



## Type Approval Certificate

This is to certify that the undernoted product(s) has/have been tested with satisfactory results in accordance with the relevant requirements of the Lloyd's Register Type Approval System.

<b>Manufacturer</b>	<b>SEG Electronics GmbH</b>
<b>Address</b>	Krefelder Weg 47, Kempen, 47906, Germany
<b>Place of Production</b>	SEG Electronics GmbH Krefelder Weg 47, Kempen, 47906, Germany
<b>Type</b>	Protective Devices
<b>Description</b>	Protection Relays HighPROTEC-Series consisting of:  MCA4 - Feeder protection relay MCDGV4 - Generator differential protection relay MRDT4 - Transformer differential protection relay MRI4 - Overcurrent and earth-fault protection relay MRM4 - Motor protection relay MRU4 - Voltage and frequency protection relay  For detailed product description, pls. refer to appendix.
<b>Trade Name</b>	HighPROTEC
<b>Application</b>	Marine, Offshore and Industrial applications for use in environmental category ENV2, as defined in Lloyd's Register Type Approval System, Test Specification Number 1 – December 2021. Suitable for general power distribution zones only.

71 Fenchurch Street, London, EC3M 4BS, United Kingdom

**Matthias Karg**

Electrical & Control - Specialist to Lloyd's Register EMEA  
A member of the Lloyd's Register group

Lloyd's Register Group Limited, its affiliates and subsidiaries and their respective officers, employees or agents are, individually and collectively, referred to in this clause as 'Lloyd's Register'. Lloyd's Register assumes no responsibility and shall not be liable to any person for any loss, damage or expense caused by reliance on the information or advice in this document or howsoever provided, unless that person has signed a contract with the relevant Lloyd's Register entity for the provision of this information or advice and in that case any responsibility or liability is exclusively on the terms and conditions set out in that contract.



## Type Approval Certificate

<b>Specified Standard</b>	IEC 60255-1: 2022 IACS UR E10 Rev. 8: 2021
<b>Ratings</b>	Ingress Protection IP54 (front with seal) IP50 (front without seal) IP20 (rear)  Software revision: 3.xx
<b>Additional Tests</b>	Dry heat test (+55 °C / 16 h) Low temperature test (-20 °C / 16 h) Shock test (half-sine, 5 g, 11 ms)
<b>Other Conditions</b>	<p>For systems consisting of the listed components the final functional arrangement and application software are to comply with appropriate Lloyd's Register Rules and Regulations and shall be subject to project related Plan Approval Process, when installed on LR classed vessels. Documents and drawings for the actual application are to be provided according relevant LR Rules and Regulations.</p> <p>Examination of software aspects is restricted to functional operation, as demonstrated in the performance test.</p> <p>Programmable electronic systems of MCDGV4 and MRDT4 which implements emergency stop or safety critical functions have satisfied the requirements of the LR's Software Conformity Assessment (Software Conformity Certificate No. LR24104094SC) and can be used without independent hard-wired back-up or redundancy within design.</p> <p>Major software changes shall be reported and approved by the Classification Society prior implementation in the product.</p> <p>Type Approval does not eliminate the need for normal inspection and survey procedures required by the Rules and Regulations.</p>

71 Fenchurch Street, London, EC3M 4BS, United Kingdom

Lloyd's Register Group Limited, its affiliates and subsidiaries and their respective officers, employees or agents are, individually and collectively, referred to in this clause as 'Lloyd's Register'. Lloyd's Register assumes no responsibility and shall not be liable to any person for any loss, damage or expense caused by reliance on the information or advice in this document or howsoever provided, unless that person has signed a contract with the relevant Lloyd's Register entity for the provision of this information or advice and in that case any responsibility or liability is exclusively on the terms and conditions set out in that contract.



---

## Type Approval Certificate

If the specified standards are amended during the validity of this certificate, the product is to be re-approved prior to it being supplied to vessels to which the amended standards apply.

This certificate is not valid for equipment, the design, ratings or operating parameters of which have been varied from the specimen tested. The manufacturer should notify Lloyd's Register EMEA of any modification or changes to the equipment in order to obtain a valid Certificate.

