TRANSPOWER

Temuka Overload Protection Scheme Overview

Purpose of the Document	This document provides information on the operation and procedures related to the Temuka Supply Transformer Overload Protection Scheme Overview.
System need	Increase supply capacity and security to Temuka load. The scheme allows more load to be supplied when both transformers are in service, then if one of the supply transformers trips the scheme ensures the remaining transformer does not thermally overload and trip, hence preventing a total loss of supply at the Temuka GXP. The scheme sends a signal to initiate ripple control load management. If the overload remains, feeders are opened at Temuka.
Purpose of the Scheme	The Purpose of the Scheme is to provide overload protection for the Temuka 110/33 kV supply transformers T1 and T2. Detects an overload on the Temuka supply transformers following a contingency.
When to Enable the Scheme	The scheme is normally enabled.
When to Disable the Scheme	This scheme may be disabled during maintenance or testing of this scheme or the associated 110/33 kV transformers or related systems. Note: normal seasonal ratings would apply. Historical 0.5-hour rating offer is not available but may be requested if required for an extended scheme outage.

Overview of the Scheme

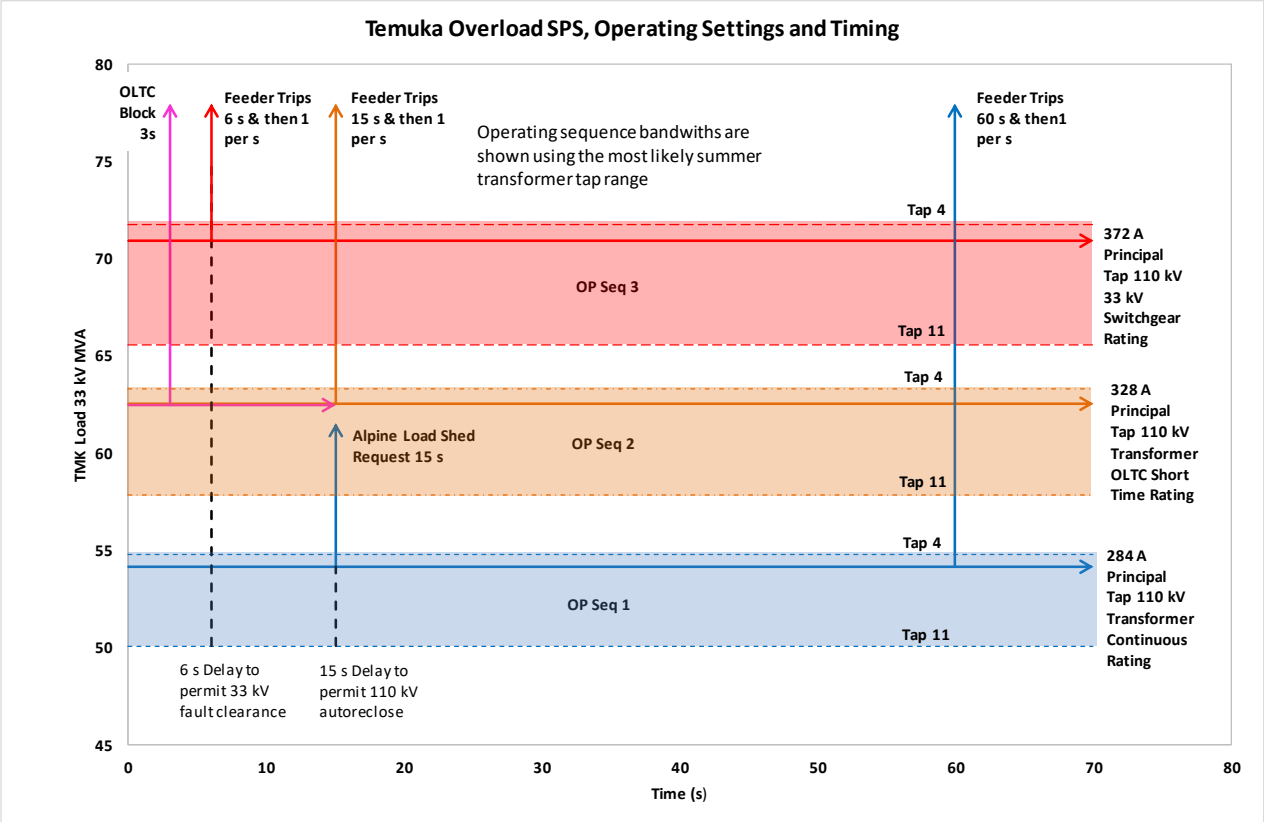
The overall scheme is the Temuka 110 kV Overload Special Protection Scheme TMK_110SPS. The scheme functionality is duplicated as TMK_110SPS_1 and TMK_110SPS_2 in two SEL-451-5 relays at Temuka.

The Temuka GXP 33 kV peak load has reached and will exceed the Temuka 110/33 kV supply transformers (T1 and T2) n-1 thermal capacity. There is no 110 kV bus at Temuka and each transformer is directly connected to a 110 kV circuit to Timaru in the form of a dual transformer feeder arrangement. During a Temuka 110/33 kV transformer or TIM-TMK 110 kV circuit contingent event the remaining in service Temuka 110/33 kV transformer will be overloaded under predicted future prudent (P90) forecasted peak load.

This 110 kV Overload Special Protection Scheme will detect overloading on the Temuka T1 and T2 transformers by measuring transformer 110 kV current at Temuka. On detecting a transformer overload, it will initiate 33 kV load shedding requests to Alpine Energy and sequentially trip appropriate 33 kV feeder circuit breakers as required to remove the overload.

Component	**SPS Overload Functions**
TMK_110SPS_1	132OL(DefT)1, T1 Overload Protection 1
	112OL(DefT)1, T2 Overload Protection 1
TMK_110SPS_2	132OL(DefT)2, T1 Overload Protection 2
	112OL(DefT)2, T2 Overload Protection 2

The SPS is designed to cater for future Temuka 33 kV peak load up to 85 MVA. At a peak 33 kV load of 85 MVA co-ordination between SPS load shedding and transformer overcurrent protection is extremely tight and 85 MVA likely represents the effective upper limit of co-ordinated SPS operation. Co-ordination is affected by voltage regulation on the 110/33 kV Temuka – Timaru system and Temuka transformer tap position.


Temuka Overload SPS, Operating Settings and Timing
OLTC Block 3s
Feeder Trips 6 s & then 1 per s
Feeder Trips 15 s & then 1 per s
Operating sequence bandwiths are shown using the most likely summer transformer tap range
Feeder Trips 60 s & then1 per s
Tap 4
372 A Principal Tap 110 kV 33 kV Switchgear Rating
OP Seq 3
Tap 11
Tap 4
328 A Principal Tap 110 kV Transformer OLTC Short Time Rating
Alpine Load Shed Request 15 s
OP Seq 2
Tap 11
Tap 4
284 A Principal Tap 110 kV Transformer Continuous Rating
OP Seq 1
Tap 11
6 s Delay to permit 33 kV fault clearance
15 s Delay to permit 110 kV autoreclose
TMK Load 33 kV MVA
Time (s)
80
75
70
65
60
55
50
45
0
10
20
30
40
50
60
70
80