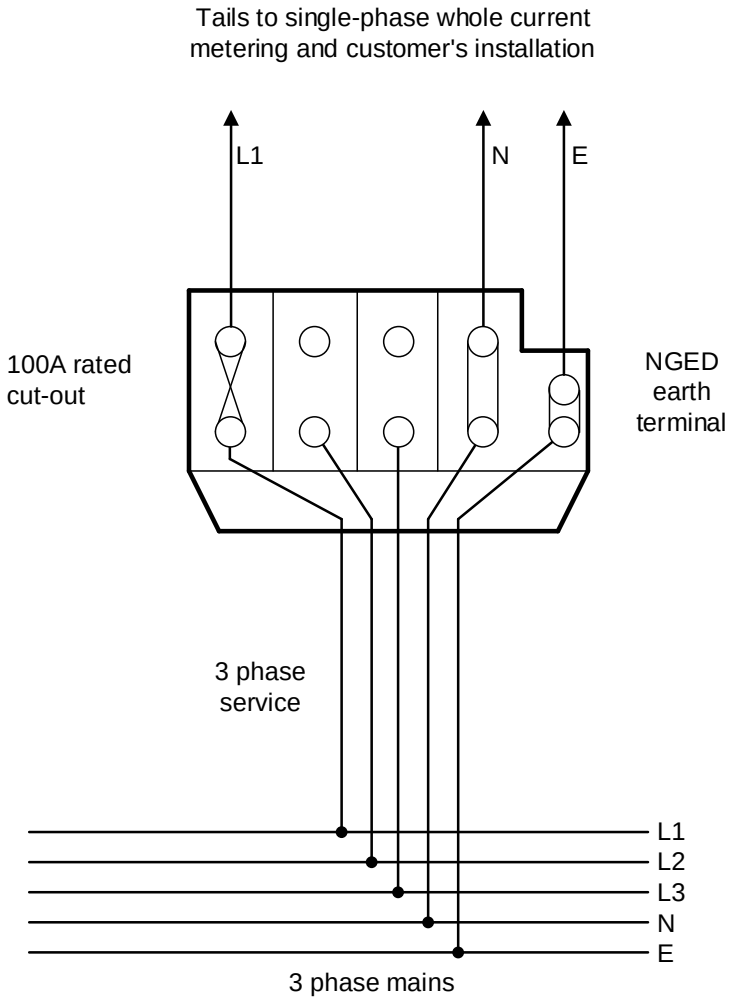
5) An appropriate ‘Connect to L*’ label (Figure 5K) shall be placed adjacent to cut-out;

6) Figure 5A shows a fuse inserted in L1, however, the fuse should be inserted into the phase that has been stipulated by the designer on the design plan or work instruction;

7) An empty Fuse carrier shall be inserted within the spare fuse-ways.

FIGURE 5B **Single-phase SNE Connection Arrangement (Three-phase Cut-out);**

Sustained capacity of up to 18.4kVA only



Notes:

1) Standard fuse rating of 80A per phase;

2) If a customer requests a capacity greater than 80A/18.4kVA, the customer will be required to connect the additional load to one or more of the spare fuse ways;

3) Service cable must have a continuous rating above the cut-out fuse size;

4) SNE label shall be placed adjacent to cut-out;

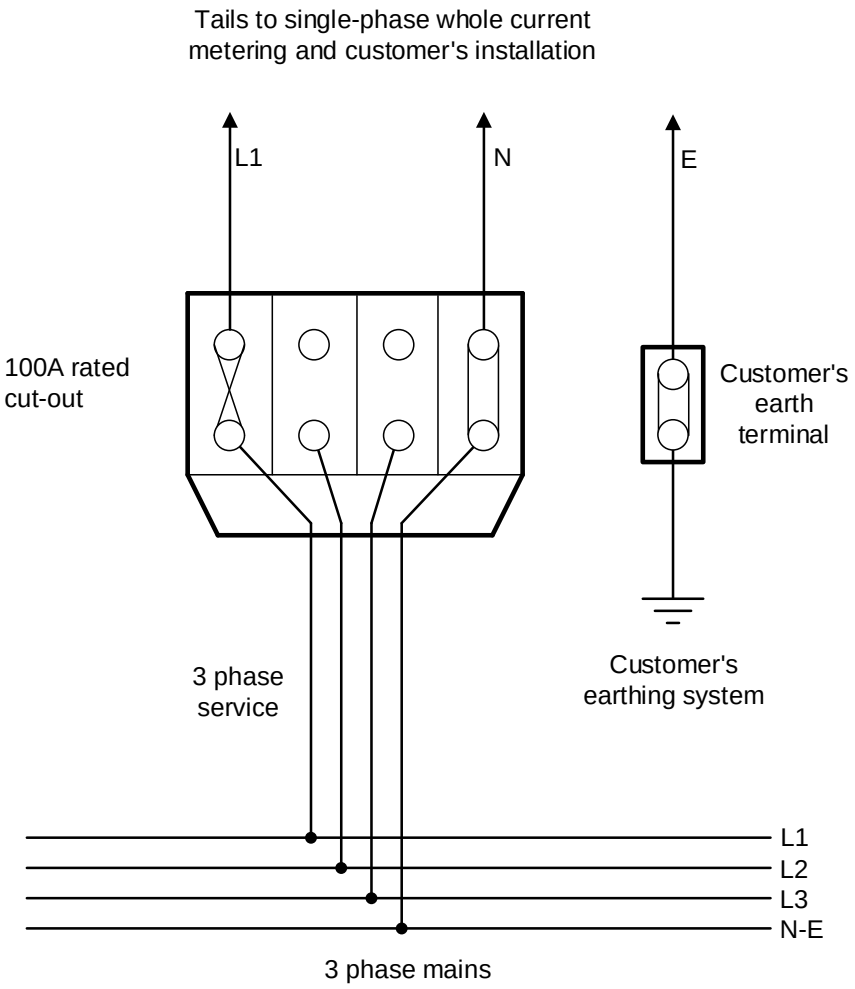
5) An appropriate ‘Connect to L*’ label (Figure 5K) shall be placed adjacent to cut-out;

6) Figure 5B shows a fuse inserted in L1, however, the fuse should be inserted into the phase that has been stipulated by the designer on the design plan or work instruction;

7) An empty Fuse carrier shall be inserted within the spare fuse-ways.

FIGURE 5C **Single-phase Directly Earthed Connection Arrangement (Three-phase Cut-out);**

Sustained capacity of up to 18.4kVA only



Notes:

1) Standard fuse rating of 80A per phase;

2) If a customer requests a capacity greater than 80A/18.4kVA, the customer will be required to connect the additional load to one or more of the spare fuse ways;

3) Service cable must have a continuous rating above the cut-out fuse size;

4) Customer provides own earthing system and earthing terminal;

5) A direct earthing label shall be placed adjacent to cut-out;

