DET NORSKE VERITAS

TYPE APPROVAL CERTIFICATE

CERTIFICATE NO. **E-11465**

This is to certify that the
Multifunction Relay

with type designation(s)
Feeder Terminal REF54_ , Machine Terminal REM54_ and Transformer Terminal RET54_

Manufactured by
ABB Oy, Distribution Automation
Vaasa, Finland

is found to comply with
Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards

Application
For installations inside switchboard/enclosures onboard ships and offshore units.

Høvik, 2011-12-22
for **Det Norske Veritas AS**

Marit Laumann
Head of Section

DNV local office:
Vaasa

This Certificate is valid until
2015-12-31

Nicolay Horn
Surveyor

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.
If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.

Product description

a) Microprocessor based multifunction relay machine terminal - **type REM 54_**:

Basic functions:
Motor and generator protection, measurement, control, condition monitoring, communication, general and standard.

b) Microprocessor based multifunction relay feeder terminal - **type REF 54_**:

Basic functions:
Feeder protection, measurement, control, condition monitoring, communication, power quality, general and standard.

c) Microprocessor based multifunction relay transformer terminal - **type RET 54_**:

Basic functions:
Transformer protection, measurement, control, condition monitoring, communication, general and standard.

Protection functions available in REF/REM/RET 541/543/545:

ANSI Code	Protection function *)	Function Block Code
50/51/51B	Three-phase non-directional overcurrent	NOC3Low, -High, -Inst
67	Three-phase directional o/c	DOC6Low, -High, -Inst
51V	Voltage dependent overcurrent	VOC6Low, -High
87G/87M	Three-phase high-impedance/flux-balance based diff. prot. for motors/generators	Diff3
87G	Three-phase differential protection for generators, stabilized and inst. stages	Diff6G
87T	Three-phase differential protection for transformers, stabilized and inst. stages	Diff6T
21G	Three-phase underimpedance protection	UI6Low, -High
50N / 51N	Non-directional earth-fault	NEF1Low,-High,-Inst
67N/51N	Directional earth-fault	DEF2High, DEF2Inst
67N	Directional earth-fault sensitive	DEF2_Low
87N	High-impedance based restricted earth-fault protection	REF1A
87N	Three-phase low impedance based restricted earth-fault protection	REF4A,-B
59N	Residual overvoltage	ROV1Low,-High,-Inst
46	Negative-phase-sequence current protection	NPS3Low, -High
46	Phase discontinuity	CUB3Low
46R	Phase reversal protection	PREV3St1,-St2
59	Three-phase overvoltage	OV3Low,-High
27	Three-phase undervoltage	UV3Low,-High
81U/81O	Underfrequency or overfrequency inc. rate of change	Freq1St1...5
32P/32Q	Three-phase directional overpower protection	OPOW6St1...3
32	Three-phase reverse power/ directional underpower protection	UPOW6St1...3
24	Overexcitation protection	OE1Low,-High
40	Three-phase underexcitation protection	UE6Low,-High
79	Auto-reclosure, 5 shots	AR5Func
25	Synchro-check/voltage check	SCVCSt1, -2
68	Three-phase inrush detector	Inrush3
60	Fuse failure supervision	FuseFail
37	Three-phase non-directional undercurrent protection	NUC3St1,-2
62BF	Circuit breaker failure protection (integrated into other protections)	-
66	Cumulative start-up time counter	MotStart
49F	Three-phase thermal overload (feeders & cables)	TOL3Cab
49M/G/T	Three-phase thermal overload protection for motors, generators or transformers	TOL3Dev
49/38	Thermal supervision of windings or bearings by RTDs	MEAI1...8
48	Motor start-up supervision, Is^2 x ts	MotStart

ANSI Code	Protection function *)	Function Block Code
14	Speed switch support	MotStart
51LR	Locked rotor	NOC3High, -Inst
51MS	Motor start	NOC3High, -Inst
27, 47, 59	Three-phase positive/negative sequence voltage protection	PSV3St1,-St2
86	Electrically latched lockout relay	-
51C,37C, 68C	Three-phase overload protection for shunt capacitor banks	OL3Cap
51NC	Current unbalance protection for shunt capacitor	CUB1Cap
51NC	Three-phase current U/B protection for H-bridge shunt capacitors	CUB3Cap
21FL	Fault Locator	FLOC

*) Not all functions are available in each product, depends on type of product and application

Rated primary current 0 – 6000 A on primary transformer, rated secondary current 5A, 1A and 0.2 A of the primary current transformer.

Rated voltage on the primary voltage transformer 0 – 440 kV, rated secondary voltage 100V, 110V, 115V and 120V of primary voltage transformer.

Application/Limitation

Installation of the unit is to be according to manufacturer's specifications.

- The total panel instrumentation to be in accordance with the Rules.
- Product certificate:

When the unit is used for protection purposes no product certificate is required. When the unit is used for other control purposes a product certificate acc. to Pt.4 Ch.8 Sec.1 and Pt.4 Ch.9 Sec.1 A 202 will be required. Correct configuration and set up for each delivery to be tested during commissioning after installation.

- The Type Approval covers hardware and software for the unit.
- The Type Approval does not cover application software.

The following documentation of the actual application is to be submitted for approval in each case:

- System Block Diagram
- Power supply arrangement (may be part of the system block diagram)

The Type Approval covers hardware listed under Product description.

Clause for application software control:

All changes in software are to be recorded. Major changes are to be forwarded to DNV for evaluation and approval. Major changes in the software are to be approved before installed in the computer. A certification of application functions may be required for the particular vessel.

Type Approval documentation

Technical info:
Table 1 "Protection function available in REF/REF/RET 541/543/545. Technical reference manual for RET 54_ Transformer Terminal, REF 54_ Feeder terminal and REM 54_ Machine terminal issued April 2000. List of software/hardware versions (ordering information) doc. no: 1MRS081301, rev. A issued 02-06-13.

Test reports:
FLOG test, diffent dates, zip file, Functionally test of REF543AM129AABA for DNV certification process, doc. no. 1MRS081317, rev A, issued 02-06-28, Type test report for REF_54 General, doc. no. 1MRS080726, rev. B, issued 01-03-08, Type test report for REM_54 General, doc. no. 1MRS080846, rev. B, issued 01-03-08, emcec test report doc. no. 00-03-21, VTT test report, doc. no. AUTO46-010289, issued 01-04-25.

Tests carried out

Type tests in accordance with IEC 60255, Environmental tests according to DNV Standard for Certification No. 2.4, April 2001. (EMC, dry heat, cold, damp heat and vibration.)

Marking of product

ABB – REF/REM/RET 54_ – Type number.

Certificate retention survey

The scope of the retention/renewal survey is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.

The main elements of the survey are:

- Ensure that type approved documentation is available.
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines.
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications.
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do no affect the type approval given.
- Ensuring traceability between manufacturer's product type marking and the type approval certificate.

- Ensuring that type approved documentation is available.

Survey to be performed at least every second year.

END OF CERTIFICATE