**Previous Version:** 15/20120 (E1)

The Design Appraisal Document TSO/24-015306 and its supplementary Type Approval Terms and Conditions form part of this Certificate.

71 Fenchurch Street, London, EC3M 4BS, United Kingdom

---

Lloyd's Register Group Limited, its affiliates and subsidiaries and their respective officers, employees or agents are, individually and collectively, referred to in this clause as 'Lloyd's Register'. Lloyd's Register assumes no responsibility and shall not be liable to any person for any loss, damage or expense caused by reliance on the information or advice in this document or howsoever provided, unless that person has signed a contract with the relevant Lloyd's Register entity for the provision of this information or advice and in that case any responsibility or liability is exclusively on the terms and conditions set out in that contract.





## Appendix

### DESCRIPTION

Protection Relays HighPROTEC-Series

MCA4 - Feeder protection relay

MCA4-2 ①②③④⑤

	Code	Description
①	Inputs and outputs	
	A	- 8 digital inputs, 7 binary output relays
	D	- 16 digital inputs, 13 binary output relays
	E	- 24 digital inputs, 20 binary output relays
	F	- 16 digital inputs, 15 binary output relay, 2/2 analogue input/output
②	Hardware variants	
	0	- Phase current 5A/1A, ground current 5A/1A
	1	- Phase current 5A/1A, sensitive ground current 5A/1A
③	Housing and mounting	
	A	- Door mounting
	B	- Door mounting 19" (flush mounting)
	H	- Customer version 1
	K	- Customer version 2
④	Communication protocols	
	A	- Without protocol
	B	- RS485 terminals: Modbus RTU, DNP3.0 RTU
	C	- Ethernet 100MB/RJ45: Modbus TCP, DNP3.0 TCP/UDP
	D	- Optic fibre/ST-connector: Profibus-DP
	E	- RS485/D-Sub: Profibus-DP
	F	- Optic fibre/ST-connector: Modbus RTU, DNP3.0 RTU
	G	- RS485/D-Sub: Modbus RTU, DNP3.0
	H	- Ethernet 100MB/RJ45: Modbus TCP, DNP3.0 TCP/UDP
	I	- see description of "B" and "H"
	K	- Optical Ethernet 100MB/LC duplex connector: Modbus TCP, DNP3.0 TCP/UDP
	L	- Optical Ethernet 100MB/LC duplex connector: Modbus TCP, DNP3.0 TCP/UDP
	T	- Modbus RTU, DNP3.0 RTU, RS485/terminals - Modbus TCP, DNP3.0 TCP/UDP, Ethernet 100 MB/RJ45
⑤	Environment options	
	A	- None
	B	- Conformal coating



**DESCRIPTION (continued)** MCDGV4 - Generator differential protection relay

MCDGV4-2 ① ② ③ ④ ⑤

	Code	Description
①	Inputs and outputs	
	A	- 16 digital inputs, 11 binary output relays, 0/0 analogue input/output, power input 0-800 V
	B	- 8 digital inputs, 11 binary output relays, 2/2 analogue input/output, power input 0-800 V
	C	- 24 digital inputs, 11 binary output relays, 0/0 analogue input/output, power input 0-300 V
	D	- 16 digital inputs, 16 binary output relays, 0/0 analogue input/output, power input 0-300 V
②	Hardware variants	
	0	- Phase current 5A/1A, ground current 5A/1A
	1	- Phase current 5A/1A, W1 sensitive ground current 5A/1A
③	Housing and mounting	
	A	- Door mounting
	B	- Door mounting 19" (flush mounting)
	H	- Customer version 1
	K	- Customer version 2
④	Communication protocols	
	A	- Without protocol
	B	- RS485 terminals: Modbus RTU, DNP3.0 RTU
	C	- Ethernet 100MB/RJ45: Modbus TCP, DNP3.0 TCP/UDP
	D	- Fibre optic interface/ST connector: Profibus-DP
	E	- RS485/D-SUB interface: Profibus-DP
	F	- Fibre optic interface/ST connector: Modbus RTU, IEC60870-5-103, DNP3.0 RTU
	G	- RS485/D-SUB interface: Modbus RTU, IEC60870-5-103, DNP3.0 RTU
	H	- Ethernet 100MB/RJ45: IEC61850, Modbus TCP, DNP3.0 TCP/UDP
	I	- RS485 terminals: IEC60870-5-103, Modbus RTU, DNP3.0 RTU - Ethernet 100MB/RJ45: Modbus TCP, DNP3.0 TCP/UDP
	K	- Optical Ethernet 100MB/LC duplex connector: IEC61850, Modbus TCP, DNP3.0 TCP/UDP
	L	- Optical Ethernet 100MB/LC duplex connector: Modbus TCP, DNP3.0 TCP/UDP
	T	- Modbus RTU, DNP3.0 RTU, RS485/terminals - Modbus TCP, DNP3.0 TCP/UDP, Ethernet 100 MB/RJ45
⑤	Environment options	
	A	- None
	B	- Conformal coating



