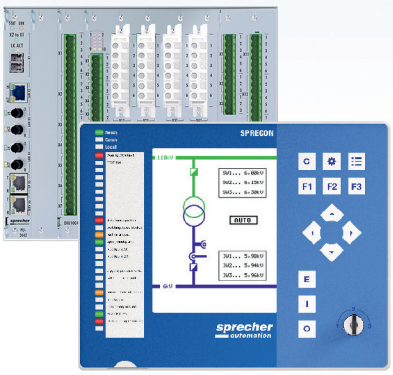

SPRECON®-E-P D3Qpi6

Differential Protection for Transformers with Protection Data Interface

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INTRODUCTION

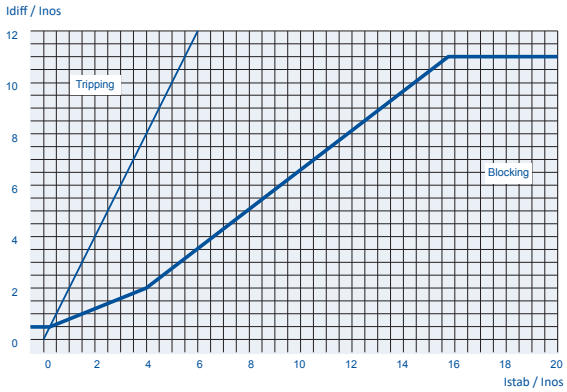
The SPRECON-E-P D3Qpi6 provides differential protection for transformers. It comes with an Ethernet-based protection data interface which allows protection communication with a line protection device of the SPRECON-E-P DL6 series. Time synchronisation via PTP (Precision Time Protocol) as well as data exchange between the devices is realised via this interface. The device is equipped with standardised hardware modules and is available as:

- SPRECON-E-P D3Qpi6-1
  (Protection device with control function)
- SPRECON-E-P D3Qpi6-2
  (Modular protection and control device)

Modular one-box solutions show higher application flexibility than protection devices with control function. Protection devices with control function have a fixed range of in- and outputs. Besides protection and measured value collection, they also feature control of up to four switching devices. Due to its modular design, the one-box solution can be easily expanded for realising comprehensive protection, measurement, control and monitoring tasks in secondary systems.

The multifunctional SPRECON-E-P devices feature a clear separation of control and protection functions which allows either combined or separated operations of control and protection functions:

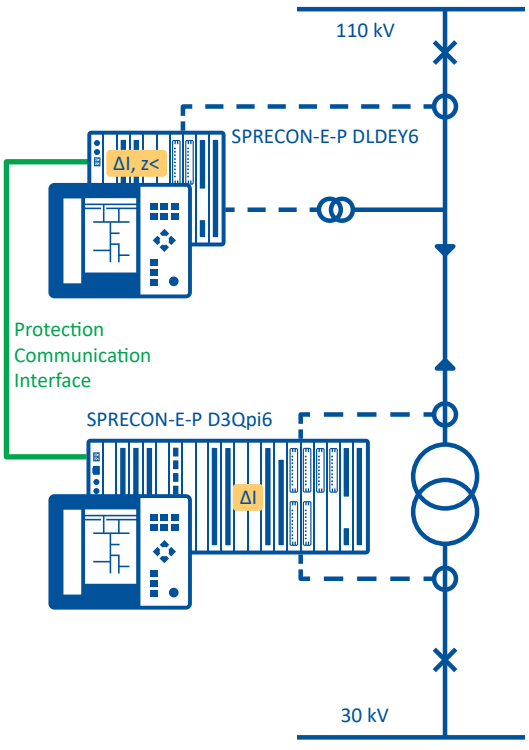
- Separated data models
- Separated control and protection firmware
- Separated control and protection configuration
- Separated passwords
- No testing of protection function at feeder nor primary circuit disconnection required on updating control parameters or firmware



Current stabilised differential protection

APPLICATION

The SPRECON-E-P D3Qpi6 is a multifunctional device for protection, control and automation of energy stations. It can be applied as main protection unit of transformers in different neutral point connections at medium or high voltage levels. By using the transformer differential protection with protection data interface and a line differential protection to protect a cable line with transformer, one line differential protection device can be saved. Additionally, faults at the transformer can be detected selectively.