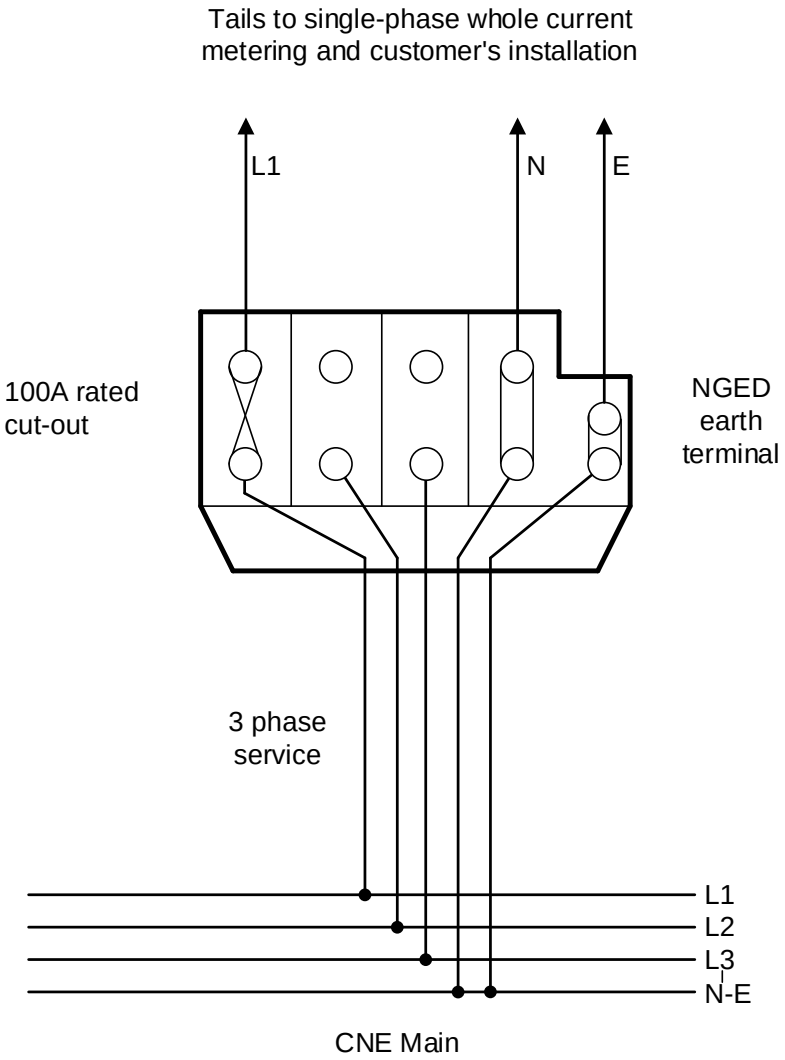
6) An appropriate ‘Connect to L*’ label (Figure 5K) shall be placed adjacent to cut-out;

7) Figure 5C shows a fuse inserted in L1, however, the fuse should be inserted into the phase that has been stipulated by the designer on the design plan or work instruction;

8) An empty Fuse carrier shall be inserted within the spare fuse-ways.

FIGURE 5D **Single-phase SNE from CNE main Connection Arrangement (Three-phase Cut-out);**

Sustained capacity of up to 18.4kVA only



Notes:

1) Standard fuse rating of 80A per phase;

2) If a customer requests a capacity greater than 80A/18.4kVA, the customer will be required to connect the additional load to one or more of the spare fuse ways;

3) Service cable must have a continuous rating above the cut-out fuse size;

4) SNE from CNE main label shall be placed adjacent to cut-out;

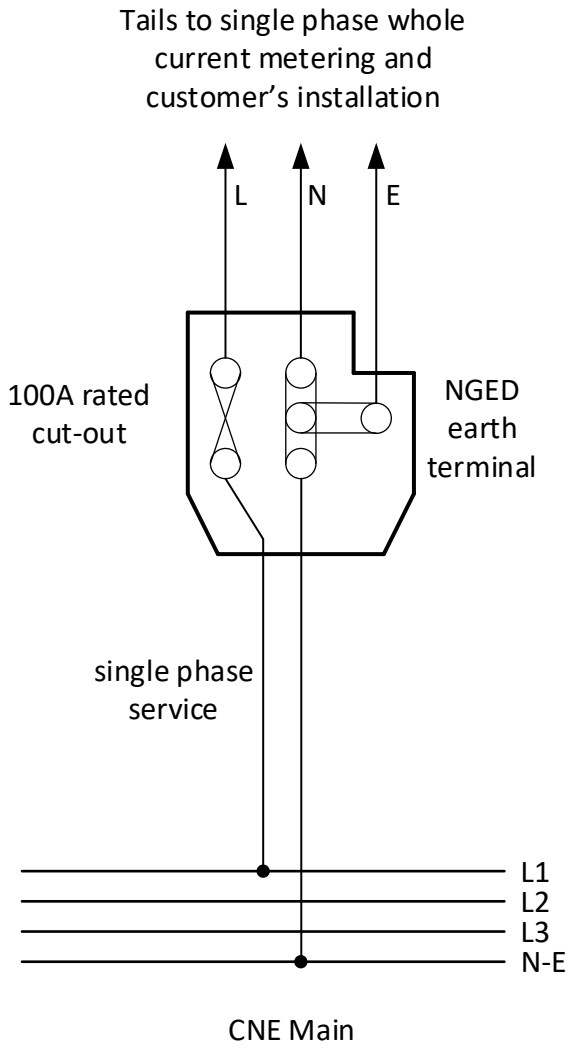
5) An appropriate ‘Connect to L*’ label (Figure 5K) shall be placed adjacent to cut-out;

6) Figure 5D shows a fuse inserted in L1, however, the fuse should be inserted into the phase that has been stipulated by the designer on the design plan or work instruction;

7) An empty Fuse carrier shall be inserted within the spare fuse-ways.

FIGURE 5E **Single-phase PME Connection Arrangement;**

Sustained capacity of up to 18.4kVA, with cyclic capacity of up to 23kVA



Notes:

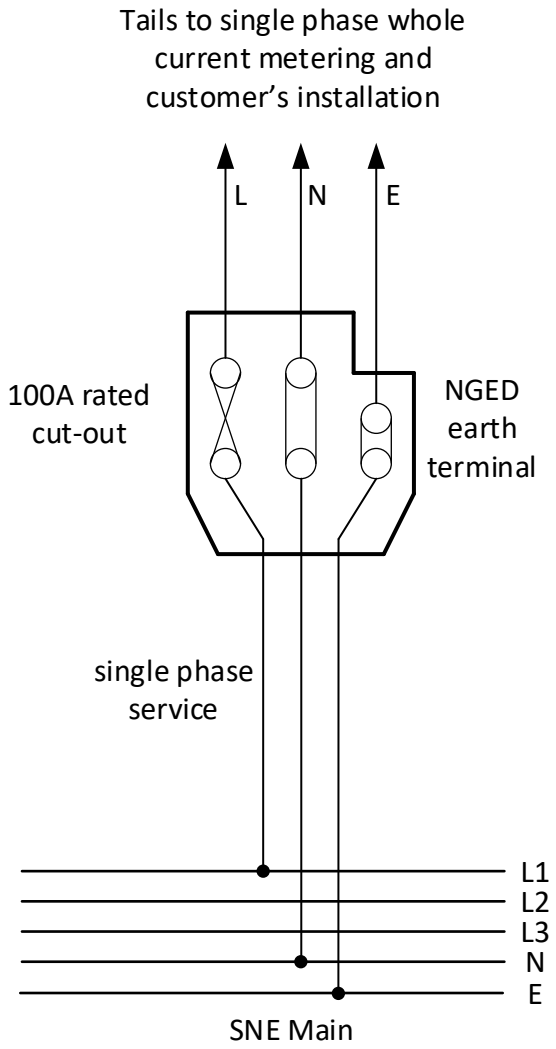
1) Standard fuse rating of 80A per phase;

2) Service cable and meter tails must have continuous rating above cut-out fuse size;

3) A PME label shall be placed adjacent to cut-out.

FIGURE 5F **Single-phase SNE Connection Arrangement;**

Sustained capacity of up to 18.4kVA, with cyclic capacity of up to 23kVA



Notes:

