

## Transformer Tap Changer Controller



*Automatic voltage regulation, analysis, and control functions for transformer applications.*

### Applications

- Control power transformer OLTCs to regulate voltage
- Integrated Systems

### Protection and Control

- Automatic voltage regulator
- Automatic/manual operation
- Three setting tables
- Configurable inputs and outputs
- BCD format inputs to detect tap changer position
- Control pulse outputs

### Monitoring and Metering

- I, V, P, Q, cos  $\phi$ , frequency measurement
- Transformer OLTC position
- Event recording
- Counter of the tap position increases and decreases for rise and lower operations of tap changer

### User Interfaces

- Rear communication port (plastic or glass fiber optic, RS232 or RS485)
- RS232 port, faceplate accessible
- GE-NESIS Windows® based programming software
- Mimic for increasing/decreasing commands and tap displaying
- Graphic display and keypad
- ModBus®, M-Link, and M-Link Plus communications protocols
- DDS system compatible



## DESCRIPTION

The transformer tap changer controller DTR controls automatically the transformer on load tap changer, so that the power supply voltage is practically constant, independently from the load. In order to achieve this, the DTR is able to increase and decrease the OLTC in the power transformer.

The DTR can be applied to any existing tap changer, as its settings and operation ranges, as well as its inputs and outputs, are fully compatible with all the OLTC available in the market.

The DTR has been designed using the same hardware architecture as the DDS protection and control system. This means that, besides being a powerful individual element, the DTR is completely compatible with the system, and can be fully integrated in a substation.

The DTR also provides analysis and control functions, such as event recording. The internal memory allows storing up to 165 events. It also includes measuring functions for I, V, frequency, etc.

As all the units part of the DDS family, the DTR provides easily configurable inputs and outputs. The user can program these inputs and outputs by means of user-friendly software programs, part of GE-NESIS (GE-INTRO, GE-LOCAL). This software package is Windows® based and it is the same for all the DDS family.

## CONTROL

### Operation

The DTR is used to maintain a constant voltage level at feeders busbar. The unit gives commands to increase and decrease the transformer OLTC. As these differences in the tap position are usually discrete, the DTR allows the user to set the percentage of change between taps. In addition, a time delay is provided by setting, to allow matching the OLTC time required to change from one tap to the closest next.

### Automatic/Manual Operation

Using one of the configurable digital inputs, the DTR can receive an order for automatic or manual operation. Manual operation has priority over automatic, in order to avoid performance failures in the case of manual operations. This command can also be sent to the unit by means of the communications software, or the MMI.

### Blockings

The transformer tap changer controller DTR blocks its operation in case that voltage falls below user defined limits, (undervoltage blocking), and also when voltage or current exceeds another user defined limit (overvoltage or over-current blocking).

### Settings

The unit provides three setting tables. The user can move from one table to another using a digital input or through communications. This feature allows the use of different settings in different system situations to better maintain the actual system needs of security, etc.

## MONITORING AND METERING

### Measures

The voltage regulator DTR displays instantaneous values of I, V, P and Q (three-phase), frequency and  $\cos \phi$  values.

