

Load Exclusion Module

For use with SuperTAPP

Voltage Control Relays

Type LEM/1

Description and User Instructions

Version	Date
V1.0	22-10-2001

Fundamentals Ltd

1. DESCRIPTION & PRINCIPLE OF OPERATION

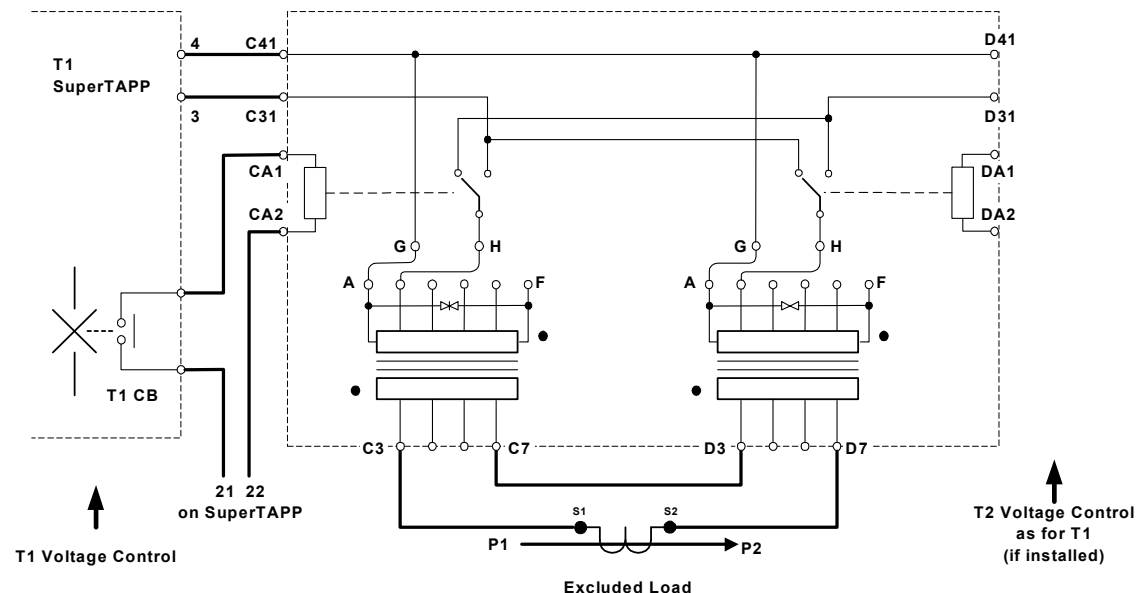
The load exclusion module, type LEM, is for use with the SuperTAPP voltage control relay where a specific load is to be excluded from the effective measured power transformer load.

A typical application is where a capacitor, used for reduction of system losses, is switched into and out of service at intervals, or is permanently connected.

Embedded generation either synchronous or asynchronous can also cause changes to the network parameters. In these situations the power factor of the transformer(s) load may change significantly and reduce the accuracy of the voltage control system to a point that is unacceptable.

The LEM module is equipped for use with up to two transformers operating in parallel with one excluded load.

The module uses two tapped interposing transformers connected as shown in figure 1. Current from a current transformer derived from the load to be excluded is passed through the primary connections to the LEM module connections C3-7 and D3-7. The connections accept a CT secondary of 0.5, 1 or 5A.



Notes:

1. LEM to be mounted in T1 AVC Panel
2. For a single transformer connect C31 to D31. No connections are required to CA1/2
3. In all cases link G and H on blocks A and B according to schedule

Figure 1

The output current from each interposing transformer is selected such that the current is equivalent to the magnitude of the excluded load in the secondary current from each

main transformer. For instance, if the CT ratio of the main transformer is 1000:1 and the ratio of the excluded load CT is 500:1 the current output from the LEM must be halved.

