ORMAZABAL
velatia

ekorsys units:
protection, telemanagement & communication

ekor.wtp

Protection, metering and control unit
for wind turbine generators

Reliable innovation. Personal solutions.

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Preface

Based on the state of the art on its own relay **ekorsys** family, the dual & self powered **ekor**.wtp protection, metering and control unit combines a full range of equipment to form comprehensive wind turbine generator protection units.

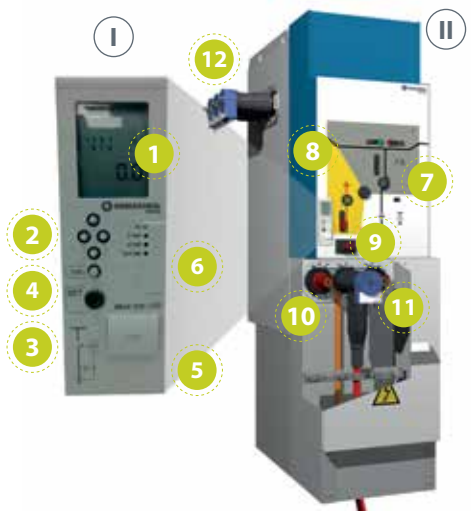
The constantly increasing demands in wind farms result in new requirements for both MV switchgear and associated protection functions. The **ekor**.wtp range is designed through each phase of its life cycle to respond to the variously changing demands of a wind turbine generator:

From its design phase to the operation and maintenance phase during the total working hours of a wind turbine generator, the **ekor**.wtp non-stopped optimizes the performance and energy production of on/offshore WTGs, improves turbine reliability and grid service capacity, while keeping them protected against electrical faults.

Features

- In cubicle integrated solution
  - Factory-installed, set and checked equipment
  - Minimization of wiring errors and commissioning time
- Modular functionality
  - Self-powered protection features
  - Scalable automatisms
  - Remote control & comms
- Reliability
  - MTBF optimization
  - Programmable automatisms vs wired ones
  - Functional at low temperatures
- Personnel safety
  - Programmable automation
  - Alarms

Design



I. **ekor**.wtp

1	Screen	4	ESCAPE button
2	Menu keypad	5	COMMS ports
3	SET button	6	Status LEDs

II. Switchgear

7	Circuit breaker	10	Current sensors
8	Earthing switch	11	MV cable voltage sensor (**ekor**.evt-c)
9	Voltage indicator: **ekor**.vpis/ivds	12	MV busbar voltage sensor (**ekor**.evt-c)

Wind turbine approach

Design

- Wind Turbine Protection:
  - Self-powered relay for overcurrent protection on every earthing system
  - Trip acceleration for internal faults
  - High reliability tripping
  - Trip block on inrush current
  - Watch-dog
  - Harsh environment performance
  - Scalable & compact solution
- Grid code compliance:
  - Sequential reconnection
  - Voltage dips
- Tailor-made solutions:
  - Low temperature disconnection/ reconnection
  - Extreme weather events automation
  - Integration with other devices and information exchange

Manufacturing

- Solution fully-assembled & tested in factory
- Factory testing reports

Commissioning

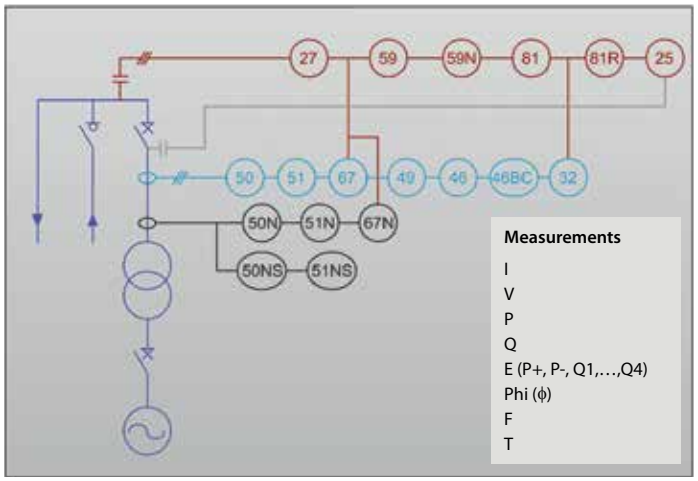
- Reduced commissioning:
  - Compact solution prSe-tested in factory
  - CTs installed around the bushings from factory
- Event & fault log

Operation & Maintenance

- Remote control and operation
- Access through webserver
- Faults and events register
- Oscillography
- MV measurements
- Diagnosis tools:
  - Installation insulation: compatibility with partial discharge measurements
  - Power transformer ageing: MV/LV measurements
- Personnel safety: interlocking automation, alarms, etc.

ANSI functions diagram

ekor.wtp protection functions.



Technical characteristics

ekor.wtp				**ekor**.wtp-110	**ekor**.wtp-120	**ekor**.wtp-210	**ekor**.wtp-220
General characteristics							
Dual power supply		Self-powered/230 V_{AC}/24/48/125 V_{DC}		●	●	●	●
Current analog inputs				4 + I_o (1)	4 + I_o (1)	4 + I_o (1)	4 + I_o (1)
Voltage analog inputs	$V_{MVbusbar}$	$V_{generator}$		3 + V_o (1)	3 + V_o (1)	3 + V_o (1) + 3 + V_o (1)	3 + V_o (1) + 3 + V_o (1)
External fail safe trip inputs				2 (2)	2 (2)	2 (2)	2 (2)
Configurable digital inputs/outputs				0/2	0/2	8/4	8/4
Setting groups				1	1	2	2
Protection functions							
50 - 51		50N - 51N		● (2)	● (2)	● (2)	● (2)
50Ns - 51Ns				○ (2)	○ (2)	○ (2)	○ (2)
51G						● (2)	● (2)
49	46	46BC				●	●
67		67N			● (2)	● (2)	● (2)
67Ns					○ (2)	○ (2)	○ (2)
27	59	59N					●
81O	81U	81R	32				●
25							○
Wind turbine applications							
High reliability alarms/trips				2 (fail safe)	2 (fail safe)	2 (fail safe)	2 (fail safe)
Watch-dog (WD)				●	●	●	●
Trip blocked by 2nd harmonic				● (2)	● (2)	● (2)	● (2)
Trip acceleration					● (2)	● (2)	● (2)
Sequential reconnection automation						○	○
Voltage dips management (acc. to grid code)						○	○
Safety interlockings						○	○
Temperature automation						○	○
Measurements							
Current							
Voltage		Active/Reactive power			●	●	●
Energy P+, P-, Q1,…,Q4		Frequency				●	●
Phi angle (ϕ)					●	●	●
Temperature						○	○
Current & voltage THD						●	●
Control and supervision							
Circuit Breaker control & operation		Locking-out (86)				●	●
Trip coil supervision (TCS)		Voltage presence/absence				○	○
Events record						4000	4000
Fault record				10	10	10 (advanced)	10 (advanced)
Oscillography						●	●
LEDs/Configurable LEDs				4/0	4/0	8/2	8/2
Configuration through software				●	●	●	●
Configuration through web						●	●
Front communication ports				● miniusb	● miniusb	● miniusb ○ RJ45	● miniusb ○ RJ45
Rear communication ports						● RS485 ○ RJ45	● RS485 ○ RJ45
Communications							
MODBUS-RTU	MODBUS-TCP	PROCOME				●	●
DNP.3 Serial		DNP.3 TCP				●	●
IEC 60870-5-101		IEC 60870-5-104				●	●
IEC 61850						○	○

Configuration:
● Standard
○ Optional

Notes:
(1) Calculated
(2) Self powered

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