

POWER TRANSFORMER MONITORING and AVR

CONVENTIONAL SUBSTATION

General Information

Company ROCON provides most modern solutions for Power Transmission & Distribution network, comprising wide range of world-class numerical Intelligent Electronic Devices (IEDs) - Protection relays, Bay control units (BCUs), Transformer Monitoring and Automatic Voltage Regulation (MAVR) systems and Annunciators.

MAVR

Power transformers as basic equipment in the Transmission and Distribution Network objects raised the development of modern and powerful MAVR systems.

The systems provide basic functions specially intended for Oil immersed Power Transformers:

- Measuring and monitoring of electrical and technological parameters;
- Automatic Voltage Regulation (AVR) of Single/Parallel operating Power Transformers;

System architecture

MAVR offers two types of architecture oriented to the customer requirements:

- With single device see Fig.1;
- With Main unit placed in the Control room and Technological Information unit installed in a cubicle near the Power Transformer – see Fig.2;

The technical parameters of the devices are available in Table 1. In case of parallel operating transformers the necessary information exchange between the RTUs of the different transformers is realized through the Station bus in the object via FO/Electrical Ethernet and IEC 61850. In case of lack of Station bus the "Daisy Chain" for interconnection between the RTUs is applicable. The latter does not need switches and other communication devices.

MAVR main features

Maximum operational reliability and data security

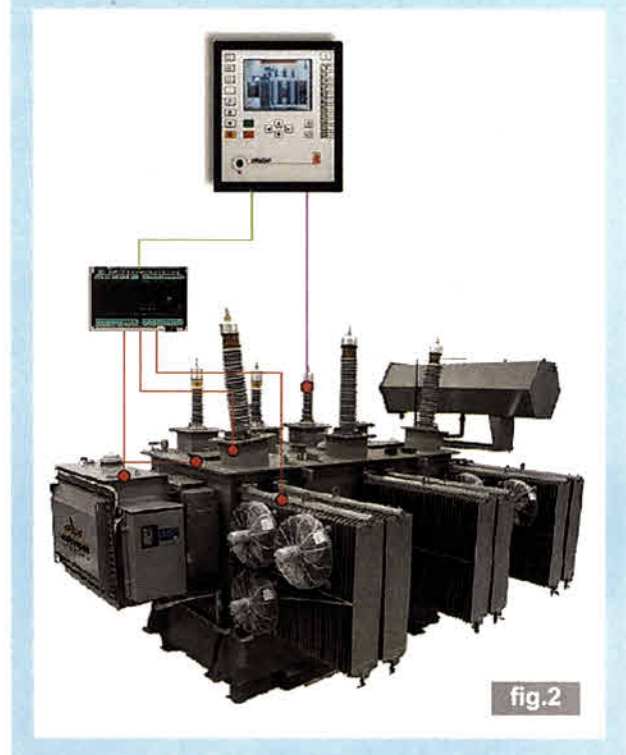
The years of experience, high level of R&D team and the application of the decensalized architecture with high level of redundancy is a guarantee for the reliability and security operation of MAVR systems.

Individual customer solutions

On request, our experts are able to develop special solutions for customer specific requirements.

Easy updates and remote access

Firmware and configuration updates are available via Ethernet and/or USB connection with PC based MMI program.





№	TECHNICAL PARAMETERS For CONVENTIONAL SUBSTATION	Availability
1 Measurement & Monitoring		
1.1	OLTC Tap position	•
1.2	Top oil temperature in the transformer tank	•
1.3	Load current	•
1.4	Busbar voltage	•
1.5	Technological limits – user defined logical equations with settings	•
1.6	Binary inputs (BIs) and Binary outputs (BOs) status monitoring	•
2 Calculations and statistics		
2.1	OLTC switching operations – registration, number, type	•
2.2	Winding insulation hot-spot temperature (HST) calculation and monitoring acc. IEC 60076-7	•
2.3	Transformer loss of life calculation acc. IEC 60076-7	•
2.4	Number of OLTC operations as a function of the load current	•
2.5	Transformer working hours monitoring	•
2.6	Event recorder	•
3 Visualization, control, signalization, settings		
3.1	Visualization of stored information and settings via Alpha numerical/Graphical display, Functional and System keypad and LEDs indication	•
3.2	OLTC local/remote control	•
3.3	OLTC Warning signalization/blocking	•
4 Automatic voltage regulation		
Type		
• Single		
• Parallel		
Line drop compensation mode		
• R & X compensation		
• Z compensation		
5 Communication		
System interface with SAS		
• FO/Electrical Ethernet		
• Electrical RS485		
Communication protocols for the system interface		
• IEC 61850 Edition 1 and 2, Server & Client, GOOSE		
• MODBUS ASCII / RTU / TCP		
• IEC60870-5-101/103		
• IEC60870-5-104		
• DNP 3.0		
• Redundancy protocols RSTP, PRP and HSR		
Interface for PC based MMI program IrDA, FO cable		
Time synchronization		
• Manual		
• Remote - via Station bus		
6 HARDWARE Main unit RTU D		
6.1	Power supply range 110-220VDC/VAC	•
6.1.1	Power consumption - max 17 W at 220VDC	•
6.2	Binary inputs	•
6.3	Binary outputs	•
6.4	AC analog inputs – 1A/5A, U (100/110VAC)	•
6.5	DC/AC inputs - currents, voltages, resistance, 4+20mA	•
6.6	User configurable LED indication – 24+1 Ready	•
6.7	Functional buttons 4 Nos; Operational Buttons 12 Nos.	•
6.8	Working language: English, Russian, Bulgarian	•
Additional parameters		
6.9.1	Protection degree Front panel acc. to BDS EN 60529 - IP52	•
6.9.2	Protection degree - terminals acc. to BDS EN 60529 - IP20	•
6.9.3	Operating temperature -25++55°C	•
6.9.4	Dimension and weight (225x266x133/ 3,4 kg	•
7 HARDWARE Technological information unit RTB 12		
7.1	Power supply 110-220 VDC/VAC	•
7.2	DC/AC analog inputs – currents, voltages, resistance, 4+20mA	•
7.3	Binary inputs	•
7.4	Binary outputs	•
Additional parameters		
7.5.1	Protection degree acc. to BDS EN 60529 - IP20	•
7.5.2	Operational temperature - 25++55°C	•
7.5.3	Dimension and weight (W x H x D) – 265.4x99.5x80.2/0.8 kg	•

• Standard function • optional