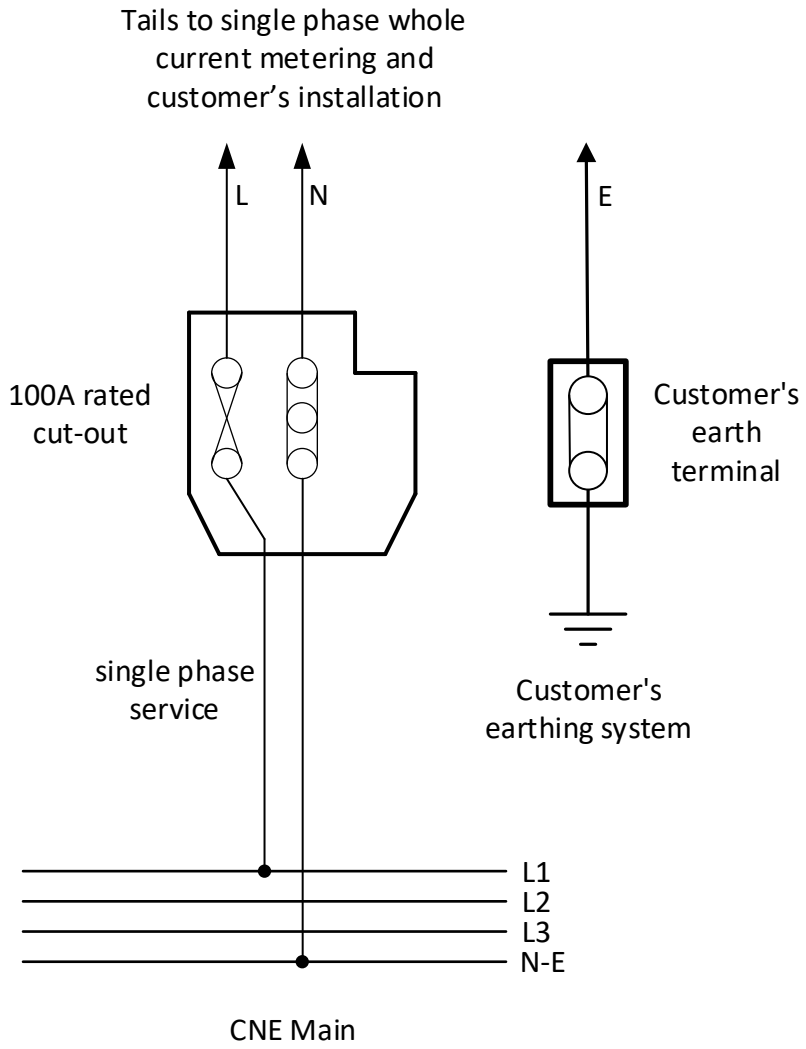
1) Standard fuse rating of 80A per phase;

2) Service cable and meter tails must have continuous rating above cut-out fuse size;

3) A SNE label shall be placed adjacent to cut-out.

FIGURE 5G **Single-phase Directly Earthed Connection Arrangement;**

Sustained capacity of up to 18.4kVA, with cyclic capacity of up to 23kVA



Notes:

1) Standard fuse rating of 80A per phase;

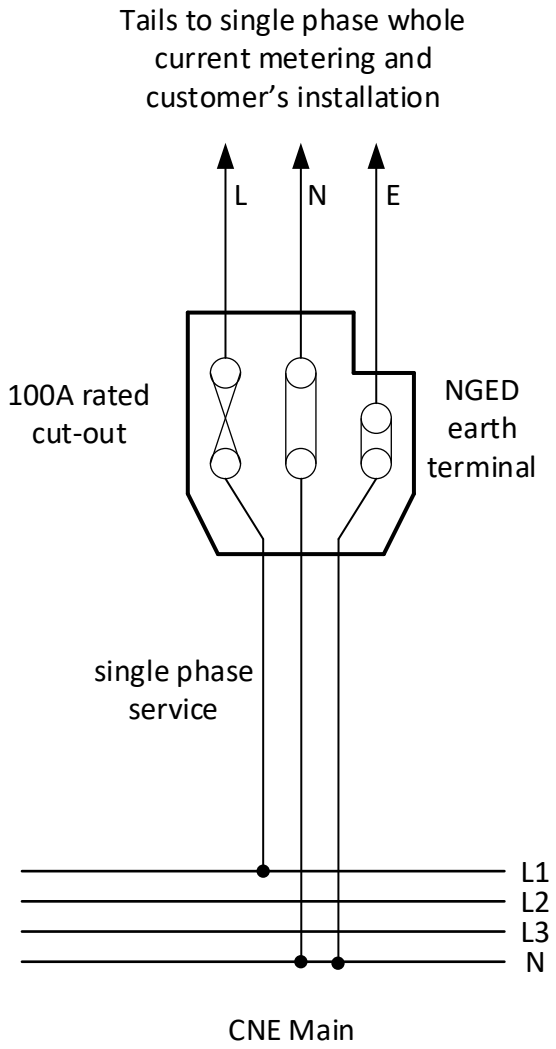
2) Service cable and meter tails must have continuous rating above cut-out fuse size;

3) Customer provides own earthing system and earthing terminal;

4) A direct earthing label shall be installed adjacent to cut-out.

FIGURE 5H Single-phase SNE from CNE main Connection Arrangement;

maximum load normally limited to 80A



Notes:

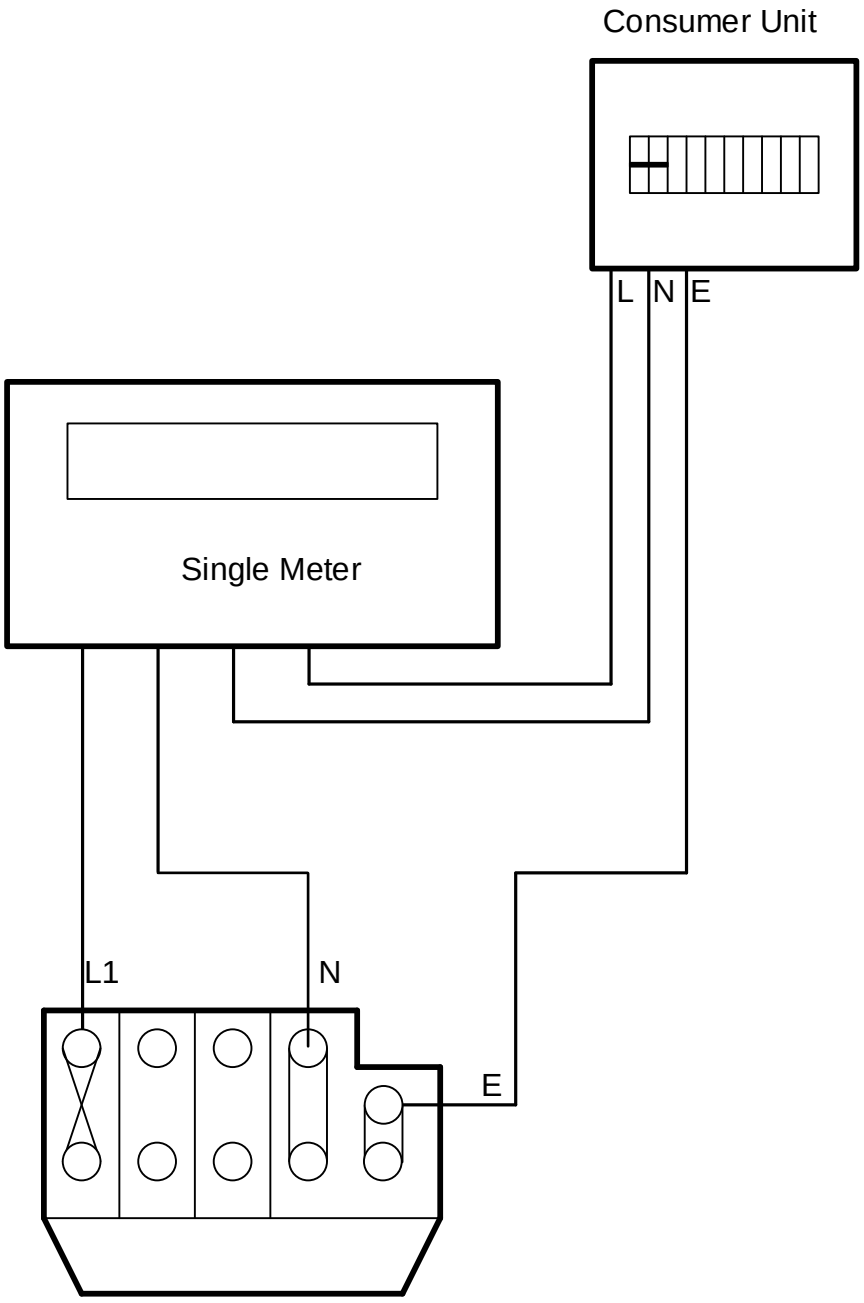
1) Standard fuse rating of 80A per phase;

2) Service cable and meter tails must have continuous rating above cut-out fuse size;

3) A SNE from CNE main label shall be installed adjacent to cut-out.

