GE VERNOVA

MiCOM P40 Agile

P746

Technical Manual
Numerical Busbar Protection

Hardware Version: Up to M
Firmware Version: 91
Publication Reference: P746-VH-EN-L44



1 HARDWARE AND SOFTWARE VERSION HISTORY

S/W Version Major	S/W Version Minor	H/W Version	Original Date of Issue	Description of Changes	S1 Compatibility	Technical Documentation
01		K	February 2008	▪ Original issue ▪ First release to production	v2.14	P746/EN xx/A11
01	C	K	November 2008	▪ Improvement of the CBF undercurrent detection reset correction to make output relay test pattern settable through Courier	v2.14	P746/EN xx/B11
01	D	K	February 2009	▪ Addition of high break boards	v2.14	P746/EN xx/C11
01	E	K	May 2009	▪ Improvement of internal fault tripping	v2.14	P746/EN xx/E11
01	F	K	March 2011	▪ Rebranding from AREVA to Alstom	v3.1	
02	A	K	May 2010	▪ Ratio of virtual CT as reference for secondary currents calculation fixed ▪ New phase comparison setting	v2.14	P746/EN xx/F21
02	B	K	May 2011	▪ New option with 32I/32O board option ▪ Rebranded from AREVA to Alstom	v3.1	P746/EN xx/G31
02	C	K	October 2011	▪ Upgrade IEC 61850 from ph1 to ph2	v3.1	
02	D	K	February 2012	▪ Improvement of measurements courier cell display when restore all command ▪ Improvement of IEC 61850 data model alarm mapping	v3.1	
03	A	K	January 2010	▪ Secure communications (cyber security) ▪ Redundant Ethernet option	v3.1	P746/EN xx/G31
03	B	K	March 2011	▪ Rebranded from AREVA to Alstom	v3.1	P746/EN xx/G31
03	C	K	February 2012	▪ Improvement of measurements courier cell display when restore all command ▪ Improvement of IEC 61850 data model alarm mapping	v3.1	
03	D	K	May 2012	▪ Support for new Parallel Redundant Protocol PRP Ethernet cards	v3.1	
03	E	K	April 2013	▪ Platform upgrade		
03	F	K	June 2014	▪ Platform upgrade		
03	G	K	October 2015	▪ Improvements to the IEC 6150 application performance	v1.2.0 or later	
03	H	K	June 2016	▪ Corrections to Russian Language settings names	v1.2.0 or later	
03	J	K	December 2019	▪ Enhanced SRAM checking algorithm and enlarged monitor task stack size ▪ Corrected wrong phase indication during Dead Zone Operation & CZ start Alarm	v1.2.0 or later	P746/EN xx/K43
11	A	M	June 2012	▪ Support for sampled values 9-2LE ▪ GOOSE performance improvements	v1.2.0 or later	

S/W Version Major	S/W Version Minor	H/W Version	Original Date of Issue	Description of Changes	S1 Compatibility	Technical Documentation
12	B	M	January 2013	▪ Ethernet failover and SNTP Alarm added		
12	C	M	July 2013	▪ Platform upgrade ▪ Software release compatible with both NCIT and conventional devices		
12	D	M	August 2014	▪ Improvement in IEC 61850 applications when data frequently changes ▪ Improvement in 9-2LE protection functions response Not released to production		
12	E	M	March 2015	▪ Added DNPoE		
12	F	M	June 2016	▪ Corrections to Russian Language settings names	v1.2 or later	
12	G	M	June 2017	▪ GE rebranding release	v1.3.1 or later	
12	H	M	February 2020	▪ Improvement to CBF reset time	v1.3.1 or later	
12	J	M	March 2020	▪ Dead zone and Check zone alarm reporting improvement ▪ Improvements to IEC 61850 reporting	v2.0.1 or later	
12	K	M	April 2021	▪ Corrections to the logical zone start address ▪ Improvements to avoid any interruption in configuration loading	v1.2.0 or later	P746/EN xx/K43
91	A	M	March 2021	▪ Cybersecurity release including: ▪ IEC 61850 Edition 2 - with support for Ed2 test modes for online testing ▪ IEEE 1588 Precision Time Protocol - efficient time synchronizing direct from the substation LAN ▪ Editable Logical Nodes/Devices - to customize the IEC 61850 modelling and maximize interoperability ▪ Role based access control (RBAC) for centralized authentication ▪ Authorization and account management via RADIUS, and directly on the relay ▪ Security Event Management via Syslog ▪ SNMP version 2c and cybersecure v3 - network management tools can monitor protection IEDs ▪ New Ethernet Board - Improved traffic density handling, PRP, HSR and RSTP supported in the same order option for standardization (CORTEC options R/S/T) ▪ Multi-Client Reporting ▪ Compatible with both NCIT (IEC 61850 9-2 LE) and CIT	v2.0.1 or later	P746/EN M/l43
91	C	M	May 2024	▪ Increased the MMS_MAX_MSG_SIZE to 65536 from 16384. For V91 software IEDs, Multi Client Reports are supported and if a read is done on System LLN0, the server size may be exceeded	v2.0.1 or later	P746/EN M/l43
91	D	M	April 2026	▪ Support for new Ethernet boards, U/W/Y options in the CORTEC order code ▪ Combined 2 instances of SNMP into one, plus additional security and network statistics. Previously, there was one SNMP instance on the main CPU, and another SNMP instance on the Ethernet board for Ethernet & redundancy information ▪ Added LCCH logical node for IEC 61850 Ed1 and Ed2 data models for link status of Ethernet ports (NP2A, and NP2B) for the new Ethernet boards ▪ Added two DDBs to show link status of NP2A and NP2B ports	v2.0.1 or later	P746/EN M/l43

