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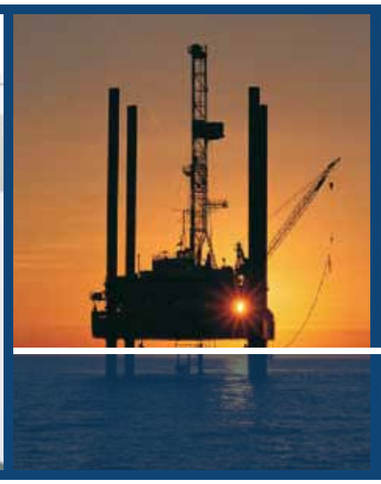
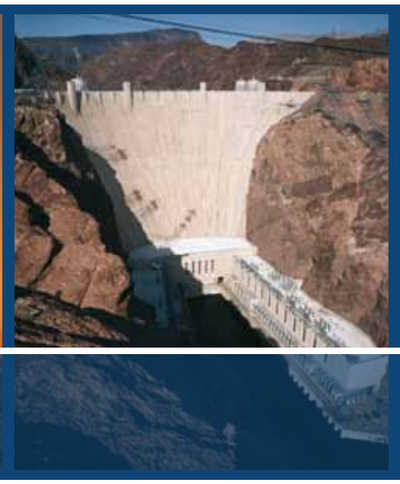


SYMAP®

ADVANCE DIGITAL PROTECTION RELAYS

HEAD OFFICE

Stucke Elektronik GmbH
Am Feenteich 18
22085 Hamburg
Germany

Tel.: +49(0)40 2274 68-11
Fax: +49(0)40 2274 68-24

mail@stuckegmbh.de
www.stuckegmbh.de

from June 2010 new address:
Merkurring 26
22143 Hamburg
Germany

Stucke Elektronik GmbH
PROTECTION
MADE IN GERMANY
since 1968

SYMAP®

Advance Digital Protection Relays

stucke GmbH elektronik

PRODUKT OVERVIEW

SYMAP® is a flexible microprocessor-based digital protection device for use in low, medium, and high-voltage power systems.
Because of its integrated protection functions and human-machine interface capabilities it is an efficient and cost-effective solution for all types of switchbays.
With **three powerful microprocessors**, SYMAP® offers complete protection functions for generators, motors (synchronous and asynchronous), transformers, power lines, and distributions.
All protection functions can be activated simultaneously and there are no limits to using all of them at the same time.

With SYMAP®, **five main breaker controls** can be activated with all the necessary functions, such as display, control, and blocking, for optimal breaker management. A small **integrated PLC** allows individual interlocks from controlling functions. For flexibility in commissioning and during use, both digital and analog outputs can be used to connect the SYMAP® control unit to main switchboard controls. Additionally, a variety of serial interfaces with different kinds of protocols can be used for communication between SYMAP® units and the central control system.
For **diagnostics and monitoring**, SYMAP® has three microprocessors that supervise each other, providing a watchdog system. Important functions are laid out in a double redundancy combination, operating independently with the second processor. Connected separately, an optional unit for short circuit protection operates parallel to the SYMAP® device and will do so even if the entire voltage fails.

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HUMAN MASCHINE INTERFACE

SYMAP® is easy to program and operate. A large graphic LCD with optional LED indicators conveys important data, such as position of all connected breakers, parameter settings, and event histories, at a glance.
Graphics and measurements are displayed side-by-side on the LCD, so that the user does not have to switch between pages.

The entire programming of SYMAP® can be done with the keys on its front panel or using a laptop. Using a laptop offers certain advantages, such as parameter data stored in the laptop can be easily input into other SYMAP® units. Either way, ease of programming is guaranteed and on-site visits by the manufacturer‘s engineers during commissioning are not required.
SYMAP® provides four hotkeys under the LCD through which four main groups of values can be accessed:

“Meters”, “Alarm”, “Process” and “Breaker Control”.
The user can press the hotkeys to scroll through pages of information pertaining to these values.

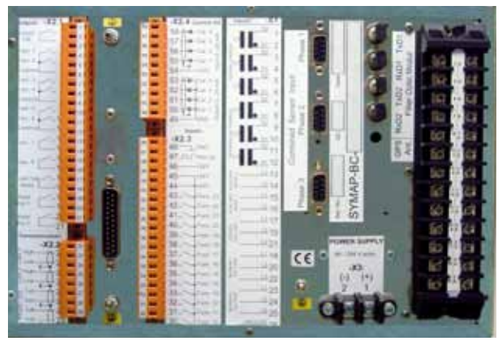
Under the hotkey **„Meters“**, detailed information of electric measurement values, counters for active and reactive power, and of working hours is provided. Under the hotkey **„Alarms“**, all active alarms, eventstores, and blockings are displayed. Under **„Process“**, all process data, such as synchronization display, motor thermal indication, and breaker counters, are shown. Under **„Breaker Control“**, up to five breakers can be accessed and controlled.

When programming breaker controls, the user has access to various layout configurations available through a library of graphics maintained within SYMAP®. Programmed blockings remain active when manual control of the breaker is used. Each of the highlighted breakers in the LCD can be further controlled by the keys „O“ and „I“.

For security, access to SYMAP®'s parameter and breaker control data is protected by a code system.
The code system offers dual access: by a transponder card or by password input.

TERMINAL CONNECTIONS

All connections to SYMAP® are made with terminal plugs on the back of the device, allowing the device to be exchanged easily.