**DESCRIPTION (continued)** MRDT4 - Transformer differential protection relay

MRDT4-2 ①②③④⑤

	Code	Description
①	Inputs and outputs	
	A	- 8 digital inputs, 7 binary output relays
	D	- 16 digital inputs, 13 binary output relays
②	Hardware variants	
	0	- Phase current 5A/1A, W1/W2 ground current. 5A/1A
	1	- Phase current 5A/1A, W1 sensitive ground current, W2 ground current 5A/1A
	2	- Phase current 5A/1A, W1 ground current 5A/1A, W2 sensitive ground current 5A/1A
	3	- Phase current 5A/1A, W1/W2 sensitive ground current 5A/1A
③	Housing and mounting	
	A	- Door mounting
	B	- Door mounting 19" (flush mounting)
	H	- Customer version 1
	K	- Customer version 2
④	Communication protocols	
	A	- Without protocol
	B	- RS485 terminals: Modbus RTU, DNP3.0 RTU
	C	- Ethernet 100MB/RJ45: Modbus TCP, DNP3.0 TCP/UDP
	D	- Optic fibre/ST-connector: Profibus-DP
	E	- RS485/D-Sub: Profibus-DP
	F	- Optic fibre/ST-connector: Modbus RTU, DNP3.0 RTU
	G	- RS485/D-Sub: Modbus RTU, DNP3.0
	H	- Ethernet 100MB/RJ45: Modbus TCP, DNP3.0 TCP/UDP
	I	- see description of "B" and "H"
	K	- Optical Ethernet 100MB/LC duplex connector: Modbus TCP, DNP3.0 TCP/UDP
	L	- Optical Ethernet 100MB/LC duplex connector: Modbus TCP, DNP3.0 TCP/UDP
	T	- Modbus RTU, DNP3.0 RTU, RS485/terminals - Modbus TCP, DNP3.0 TCP/UDP, Ethernet 100 MB/RJ45
⑤	Environment options	
	A	- None
	B	- Conformal coating



**DESCRIPTION (continued)** MRI4 - Overcurrent and earth-fault protection relay

MRI4-2 ①②③④⑤

	Code	Description
①	Inputs and outputs	
	A	- 8 digital inputs, 6 binary output relays
②	Hardware variants	
	0	- Phase current 5A/1A, ground current. 5A/1A
	1	- Phase current 5A/1A, sensitive ground current 5A/1A
③	Housing and mounting	
	A	- Door mounting
	B	- Door mounting 19" (flush mounting)
	H	- Customer version 1
	K	- Customer version 2
④	Communication protocols	
	A	- Without protocol
	B	- RS485 terminals: Modbus RTU, DNP3.0 RTU
	C	- Ethernet 100MB/RJ45: Modbus TCP, DNP3.0 TCP/UDP
	D	- Optic fibre/ST-connector: Profibus-DP
	E	- RS485/D-Sub: Profibus-DP
	F	- Optic fibre/ST-connector: Modbus RTU, DNP3.0 RTU
	G	- RS485/D-Sub: Modbus RTU, DNP3.0
	H	- Ethernet 100MB/RJ45: Modbus TCP, DNP3.0 TCP/UDP
	I	- see description of "B" and "H"
	K	- Optical Ethernet 100MB/LC duplex connector: Modbus TCP, DNP3.0 TCP/UDP
	L	- Optical Ethernet 100MB/LC duplex connector: Modbus TCP, DNP3.0 TCP/UDP
T	- Modbus RTU, DNP3.0 RTU, RS485/terminals - Modbus TCP, DNP3.0 TCP/UDP, Ethernet 100 MB/RJ45	
⑤	Environment options	
	A	- None
	B	- Conformal coating



