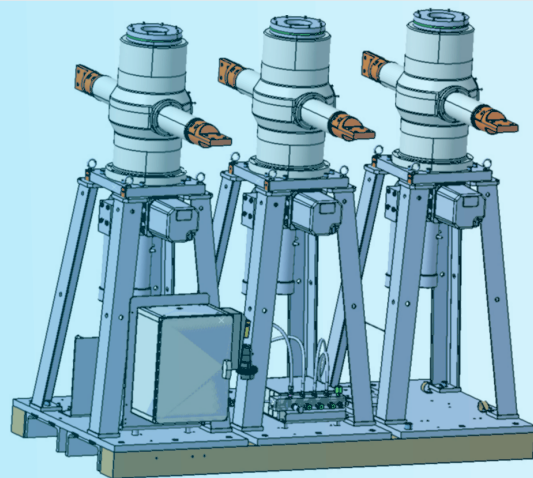
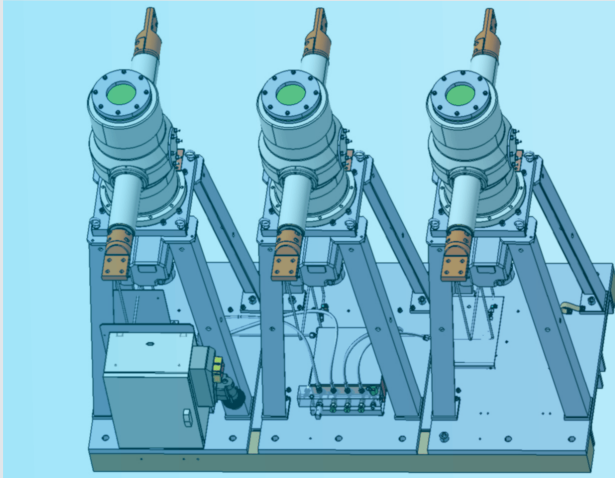


ETNA MOBILE MAKE SWITCH EQUIPMENT

INDUSTRIE



MAIN FEATURES

This three phase make switch equipment is used in mobile application for generator short circuit testing; it can be moved with two hand fork trolleys.

Due to hydraulic technology, which enables to store operating energy on each phase of the Make Switch, this equipment only **requires 3 phase 220 V A/C** (or 380 V A/C) **power supply**.

PRINCIPLE OF OPERATION

An oleo-pneumatic actuator, triggered by a hydraulic drive, achieves the displacement of the mobile contact.

In closed position, the mobile contact is tightly pressed against the fixed contacts in order to ensure the passage of very high current.

High actuator speed reduces the pre-arcing time and minimises the wear of the contacts at closing.

DESCRIPTION

Each phase structure:

- ☞ A vessel filled with SF6 under pressure which contains:
 - 2 fixed contacts linked to the connexion bars.
 - 1 mobile contact driven by the oleo-pneumatic actuator rod.
- ☞ A hydraulic drive allowing the displacement of the actuator rod for closing and opening. This drive located under the vessel consists of:
 - 1 oleo-pneumatic actuator on which is fitted:
 - 1 control block driven by 2 electromagnets (one for contacts opening, the other for closing).
 - 1 oil reservoir.
 - 1 oleo-pneumatic accumulator used as a reserve of energy.

For the whole equipment:

- ☞ 1 motor pump unit.
- ☞ Electrical equipment consisting in a make switch cabinet and a control unit (*) (fitted in a rack 19") allows the control in remote or local mode of the following functions:
 - Regulation of hydraulic pressure.
 - Control of SF6 pressure.
 - Electromagnet order equipment with anti-pumping function.
 - Make switch contact position indicator.
 - 1 pump restarts counter.
 - 1 operations counter.
 - Make switch closing.

Option:

Auxiliary contacts unit and 3 phases synchronization.

(*): *€ approval*

INSTALLATION

Make switch have to be used in IPX3 conditions.

In order to keep its very accurate closing time ability, the service temperature has to be between + 5°C and + 50°C.

The frame has to be properly fixed on an even ground* or mobile platform which have to be grounded.

Special care has to be taken as to the interface between the make switch bar ends and the circuit to be tested*.

Static and electrodynamic efforts have to be minimised as much as possible on the bars.

COMMISSIONING

The commissioning is carried out in a few very easy steps:

- 1) Fill the oil reservoir.
- 2) Inflate the vessel with SF6 (not provided). The vessel is delivered pre-charged with SF6 at 1,3 bar absolute.
- 3) Proceed with electrical connection of the Equipment:
 - Alternative supply (motor pump unit, control units).

CHARACTERISTICS

Rated voltage*.....	5 to 36	kV
Insulation level impulse voltage.....	38 to 170	kV pk
Insulation level at nominal frequency	15 to 70	kV rms
Rated frequency	10 to 60	Hz
Contacts closing in SF6 under pressure of	6.8	bar absolute
Closing time	< 10	ms
Tolerance on closing time		
	±0.1	ms
Maximum making current (symmetrical)	120	kA rms
Maximum making current (asymmetrical)	325	kA pk
Occasional permanent current	1.5	kA rms
Electro-magnets for D.C. supply:		
- Opening operation	300	W
- Closing operation	1000	W
Reliability (number of operations before inspection):		
- 100% of closing at I _{max}	500	Operations
- 50% of closing at I _{max}	1,000	Operations
- 10% of closing at I _{max}	4,000	Operations
- Hydraulic drive	10,000	Operations

WORLDWIDE REFERENCES

ETNA Industrie make switches with nominal voltage from 15 to 80 kV have been dispatched all around the world to laboratories such as:

(*): *ETNA Industrie can advise you upon request.*

SPAIN
ORMAZABAL

SOUTH KOREA
LGIS
KERI

BELGIUM
LABORELEC
ACEC

CANADA
KINECTRICS
BC HYDRO
IREQ

ITALY
CESI
ABB SACE

BRASIL
CEPEL

NORWAY/SWEDEN
ABB

BOSNIA
ENERGOINVEST

INDIA
CPRI
BHEL

FRANCE
SCHLUMBERGER
ONERA
EDF
VOLTA L2E

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