FIGURE 5I **Typical Metering / Customer Arrangement;**

Single-phase connection with standard fuse rating of 80A (Three-phase cut-out)



Notes:

1) An appropriate ‘Connect to L*’ label (Figure 5K) shall be placed adjacent to cut-out;

2) Figure 5I shows a fuse inserted in L1, however, the fuse should be inserted into the phase that has been stipulated by the designer on the design plan or work instruction;

3) An empty Fuse carrier shall be inserted within the spare fuse-ways.

FIGURE 5J **Typical Metering / Customer Arrangement;**

Single-phase connection with standard fusing of 80A

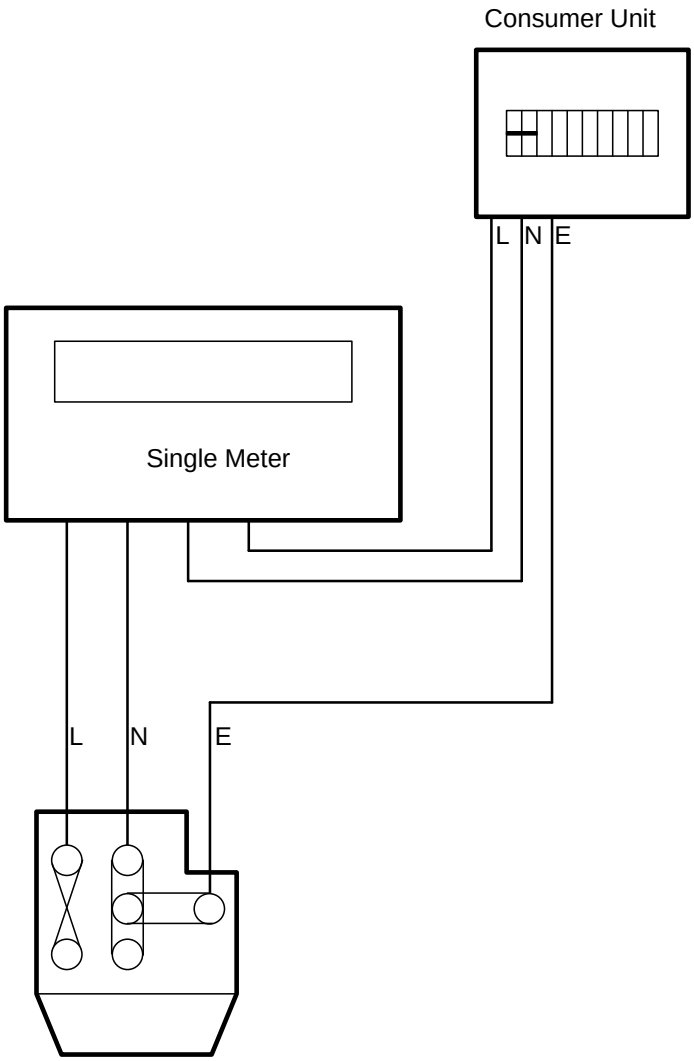


FIGURE 5K **Connect to L* Labels (L1 / L2 / L3) for Figures 5A to 5D**



Connect to L1 Label
(NGED Ref. 400263)



Connect to L2 Label
(NGED Ref. 400264)



Connect to L3 Label
(NGED Ref. 400265)

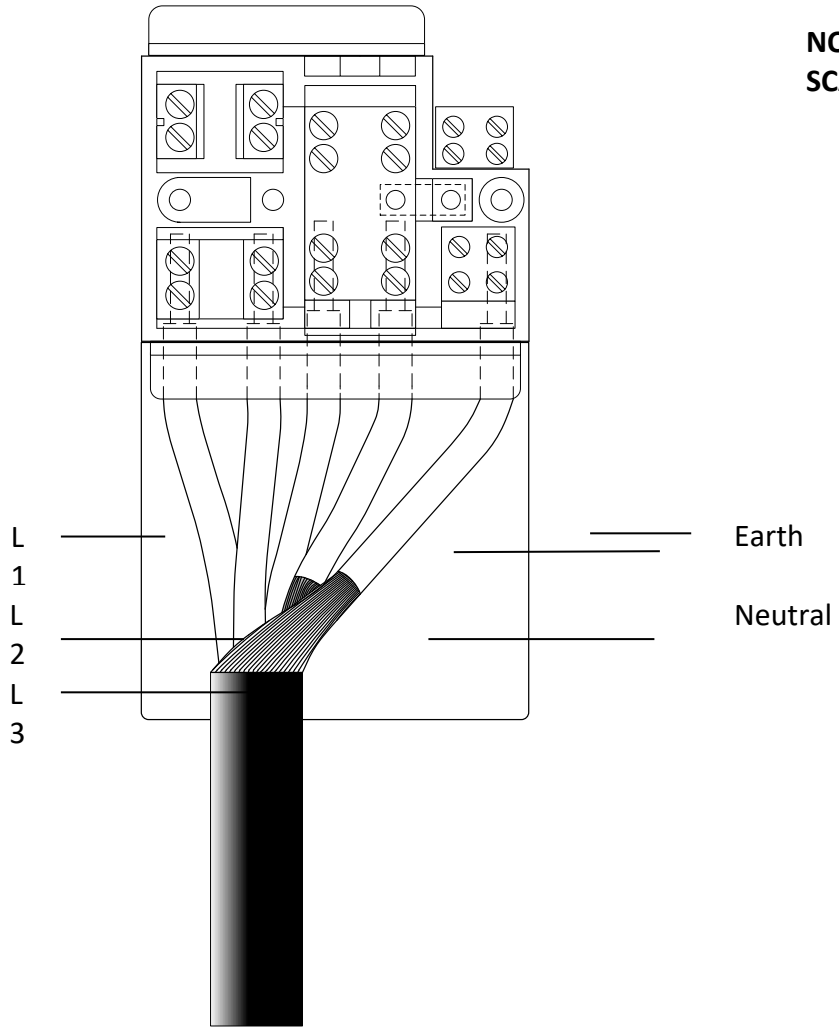
Notes:

1) The appropriate 'Connect to L*' label(s) shall be selected and used on site with cut-out arrangements shown in Figures 5A to 5D;

2) The label is to be placed immediately adjacent to the cut-out, to make it obvious to DNO and Meter Operator staff which phase is being utilised;

3) 'Connect to L1' label: NGED/W400263;
'Connect to L2' label: NGED/W400264;
'Connect to L3' label: NGED/W400265.

FIGURE 5L Bunched Three-Phase Service Cable Termination into Single-Phase Cut-out



Notes:

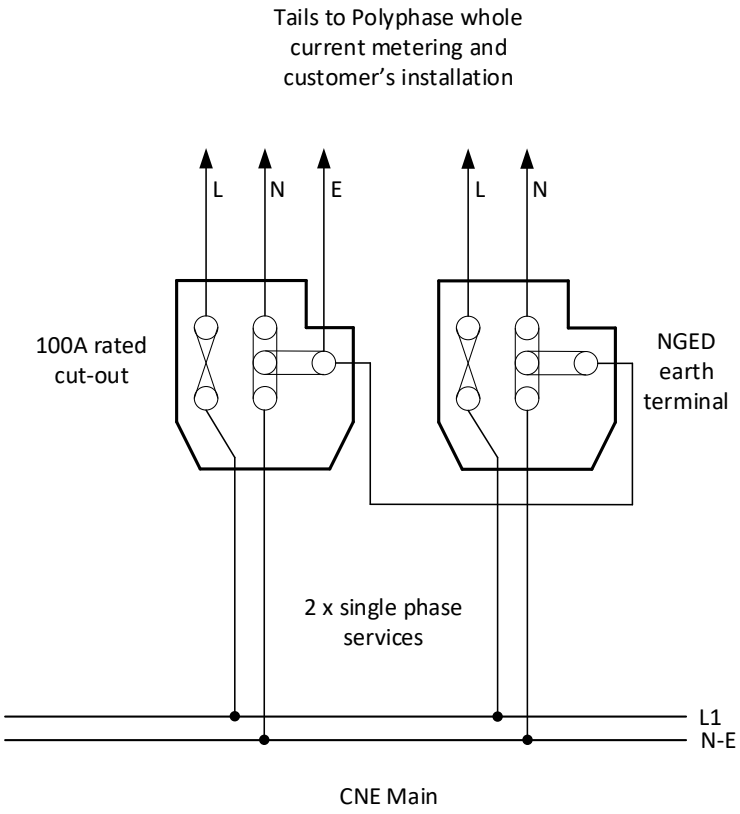
1) Figure 5F is to be read in conjunction with Clause 3.5;

2) This Figure shows a three-phase split concentric service cable being terminated into a single-phase cut-out. Where a plain concentric service cable is being utilised, the neutral and earth sheaths are combined as a single neutral/earth sheath, which would be terminated into the neutral block, in the position of the neutral conductor, above;

3) Typical service cable bunching would be for the L1 and L2 cores to be bunched as phase conductors, with L3 being bunched with the neutral, to provide greater neutral cross-sectional area. For the split concentric example, above, the earth sheath is not bunched with another conductor. If a plain concentric were used, L3 would be bunched with the neutral/earth sheath.