ANALOG INPUT FOR MEASUEMENT

SYMAP® provides inputs for analog sensors at the rear of the device.
If terminal plugs for the CTs are disconnected, the circuits will be linked automatically so there is no disconnection in the CT circuit loops.

A total of 17 analog inputs for current and voltage transformers are used for protection functions. The following list shows possible connections for current transformers (CT) and potential transformers (PT):

- **3 x CT for feeder current**
- **3 x CT for differential current**
- **2 x CT for ground current**
- **3 x PT for feeder voltage**
- **3 x PT for bus bar 1 voltage**
- **3 x PT for bus bar 2 voltage**
- **2 x PT for ground voltage**

By use of combined sensors, SYMAP® can provide:

- **3 x for feeder current**
- **3 x for feeder voltage**

SYMAP®

COMMUNICATION

SYMAP® can serve as the main bay controller for the power management system or substation system. The following list shows the station system items available through SYMAP®.

- **Remote supervision**
- **Remote control**
- **Remote parameter settings**
- **Central registration of measured and calculated values**
- **Central event logging**
- **Central fault recording, analysis and logging**
- **Plant power management**

COMMUNICATION INTERFACES

SYMAP® provides communication ports available with the following interfaces and protocols:

- **1 x RS 232** on the front panel for programming and data output
- **2 x CANBUS**
- **1 x RS 422/485 port**
- **MODEM** (Analog or ISDN)
- **1 x PROFIBUS DP** (RS485 or fiber optic port)
- **MODBUS** (RS485 or fiber optic port)
- **IEC 60870-5-103** (RS485 or fiber optic port)
- **IEC 61850** (RS485 or fiber optic port)
- **CANBUS1** (communication between devices as power management system, breaker control interlocking)
- **CANBUS2** (engine control:MTU, VOLVO, DEUTZ etc.)

EXTENDED BOARD (OPTIONAL)

An extended board can be connected to SYMAP®, providing additional in- and output channels.
The extended board is customized to individual client requirements and can be equipped to a maximum of the following in- and output channels:

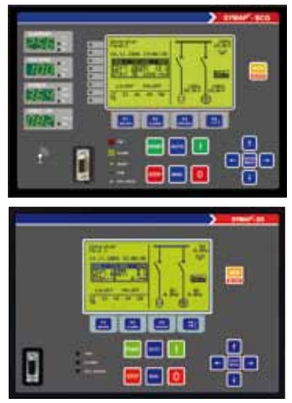
- **44 digital inputs**
- **32 relay outputs**
- **40 analog inputs - Multi Purpose**
- **4 analog inputs - VDO**
- **24 analog inputs - NiCrNi**
- **20 analog outputs**

EVENT HISTORY

SYMAP® automatically collects and stores all activated events with their number, title, appearing and disappearing status, and a time stamp.
A maximum of 5.000 events can be stored. In case of overflow, the oldest data will be recorded over.transferred and analyzed via a PC tool. Regardless of power supply, the data store is permanent.

DETAILED PROTECTION FUNCTION HISTORY

SYMAP® automatically collects and stores all activated events related to protection functions with a time stamp.
A maximum of 1.000 protection function events can be stored. In case of overflow, the oldest data will be recorded over.



DATA RECORDER (OPTIONAL)

The data recorder can log 16 analog inputs, 14 digital inputs, and 12 digital outputs. The recorder has the following settings:

- **Number of samples (6 - 72)**
- **Recording period (5 - 60 sec)**
- **Pre-trigger (0 - 100%)**
- **Trigger event (stop for recorder)**
- **Trigger event (stop for recorder)**

The recording period depends on the number of samples. The recorder can be set with the pre-trigger in such a way as record event data even before the event happens.

Stopping the recorder can be triggered either by an event or by a preset time. For easier management and trouble-shooting, event data can be transferred and analyzed via a laptop computer. The transfer of data is made by a link through a plug on the front panel of the SYMAP® device.

DIAGNOSTIC AND MONITORING

SYMAP® provides various diagnostic and monitoring functions as follows:

- **All memories** (ROMs, RAMs, EEPROMs)
- **All analog reference voltages**
- **Automated test sequences**
- **Control power ON/OFF of SYMAP®**
- **Binary input and output for control logic**

The following supervising systems are offered by SYMAP®:

- **Self diagnostics of SYMAP®**
- **The inputs of analog data** (auxiliary circuit)
- **The status and position of switching device and motor‘s on-off status**
- **Supervising supply of trip coil**
- **Gas pressure**
- **Temperature inside panel**
- **Each operating life of breaker** (hours)

SYMAP® SERIES

There are two series of SYMAP® units as follows:

SYMAP®-Y (EC, ECG, F, G, M, T, LD)
Essential cost series with power management, diesel and turbine control

- **EC.....Engine Control***
- **ECG.....Engine Control + Generator Protection***
- **F.....Feeder Proptection***
- **G.....Generator Protection***
- **M.....Motor Protection***
- **T.....Transformer Protection***
- **LD.....Line Differential***

SYMAP®-BC (BC, BCG)
Basic series expanded to include LED indicators, event data recorder, extended board, power management, diesel, gas engine and turbine control.

