

Specification for Streetlight Connection at ELV Traffic Signal Sites

© Waka Kotahi NZ Transport Agency

First edition

Effective from 01 July 2022



INTRODUCTION

This document has been written to provide technical direction on how to connect 230v streetlights to ELV traffic signal sites.

It is important for both servicing, and asset management, that a standard approach is taken with how 230v streetlights are installed at ELV signal sites.

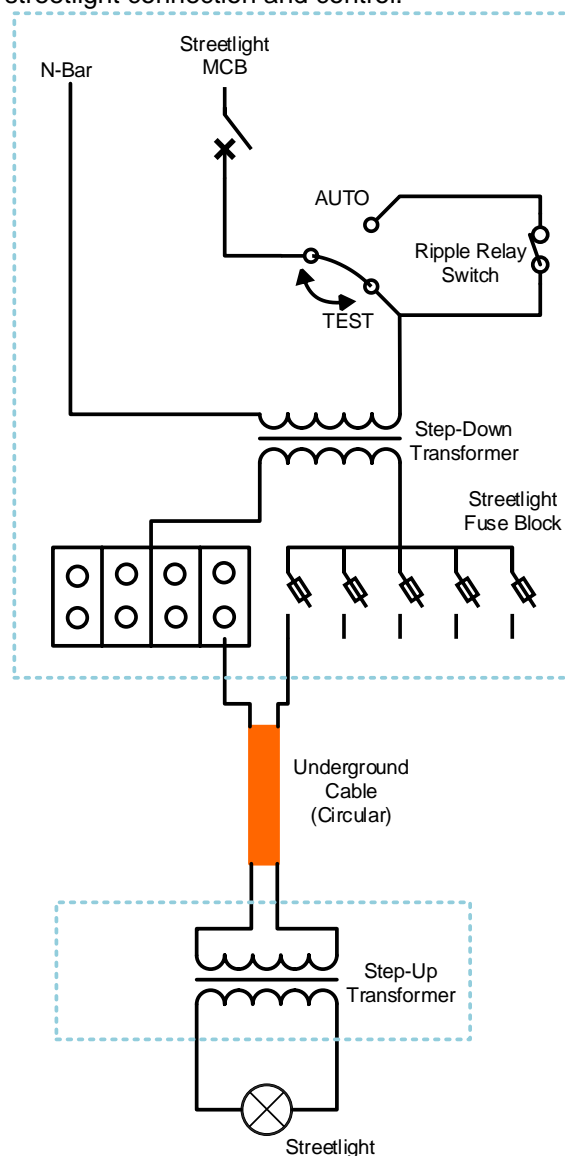
SCOPE

This technical direction applies to all ELV traffic signal sites where there are joint user streetlight poles in use. NZS3000 requires a single point of isolation for all services entering a structure. This means that the street light power must be supplied from the traffic signal controller cabinet.

On ELV sites, the intention is to not have 230v cabling inside the underground ducts, chambers, or poles. This provides a higher level of safety, as mains voltages are only present at the signal controller cabinet, and not downstream into the installation.

WIRING OVERVIEW

The diagram below shows the streetlight solution wiring overview. This diagram only includes the components relevant to the streetlight connection and control.



TRANSFORMER SELECTION

The transformers utilised are referred to as 'step-down' transformers, and 'step up' transformers. As shown in the diagram, there is one step-down transformer for each installation, and a number of step-up transformers. There is one step-up transformer required for each streetlight.

In order to provide consistency across multiple sites, there are specific details for the step-down and step-up transformers.

All transformers must be 50Hz, Full Sinewave, Iron / Steel Core transformers.

Step-Down Transformer -

The output voltage must be 45v.

The transformer must have a front-facing overload or circuit breaker.

The transformer must be suitably sized to match the load.

One of the following two sizes must be used -

- 650 VA
- 1000 VA

To clarify, the minimum size for the step-down transformer is 650 VA.

If 1000 VA is not large enough to handle the streetlighting load, you must advise the project manager who will obtain direction from the project technical lead and the asset management team.

Step-Up Transformers –

The transformer must be rated for the input voltage as 45v, and the output voltage as 230v.