Application example

In addition to the characteristic-stabilised differential protection for phase currents, the SPRECON-E-P D3Qpi6 also comes with characteristic-stabilised ground differential protection, zero-sequence filtering, inrush and overexcitation stabilisation as well as overcurrent protection per winding. Furthermore, motor protection and a thermal image secure the use for medium voltage motor applications.

The implementation of standard and proprietary protocols allows close collaboration with controlling systems of various manufacturers. All necessary protection and control functions are integrated in the devices.

CONFIGURATION

All functions can be configured separately. By separating protection configuration from control configuration, all different kinds of requirements of different applications can be met. The protection-specific functions are separately configured or deactivated depending on the respective application. Irrelevant functions are hidden and inactive which allows simple and structured configuration of the devices.

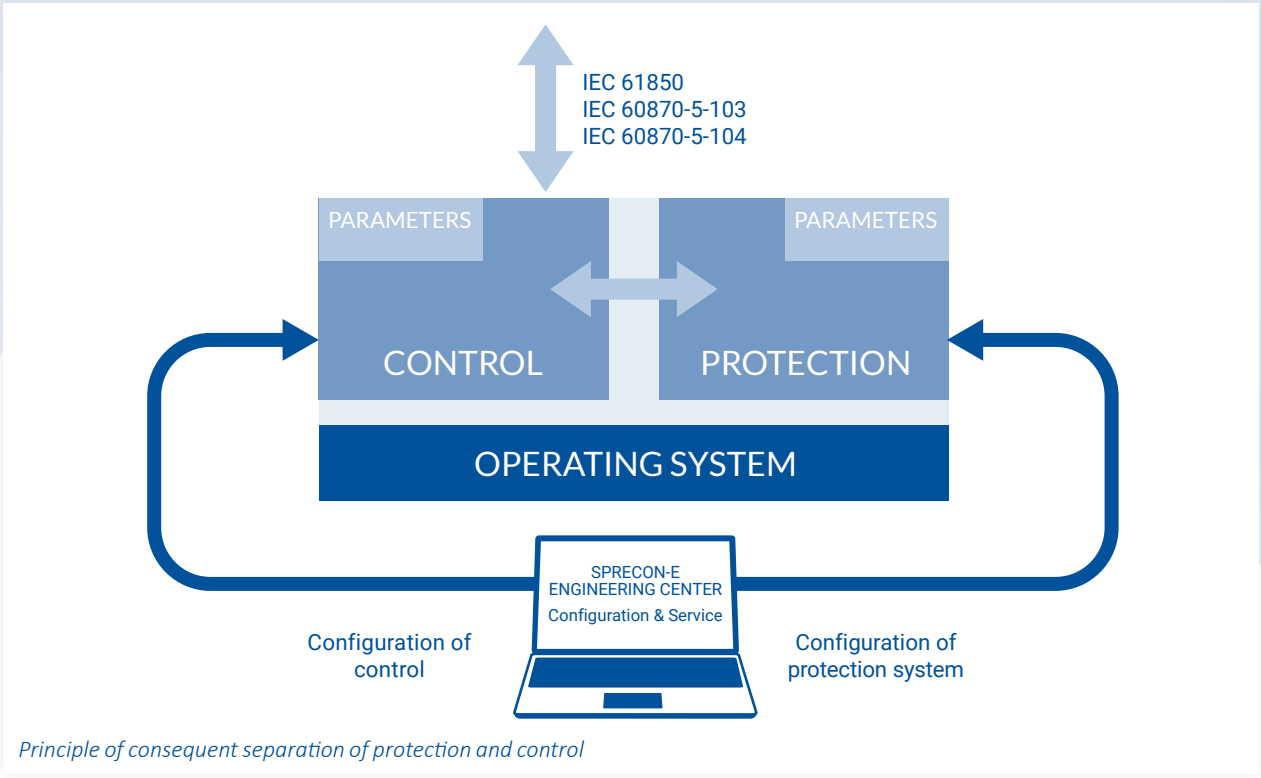
In the control application, all configured bays are typeorientedly stored in a database. They can therefore be copied and reused as well as easily readapted, which facilitates configuration of large scale systems.