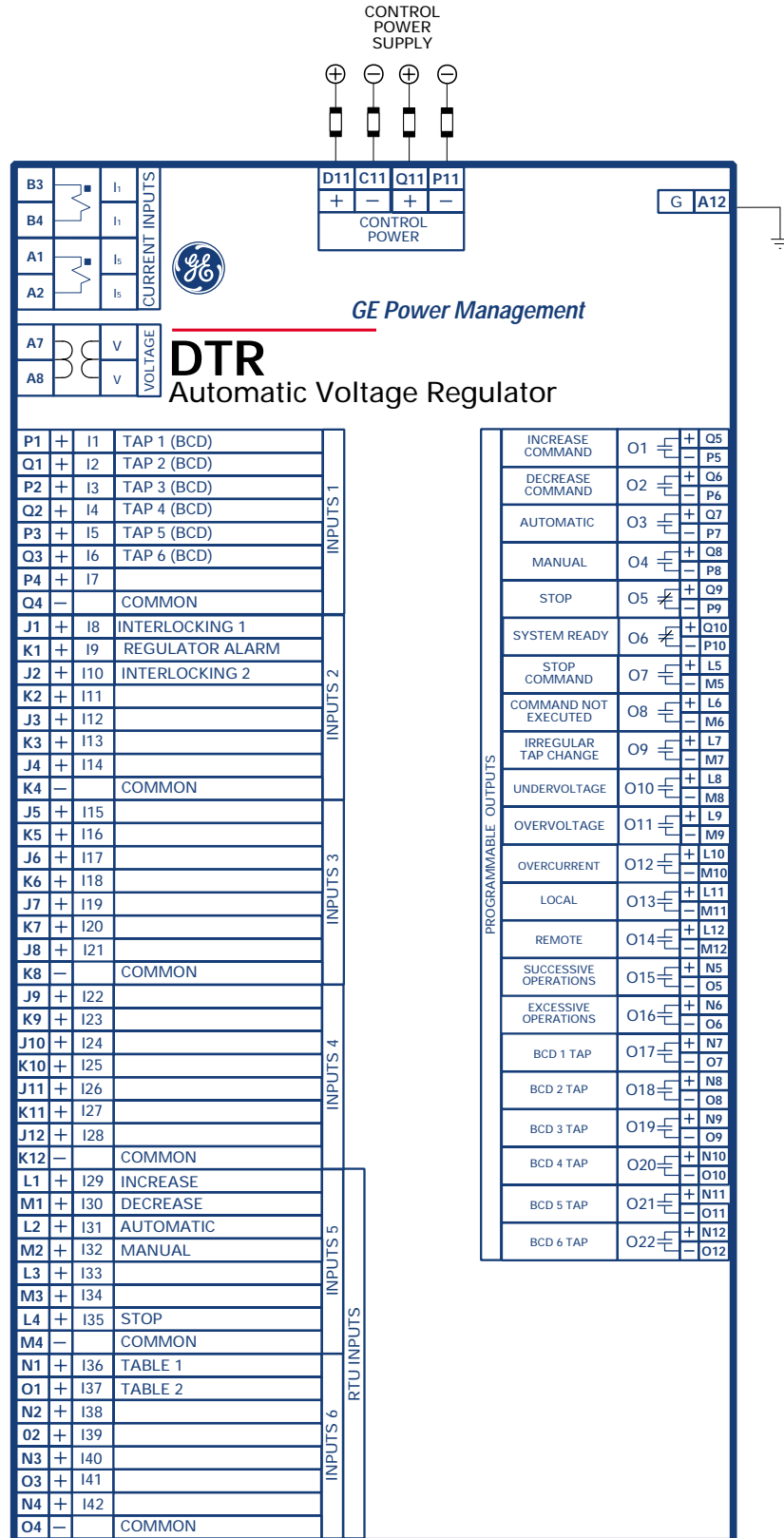
### Event Recorder

165 events are recorded in non-volatile EEPROM memory. Date and time (1 ms resolution), type of event, voltage and current, and a relay status snapshot are stored.

### Digital Inputs and Outputs

The DTR system has 42 digital inputs and 22 outputs. These I/Os can be configured by the user by means of GE-INTRO configuration software.

# Typical Wiring



EN DTR CON.cdr

## Technical Specifications Ordering

METERING	
Frequency:	50/60 Hz
Nominal Phase Current:	1 or 5 A
Nominal Voltage:	100/√3 - 220/√3 VAC
Auxiliary Voltage:	48-125 VDC, ±20% 110-250 VDC, ±20%