- **SYMAP®-BC - Multifunctional Protection Relay***
- **SYMAP®-BCG - Multifunctional Protection Relay***

*see the hardware and software capabilities

TECHNICAL DATA

NO	Description	Condition/Characteristics	
1	**Dimension (w x h x d)**	BC: 279 x 192 x 150 (mm)	
		X: 279 x 192 x 110 (mm)	
		Y: 192 x 192 x 110 (mm)	
2	**Weight**	BC: 5 kg	
		X: 3,2 kg	
		Y: 2,3 kg	
3	**Power supply**	12-36 V DC, 36-72 V DC, 80-300 V DC or 60-230 V AC	
4	**Power consumption**	< 30 W	
5	**Ambient condition**	Service temperature	-20 °C to +70°C
		Storage temperature	-40 °C to +70°C
		Transport temperature	-40 °C to +70°C
		Humidity	< 80 %
6	**Degree of protection**	Front panel	IP54 (IEC529)
		Terminals	IP10 (IEC529)
7	**Vibration**	Standards:	IEC 60068-2-6
		Frequency range:	5 Hz to 100 Hz
		Cross-over frequency:	15,8 Hz; +/- 1,0 mm amplitude to 1 g acceleration
		in 3 orthogonal axes (X,Y,Z)	
8	**Seismic vibration***	Standards:	KWU DWR 1300
		Frequency range:	5 Hz to 100 Hz
		Cross-over frequency:	11,2 Hz; +/- 10,0 mm amplitude to 5 g acceleration
		Sweep rate 5 Hz to 35 Hz:	1 Oct/min
		Sweep rate 35 Hz to 100 Hz:	10 Oct/min
		in 3 orthogonal axes (X,Y,Z)	
9	**Tests**	Electromagnetic compatibility	EN 55011, EN 61000-4, KERI
		Protection functions	IEC255, KERI
***X and BC Series**			

HARDWARE CAPABILITIES OF SYMAP® FAMILY

SYMAP® Series-	Y							X		BC		CMA		
Type-	EC	ECG	F	G	M	T	LD	X	XG	BC	BCG	216/217	218	228***
FRONTPANEL														
-Graphic-LCD	X	X	X	X	X	X	X	X	X	X	X	-	-	-
-Keyboard	X	X	X	X	X	X	X	X	X	X	X	-	-	-
-7 segment displays	-	-	-	-	-	-	-	-	-	X	X	-	-	-
-8 Alarm LEDs	-	-	-	-	-	-	-	-	-	X	X	-	-	-
-Transponder access	-	-	-	-	-	-	-	-	-	(X)	(X)	-	-	-
COMMUNICATION														
-RS232	X	X	X	X	X	X	X	X	X	X	X	-	-	-
-PROFIBUS	-	(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)	-	-	-
-CANBUS1	-	(X)	-	-	-	-	-	X	X	X	X	-	-	-
-CANBUS2	(X)	(X)	-	-	-	-	-	X	X	X	X	-	-	-
-MODBUS, RS485/RS422	-	(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)	-	-	-
-IEC 60870-5-103, 61850	(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)	-	-	-
-MODEM (analog)	(X)	(X)	-	-	-	-	-	(X)	(X)	-	-	-	-	-
-MODEM (ISDN)	(X)	(X)	-	-	-	-	-	(X)	(X)	-	-	-	-	-
INPUTS/OUTPUTS														
-Digital inputs	14(20)	14(20)	14(20)	14(20)	14(20)	14(20)	14(20)	14	14	14	14	-	-	-
-Digital inputs ext. board	-	-	-	-	-	-	-	(36)	(36)	(36)	(36)	24	-	12
-Relay outputs basic unit	12(16)	12(16)	12(16)	12(16)	12(16)	12(16)	12(16)	12	12	12	12	-	-	-
-Relay outputs ext. board	-	-	-	-	-	-	-	(36)	(36)	(36)	(36)	24	-	8
ANALOG I/O 4-20 mA														
-Analog in 4-20 mA	(2)	(2)	(1)	(1)	(1)	(1)	(1)	4	4	4	4	-	-	32****
-Analog out 4-20 mA	(2)	(2)	(1)	(1)	(1)	(1)	(1)	4	4	4	4	-	-	12
-PT100/PT1000 +ext. converter	-	-	-	-	-	-	-	-	-	-	-	6	6	-
-PT100/PT1000 ext. board	-	-	-	-	-	-	-	-	-	-	-	6**	6	-
ANALOG INPUT FOR MEASURING AND PROTECTION														
-Total analog inputs	-	13	13	13	13	13	13	13	13	17	17	-	-	-
-3 CT's for FEEDER CURRENT	-	X	X	X	X	X	X	X	X	X	X	-	-	-
-3 Ph. current via combined sensor	-	-	-	-	-	-	-	-	-	X	X	-	-	-
-3 CT's for DIFF. CURRENT	-	-	-	-	-	-	-	-	-	X	X	-	-	-
-CT for GROUND CURRENT 1	-	X*	X*	X*	X*	X*	X*	X*	X*	X	X	-	-	-
-CT for GROUND CURRENT 2	-	-	-	-	-	-	-	-	-	X	X	-	-	-
-3 PT's for FEEDER VOLTAGE	X	X	X	X	X	X	X	X	X	X	X	-	-	-
-3 Ph. voltage via combined sensor	-	-	-	-	-	-	-	-	-	X	X	-	-	-
-3 PT's for BUS VOLTAGE 1	X	X	X	X	X	X	X	X	X	X	X	-	-	-
-3 PT's for BUS VOLTAGE 2	-	X	X	X	X	X	X	X	X	X	X	-	-	-
-PT for GROUND VOLTAGE 1	-	X*	X*	X*	X*	X*	X*	X*	X*	X	X	-	-	-
-PT for GROUND VOLTAGE 2	-	-	-	-	-	-	-	-	-	X	X	-	-	-
RECORDING UNIT														
-Data logger	-	-	-	-	-	-	-	-	-	(X)	(X)	-	-	-
-Detailed protection history	X	X	X	X	X	X	X	X	X	X	X	-	-	-