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91	D	M	April 2026	▪ Configuration of HSR/PRP/RSTP/Failover for new Ethernet boards is via S1 Agile IED configuration tool over MCL ▪ Ethernet traffic overload improvements. Reduced ARP broadcast messages, from 1.5ms to 20s ▪ Fixed issue where if a user creates a dataset and adds SI units' data attributes under the CF functional constraint and configures the RBCB with that dataset and Enables RBCB with IED scout the connection to the relay is lost ▪ Fixed issue related to NIC No Response and NIC MemAlloc Fail Alarms if dataset contains CF elements ▪ Fixed issue with frequent logging of short duration 'SNTP Failure' Alarms ▪ Fixed issue where the IRIG-B Status changes to 'Card Failed' from 'Signal Healthy' after a long duration of operation ▪ Fixed issue to be compliant to IEC 61850 Edition 2.1, where for LPHD.Sim and Mod, the test flag should be ignored, and the command should be executed with or without the test flag. Previous implementation of Edition 2 required the test flag to be present when LLN0.Mod is in Test for LPHD.Sim to be active ▪ Fixed issue with GOOSE Control Block (GCB) enable and CSWI controls which are failing when initiated only from "UniGrid" conformance test tool (The UniGrid tool is Used for level A and Level B IEC 61850 conformance tests) ▪ Fixed issue with IED losing MMS Communication when EntryID/Buffer Overflow is selected for URCB ▪ Fixed IEC 61850 Ed2 issue where for a free BRCB, ResvTms must be >0 value if client does not write it ▪ Fixed issue where with the device in Test/Blocked Mode and user sends a control with the test flag the user gets a message saying the control has executed, but there is no change in status of the Control Inputs or outputs ▪ Fixed issue where relay should not send out CommandTermination - when the operation is positive and the value is changed in IEC 61850 DOes and SBOes ▪ IEC 61850 Association ServiceSupportedCalled includes support for obtainFile ▪ Fixed issue for DNP 3.0 Function Code 9 (Freeze and Clear) & 10 (Freeze and Clear no ACK), as soon as command is issued - the relay displays an error code and restarts automatically. After relay has recovered, the communication works ▪ Fixed occasional Ping Loss on the IEC 61850 IED ▪ Fixed issue where the IED stops IEC 61850 MMS reporting after sequences of IEC 61850 MMS controls to PloGGIO/SPCSO Controls Inputs, if these are configured with either: (1) SBO with enhanced security or (2) Direct Control with enhanced security ▪ Fixed issue where when the stNum of a 'duplicate' GOOSE that is being published without Sim Flag goes > the stNum of the 'real' GOOSE Publisher, the P40 subscriber switched over to the new stNum ▪ Fixed issue where some data changes are not reported via IEC 61850 if 'BufTm' is set > 0 ▪ Fixed issue where IEC 61850 Server has no respond for SetDataValues request on setSrcRef DA	v2.0.1 or later	P746/EN M/l43