FIGURE 6A **Single-phase PME Connection Arrangement;**

maximum load is between 80A and 160A



Notes:

1) Two single phase arrangements are required to provide 2 x 80A (160A) capacity

2) The earth terminals shall be cross bonded with 25mm² Cu earth tail (yellow/green)

3) Maximum cut-out fuse size is 80A;

4) A label shall be placed at cut-out position reading "Warning this installation is not compatible with three-phase equipment";

5) Service cable must have a continuous rating above the cut-out fuse rating;

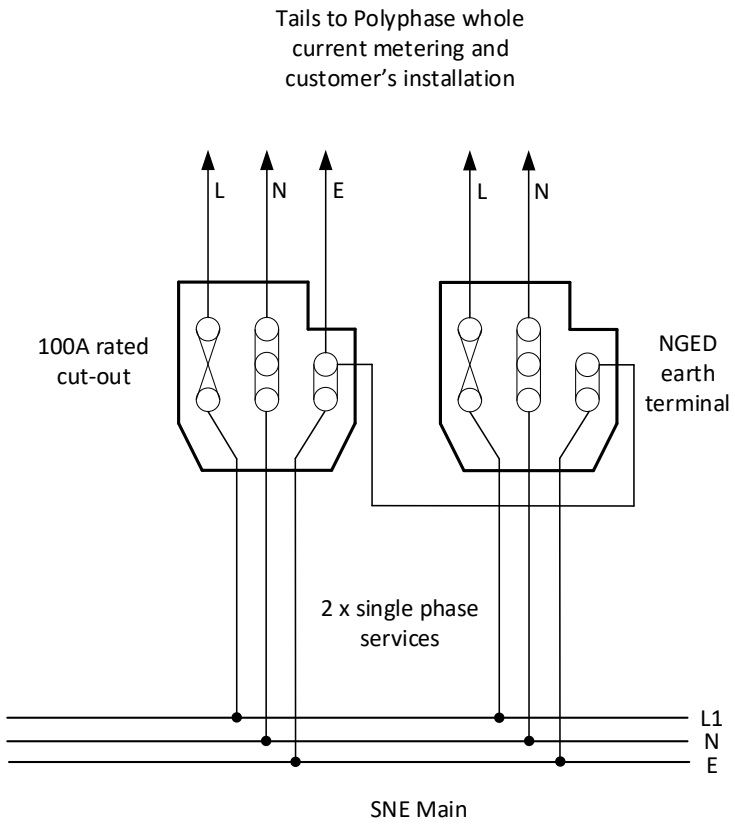
6) The connections must originate from the same circuit

7) A PME label shall be placed adjacent to cut-out;

8) Only one earth terminal shall be made available for the customer

FIGURE 6B **Single-phase SNE Connection Arrangement;**

maximum load is between 80A and 160A



Notes:

1) Two single phase arrangements are required to provide 2 x 80A (160A) capacity

2) The earth terminals shall be cross bonded with 25mm² Cu earth tail (yellow/green)

3) Maximum cut-out fuse size is 80A;

4) A label shall be placed at cut-out position reading "Warning this installation is not compatible with three-phase equipment";

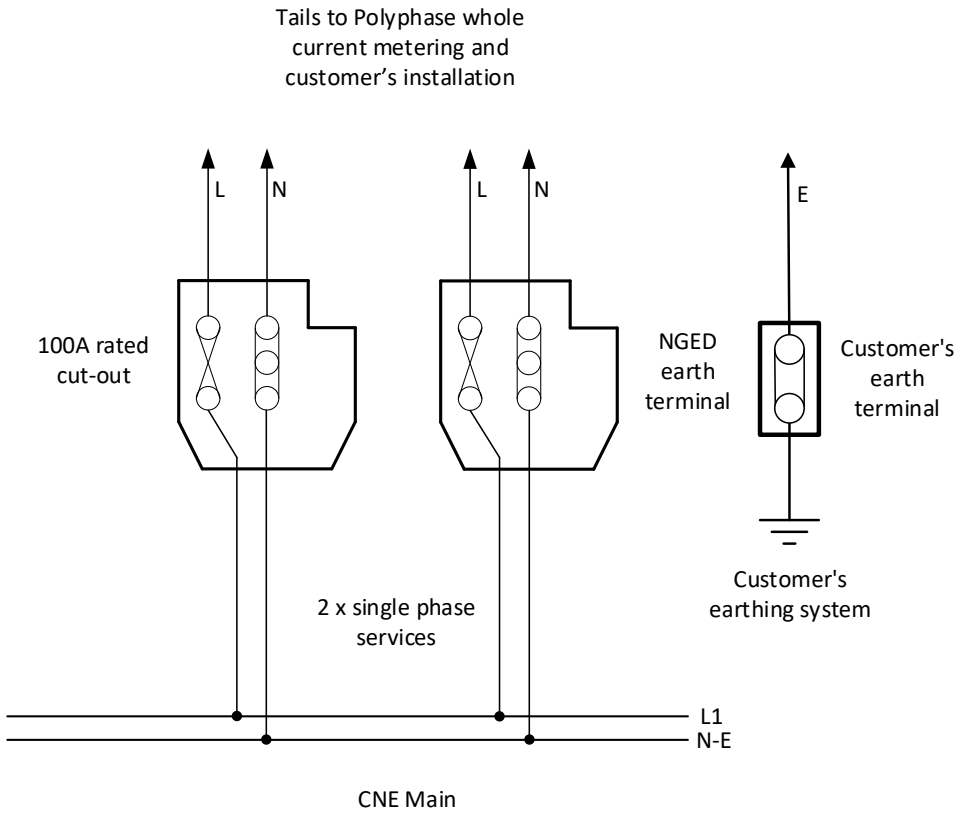
5) Service cable must have a continuous rating above the cut-out fuse rating;

6) The connections must originate from the same circuit

7) A SNE label shall be placed adjacent to cut-out;

8) Only one earth terminal shall be made available for the customer

FIGURE 6C **Single-phase Directly Earthed Connection Arrangement; maximum load is between 80A and 160A**



Notes:

1) Two single phase arrangements are required to provide 2 x 80A (160A) capacity

2) The earth terminals shall be cross bonded with 25mm² Cu earth tail (yellow/green)

3) Maximum cut-out fuse size is 80A;

4) A label shall be placed at cut-out position reading "Warning this installation is not compatible with three-phase equipment";