COMMUNICATIONS	
<b>Local Communication:</b>	LCD alphanumeric display with two lines of 16 characters per line; 20 button frontal keypad
<b>Remote Communication</b> (local or remote PC and communications net):	
Mode:	half duplex
Speed:	1,200 to 115,000 bps
<b>Physical media:</b>	
RS232 (ports 1 and 2)	
RS485 (port 2 optional)	
<b>Plastic Fiber Optic (port 2 optional):</b>	
Type of connector:	HFBR-4516
Power supplied:	8 dBm
Receptor's sensitivity:	-39 dBm
Wave length:	660 nm
<b>Glass Fiber Optic (port 2 optional)</b>	
Type of connector:	STA
Power supplied:	17.5 dBm
Receptor's sensitivity:	-24.5 dBm
Wave length:	820 nm
<b>Synchronization:</b>	IRIG-B
	<ul style="list-style-type: none"> <li>DB9 connector for RS232 ports on the front (1) and on the rear (2).</li> <li>DB9 connector for RS232 port on the rear (3), with 1 mm plastic fiber optic or 50/125 glass fiber optic option.</li> </ul>

INPUTS	
<b>THERMAL CAPACITY</b>	
<b>Current Circuits:</b>	
Continuously:	4 x I <sub>n</sub>
During 3 Sec:	50 x I <sub>n</sub>
During 1 Sec:	100 x I <sub>n</sub>
<b>Voltage Circuits:</b>	
Continuously:	2 x V <sub>n</sub>
During 1 Min:	3.5 x V <sub>n</sub>
<b>BURDENS</b>	
<b>Current Circuits:</b>	0.5 VA for I <sub>n</sub> = 5 A 0.1 VA for I <sub>n</sub> = 1 A
<b>Voltage Circuits:</b>	0.2 VA, V <sub>n</sub> = 63.5 V
<b>DC Burden:</b>	
During Operation:	12 W
Per Each Activated Input:	8 mA / 1 W, V <sub>aux</sub> : 125 VDC

OUTPUTS	
<b>TRIPPING CONTACTS</b>	
<b>Contact Capacity:</b>	
Maximum Operating Voltage:	440 VAC
Continuous Current:	16 A
Make and Carry:	30 A
Breaking:	4000 VA

ENVIRONMENTAL	
<b>Temperature:</b>	
Storage:	-40 to +85°C
Operation:	-20 to +70°C
<b>Humidity:</b>	Up to 95% without condensing

MECHANICAL CHARACTERISTICS	
	<ul style="list-style-type: none"> <li>Metallic package in 19" rack and 4 units high.</li> <li>Frontal HMI with LCD display and keypad.</li> <li>Protection class IP52 (according to IEC 529)</li> </ul>

TYPE TESTS	
<b>Isolation Test Voltage:</b>	2 kV, 50/60 Hz, 1 min
<b>Surge Test Voltage:</b>	5 kV peak, 0.5 J
<b>Interference:</b>	Class III according to CEI 255-22-1
<b>Electrostatic Discharge:</b>	Class IV according to CEI 255-22-2
<b>Radiointerference:</b>	Class III according to CEI 255-22-3
<b>Fast Transient:</b>	Class IV according to CEI 255-22-4
<b>Sinusoidal Vibration:</b>	Class II according to CEI 255-21-1
<b>Shock:</b>	Class I according to CEI-22521-2
<b>Radiofrequency Emission:</b>	according to CEI 41B (Sec) 81 and EN55022 class B

PACKAGING	
<b>Dimensions:</b>	H 7.3" x W 19.0" x D 9.1" (185 mm x 484 mm x 231 mm)
<b>Weight:</b>	
Not Packaged:	13.2 lbs (6 kg)
Packaged:	15.4 lbs (7 kg)

APPROVALS	
CE Compliant	UL - UL listed for USA and Canada

### DTR 1 \* 0 \* \* 000 \* 00 A

DTR				
0				Automatic Voltage Regulator
1				RS232 communications interface
2				Plastic fiber optic + RS232 communications interface
3				Glass fiber optic + RS232 communications interface
	0			RS485 communications interface
	2			P1, P2: M-Link protocol
				P1: M-Link protocol; P2: ModBus® RTU protocol
		M		Spanish language
		D		English language
			G	48 - 125 VDC auxiliary voltage
			H	110 - 250 VDC auxiliary voltage



\*Specifications subject to change without notice.