**DESCRIPTION (continued)** MRM4 - Motor protection relay

**MRM4-2** ①②③④⑤

	<b>Code</b>	<b>Description</b>
①	Inputs and outputs	
	A	- 8 digital inputs, 6 binary output relays, 0/0 analogue input/output
	B	- 4 digital inputs, 4 binary output relays, 0/1 analogue input/output
②	Hardware variants	
	0	- Phase current 5A/1A, ground current. 5A/1A
	1	- Phase current 5A/1A, sensitive ground current 5A/1A
③	Housing and mounting	
	A	- Door mounting
	B	- Door mounting 19" (flush mounting)
	H	- Customer version 1
	K	- Customer version 2
④	Communication protocols	
	A	- Without protocol
	B	- RS485 terminals: Modbus RTU, DNP3.0 RTU
	C	- Ethernet 100MB/RJ45: Modbus TCP, DNP3.0 TCP/UDP
	D	- Optic fibre/ST-connector: Profibus-DP
	E	- RS485/D-Sub: Profibus-DP
	F	- Optic fibre/ST-connector: Modbus RTU, DNP3.0 RTU
	G	- RS485/D-Sub: Modbus RTU, DNP3.0
	H	- Ethernet 100MB/RJ45: Modbus TCP, DNP3.0 TCP/UDP
	I	- see description of "B" and "H"
	K	- Optical Ethernet 100MB/LC duplex connector: Modbus TCP, DNP3.0 TCP/UDP
	L	- Optical Ethernet 100MB/LC duplex connector: Modbus TCP, DNP3.0 TCP/UDP
T	- Modbus RTU, DNP3.0 RTU, RS485/terminals - Modbus TCP, DNP3.0 TCP/UDP, Ethernet 100 MB/RJ45	
⑤	Environment options	
	A	- None
	B	- Conformal coating





**DESCRIPTION (continued)** MRU4 - Voltage and frequency protection relay

MRU4-2 ①②③④⑤

	Code	Description
①	Inputs and outputs	
	A	- 8 digital inputs, 6 binary output relays
②	Hardware variants	
	0	- Standard
③	Housing and mounting	
	A	- Door mounting
	B	- Door mounting 19" (flush mounting)
	H	- Customer version 1
	K	- Customer version 2
④	Communication protocols	
	A	- Without protocol
	B	- RS485 terminals: Modbus RTU, DNP3.0 RTU
	C	- Ethernet 100MB/RJ45: Modbus TCP, DNP3.0 TCP/UDP
	D	- Optic fibre/ST-connector: Profibus-DP
	E	- RS485/D-Sub: Profibus-DP
	F	- Optic fibre/ST-connector: Modbus RTU, DNP3.0 RTU
	G	- RS485/D-Sub: Modbus RTU, DNP3.0
	H	- Ethernet 100MB/RJ45: Modbus TCP, DNP3.0 TCP/UDP
	I	- see description of "B" and "H"
	K	- Optical Ethernet 100MB/LC duplex connector: Modbus TCP, DNP3.0 TCP/UDP
	L	- Optical Ethernet 100MB/LC duplex connector: Modbus TCP, DNP3.0 TCP/UDP
	T	- Modbus RTU, DNP3.0 RTU, RS485/terminals - Modbus TCP, DNP3.0 TCP/UDP, Ethernet 100 MB/RJ45
⑤	Environment options	
	A	- None
	B	- Conformal coating