If two transformers are connected to the bus bar supplying the excluded load the output current from the LEM to each transformer must be halved again. Two relays are used for detection of the transformer running arrangement. When both transformers are in service the output from one interpose CT is connected to one SuperTAPP relay, when one transformer is out of service the output from **both** interpose CTs is connected to the remaining SuperTAPP relay.

In order to cater for a wide variation of installed current transformers, the secondary connection from each interpose transformer is tapped, a table of connections is then used to select the output current from the LEM.

Connections to the SuperTAPP relay are always made to the 0.5A connections regardless of the CT used, that is, terminals 3 and 4.

2. DETERMINATION OF SETTINGS

For correct operation the relative capacities of the transformer and the load to be excluded must be known. When the ratio of the current transformer primary rating is calculated using formula 1, the appropriate connections are made to the LEM as shown by table 1.

Formula 1

Ratio of Ratings = Transformer LDC CT Primary ÷ Load CT Primary

Ratio of Ratings		Module Connections – T1 and T2	
From	To	Block A	
13.6	7.7	A - G	F - H
7.7	4.8	A - G	B - H
4.8	3.2	B - G	F - H
3.2	2.4	C - G	F - H
2.4	1.9	B - G	E - H
1.9	1.5	E - G	F - H
1.5	1.3	B - G	D - H
1.3	1.1	B - G	C - H
1.1	0.9	C - G	E - H

Table 1

Example: -

1.

Transformer 10MVA and LDC CT 525/1

Load 1MVA and CT used 60/1

Ratio of Rating $525/60 = 8.75$

Link A to G and F to H.

2.

Transformer 45MVA and LDC CT 1000/1

Load 10MVA and CT used 200/1

Ratio of Rating $1000/200 = 5$

Link A to G and B to H.

3. CONNECTIONS

The module general layout is shown in figure 2. Four terminal blocks are provided, one block to each transformer voltage control relay and two blocks for connection from the excluded load CT.