*: one ground input available: U_{GND} I_{GND}

**: in communication with CMA217

(X): function is special equipment which can be ordered separately (see order information)

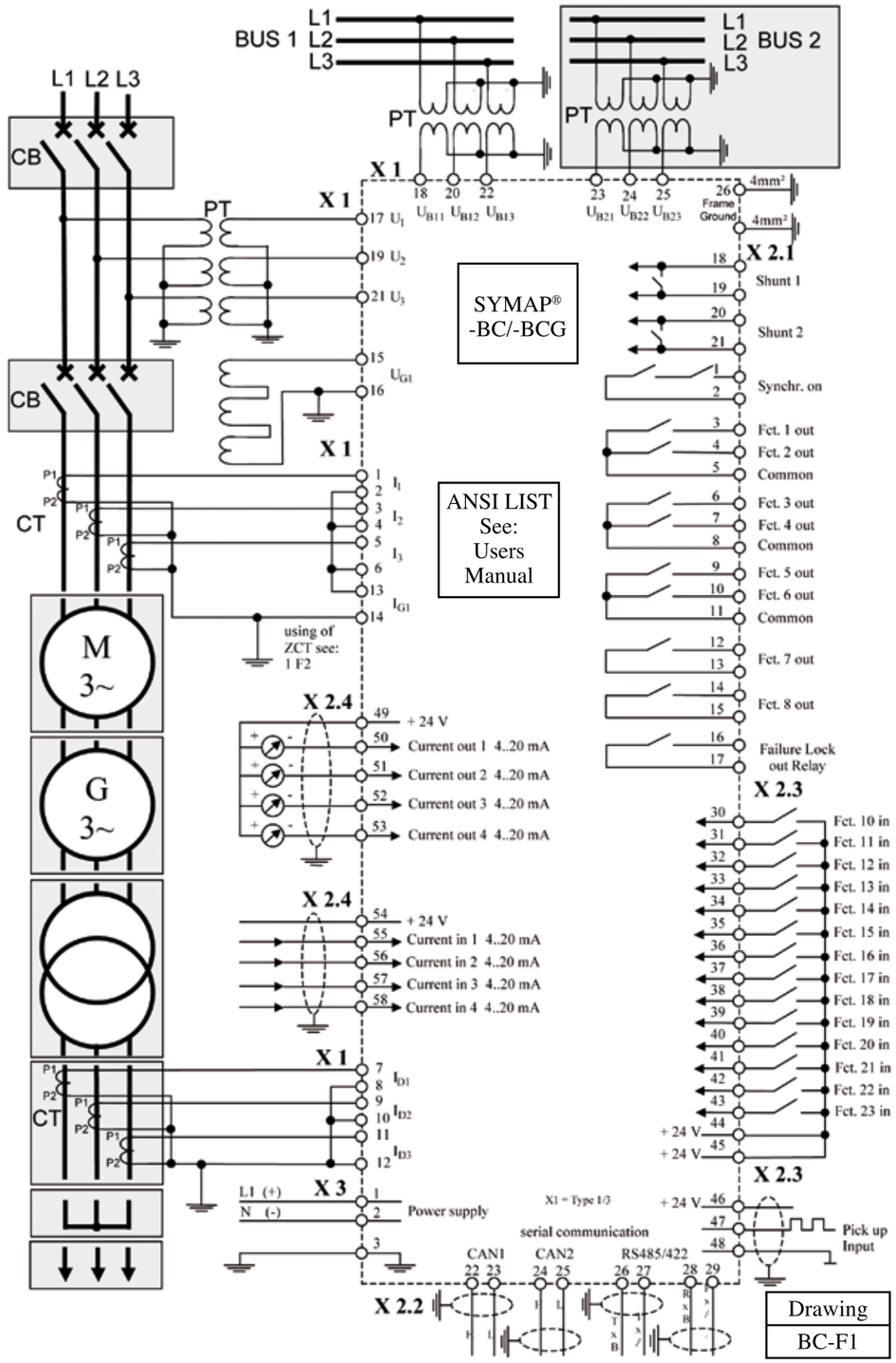
***: two units can be combined to obtain double number of in- and outputs

