

## SigmaProt system information



### The SigmaProt devices

The members of the *SigmaProt* device family are simplified versions of the *EuroProt* devices, which are well known in the Hungarian electric power system. Their main advantage is the significantly smaller size and the compact structure, which is hardware and software compatible with the “traditional” *EuroProt* devices. At the same time they eliminate the inconvenience of the *OmegaProt* devices, produced by Protecta Co. Ltd. as well: *SigmaProt* devices have built-in man-machine interface. The large graphic display and the simple keyboard allow easy setting and checking of the device. The „traditional” “Protecta-like” convenient operation by an attached PC is one of the main features.

The functionality of the device can be configured according to the requirements, the most common factory configurations are:

- DTI numerical overcurrent protection,
- DMV complex numerical motor protection,
- DTD 2 x 3 current input differential protection.

The *SigmaProt* devices have the same intelligence as the latest versions of all Protecta devices: additional to the protective functions the „usual” features of the numerical devices are included:

- event recorder function,
- disturbance recorder function,
- trip matrix,
- freely configurable logic equations,
- fibre optic cable connection to the substation supervisory and control system,
- self check.

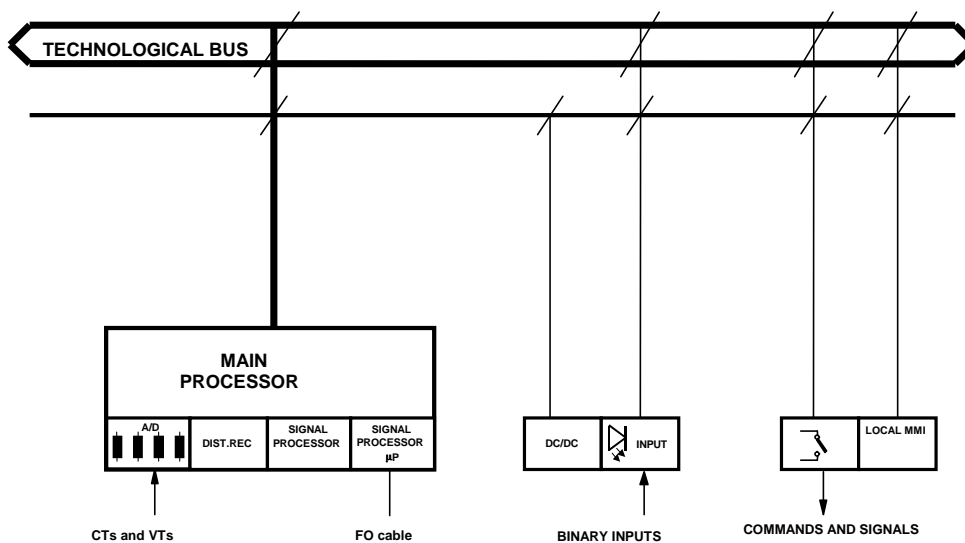
The mechanical limitations of the compact devices are as follows:

- 2 x 4 independent analogous inputs,
- 8 digital inputs grouped as 3,3,1,1,
- 8 relay outputs with 4 NO and 4 NO/NC contacts.

The multifunctional devices are assembled of modules. These modules in the *SigmaProt* devices allow a small number of variations only; the diversity is limited to the configuration of the analogue inputs. The functionality of the device is determined by the software configuration. This manual describes the common properties of the numerous possibilities. The individual characteristics of the specific applications are described in the manuals of the devices.

## **Operation of the devices**

The SigmaProt multifunctional devices are assembled of modules, which can be selected and configured according to the needed tasks. The principal scheme is as follows:



**ΣPROT HARDWARE STRUCTURE**

In the *SigmaProt* devices the principal scheme is realised with modules. As compared to the *EuroProt* system, the assortment of the *SigmaProt* modules is limited to a few modules.

The central module of the *SigmaProt* system is the central processing unit. Its elements are:

- “main processor” (80C196NU), for organising the cooperation of the system elements, with clock, “watch-dog” circuits, 2 CAN controllers, drivers, interface elements,
- signal processor (ADSP2189M), for performing protection functions of the device,
- signal processor (ADSP2189M), for performing communication and supervisory functions,
- flash memory for storing the programs of the processors,
- flash memory for storing the integrated disturbance records,
- EEPROM memory for storing the parameter values,
- battery supported RAM for storing recorded events and clock information,
- 2 pieces of 8 channel multiplexer and 14 bit A/D converter,
- 4 fibre optic interface (dual loop possibility for protection engineering workstation, and dual loop for the supervisory control system (these interfaces are included only according to the ordering)).

The power supply module of the system contains 8 opto-coupler digital inputs as well.

Similarly a combined module contains 8 relay outputs and the driver elements of the local man-machine interface.

