

TARTN20D

Voltage Regulating Control Relay



The Voltage Regulating Control Relay «TARTN20D» provides regulation of the supply medium-voltage (MV) provided by a transformer HV / MV or by two parallel transformers.

The TARTN20D monitors the voltage and current of HV network and initiates to the transformer tap changer mechanism the different commands to raise or lower voltage.

The TARTN20D can operate according two modes:

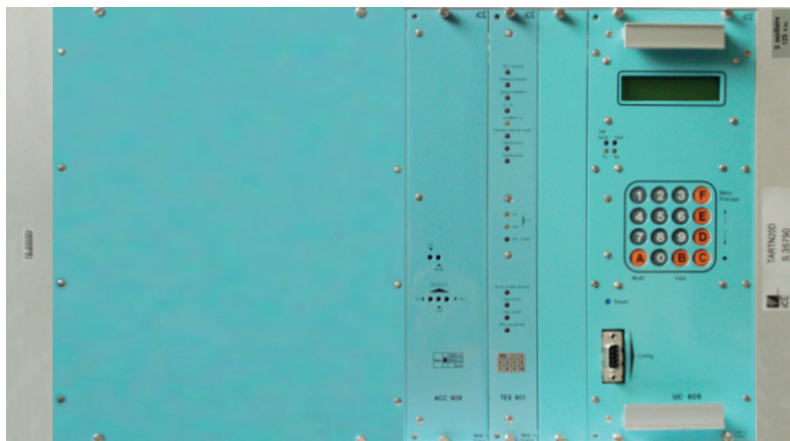
- direct regulation by measuring output voltage of the transformer,
- by reactive compoundge regulation.

The direct regulation operates by comparasion between transformer output voltage and the setting voltage V_c (apart near a α).

The reactive compounding takes account the complex load impedance of the network: $Z = R + jX$, in order to calculate a compensated output voltage.

The setting of TARTN20D can be done:

- directly in front face, by using the 16 keys of keypad, the screen display and the signalling LEDs,
- by remote laptop connected on front RS232 port.



Functionalities

- compounding
- voltage compensation
- voltage moitoring

The TARTND20D allows

- great flexibility of settings:
 - choice of all compounding categories (active, reactive, additive & subtraction of reactive),
 - choice of time delay (definite or dependent time) for the first tap changing

- choice of taps failure on undervoltage or by external command
- 2 setting voltage available (1 for summer & 1 for winter)
- friendly MMI by PC under WINDOWS® or by local keypad / screen
- auto-test of all electronic cards
- choice of wiring connection (front or rear connections)
- High immunity level EMC (IEC 8001.4 class 4, ...)