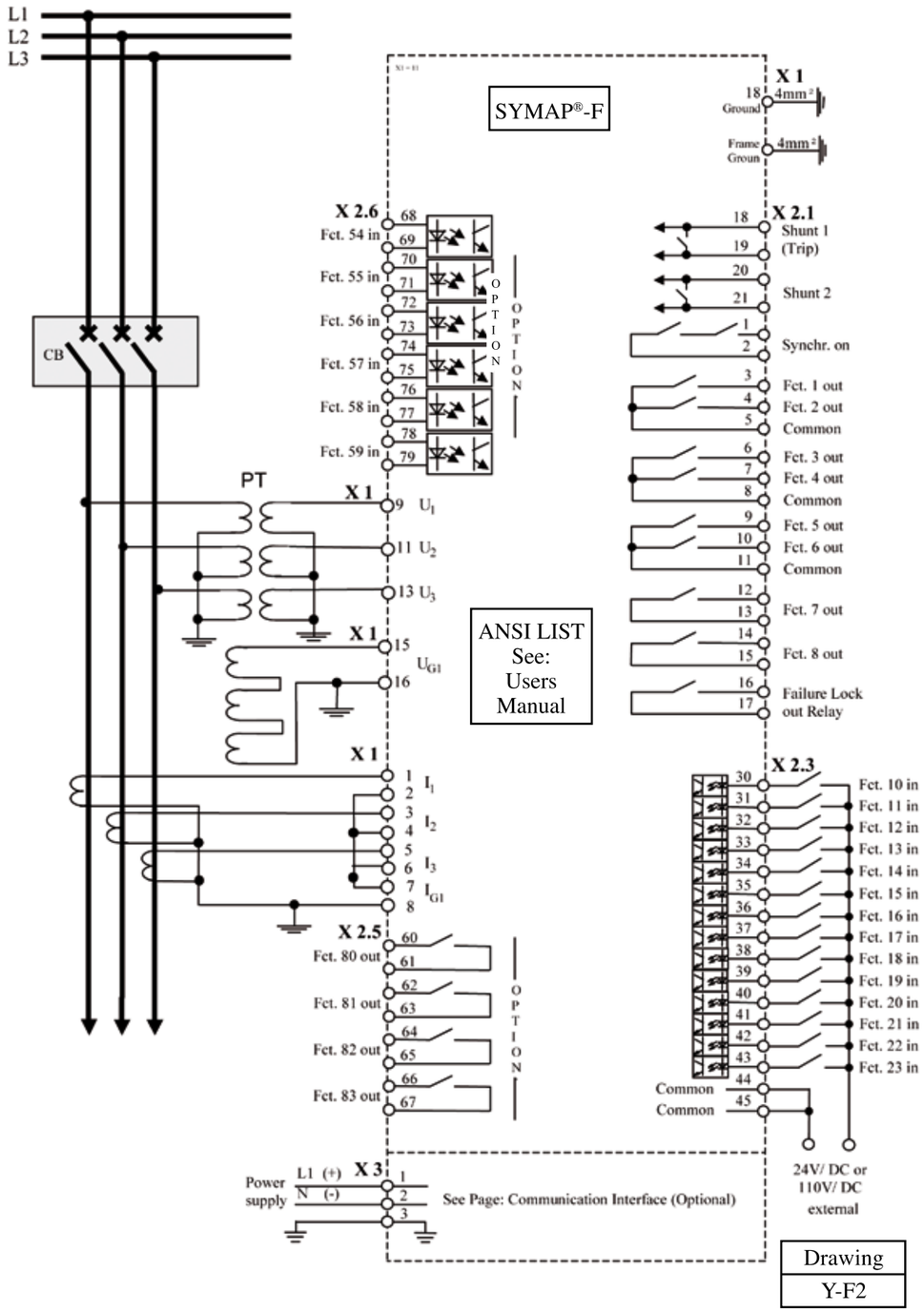
****: 20 x multi purpose, 2 x VDO, 10 x NiCrNi