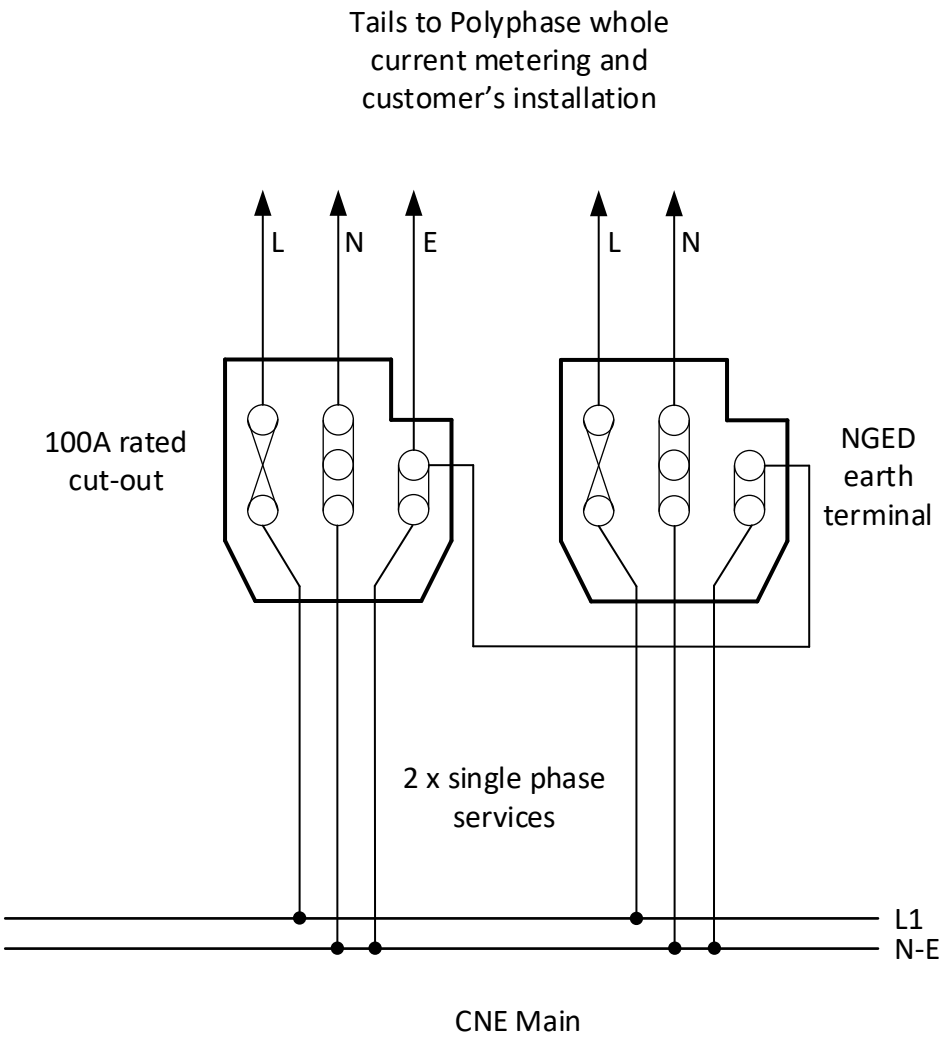
5) Service cable must have a continuous rating above the cut-out fuse rating;

6) The connections must originate from the same circuit

7) Customer provides own earthing system and earthing terminal;

8) A direct earthing label shall be placed adjacent to cut-out;

FIGURE 6D **Single-phase SNE from CNE main Connection Arrangement; maximum load is between 80A and 160A**



Notes:

1) Two single phase arrangements are required to provide 2 x 80A (160A) capacity

2) The earth terminals shall be cross bonded with 25mm² Cu earth tail (yellow/green)

3) Maximum cut-out fuse size is 80A;

4) A label shall be placed at cut-out position reading "Warning this installation is not compatible with three-phase equipment";

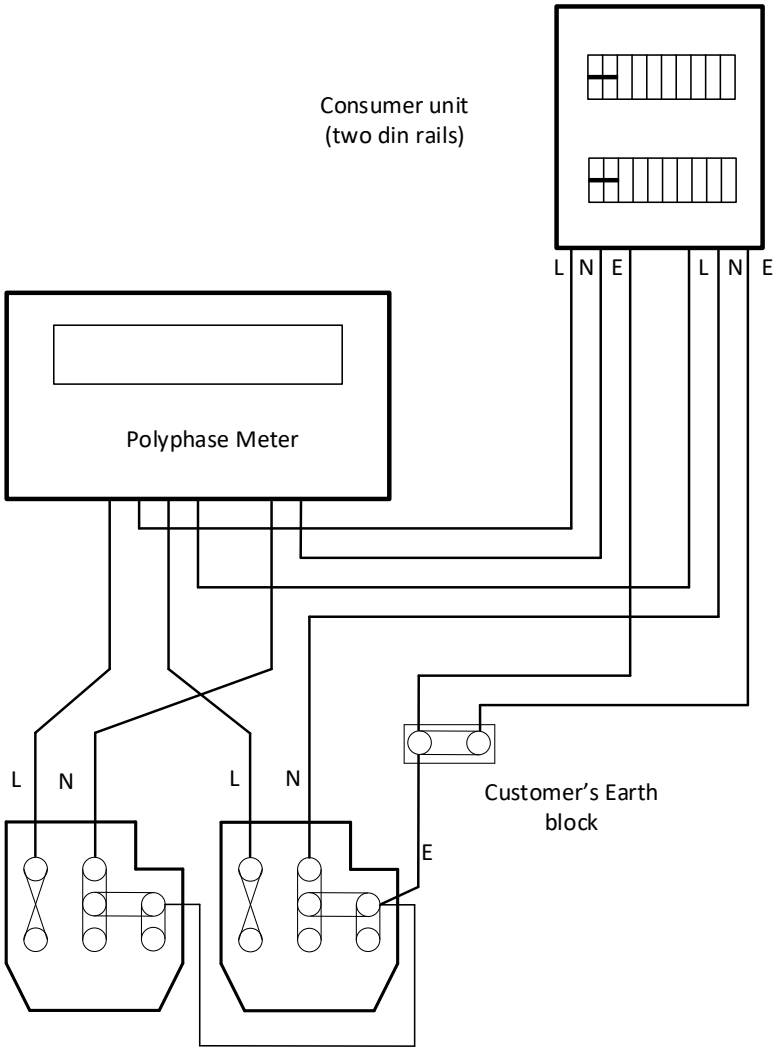
5) Service cable must have a continuous rating above the cut-out fuse rating;

6) The connections must originate from the same circuit

7) A SNE from CNE main label shall be placed adjacent to cut-out;

FIGURE 6E **Typical Metering / Customer Arrangement;**

single phase connection with poly-phase metering with a maximum load of 80A to 160A



Notes:

1) Customer must split load into two separate groups. In this example a multiphase distribution board is shown, however, two separate single phase consumer units can be used

2) Customer Earth block is required to facilitate required number of connections

3) Customer provided with one Earth terminal

4) The meter only requires one neutral connection for 'reference'

FIGURE 7 Isolation Switches



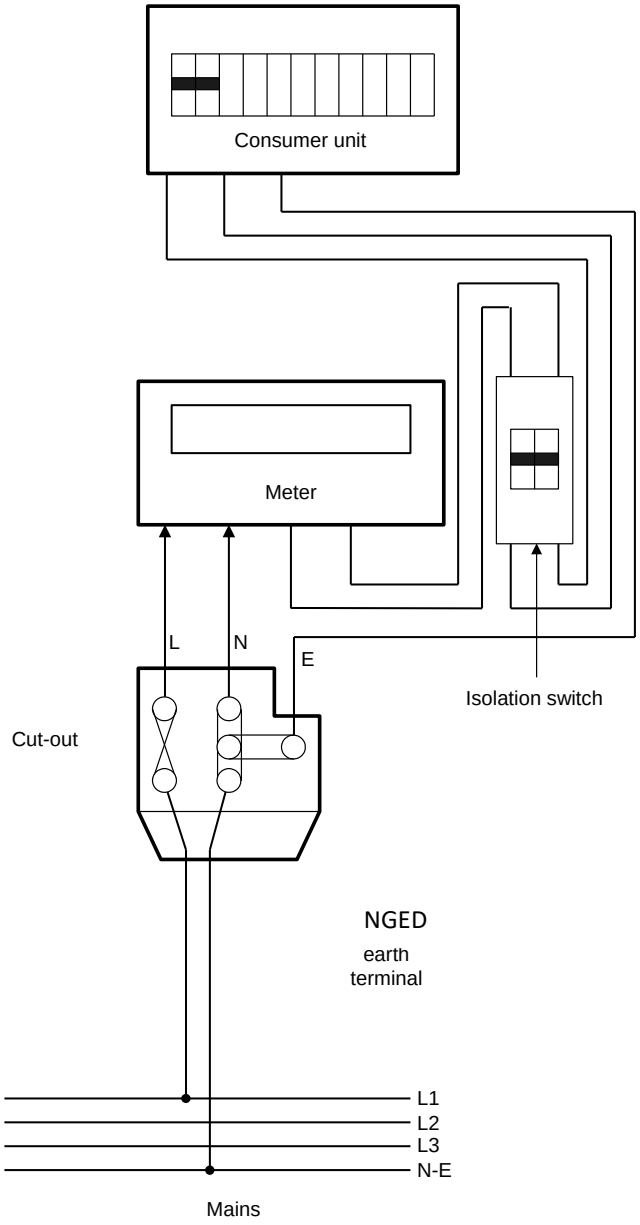


Notes:

1) Isolation switches used by NGED are specified in EE SPEC: 27;

2) Installation and operation of isolation switches to be in accordance with ST: TP14M.