S/W Version Major	S/W Version Minor	H/W Version	Original Date of Issue	Description of Changes	S1 Compatibility	Technical Documentation
91	D	M	April 2026	▪ Fixed issue where if a user is configured in RADIUS, irrespective of the settings in the IED, the account does not lock out for the lock out period set when there is a failure to login to the server ▪ Fixed cyber security vulnerability in TMW Library for DNP3.0 DNP TMW library updated from 3.08 to 3.16.. Link to reported vulnerability. Affected versions are v3.06.0000 through v3.15.0000.. https://www.cisa.gov/news-events/ics-advisories/icsa-13-240-01 ▪ Fixed issue with malformed packet from P40 IEDs. One of the IEC 61850 Clients can occasionally give up the association with a P40 relay - In most cases this is observed after a control action from the client ▪ Fixed issue where change of the IED's LPHD1.PhyHealth causes two IEC 61850 reports to be generated, the first one with the wrong timestamp and the second one with the correct timestamp ▪ Fixed issue where a change of the IEC 61850 IED Mode (LLN0.ST.Mode) causes two IEC 61850 reports generated, first one with wrong timestamp and second one with correct timestamp ▪ Fixed issue where in P746 Mod/Beh/.q values in some of the IEC 61850 LNs are wrong (DznT01PTOC1) ▪ Fixed issue where when P746 IED is put into Test Mode, LPHD1.PhyHealth goes to Alarm state ▪ Fixed issue with P746 incorrect Courier mapping to IEC 61850 PriCznMMXU.ADiff.PhsA ▪ Fixed issue with P746 Incorrect IEC 61850 data mapping of PTOC elements ▪ Fixed issue with P746 Disturbance Records: CT and VT ratios expressed as very large numbers due to Comtrade scaling ratios being incorrect ▪ Correction of some P746 IEC 61850 MMXU DataObject names ▪ Existing LN PriDvdMMXU1, existing DO T01 -T06, new DO NeutA1 -NeutA6 ▪ Existing LN PriMsiMMXU1, existing DO T01 -T06, new DO T01A1-T06A6 ▪ Existing LN PriMsiMMXU2, new LN name PriMsiMMXN1, existing DO T01-T18, new DO T01Amp1 -T18Amp18 ▪ Existing LN SecDvdMMXU1, existing DO T01 -T06, new DO NeutA1 -NeutA6 ▪ Existing LN SecMsiMMXU1, existing DO T01 -T06, new DO T01A1-T06A6 ▪ Existing LN SecMsiMMXU2, new LN name SecMsiMMXN1, existing DO T01-T18, new DO T01Amp1 -T18Amp18 ▪ Improvement of P746 IEC 61850 data model mapping after full review. Changes are below: ▪ Measurements/PriFltMLFR1.CF.CZADifFlt.phsB.units.SIUnit ▪ Measurements/PriMsiMMXU1.MX.T5.phsB.cVal.mag.f ▪ Measurements/PriMsiMMXU1.CF.T5.phsB.units.SIUnit ▪ Measurements/PriMsiMMXU1.MX.T5.phsB.cVal.ang.f ▪ Measurements/SecMsiMMXU1.MX.T6.phsC.cVal.ang.f ▪ Measurements/SecCznMMXU1.MX.ADiff.phsA.cVal.mag.f ▪ Measurements/SecCznMMXU1.CF.ADiff.phsB.units.SIUnit	v2.0.1 or later	P746/EN M/l43

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91	D	M	April 2026	▪ Measurements/SecCznMMXU1.CF.ADiff.phsC.units.SIUnit ▪ ProtBbT01/BbpT01PTRC1.ST.Mod.stVal ▪ System/RlyGGIO1.DC.NamPlt.d ▪ ProtBbT01/BbpT01PDIF1.ST.Beh.stVal ▪ ProtBbT10/DznT10PTOC1.ST.Mod.stVal ▪ ProtBbpDif/BbpZonPDIF1.ST.Mod.stVal ▪ ProtBbpDif/BbpZonPDIF2.ST.Mod.stVal ▪ ProtBbT15/BbpT15PDIF1.ST.Mod.stVal ▪ ProtBbT02/OcpT02PTOC1.ST.Mod.stVal ▪ ProtBbpDif/LLN0.ST.Beh.stVal	v2.0.1 or later	P746/EN M/I43

2 SOFTWARE VERSION COMPATIBILITY

IED S/W Version	Setting File Version	Menu Text File Version*8	PSL File Version
00	00	00	00
01	01	01	01
02	02	02	02
03	03	03	03
11	11	11	11
12	12	12	12
91	91	91	91



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