SOFTWARE CAPABILITIES OF SYMAP® FAMILY

SYMAP® Series		Y							X		BC	
Type -		EC	ECG	F	G	M	T	LD	X	XG	BC	BCG
POWER MANAGEMENT MODULES												
-Synchronizing unit		X	X	X	X	X	X	X	X	X	X	X
-Load sharing/asymmetrical load ctrl.		-	X	-	X	-	-	-	-	X	-	X
-Frequency controller		X	X	-	X	-	-	-	-	X	-	X
-Voltage regulator		X	X	-	X	-	-	-	-	X	-	X
-Power factor control		-	X	-	X	-	-	-	-	X	-	X
-Load controller (big consumer)		-	X	-	-	-	-	-	-	X	-	X
-Load depending start/stop (PMS)		-	X	-	-	-	-	-	-	X	-	X
-Preferential trip management		-	X	-	-	-	-	-	-	X	-	X
-Blackout management		X	X	-	-	-	-	-	-	X	-	X
-Diesel control		X	X	-	-	-	-	-	-	X	-	X
LOGIC BUILDER UNIT (PLC)												
-Breaker controls/interlocks		X	X	X	X	X	X	X	X	X	X	X
-Logic diagrams		X	X	X	X	X	X	X	X	X	X	X
PROTECTION RELAYS (ACCORDING TO ANSI DEVICE NUMBERS)												
15	Matching device (motorpoti)	X	X	-	-	-	-	-	X	X	X	X
24	Overexcitation protection	-	X	-	X	-	-	-	X	X	X	X
25/A	Automatic synchronizing, Synchro-Check	X	X	X	X	X	X	-	X	X	X	X
27	Undervoltage, inst., def. time	X	X	X	X	X	X	X	X	X	X	X
27B	BUS undervoltage, def. time	X	X	(X)	(X)	-	(X)	(X)	X	X	X	X
32	Overload relay	-	X	X	X	X	(X)	(X)	X	X	X	X
37	Undercurrent protection	-	X	-	X	X	-	-	X	X	X	X
40/Q	Loss of field, reac.power, impedance	-	-	-	-	-	-	-	X	X	X	X
46	Reverse phase current	-	X	-	X	X	-	-	X	X	X	X
47	Phase sequence voltage	(X)	X	X	X	X	X	X	X	X	X	X
49	Thermal overload protection	-	X	X	X	X	X	X	X	X	X	X
50BF	Breaker failure	-	X	X	X	X	X	X	X	X	X	X
50	Overcurrent, instantaneous	-	X	X	X	X	X	X	X	X	X	X
50G/N	Current earth fault, instantaneous	-	X	X	X	X	X	X	X	X	X	X
51	time overcurrent, def. time, IDMT	-	X	X	X	X	X	X	X	X	X	X
51G/N	AC Ground overcurr., def. time, IDMT	-	X	X	X	X	X	X	X	X	X	X
51LR	Locked rotor	-	-	-	-	X	-	-	X	X	X	X
51V	Voltage restrained overcurrent	-	-	-	-	X	-	-	X	X	X	X
59	Overvoltage, inst., def. time, norm. inv.	(X)	X	X	X	X	X	X	X	X	X	X
59B	BUS overvoltage, relay definite time	(X)	X	X	X	X	X	X	X	X	X	X
59N	Residual overvoltage	(X)	X	X	X	X	X	X	X	X	X	X
60FF	Fuse failure (voltages)	X	X	X	X	X	X	X	X	X	X	X
64	Ground overvoltage	(X)	X	X	X	X	X	X	X	X	X	X
66	Start inhibit	-	-	-	-	X	-	-	X	X	X	X
67	AC dir. overcurrent, def. time, IDMT	-	X	X	X	X	X	X	X	X	X	X
67GS/GD	AC directional earth fault, definite time	-	(X)	(X)	(X)	(X)	(X)	(X)	X	X	X	X
78	Vector surge supervision	(X)	X	(X)	X	-	-	-	X	X	X	X
78S	Out of step tripping	-	X	-	X	-	-	-	X	X	X	X
79	Auto reclosing	-	-	X	-	-	X	X	X	X	X	X
81	Frequency supervision	X	X	X	X	X	X	X	X	X	X	X
81B	BUS frequency supervision	(X)	X	X	X	X	X	X	X	X	X	X
86	Electrical lock out	X	X	X	X	X	X	X	X	X	X	X
87G/M	Generator/Motor differential	-	-	-	-	-	-	-	-	-	X	X
87LD	Line differential	-	-	-	-	-	-	X	-	-	-	-
87N	Restrict earth fault relay	-	-	-	-	-	-	-	-	-	X	X
87T	Transformer differential	-	-	-	-	-	-	-	-	-	X	X
94	Trip circuit supervision	X	X	X	X	X	X	X	X	X	X	X
95i	Inrush blocking	-	-	X	-	-	X	X	X	X	X	X

CONNECTION DRAWING





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ORDER INFORMATION

Y-Series, X- and BC-Series

Stucke Elektronik GmbH
PROTECTION
MADE IN GERMANY
since 1968

Order information Y-Series

			Available for					
			EC	T	M	G	F	LD
a.	**Power supply**							
	24	: 12 - 36 V DC	•	•	•	•	•	•
	60	: 36 - 72 V DC	•	•	•	•	•	•
	110	: 60 - 230 V AC; 80-300 V DC	•	•	•	•	•	•
b.	**Current transformer**							
	1A	: 1 A CT (0 - 20 × In)		•	•	•	•	•
	5A	: 5 A CT (0 - 20 × In)		•	•	•	•	•
c.	**Voltage transformer**							
	R100V	: 100 V/√3 PT secondary (resistor)	•	•	•	•	•	•
	R200V	: 200 V/√3 PT secondary (resistor)	•	•	•	•	•	•
	R400V	: 400 V/√3 PT secondary (resistor)	•	•	•	•	•	•
	R800V	: 800 V/√3 PT secondary (resistor)	•	•	•	•	•	•
	PT100V	: 100 V/√3 PT secondary (galvanic isolatad, without second BUSBAR)	•	•	•	•	•	•
	PT400V	: 400 V/√3 PT secondary (galvanic isolatad, without second BUSBAR)	•	•	•	•	•	•
d.	**Ground current**							
	GC0	: no ground corrent						
	GC1	: one ground current input (0 - 20 × In)	•	•	•	•	•	
	GCS20	: one sensitive ground corrent input (0-20 mA)	•	•	•	•	•	
	GCS100	: one sensitive ground corrent input (0-100 mA)	•	•	•	•	•	
e.	**Ground voltage**							
	GV0	: no ground voltage						
	G1V100	: one 100 V/√3 PT secondary (resistor; without second BUSBAR)	•	•	•	•	•	•
	G1V200	: one 200 V/√3 PT secondary (resistor; without second BUSBAR)	•	•	•	•	•	•
	G1V400	: one 400 V/√3 PT secondary (resistor; without second BUSBAR)	•	•	•	•	•	•
	G1V800	: one 800 V/√3 PT secondary (resistor; without second BUSBAR)	•	•	•	•	•	•
f.	**Communication**							
	C0RS	: standard (1 x RS232 [PC] rear side)	•	•	•	•	•	•
	C0FS	: standard (1 x RS232 [PC] front side)	•	•	•	•	•	•
	C1	: additional CANBUS port (direct engine control)	•					
	C2	: additional RS422 or RS485 port (MODBUS)		•	•	•	•	•
	C3	: additional PROFIBUS DP port (RS485)		•	•	•	•	•
	C3F	: additional PROFIBUS DP port (fibre optic)		•	•	•	•	•
	C4F860	: additional port (fibre optic for 87 LD, wavelength 860 nm)						•
	C4F1300	: additional port (fibre optic for 87 LD, wavelength 1300 nm)						•
	C5	: additional RS485 port (IEC60870-5-103)	•	•	•		•	•
	C6	: ISDN-Modem	•					
	C7	: Analog-Modem	•					
	C8	: IEC 61850		•	•	•	•	
g.	**Digital I/O**							
	0	: none						
	1	: “SHUNT1”-output normally closed (standard: n. o.)	•	•	•	•	•	•
	2	: six additional binary inputs (optional)	•	•	•	•	•	•
	3	: four additional relais outputs (optional)	•	•	•	•	•	•
	4	: binary in- and output voltage 24 V DC	•	•	•	•	•	•
	5	: binary in- and output voltage 60 V DC	•	•	•	•	•	•
	6	: binary in- and output voltage 230 V DC	•	•	•	•	•	•
h.	**Analog I/O (optional)**							
	1	: one additional analog input/output (0 - 20 mA)	•					
	2	: two additional analog input/output (0 - 20 mA)	•					
i.	**Nominal frequency**							
	1	: 50 Hz	•	•	•	•	•	•
	2	: 60 Hz	•	•	•	•	•	•
j.	**Frontpanel type**							
	1	: SYMAP®-EC Stucke	•					
	2	: SYMAP®-F,G,T,M Stucke		•	•	•	•	•
	3	: Customer-specific constructions are of spezial request available	•	•	•	•	•	•