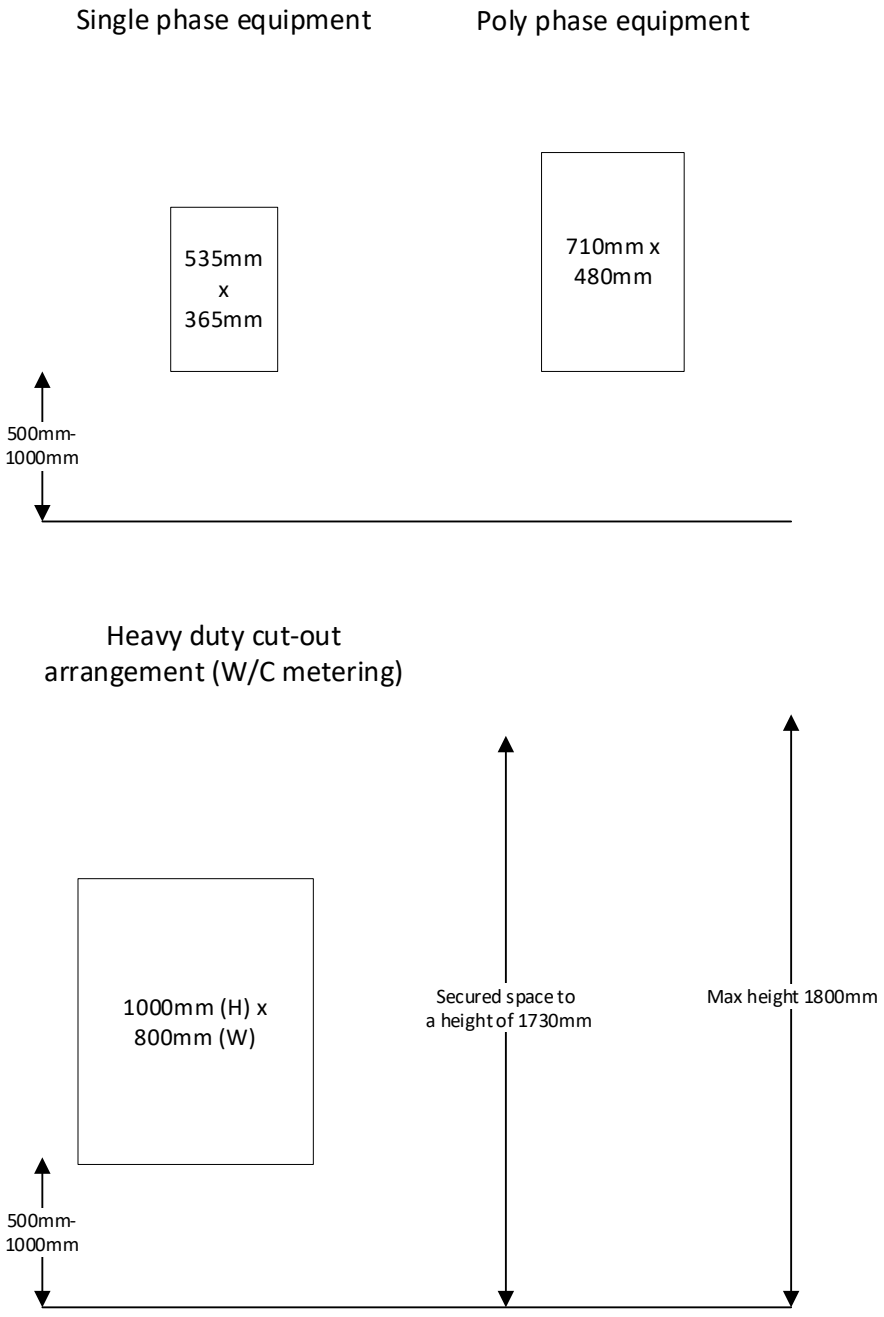
FIGURE 8 Typical Isolation Switch Application



Notes:

1) Isolation switch to be fitted between meter and customers equipment

FIGURE 9 Space Requirements



Note

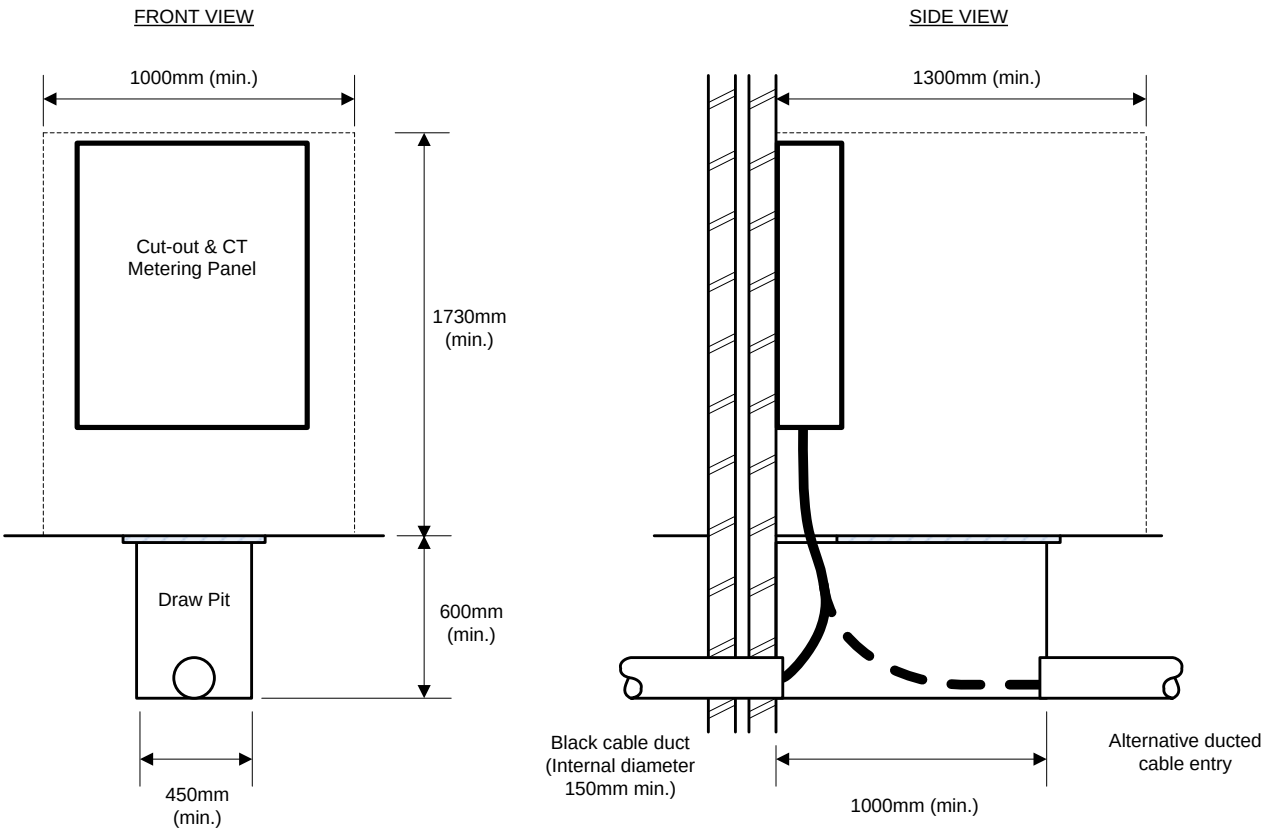
1) The dimensions shown for single and poly phase equipment are interposable

