

EARTH FAULT COMPENSATION CONTROLLER

EFC 70



Trench is a global leader in high-voltage equipment for electric utilities and high-energy industrial systems. Our expertise in Arc Suppression Coil (ASC) technology ensures safe and efficient neutral earthing for modern and reliable power networks.

The new **EFC 70** is built on proven algorithms (with and without current injection) and enhanced with new features like integrated webserver, cyber security and a flexible hardware design.

Trench Management System is certified to ISO 9001, ISO 14001 and ISO 45001 standards.



MAIN FEATURES

GENERAL

Advanced controller for adjusting Arc Suppression Coils (ASCs) to the network conditions.

Resonance peak calculation by minor coil adjustment.

Control mode using internal current injection module with the fundamental frequency or multifrequency.

An external current injection module ECI with 50 or 60 Hz injection can be used as an option.

APPLICATIONS

In resonant earthed power distribution networks the neutral point of the network is connected to earth by means of a stepless adjustable inductor (ASC).

If the resonance circuit formed by the adjustable inductive coil and the earth capacitance of the network is tuned to or close to resonance, the fault current is significantly reduced in the event of a single-phase earth fault.

In most cases the arc caused by the fault current is extinguished without the need to switch off the faulty part of the network.

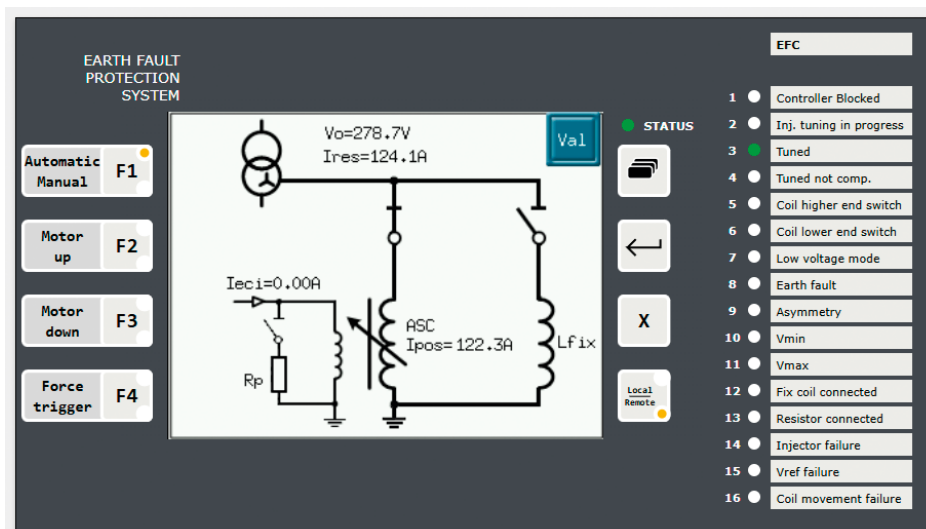
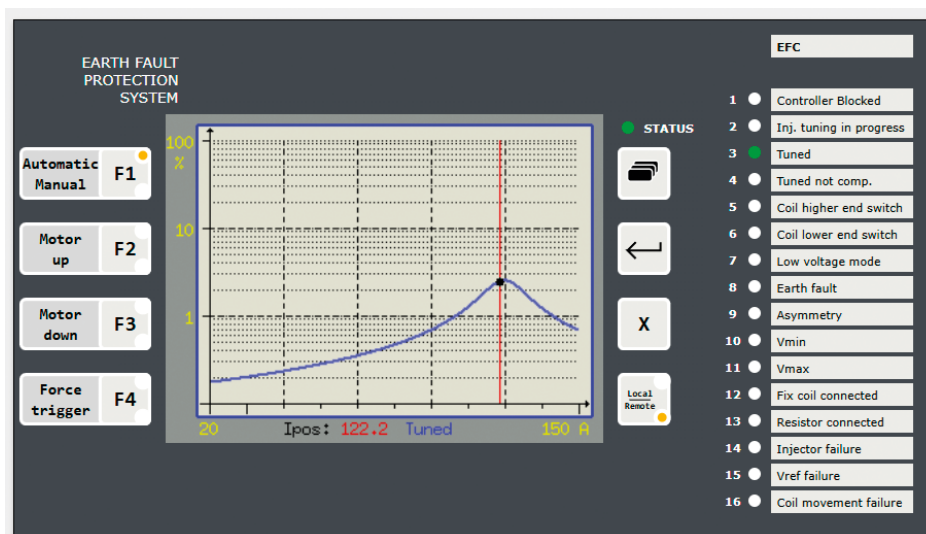
OPERATION