The transformer must be suitably sized to match the load and must be a fully insulated construction.

Only one streetlight can be connected to each step-up transformer.

Step-up transformers must be supplied with flying leads of at least 300mm, which can be terminated directly into the terminal strip in the Montrose box.

There must be no exposed terminations, lugs (except earthing lugs), or voltage taps on the step-up transformer.

Step-up transformers must be fitted with at least two mounting lugs on the bottom.

TRANSFORMER LOCATION

Step-Down Transformer -

The step-down transformer must be securely mounted on the controller shelf beside the logic rack.

An example of an installed Step-Down transformer is shown in photo 1 on page 5.

The step-down transformer must be supplied inside a ventilated metal enclosure, and all cabling on the 230v side, and all cabling above the cabinet shelf must be double sheathed, or insulated and sleeved.

Step-Up Transformers –

The step-up transformer is to be installed inside the Montrose box, at the bottom right side. The transformer must sit in the bottom of the Montrose box, and be secured through the bottom of the box with suitable nuts & bolts.

Most Montrose boxes come with pre-punched cable entry holes. Where the transformer sits over these holes, the hole must be suitably closed off to prevent weathering of the bottom of the transformer. This can normally be done by turning the 'bung' over.

The ELV side of the transformer will connect into the supply cable in the main terminal strip in the Montrose box.

A separate terminal strip must be fitted to the DIN rail to allow connection of the 230v secondary side from the transformer to the streetlight. This terminal strip must be separate from the main ELV terminal strip.

CABLE SELECTION

To reduce the impact of 'clumps' of streetlights failing, each streetlight must have an individual cable 'home-run' back to the fuse in the controller cabinet. It is therefore not permitted to loop the streetlight feed around the intersection from pole to pole.

The ELV cable from the controller cabinet to the Montrose box must be suitably sized to handle the maximum permitted voltage drop.

If the streetlight is close to the controller cabinet, the existing Orange core and an unused core in the signal cable may be used provided the voltage drop remains compliant. Ensure that the use of these cores is detailed on the cable termination chart.

If the voltage drop exceeds the permitted maximum limit, a twin cable must be installed from the controller cabinet to the Montrose box to connect to the transformer.

This cable must be at least 4mm cross-section, and must not be a flat TPS or white TPS cable.

It is recommended to use circular Orange TPS, but it is acceptable to use circular Black TPS, and circular Black rubber cable.

If the ELV streetlight cable used contains a green / yellow conductor, that conductor must be connected to the earth bus-bar at the controller cabinet end, and not terminated at the Montrose box end.

CABLE PROTECTION

To reduce the impact of 'clumps' of streetlights failing, each streetlight cable must be connected to an individual fuse in the controller cabinet, as shown in the wiring diagram.

An example of the secondary side cable protection is shown in photo 2 on page 5.

The entire street lighting system must be connected to a dedicated MCB in the controller main switchboard. This MCB must be 16 Amp rated, and D curve operation.

An example of the streetlighting MCB is shown in photo 3 on page 6.

LABLING

In addition to the normal streetlight labelling required at the controller cabinet in P43, additional labelling is required to be fitted to the Montrose box. This is to ensure future service technicians are aware of the unique electrical hazard that exists inside that Montrose box.

The label must be of a strong vinyl or polyester construction, with rounded edges to prevent peeling, and printed in fade-proof indelible ink. The label must be of premium quality to ensure it does not shrink or crack.

It is not permitted to have any company logos or branding on any external facing warning labels.

An example of the labelling standard required is shown in photo 4 on page 6.



