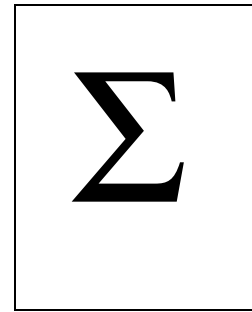# DTI-SP

COMPACT NUMERICAL OVERCURRENT PROTECTION

$$\Sigma$$

Field of application

The members of the **SigmaProt** complex protection series are basically modular devices. The modules are assembled and configured according to the required protection functions. This information sheet describes the specialities of one of the numerous applications: the **DTI-SP** factory configuration. The general user's manual for the **SigmaProt** devices is the document „SPCP-2004 SigmaProt complex protection, hardware and software manual", which provides all common information to the members of the **SigmaProt** complex protection series.

The **DTI-SP** complex numerical device made by PROTECTA Co. Ltd. is pre-configured for a three-phase definite time overcurrent protection with earth-fault protection. This device can be applied in all areas of the electric power system, where overcurrent protection is needed to protect against short-circuits, overload or earth fault.

Main characteristics

The main features of **DTI-SP** compact protection are as follows:
The protection part of the complex device implements the following functions:

- three-phase, definite time overcurrent protection, high current setting stage (I>>),
- three-phase, definite time overcurrent protection, low current setting stage (I>),
- zero sequence overcurrent function, high current setting stage (3Io>>),
- zero sequence overcurrent function, low current setting stage (3Io>), can be set for directional earth-fault protection as well,
- zero sequence overvoltage protection,
- over/undervoltage protection.

Features of the protection functions:

- all functions can be individually switched to be operative or inoperative;
- the setting value and time delay of the functions can be set independently,
- the zero sequence low current setting stage can be set for directional earth-fault protection as well.

Additional features:

- trip matrix,
- PROTLOG equations.

The features of the supervisory and control functions implemented in the device are as follows:

- the supervisory and control functions are implemented in a dedicated processor, located on the Central Processing Unit (CPU) of the device,
- the large graphic LCD realises full-scale local control unit for the bay,
- the supervisory and control functions are as follows:
- control of switching devices:
- local and remote operation,
- interlocking functions,
- generation of status signals,
- event logging,
- protective command transmission,
- communication with the intelligent graphic display,
- transmission of protection signals to the supervisory and control system,
- transmission and execution of commands from the supervisory and control system,
- receipt of commands from the graphic LCD and their execution.
- Continuous and cyclic self-check functions are implemented; the supervision is extended to the current transformer circuits and to the trip circuits as well.
- The same software configuration is loaded in all configurations of the device. The individual functions of the software are to be set by parameters according to the requirements. The versions are basically determined by the hardware configuration.
- The integrated event recorder can store up to 50 evaluated events and up to 300 digital events with 1 ms time resolution.
- An integrated real-time clock is implemented with battery supported RAM. The clock can be synchronised by external PC or by the supervisory and control system, and additionally a Word Time Synchroniser (GPS-OP) produced by PROTECTA Co. Ltd can be ordered optionally.

- The integrated disturbance recorder of the CPU module can store up to 11 records, the total time of which is about 10 s.
- The device implements several measuring functions based on the available analogue signals.

Main hardware features

The **DTI-SP** complex digital overcurrent protection is a full numerical system, based on powerful microcontrollers. Within the limits of the hardware the functions and the versions are determined by the software.

The different hardware versions of the device – with identical software – cover practically all usual protective functions of the medium voltage part of the electric power system.
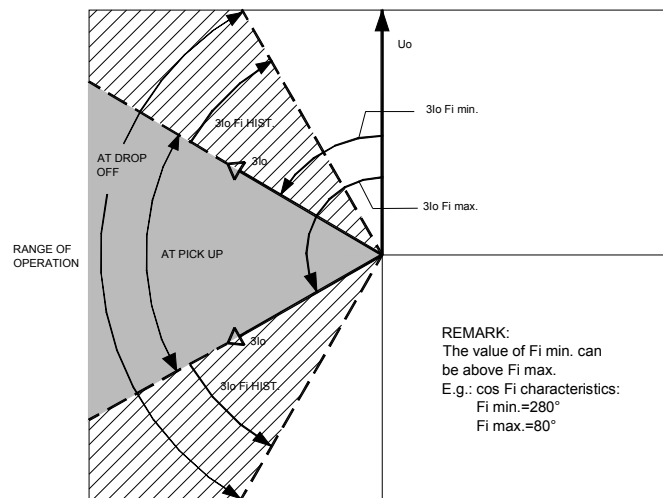

Figure 1 Zero sequence directional OC function

Technical data

General technical specification see in **SigmaProt system information sheet**
Type tests see in **SigmaProt system information sheet**
Design and sizes see in **SigmaProt system information sheet**

Setting ranges:

Parameter	Range
Phase overcurrent protection	
Setting of the low current setting stage related to the CT rated current	20 to 2500, step 5 [%]
Setting of the high current setting stage related to the CT rated current	20 to 2500, step 5 [%]
CT primary rated current related to 1A or 5A secondary value	20 to 2500, step 5
Selective time delay of the low current setting stage	0 to 60000, step 10
Selective time delay of the high current setting stage	0 to 60000, step 10

Directional zero sequence overcurrent protection	
Setting of the zero sequence low current setting stage, as percent of the rated CT current	10 to 140, step 1
Setting of the zero sequence high current setting stage, as percent of the rated CT current	20 to 2500, step 5
The primary rated current of the zero sequence CT reduced to 100 mA, or 500 mA secondary value, used only to scale the displayed values	10 to 1000, step 1
Lower angle limit	0 to 359, step 1
Upper angle limit	0 to 359, step 1
Hysteresis of the angle measurement (drop-off ratio of angle decision)	0 to 359, step 1
Angle error compensation (1/10 deg)	0 to 3599, step 1
High current setting stage time delay	0 to 60000, step 1
Low current setting stage time delay	0 to 60000, step 1
Zero sequence overvoltage protection	
Setting of the zero sequence overvoltage function, as percent of the rated voltage of the device	10 to 110, step 1
Zero sequence overvoltage stage time delay	0 to 60000, step 1
Phase overvoltage protection	
Setting of the function related of the rated input voltage of the device	10 to 110, step 1
Definition of under- or overvoltage measurement	0 / 1
Time delay setting	0 to 60000, step 1
3/2 logic	0 / 1

Options

- Interface to a SCADA system (see the **SigmaProt** system information sheet)
- Need of output contacts with 4 A DC breaking capability

Ordering information

- Type of protection [DTI-SP]
- Rated C.T. current [1 A, 5 A]
- Rated V.T. voltage [100 V, 200 V]
- Auxiliary DC voltage [220 V, 110 V, or other]