Integrated colour touchscreen

Flexible parameterization

Factory preset configuration (editable)

Maintenance free during a long lifetime



DESIGN FEATURES

HARDWARE

- Microprocessor based controller 19"-rack mounted (3 U), width 84 HP
- Optimized operation by means of a 5.7" LCD colored touchscreen.
- User-programmable and dedicated system function keys
- User-configurable, multi-colored LEDs with custom labeling for status indication.
- Potentiometer input available for 200 Ohm or 1000 Ohm.
- Analogue output modules -20 ... +20 mA / 0(4) ... 20 mA for external indication of coil position and neutral to ground voltage.
- Binary Inputs (24 / 48 / 60 / 110 / 220 V AC/DC)
- Binary Outputs

HARDWARE OPTIONS

- Number of binary inputs and outputs need to be selected before ordering.
- Different mounting methods available
- PRP/HSR according IEC 62439-3
- Electrical Ethernet interface (RJ45)
- Optical multimode Ethernet interface: LC, ST
- Optical singlemode Ethernet interface: FC
- Optical serial interface
- Electrical serial interface (RS485/422)

SOFTWARE

- Counting various events (e.g. transient earth faults) and controller conditions for statistical evaluations. Download of various data via Ethernet connection using the integrated webserver.
- Multifunctional webserver (modification of parameters, download of measurement value and status indication, upload/download of configuration and firmware file, ...)
- Integrated PLC functionality with graphical logic editor

- Indication of operation via a LEDs on the front panel
- Easy parameter setting, factory preset values can be adjusted by the user as required.

CYBERSECURITY

- RBAC (Role Based Access Control) acc. IEC 62351-8
- LDAP (Lightweight Directory Access Protocol) acc. IEC 62351-8
- Secure IEC 61850 communication basing on TLS (Transport Layer Security)
- Secure Firmware Update
- Secure Boot
- Password requirement acc. IEEE 1686

SOFTWARE FEATURES

- SEVERAL CONTROLLERS WITHIN THE SAME NETWORK
Reliable control without mutual interferences, no remote connection necessary
- EXTERNAL POWER SWITCH
Adjusting the ASC to a predefined value when the ASC is switched off
- RESISTOR CONTROL
Automatic resistor control upon earth fault
- FIX COIL CONTROL
Automatic switching of a fixed coil based on demand
- CONTROL AT EARTH FAULT
Adjust the ASC to ideal compensation ($v=0$) if an earth fault occurs.
- SCADA PROTOCOLS
IEC 60870-5-101/103/104
IEC 61850 (optional)
DNP3
- AUTOMATIC SWITCH $V_0 > V_{max}$
Automatic switching of a damping resistor during search operation if V_0 exceeds V_{max}
- VECTORIAL TRIGGER
Consideration of amplitude and phase angle of V_0 as trigger criteria