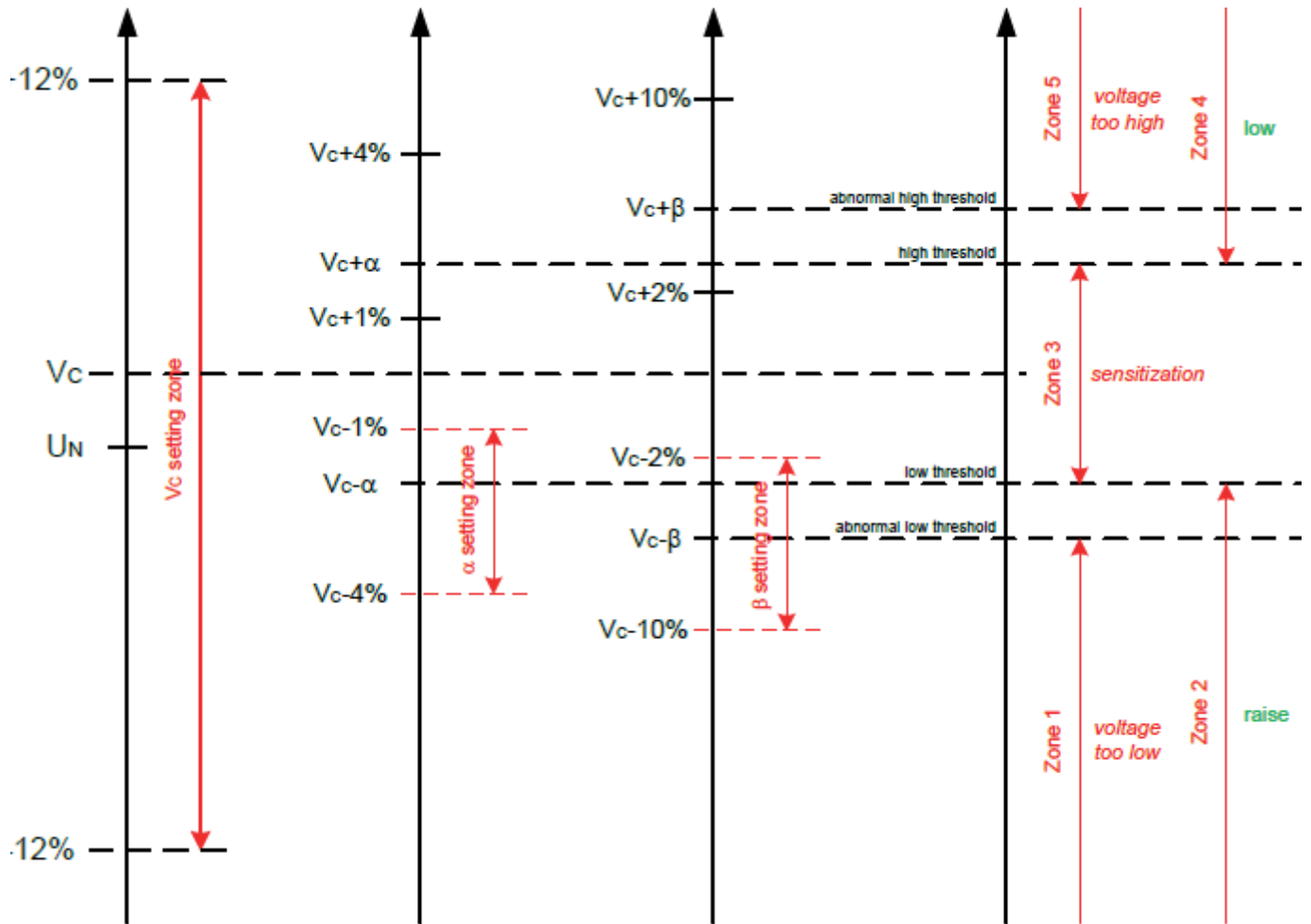
OUR TRADEMARKS



DIGITAL VOLTAGE REGULATING RELAY

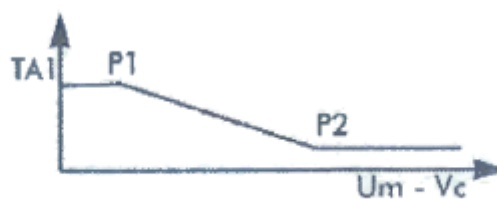
Control functions

- U_n is the secondary rated voltage of transformer (e.g.: 20 kV)
- V_c is the setting voltage value (e.g.: 98% of U_n)
- α is the sensitization threshold value (e.g.: 2% of U_n)
- β is the abnormal voltage threshold value (e.g.: 3% of U_n)
- U_m is the output voltage of the transformer
- if $V_c - \alpha < U_m < V_c + \alpha$, nothing happens
- if $U_m > V_c + \alpha$, TARTN20D initiates the command "low" to the tap changer
- if $U_m < V_c - \alpha$, TARTN20D initiates the command "raise" to the tap changer
- wif $U_m < V_c - \beta$ or $U_m > V_c + \beta$, there is abnormal condition (U_m is too low or too high)



Time delay for the first tap changing

- for the first tap changing, operator has a choice between a two time delay TA1 (definite or inverse time)
- inverse time allows to accelerate the starting of the regulation (the time being the shorter that the difference $U_m - V_c$ is high)
- characteristics of the inverse time curve can be changed



TA1 with inverse time

COMPOUNDING FUNCTION

Active or Reactive Compounding

Our compounding modules allow the voltage compensation in order to take account the line impedance.

Fed by the 3 current phases, they provide a voltage compensated. or compounding image of the network load $[(R + jX).I]$ from the output voltage of the transformer " U_m ". It allows to the AVR to regulate the voltage, not at the secondary of the transformer but tot a fictive point of the network, with:

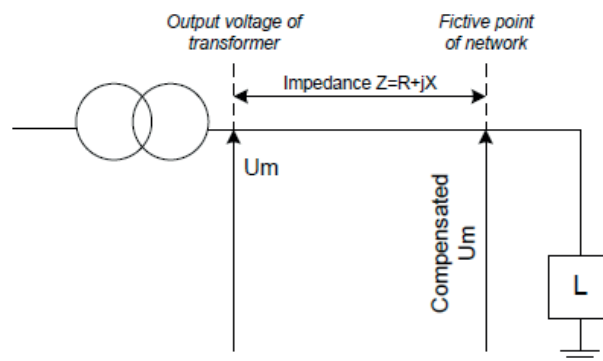
U_m compensated : $U_m - (R + jX).I$

R : line resistance

X : line reactance

I : current by phase

This compounding voltage is proportional to the current of the line but also to the impedance between the transformer and the fictive point ($R + jX$).