Photo 1 - Step-Down Transformer installed on cabinet shelf

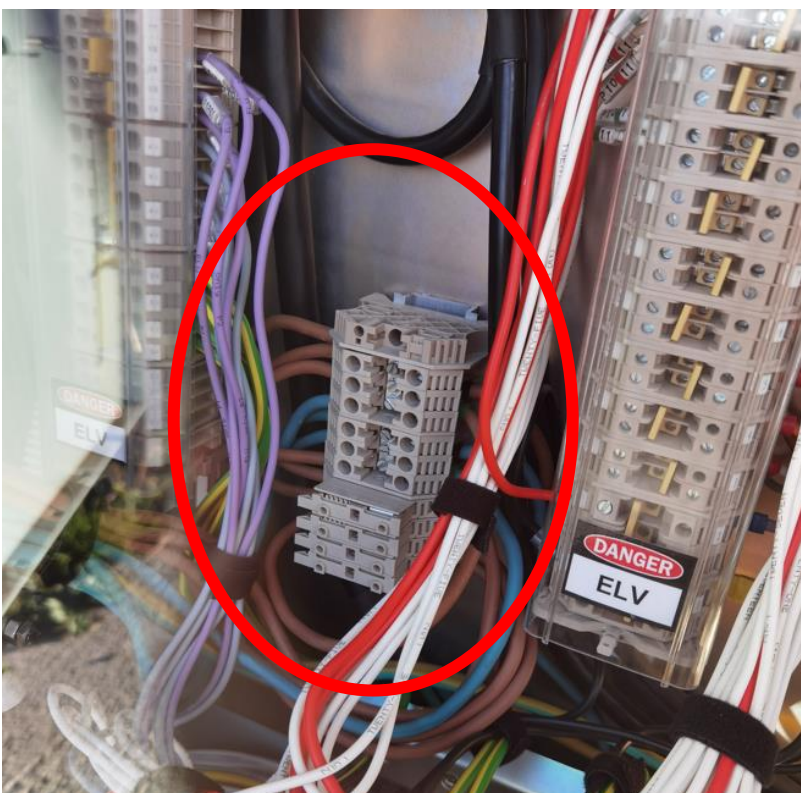


Photo 2 - Cable Protection for Secondary Side Cables

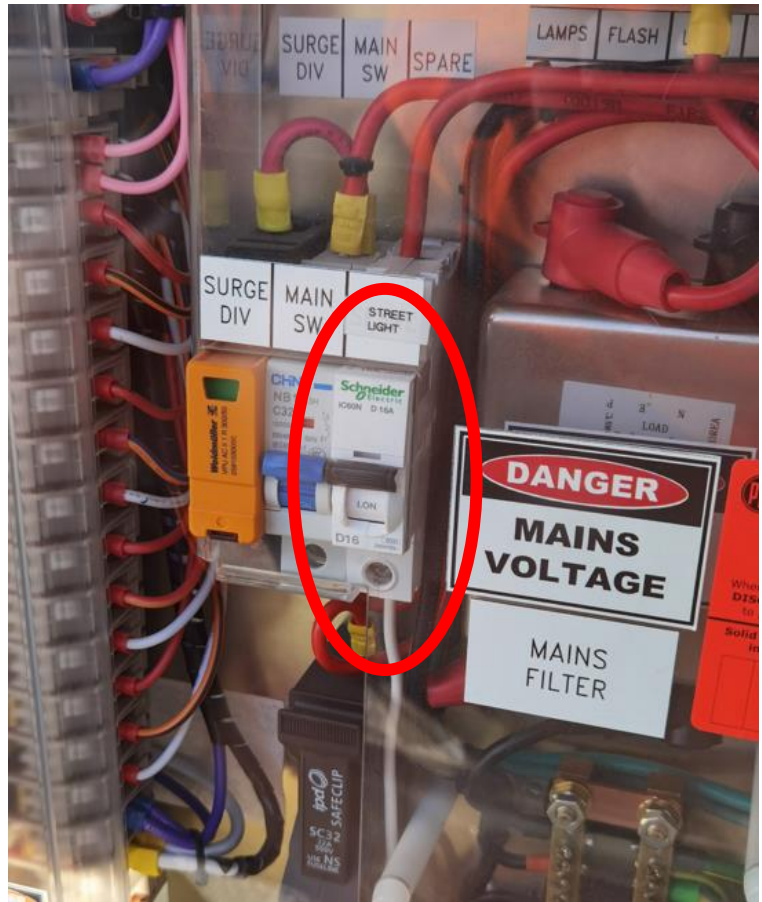


Photo 3 – Dedicated D16 Streetlighting MCB



Photo 4 – Labelling Requirement and location on Montrose box