USER INTERFACE	• 5,7" LCD, colored touchscreen • 16 programmable multi-color LEDs • 4 function keys and 4 predefined keys
FRONT INTERFACE	• RJ45 Ethernet interface
AVAILABLE SERIAL INTERFACES	• Electrical: RS485/422 • Optical glass or POF (Plastic Optical Fiber)
AVAILABLE ETHERNET INTERFACES:	• MM/ST • MM/LC • SM/FC • RJ45
ANALOGUE VOLTAGE INPUT	Nominal voltage 100 V AC Measuring range up to 130 % Rated burden 0.4 VA
ANALOGUE CURRENT INPUT	1 A or 5 A / AC
ANALOGUE CURRENT OUTPUT	For e.g. V_0 , coil position, -20 ... 20 mA / 0 ... 20 mA / 4 ... 20 mA/DC, maximum burden at 20 mA/DC: 500 Ohm
COIL POSITION	Linear potentiometer, 2 ... 200 Ohm or 10 ... 1000 Ohm Hint: Type of potentiometer must be defined at order.
BINARY INPUTS	Available with 24 V / 48 V / 60 V DC or 110 V / 220 V DC Hint: The required range must be defined at order AC voltage possible by setting in the Configuration tool.
BINARY OUTPUTS	Potential free outputs: normally open (NO) and changeover (CO) contacts 250 V AC/DC max. 8 A continuous
INTERNAL CURRENT INJECTION MODULE:	2 A (fixed) or 8 A (selectable by software in steps of 1 A) 50 or 60 Hz and multifrequency mode
POWER SUPPLY	DC: 24 V / 48 V / 60 V / 110 V / 220 V AC: 230 V Hint: The required range must be defined at order.

Communication interface, power supply type, number and type of inputs and outputs, and potentiometer values must be defined at order.

MECHANICAL DATA

DIMENSIONS

Width	483 mm	(84 HP)
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Height	133 mm	(3 U)
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Depth	223 mm
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Cut-out for front mounting:

Width	450 mm
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Height	134 mm
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WEIGHT

- approx. 5.5 kg without internal current injection module
- approx. 11.4 kg with internal current injection module

The exact weight depends on the configuration, i.e. number of installed I/O modules.

TEMPERATURES

Operation	-20°C ...	+55°C
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Storage	-40°C ...	+70°C
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MAX. INSTALLATION ALTITUDE

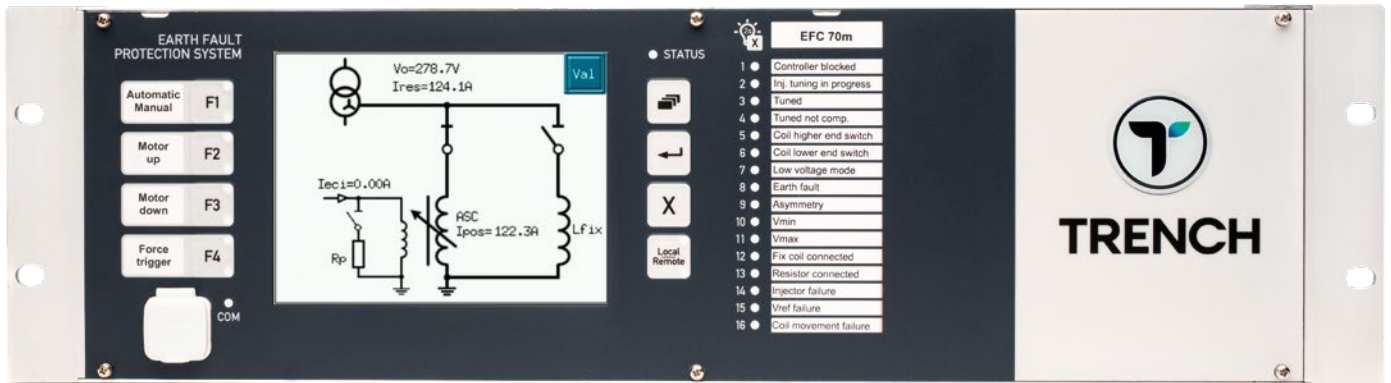
≤ 2000m a.m.s.l.

HUMIDITY (24 H AVERAGE)

10 % ... 93 %

PROTECTION CLASS

IP20 (Front side: IP40)





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