

No. 84000151-OPE/INC 17-2141

Issued to:

Ingeteam Power Technology S.A.
Power Grid Automation - PGA
Parque Tecnológico de Bizkaia, Edif. 110
48170 Zamudio, Bizkaia
Spain

For the server product:

INGEPAC EF-MD3 Multifunctional Protection and
Control Relay
Software version: 6.0.17.0
Hardware version: BCAAABCCDFEA-T-T-L-L-H-D-A---
CPU Hardware version: ZU FC2103

The server product has not been shown to be non-conforming to:

IEC 61850 Edition 2 Parts 6, 7-1, 7-2, 7-3, 7-4 and 8-1

Communication networks and systems for power utility automation

The conformance test has been performed according to IEC 61850-10 Edition 2, the UCA International Users Group Edition 2 Server Test Procedures version 1.0 with TPCL² 1.2 with product's protocol, model and technical issue implementation conformance statements: "Protocol Implementation Conformance Statement for the IEC 61850 interface in INGEpac EF, Rev: A, Date: 06/04/2017", "Model Implementation Conformance Statement for the IEC 61850 interface in INGEpac EF-MD, Rev: A, Date: 06/04/2017", and "TISSUES Implementation Conformance Statement for the IEC 61850 Ed2 interface in INGEpac EF, Rev: A, Date: 06/04/2017", and the extra information for testing: "Protocol Implementation eXtra Information for Testing (PIXIT) for the IEC 61850 interface in INGEpac EF, Rev: A, Date: 06/04/2017".

The following IEC 61850 conformance blocks have been tested with a positive result (number of relevant and executed test cases / total number of test cases):

1 Basic Exchange (23/26)	9b GOOSE Subscribe (14/14)
2 Data Sets (4/7)	12a Direct Control (10/18)
3 Substitution (3/3)	12b SBO Control (17/27)
4 Setting Group Selection (4/4)	12c Enhanced Direct Control (12/20)
4+ Setting Group Definition (12/13)	12d Enhanced SBO Control (18/28)
5 Unbuffered Reporting (19/21)	13 Time Synchronization (6/7)
6 Buffered Reporting (28/30)	14 File Transfer (8/8)
9a GOOSE Publish (12/13)	15 Service Tracking (7/17)

This certificate includes a summary of the test results as carried out at Ingeteam in Zamudio with UniCA 61850 Client Simulator 4.31.02 with test suite Ed2 4.32.06 and UniCA 61850 Analyzer 5.31.00. This document has been issued for information purposes only, and the original paper copy of the DNV GL verification report No. 84000151-OPE/INC 17-2142 will prevail.

The test has been carried out on one single specimen of the product as referred above and submitted to DNV GL by Ingeteam. The manufacturer's production process has not been assessed. This certificate does not imply that DNV GL has approved any product other than the specimen tested.

Arnhem, April 10th, 2017



P. Cjoci
Business Director
Operational Excellence of Power
Systems

Issued by:



DNV-GL
DNV KEMA is now DNV GL



R. Schimmel
Verification Manager

¹ Level A - Independent test lab with certified ISO 9001 Quality System

² TPCL - Test procedures change list

Copyright © DNV GL Netherlands B.V. Arnhem, the Netherlands. All rights reserved. It is prohibited to update or change this certificate in any manner whatsoever, including but not limited to dividing it into parts.

Applicable Test Procedures from the UCA International Users Group Edition 2 Server Test Procedures version 1.0 with TPCL 1.2

Conformance Block	Mandatory	Conditional
1: Basic Exchange	sAss1, sAss2, sAss3, sAssN2, sAssN3, sAssN4, sAssN5, sSrv1, sSrv2, sSrv3, sSrv4, sSrv5, sSrvN1abcd, sSrvN4	sSrv6, sSrv8, sSrv9, sSrv10, sSrv12, sSrvN1e, sSrvN1f, sSrvN2, sSrvN3
2: Data Sets	sDs1, sDs10a, sDsN1ae	sDs15
3: Substitution	sSub1, sSub2, sSub3	
4: Setting Group Selection	sSg1, sSg3, sSgN1	sSg11
4+: Setting Group Definition	sSg2, sSg4, sSg7, sSg8, sSg10, sSg12, sSgN2, sSgN3, sSgN4, sSgN5	sSg5, sSg9
5: Unbuffered Reporting	sRp1, sRp2, sRp3, sRp4, sRp5, sRp9, sRp14, sRp15, sRpN1, sRpN2, sRpN3, sRpN4, sRpN8	sRp8, sRp10, sRp11, sRp12, sRp13, sRpN5
6: Buffered Reporting	sBr1, sBr2, sBr3, sBr4, sBr5, sBr9, sBr14, sBr15, sBr20, sBr21, sBr22, sBr25, sBr26, sBr27, sBr28, sBrN1, sBrN2, sBrN3, sBrN4, sBrN5, sBrN8	sBr8, sBr10, sBr11, sBr12, sBr13, sBr23, sBr24
9a: GOOSE publish	sGop2a, sGop3, sGop4, sGop9, sGop10, sGop11	sGop1, sGop5, sGop6, sGop7, sGopN1, sGopN2
9b: GOOSE subscribe	sGos1, sGos2, sGos3, sGos5, sGos6a, sGos7, sGosN1, sGosN2, sGosN3, sGosN4, sGosN5, sGosN6	sGos4, sGos6b
12a: Direct control	sCtl5, sCtl10, sDOns1, sDOns2	sCtl2, sCtl7, sCtl13, sCtl15, sCtl16, sCtl17
12b: SBO control	sCtl5, sCtl8, sCtl9, sCtl10, sCtl11, sCtl25, sSBOns1, sSBOns2, sSBOns6	sCtl2, sCtl4, sCtl6, sCtl7, sCtl15, sCtl16, sCtl17, sCtl27
12c: Enhanced Direct Control	sCtl5, sCtl10, sDOes1, sDOes2	sCtl2, sCtl7, sCtl13, sCtl14, sCtl15, sCtl16, sCtl17, sCtl26
12d: Enhanced SBO Control	sCtl5, sCtl8, sCtl9, sCtl10, sCtl11, sCtl25, sSBOes1, sSBOes2, sSBOes6, sSBOes8	sCtl2, sCtl4, sCtl6, sCtl7, sCtl15, sCtl16, sCtl17, sCtl26
13: Time sync	sTm1, sTm2, sTmN1	sTm3, sTm4, sTm5
14: File transfer	sFt1, sFt2ab, sFt4, sFt5, sFtN1ab	sFt2c, sFt3, sFtN1c
15: Service tracking		sTrk1, sTrk2, sTrk4, sTrk7, sTrk8, sTrk9, sTrk11

All configuration file and data model tests have been successfully performed for the product variants using the same communication hardware and software version:

- INGEPAC EF-BF1 Breaker management
- INGEPAC EF-CB1 Capacitor bank protection and control relay
- INGEPAC EF-CD2 Control and measurement device
- INGEPAC EF-LD2 Line differential protection and control
- INGEPAC EF-MP0 Motor protection
- INGEPAC EF-TD1 Transformer protection and control relay
- INGEPAC EF-ZT1 Distance protection and control relay