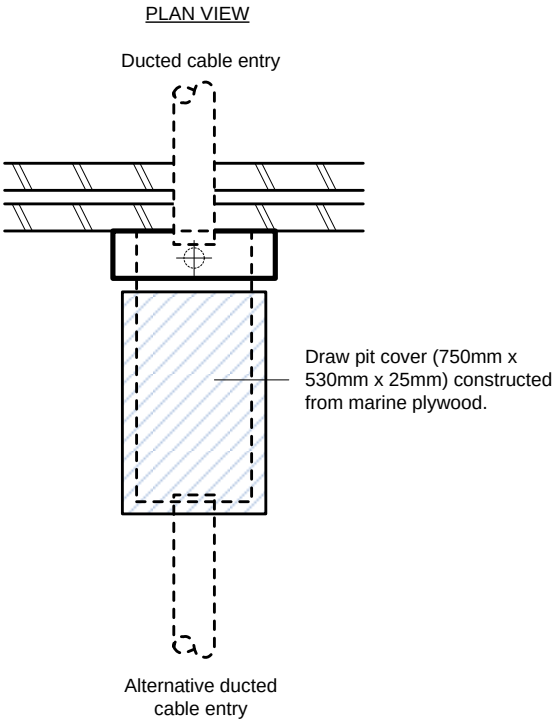
2) The dimensions shown for the heavy duty cut-out arrangement are only suitable for a 200A cut-out and whole current meter.

3) When a heavy duty cut-out arrangement is provided, space shall always be secured / reserved for the possible future installation of a CT metering panel.

FIGURE 10 **Cable Entry Requirements for Wavecon Cable (Draw Pit)**

This option is suitable for 95mm^2, 185mm^2 and 300mm^2 Wavecon cable



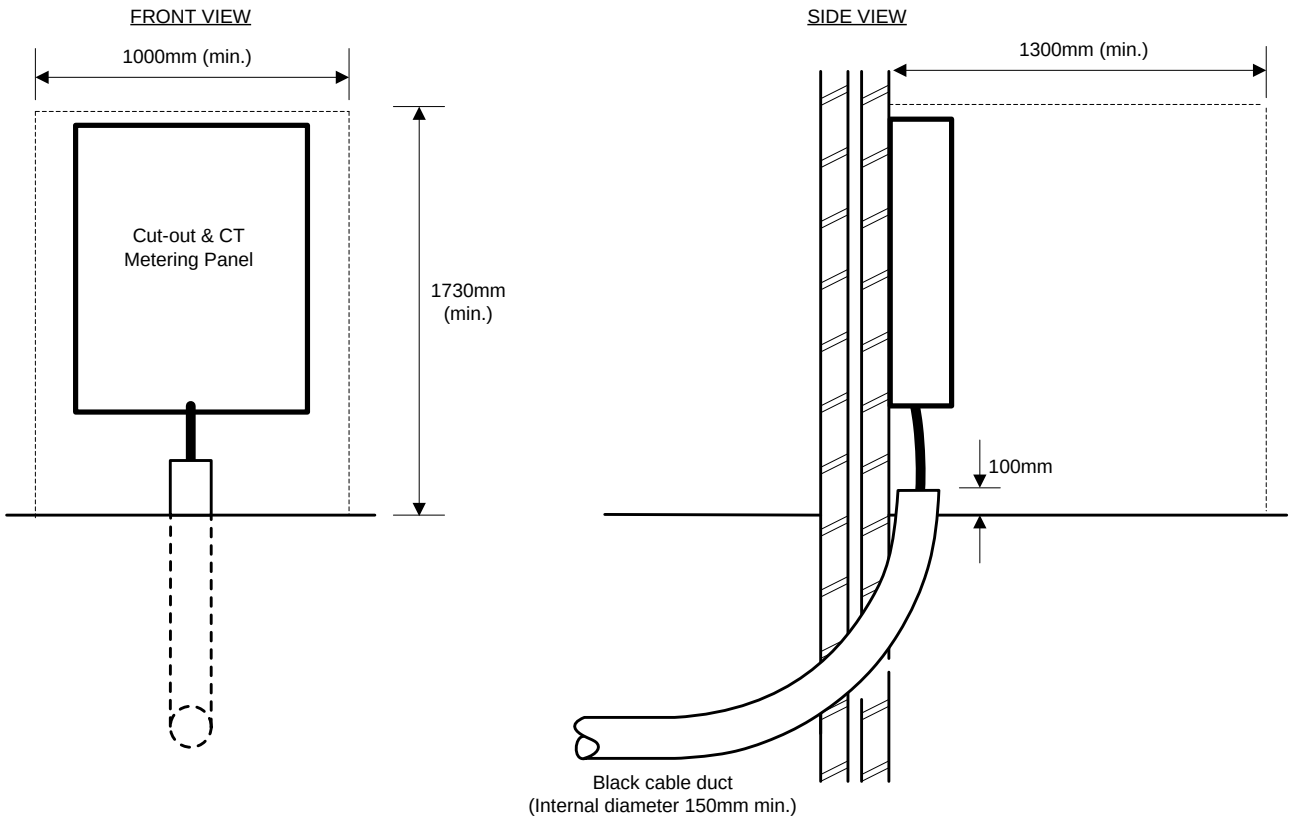


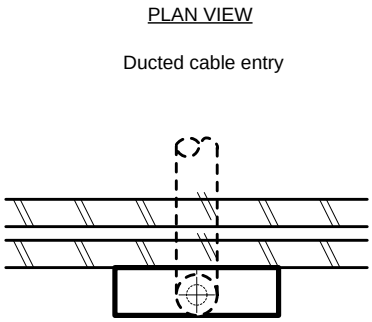
NOTE:

1) A 25mm x 50mm rebate shall be provided around the top of the draw pit to accept the draw pit cover.
2) A 150mm black cable entry duct shall be installed at the bottom of the draw pit as shown in the diagram.
3) Minimum wall space for heavy duty cut-out and metering panel is 1730mm x 1000mm. Additional space is required for distribution boards
4) A minimum of 1300mm of free space shall be provided in front of the distribution board.

FIGURE 11 Cable Entry Requirements for Wavecon Cable (Slow Bend)

This Option is only suitable for 95mm^2 Wavecon cable





NOTE:

1) 150mm cable entry duct must be installed with a slow bend (minmum bending radius of 900mm) and it must be less than 10m long.
2) Minimum wall space for heavy duty cut-out and metering panel is 1730mm x 1000mm. Additional space is required for distribution boards
3) A minimum of 1300mm of free space shall be provided in front of the distribution board.

FIGURE 12 Equipment Dimensions

Heavy duty cut-out sizes

Rating	Height	Width
200A	480mm	402mm
400A	736mm	549mm
600A	845mm	549mm

Metering dimensions

Supply	Height	Width
Single phase metering	310mm	340mm
Three phase metering	460mm	490mm
CT Panel	600mm	500mm

Note

1) Meters must not be enclosed within a metallic structure

2) Additional space is required for bending radius of cables, opening of covers and tool use / access

3) Dimensions correct at time of writing

APPENDIX A

SUPERSEDED DOCUMENTATION

This document supersedes ST: SD5D/4 dated September 2023 which has now been withdrawn.

APPENDIX B

RECORDING OF COMMENT DURING CONSULTATION

Document was not issued for formal consultation.

APPENDIX C

ASSOCIATED DOCUMENTATION

EE SPEC: 27 Specification for 100A, Low Voltage, Single Phase and Three Phase Isolation Switches

ST: SD5A Design of low voltage domestic connections

ST: SD5C Connection arrangements for flats, maisonettes and bedsits

ST: SD5E Design for low voltage commercial and industrial connections

ST: SD5R Earth Fault Loop Impedances and Phase to Neutral Loop Impedances

ST: TP14M Providing De-Energisation or the Installation of an Isolation

APPENDIX D

KEY WORDS

Cut-out, multi-service distribution board, isolation switch, PME, SNE, SNE derived from CNE, TT, Direct Earthing.