There are two slots in the device reserved for the analogue input modules. According to the protection tasks, they can contain voltage or current inputs.

## Technical specification

Rated secondary current, $I_n$	1A, or 5 A,
Rated secondary voltage, $U_n$	100 V or 200 V
Overload capacity, current inputs, continuous 1 s	4x $I_n$ 100x $I_n$ (if $I_n = 1$ A) 50x $I_n$ (if $I_n = 5$ A)
Dynamic current limit	100x $I_n$
Overload capacity, voltage inputs, continuous	$2 \times U_n / \sqrt{3}$
Frequency range	45...55 Hz
Accuracy of digital overcurrent relays (over 50 %)	$\pm 2$ %
Accuracy of digital timers 10 ms range: 1 s range:	$\pm 3$ ms $\pm 12$ ms
Resetting ratio of overcurrent relays	95%
Operational time if high current differential stage operates	25 to 30 ms 15 to 20 ms
Inputs through digital optical coupler	8 pcs
Binary input specification rated voltage current consumption	24, 48, 110, 220 V DC* 1 mA(220V)
Output contact number	8 pcs print relays
Output contacts, electrical data: rated switching voltage Continuous load current making current DC breaking capability at 220 V at pure conductive Load at load of L/R = 40 ms	250 V 8 A 16 A 0,25 A 0,14 A
Communication media	Fibre optic cable
Communication mode	Radial or loop
Auxiliary voltage	220 V or 110 V DC (range: 88 to 310 V) or 68 to 240 V AC
Permissible ambient temperature	0°C...50°C
Insulation test (IEC 255)	2 kV, 50 Hz 5 kV, 1,2/50 $\mu$ s
Disturbance test (IEC 255)	2,5 kV, 1 MHz
Electrostatic discharge (ESD, IEC 801-2)	8 kV
Burst test (IEC 801-4)	2 kV
Radio frequency radiation	IEC 801-3

\* According to the ordering specification

### Design

Size (mm)		
Width	Height	Depth
120	180	151

Weight: 2.8 kg.

***Type tests***

Electrical type tests		
Insulation tests	IEC 255-5: 1994	
Ambient conditions	IEC 68-2-1 : 1990 IEC 68-2-2 : 1974	
Climatic tests	IEC 68-2-30 : 1980	
Impulse voltage test	IEC 255-5 : 1994	
Electrostatic discharge tests	IEC 801-2 IEC 255-22-2 : 1989, level 4	EN 61000-4-2
Radiated radio-frequency tests	IEC 801-3	EN 61000-4-3
Immunity against radio-frequency disturbances	IEC 255-22-3 : 1989	EN 61000-4-6
Fast transient (Burst) test	IEC 801-4 IEC 255-22-4	EN 61000-4-4
High frequency 1 MHz disturbance test	IEC 255-22-1 : 1988 IEEE C37.90.1 : 1989	
Impulse voltage disturbance test	IEC 255-5 : 1997	EN 61000-4-5
Mains frequency magnetic field disturbance test	EN 61000-4-8 : 1993, level 5	EN 61000-4-8
Impulse form magnetic field disturbance test		EN 61000-4-9
Decaying high frequency magnetic field disturbance test		EN 61000-4-10
Disturbance test for short voltage dips and voltage variations	IEC 255-11	EN 61000-4-11
Disturbance test with oscillating waves		EN 61000-4-12
Disturbance test for input port DC ripples	IEC 255-11	EN 61000-4-17
Disturbance test for mains frequency changes		EN 61000-4-28
Disturbance test for short voltage dips and voltage variations of the DC input port		EN 61000-4-29

Shock test:	IEC 255-21-1 : 1988
	immunity: class 1
	response: class 2
Acceleration:	IEC 255-21-2 : 1988
	bump: Class 1
	response: Class 2
Earth quake test:	IEC 255-21-3 : 1993, Level 2
Protection	IEC 529
Operating temperature range	0°C ...+50°C

#### Qualification

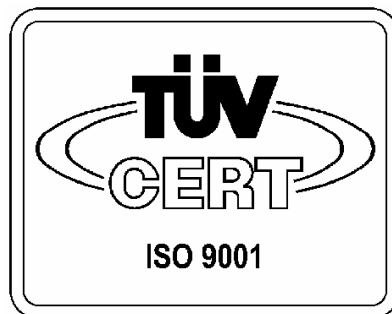
ISO: production according to ISO-9001 quality management programs.

CE: CE Certificate of Conformity

The device is designed and manufactured for application in industrial environment.

### Ordering information

- Device type, configuration,
- Rated current [1 A, 5 A],
- Rated voltage [100 V, 200 V],
- Contacts (NO/NC).



Protecta Electronics Co. Ltd. is qualified since July 1996.

by TÜV CERT

*ISO 9001 quality management system*

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