Order information X- and BC-Series

			Available for	
			-X	-BC
a.	**Power supply**			
	24	: 12-36 V DC	•	•
	60	: 36 - 72 V DC	•	•
	110	: 60 - 230 V AC; 80-300 V DC	•	•
b.	**Current transformer**			
	1A	: 1 A CT (0 - 20 x In)	•	•
	1AM	: 1 A CT/separate measuring inputs (on request) (0-20xIn)		•
	5A	: 5 A CT (0-20xIn)	•	•
	5AM	: 5 A CT/separate measuring inputs (on request) (0-20xIn) (0-20xIn)		•
c.	**Voltage transformer**			
	R100V	: 100 V/√3 PT secondary (resistor)	•	•
	R200V	: 200 V/√3 PT secondary (resistor)	•	•
	R400V	: 400 V/√3 PT secondary (resistor)	•	•
	R800V	: 800 V/√3 PT secondary (resistor)	•	•
	PT100V	: 100 V/√3 PT secondary (galvanic isolatad, without second BUSBAR)	•	•
	PT400V	: 400 V/√3 PT secondary (galvanic isolatad, without second BUSBAR)	•	•
d.	**Current transformer for differential protection**			
	D0	: no differential protection		
	D1	: Generator and Motor application (compensation)		•
	D2	: Transformer 2 windings (vector groups)		•
	D3	: Transformer 3 windings (vector groups)		•
e.	**Ground current**			
	GC0	: no ground corrent		
	GC1	: one ground current input (0 - 20 x In)	•	•
	GCS20	: one sensitive ground corrent input (0-20 mA)	•	•
	GCS100	: one sensitive ground corrent input (0-100 mA)	•	•
f.	**Ground voltage**			
	GV0	: no ground voltage		
	G1V100	: one 100 V/√3 PT secondary (resistor)	•	•
	G1V200	: one 200 V/√3 PT secondary (resistor)	•	•
	G1V400	: one 400 V/√3 PT secondary (resistor)	•	•
	G1V800	: one 800 V/√3 PT secondary (resistor)	•	•
	G2V100	: two 100 V/√3 PT secondary (resistor)		•
	G2V200	: two 200 V/√3 PT secondary (resistor)		•
	G2V400	: two 400 V/√3 PT secondary (resistor)		•
	G2V800	: two 800 V/√3 PT secondary (resistor)		•
g.	**Recording unit**			
	RU0	: without recording unit		
	RU1	: with recording unit	•	•
h.	**Communication (up to 5 ports available)**			
	C0	: standard (1xCANBUS [P.M.]); 1xRS 232 [PC])	•	•
	C1	: additional CANBUS port (direct engine control)	•	•
	C2	: additional RS422 or RS485 port (MODBUS)	•	•
	C3	: additional PROFIBUS DP port (RS485)	•	•
	C3F	: additional PROFIBUS DP port (fibre optic)	•	•
	C4F	: additional RS232 port (Fibre optic for 87LD)		
	C5	: additional RS485 port (IEC60870-5-103)	•	•
	C6	: ISDN-Modem	•	
	C7	: Analog Modem	•	
	C12	: additional CANBUS and RS422 or RS485 port	•	•
	C13	: additional CANBUS and PROFIBUS DP port (RS485)	•	•
	C137	: additional CANBUS and PROFIBUS DP port (RS485) and analog Modem	•	

			Available for	
			-X	-BC
i.	**Extended board type**			
	0	: no connection		
	1	: CMA 210 (16xPT100)	•	•
	2	: CMA 211 (24xbinary inputs; 5xPT100; 24xbinary outputs) (on request)	•	•
	3	: CMA 212 (16xbinary inputs; 18xbinary outputs) (on request)	•	•
	4	: CMA 216 (24xbinary inputs; 24xbinary outputs)	•	•
	5	: CMA 216 and CMA217 (24xbinary inputs; 6xPT100; 24xbinary outputs)	•	•
	6	: CMA 218 (6xPT100)	•	•
j.	**Special configurations (on request)**			
	0	: none		
	1	: ground insulation fault (for generator or motor rotor)		•
	2			
	3	: with additional transponder access		•
	4	: “SHUNT1”-output normally closed (standard: n. o.)	•	•
k.	**Nominal frequency**			
	1	: 50 Hz	•	•
	2	: 60 Hz	•	•
l.	**Frontpanel type**			
	1	: SYMAP®-BC Stucke		•
	2	: SYMAP®-BCG Stucke		•
	3	: SYMAP®-BCG Stucke without prog.-connector		•
	4			
	5			
	6	: SYMAP®-X Stucke	•	
	7	: SYMAP®-XG Stucke	•	
	8	: Customer-specific constructions are of spezial request available (with notation)	•	•