OPERATING

In order to meet the requirements of efficient system management, all operations can be accomplished with the detachable HMI control panel. Hence, protection configurations can be carried out locally besides using the operating program “COMM-3“.

All information about the process and the device is shown on the full-graphical display of the control panel. Configurable LEDs are available for signalling.

Separated navigation keys allow clear user guidance through the various pages and submenus. Furthermore, they facilitate simple configuration of extensive protection and control functions.



Principle of consequent separation of protection and control

SPRECON-E-P D3Qpi6 – TECHNICAL DATA (EXCERPT)

IMPLEMENTED PROTECTION FUNCTIONS	REFERENCE		TYPE
	IEEE C37.2	IEC 61850-7-4	D3Qpi6
Number of current inputs			12I
Neutral point current sensitivity			1x/1x/ 20x
Differential protection, number of ends	87T	PDIF	3
Ground differential protection, number of ends	87N	PDIF	2
Amplitude and vector group matching			✓
Zero-sequence filtering			✓
Phase rotation adaption			✓
Switch on protection (SOTF, SOP), I_P, I_E, I_{neg}, assignable to end	50, 50N	PIOC	✓
I_L>DT/IDMT, 3 stages per end, number of ends	50, 51	PTOC	3
I_E>DT/IDMT, 3 stages per end, number of ends	50N,51N, 51Ns	PTOC	3
Inrush restraint		PHAR	✓
Overexcitation stabilisation (5th harmonic)			✓
Negative sequence protection I_{neg}>, 2 stages, number of ends	46	PTOC	3
Overload protection (2 images, assignable to end)	49, 49N	PTTR	✓
Starting protection, locked rotor protection (motor protection), assignable to end	49R, 66, 48, 51LR	PMRI/PMSS	✓
Underload protection (motor protection)	37	PTUC	✓
Lockout, number of ends	86	PMRI	3
Circuit breaker failure prot. (CBF), two stages per end, number of ends	50BF	RBRF	3
Current annunciation stages (3x $I_{L>an}$, 3x $I_{E>an}$), assignable to end			✓
Circuit breaker tripping by up to 6 external signals		(PTRC)	✓
Trip circuit supervision, number of ends	74TC		3
Parameter sets			4
Logic + time stages for optocoupler inputs			✓
Virtual binary inputs/control input			30/15
Logic + operating time for output relays			✓
Measurands, short report			✓
Event logging, non-volatile		RDRE	✓
Disturbance data recording, non-volatile		RADR, RBDR	✓
Statistics			✓
Measurand checks, self supervision			✓
Assistance for testing and commissioning			✓

DIMENSIONS & WEIGHT

- Dimensions: 212/436 x 176 x 257 mm (W x H x D) incl. connections
- Weight: < 7 kg

GENERAL FUNCTIONS

- Remote maintenance and configuration
- Time synchronisation (DCF77, GPS, station & remote control)
- Diagnosis via webserver
- Automatic backup on SD card
- Redundant power supply as option
- AI, AO modules for combined devices available

COMMUNICATION

- IEC 60870-5-103/-104, IEC 61850
- RS232, RS422/485, fibre-optic, 10/100 Mbit Ethernet
- 2 additional optical Ethernet interfaces for redundant ring
- Ethernet-based protection interface
- Connection via leased or dialup line
- Integration of stand-alone devices via station bus (counter, metering devices, protection relays, AVR, Petersen coil controller etc.)

ADDITIONAL PROTECTION FUNCTIONS

- Pulse shaper stage (programmable logic)
- Separation of protection event recording from control data
- Nominal current selection (1/5 A) via terminal connection
- Settings via control panel and PC through menu-assisted plain text messaging

CONTROL FUNCTIONS

- Control and monitoring of switching devices and process elements
- Freely programmable logic (PLC)
- Control of transformer tap changers and Petersen coil
- Power output with high breaking capacity (optional)
- Limit value monitoring
- Maximum value calculation (non-return pointer)
- Metered value capturing, operating hours counter, switching operations counter
- and many more

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