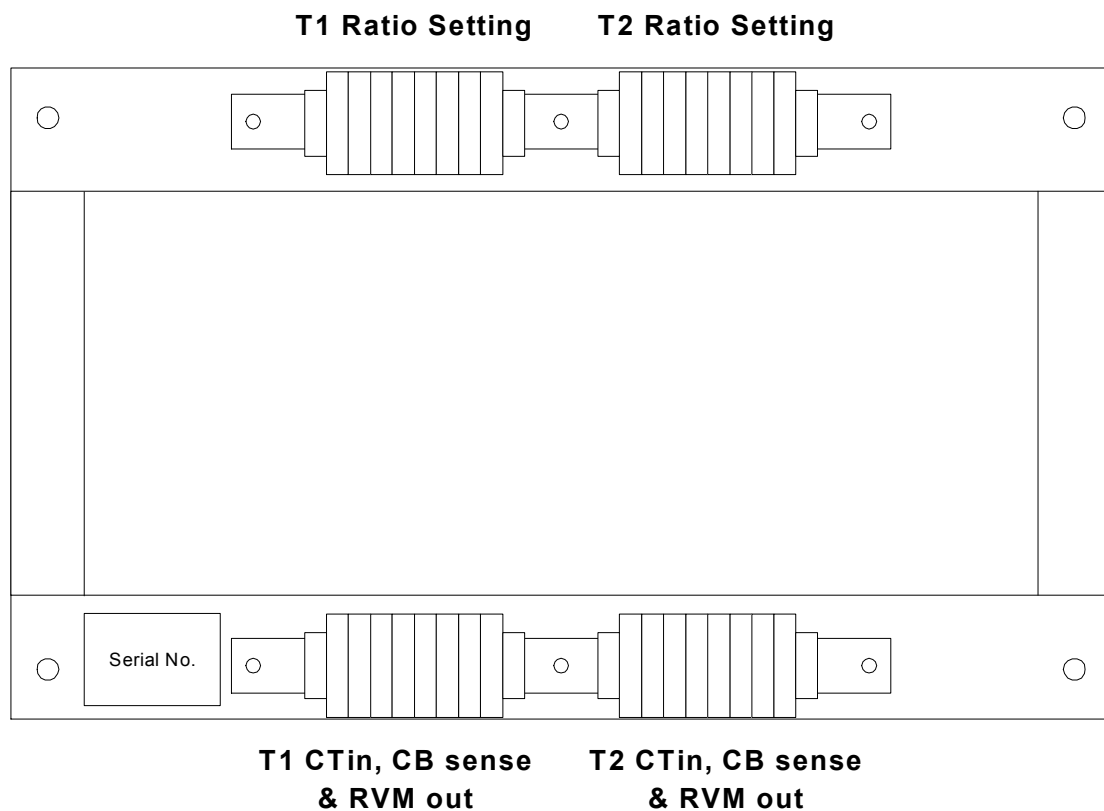


Figure 2

Figure 3 shows the module nameplate label with the connection identifiers. If the unit cover plate is removed it must be replaced in the correct orientation.

The ratio settings are made using terminal blocks T1 block A and T2 block A. If only one transformer is at the site, T1 block should be used.

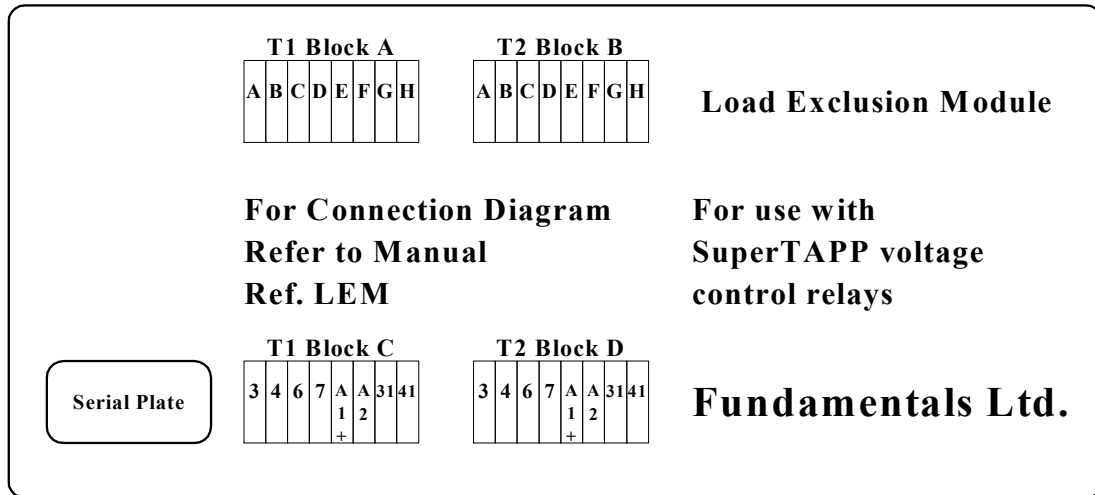


Figure 3

Block C and block D are provided for connection from the excluded load CT, for sensing of the transformer CB status and for output to the VCR load current circuit.

Block C	
Terminal	Description
3	From S1 CT of load circuit
4	To Block D terminal 3 if 0.5A CT or CT S2*
6	To Block D terminal 3 if 1.0A CT or CT S2*
7	To Block D terminal 3 if 5.0A CT or CT S2*
A1 +	CB status positive
A2	CB status common
31	To SuperTAPP terminal 3
41	To SuperTAPP terminal 4

Block D *	
Terminal	Description
3	From Block C
4	From 0.5A S2 CT of load circuit
6	From 1.0A S2 CT of load circuit
7	From 5.0A S2 CT of load circuit
A1 +	CB status (positive if DC)
A2	CB status common
31	To SuperTAPP terminal 3
41	To SuperTAPP terminal 4

* **Block D is not required for a single transformer installation.**

4. INSTALLATION

The LEM/1 module is constructed in a steel enclosure 300mm wide, 177mm deep and 95mm height from base-plate, the general outline is shown in figure 2.