FOR CONTROL & PROTECTION

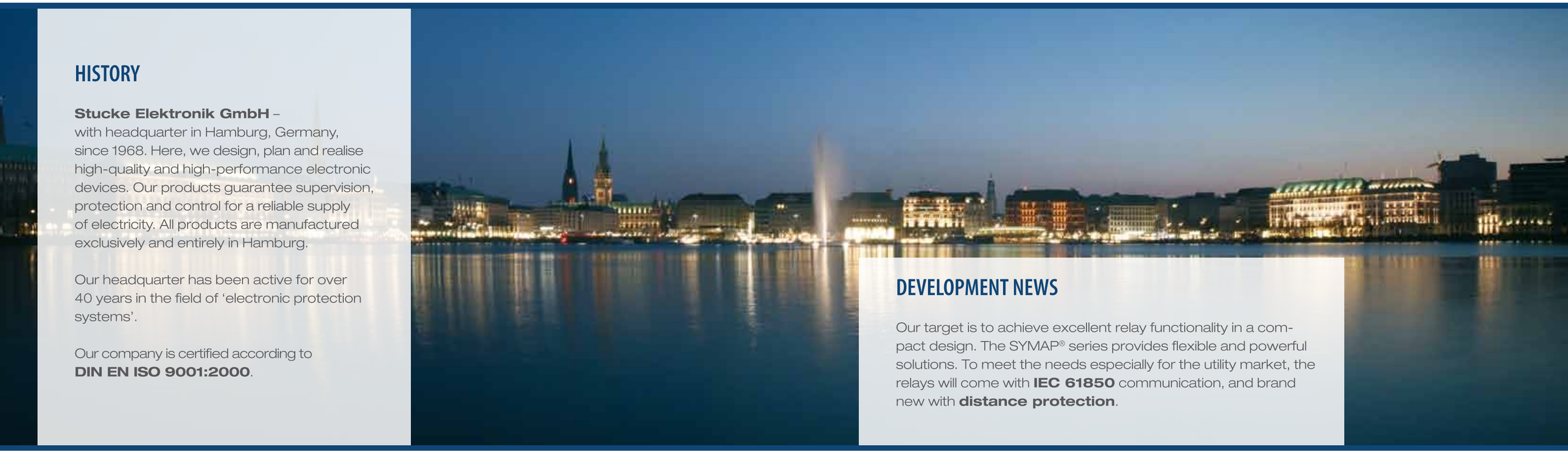
stucke GmbH elektronik

HISTORY

Stucke Elektronik GmbH –
with headquarter in Hamburg, Germany, since 1968. Here, we design, plan and realise high-quality and high-performance electronic devices. Our products guarantee supervision, protection and control for a reliable supply of electricity. All products are manufactured exclusively and entirely in Hamburg.

Our headquarter has been active for over 40 years in the field of 'electronic protection systems'.

Our company is certified according to **DIN EN ISO 9001:2000**.



DEVELOPMENT NEWS

Our target is to achieve excellent relay functionality in a compact design. The SYMAP® series provides flexible and powerful solutions. To meet the needs especially for the utility market, the relays will come with **IEC 61850** communication, and brand new with **distance protection**.

OUR CUSTOMERS

- **Marine companies**
- **Offshore companies**
- **Power companies**
- **Energie producers**
- **Medium-voltage producers**
- **Genset companies**

For diesel and gas engines we develop, plan and manufacture control systems for single- and multiple-generator systems, generator protection, network protection as well as multifunctional protective relays in low- and medium-voltage installations.

We can provide you with electrotechnologically relevant services in the areas of CAD design, turnkey technology and the production and installation of control systems for on- and offshore industries.

DEVELOPMENT & SUPPLY OF

- **Diesel-Automation System**
- **Generator-Protection System**
- **Mains Protection System**
- **Power Management Control for multi Generating Set**
- **Multifunction-Protection Relay**
- **Marine- and landbased Powerstation**
- **Emergency Power Plants**
- **Hydro-steam Tourbine Control**
- **Gas Engine Control**

SYMAP® ADVANCED, FLEXIBLE, COMPREHENSIBLE

The **SYMAP® family** reaches a typeapproval from the following classification societies:

Germanischer Lloyd	**GL**
Lloyds Register	**LR**
American Bureau of Shipping	**ABS**
Det Norske Veritas	**DNV**
Bureau Veritas	**BV**
Russian Maritime Register of Shipping	**RMRS**
China Classification Society	**CCS**
Polski Regestr Statkow	**PRS**
Nipon Kajiji Kyokai	**NPK**
Registro Italiano Navale (Italy)	**RINA**
Gossudarstwenny Standart (Russian)	**GOST**
Korean Register	**KR**

Additional Tests:

Conformité Européenne	CE
Deutsche Kraftwerksunion	**KWU**
Korea Electrotechnology Research Institute	**KERI**