Tap changer failure

The « Tap Changer Failure » module allows, if commands are available:

- to decrease the tap changer until a determinate tap
- or
- to block all tap change commands if it's on a tap lower or higher than determinate tap.

The unblocking operate during the out of service of the function.

This command is available locally or remotely.

Common functions

Abnormal voltage "High" & "Low"

If the difference between the voltage U_m and the setting voltage V_c becomes higher than a limited value (β), TARTN20D generates an alarm "abnormal voltage" after a time delay T_2 or during the feeding of the transformer, or a time delay T_3 "abnormal voltage", if the network is already fed.

Tap changer failure

If a "lower" or "raise" command is sent or remains during a time upper or egal to T_1 , TARTN20D operates an alarm "Tap changer failure".

Control voltage failure

Commands "lower" and "raise" are mutually locked-out by output relays. Both commands cannot be sent simultaneously.

Also if both commands appear together (control voltage failure), or if the interlock position for "C.B. close" is failing, an alarm "Control voltage failure" is operated.

TARTN20D failure (WD)

If internal auxiliary supply are lost, an alarm « TARTN20D » is operated.

Undervoltage function

In order to avoid an overvoltage when the voltage back, it's possible to force the tap changer to be in the lower tap position in case of lost of voltage.

Tap change position boosting after voltage back

When voltage back, a time delay TA_3 of 1 min is initiated.

During this time-delay. It's possible to accelerate the commands of tap changer by changing the long time delay TA_1 about the first tap changing by another time delay TA_2 (10 s).

GENERAL CHARACTERISTICS

Auxiliary Supply <ul style="list-style-type: none"> • Auxiliary supply • Accuracy • Rated power • Maximum rated power 	48 or 125 Vdc -20% to +10% 24W 32W
Analogue inputs <ul style="list-style-type: none"> • Rated Current <ul style="list-style-type: none"> overload limit • Rated Voltage <ul style="list-style-type: none"> burden at I_n overload limit burden at U_n • Frequency <ul style="list-style-type: none"> Inside tolerance Outside tolerance 	5A (50 Hz) $I \leq 20 I_n$ $I = 2 I_n$ (permanently) $I = 20 I_n$ (5s) 1 VA maximum by phase (active or reactive on 10%) 100/ $\sqrt{3}$ or 100 Vac $U \leq 1.2 U_n$ $U = 1.5 U_n$ (permanently) $U = 1.9 U_n$ (5s) 0.3 VA $47 \leq F \leq 52$ Hz $46 \leq F \leq 54$ Hz
Setting <ul style="list-style-type: none"> • 1 or 2 setting voltage values V_c • Sensitization threshold α • Abnormal voltage threshold β • Setting modification by remote control • Compounding: <i>active</i> <ul style="list-style-type: none"> <i>positive reactive (Q+)</i> <i>negative reactive (Q-)</i> • Taps management: <ul style="list-style-type: none"> <i>Number of tap managed</i> <i>Tap position on under voltage</i> <i>Tap position on external command</i> 	-12 to +12% U_n (step of 1%) 1 to 4% V_c (step of 0,25%) 2 to 10% V_c (step of 1%) 0.95 V_c 0 to 10% (step of 1%) 0 to 20% (step of 1%) 0 to 10% (step of 0,5%) 40 maximum 1 to 40 1 to 40
Time delay setting <ul style="list-style-type: none"> • TA1 (1st tap change) with definite time • TA1 (1st tap change) with inverse time • TA2 (tap by tap) • T5 (under voltage validation before tap changer failure) 	10 to 60s (step of 1s) setting can be changed 1 to 60s (step of 1s) 3 to 60s (step of 3s)
Time delay fixed <ul style="list-style-type: none"> • Time delay for UVR • T1 (tap changer failure) • T2 (abnormal voltage when voltage back) • T3 (abnormal voltage if network is already fed) • Control voltage failure 	2s 120s 2s 60s 4s
Accuracy <ul style="list-style-type: none"> • Resetting percentage for H/L thresholds • Voltage detection • Thresholds α & β • Time delay • Display of measured values 	high threshold, abnormal high threshold: 99.8% low threshold, abnormal low threshold: 100.2% threshold 0.73 U_n Resetting percentage: 96% $\pm 0.25\%$ $\pm 5\%$ $\pm 5\%$
Installation <ul style="list-style-type: none"> • Rear connection 	19" cabinet installation
Dimensions <ul style="list-style-type: none"> • W x H x D (mm) 	440 x 266 x 350

The specifications and drawings given are subject to change and are not binding unless confirmed by our specialists.

