SuperTAPP Voltage Control Relays

The SuperTAPP voltage control system consists of the RVM voltage control relay and the RTMU control and monitor relay. Together they provide a comprehensive voltage control solution in a 19 inch rack. The RVM relay is a solid state relay incorporating the patented TAPP (Transformer Automatic Paralleling Package) circuit. The RTMU relay is designed for use with RVM relays or as a stand alone monitor device for existing or new voltage control systems.

RVM & RTMU Relays

RVM Voltage control relay

The RVM relay is a solid state voltage regulating relay incorporating the patented TAPP circuit. The main measuring circuit and the integral digital line voltmeter both work in r.m.s. volts. Four values of basic voltage offset can be applied remotely by telecontrol for load shedding and other purposes. A tap change operations counter is incorporated which displays the number of automatic operations initiated by the relay. Independent controls for load drop compensation (LDC) and minimisation of circulating current are provided.

RTMU Control and Monitor Relay

This unit provides runaway prevention, voltage monitoring and VT supervision features. It also incorporates control switches, a digital tap position indicator (TPI) and indication of tap-change in progress.

For runaway prevention the relay monitors each tap change detected by the TPI. If a genuine tap change has not been initiated it prevents any further tap changes by breaking the tap changer motor supply (lockout) and sends an alarm.

In automatic operation the relay continuously monitors the output voltage of the power transformer and inhibits tap change operations which would cause the voltage to go above or below preset maximum and minimum voltage levels. All phases are monitored, and any out of balance (e.g. a blown VT fuse) inhibits any raise operations.

Features

- Simpler tap change control schemes
- Better voltage control at normal load power factors
- Simple line drop compensation using a single control
- Effective runaway prevention
- Integral load shedding via telecontrol signal
- Fast tap down feature
- Suitable for 1, 2, 3 or 4 transformer substations
- All types of TPI sender can be used
- Suitable for dissimilar transformers
- A type RVM/5 relay and an RTMU/1 control unit occupy a single 19 inch rack tier of 4U height.

Applications

Power transformers are generally provided with a motorised tap changer controlled by a voltage regulating relay.

For security of supply, transformers are often operated in parallel. Many transformer control systems are in use; their aim to prevent inadvertent operations which would result in abnormal power system voltage and/or excessive circulating current where transformers are operated in parallel. These systems have grown in complexity to the point where it is not unusual for the voltage control system of each transformer to occupy a complete control panel.

The SuperTAPP system has simplified voltage control to a point where only the voltage regulating relay, control unit and a few other components are necessary. The RVM/5 together with its companion RTMU/1 are ideally suited for new or refurbished transformers providing a complete modern tap change control system in a single 19" rack.

SuperTAPP is based on a modified negative reactance principal and it allows up to 4 transformers to be operated in parallel at the same site without the need for complex control circuits. System power transformers with otherwise incompatible tap change control schemes can easily be made to operate in parallel. Neighbouring networks can be paralleled without first inhibiting the automatic voltage control. SuperTAPP provides excellent line drop compensation performance and avoids the drooping characteristic associated with normal negative reactance schemes.

Quality

Certification Number: LRQ 0959146

Fundamentals are approved and operate a quality management system in accordance with the requirements of ISO9001:2000

Technical Information – RVM Relay

Indications

- LED indications
- Low voltage
- Very low voltage (< 80% target)
- High voltage
- Very high voltage (> 2% above upper band)
- Tap change outputs (raise / lower)
- Voltage offset inputs
- Time delay bar graph
- Alarm
- LCD display for measured line voltage in kV
- Tap counter

Settings

Basic voltage:	95% to 105%
Initial time delay:	10 to 120 seconds
Inter-tap delay:	5 to 60 seconds (Subsequent operations until voltage restored to within deadband)
Fast tap down:	On/Off
Output pulse:	1.5 or 4.5 seconds
Alarm:	Fixed 15 minutes
No of transformers:	1-4 (paralleled transformers)
Voltage offset:	+1.5%, +3%, -3%, - 6%, additive on "obey last call" (gives an overall range of +4.5% to -9% in 1.5% steps).
Coupling (circulating current control):	6% to 15% calibrated in transformer impedance
Line drop compensation (LDC):	0% to 10% (based on the total loading of the substation)

Technical

- Ratings 50/60 Hz
- Bandwidth: +/- 1% to +/- 2.5% with 0.25% hysteresis on band threshold
- Auxiliary Supply V_x 80 to 250 V AC/DC, burden 3 VA
- Voltage V_n 60 to 140 V true rms (nominal 110 V), burden 3 VA
- Current I_n 0.5A, 1A or 5A selectable, overload continuous 1.3 x nominal value, 20 x nominal value for 20 seconds, burden 8 VA

Contacts

- Raise and Lower NO (normally open), rating 10 A 240V ac maximum, 450 mA 110 V dc maximum
- Alarm NO, rating 5 A 240V ac maximum, 450 mA 110 V dc maximum

Technical Information – RTMU Relay

Indications

- LED indications
  - High voltage (block raise)
  - Low voltage (block lower)
  - Lockout (runaway prevention)
  - Tap in progress
  - Alarm
- LCD display for tap position

Settings

- Low voltage: 90% to 105%
- High voltage: 95% to 115%
- Number of taps: 11 to 41 in resistor mode or 11 to 39 in BCD mode
- Alarm: Fixed 15 minutes
- Transfer tap position: ON or OFF (each side of mid position)
- Voltage difference (between phases): disable, 5% or 10%

Technical

- Ratings 50/60Hz
- Auxiliary Supply V_x 80 to 250 V AC/DC, burden 3 VA
- Voltage V_n 60 to 140 V true rms (nominal 110 V), burden 3 VA

Contacts

- Lockout NO (normally open) and 2 NC (normally closed), rating 10 A 240V ac maximum, 450 mA 110 V dc maximum
- Block Raise and Block Lower NC, rating 10 A 240V ac maximum, 450 mA 110 V dc maximum
- Alarm NO, rating 5 A 240V ac maximum, 450 mA 110 V dc maximum

Environmental

- Temperature IEC68-2-1/2 and BS2011 (1977)
- Operating -10 °C to +55 °C
- Storage -25°C to +70°C
- Insulation C255-5, BS142 Section 1.3
- 5kV 1.2/50µs waveform as IEC255-4
- 2kV rms 50Hz for 1 minute between all terminals and earth
- 1kV rms 50Hz for 1 minute across open contacts
- Transient overvoltage IEC255-5
- High frequency disturbance - IEC255-22-1. – Class III
- Fast transient IEC801-4. – Level IV
- Electrostatic discharge IEC801-2. Class IV