



F650 Firmware Release Notes / History (Rev 10)

FIRMWARE VERSION	BOOT PROGRAM VERSION	CHANGES DESCRIPTION	MODELS	DATE
1.00	2.00	<ul style="list-style-type: none"> • First version of the product (Basic Model F1G0) • Full protection scheme 	F650BABF1G0HI	August 30 th 2002
1.11	2.00	<ul style="list-style-type: none"> • New model F2G0 (inputs and outputs board type 2) 	F650BABF2G0HI	October 14 th 2002
1.13	2.20	<ul style="list-style-type: none"> • Snapshot Events included (New and All) • Oscillography up to 4 records. Maximum 70 cycles at 64 samples per cycle, trip programmable via PLC. • Broken Conductor protection function included. • Boot program updated through F650PC program 	ALL	December 20 th 2002
1.14	2.20	<ul style="list-style-type: none"> • DNP 3.0 Level 2 protocol included, over TCP/IP and UDP/IP • IRIG_B synchronization 	ALL	January 22 nd 2003
1.20	2.25	<ul style="list-style-type: none"> • Programmable Graphical display • Calibration included to improve measurement accuracy 	ALL	January 28 th 2003
1.30	2.25	<ul style="list-style-type: none"> • Sensitive ground directional unit • Isolated Ground directional unit (in 5th current transformer) • Energy measurements 	ALL	March 31 st 2003
1.31	2.25	<ul style="list-style-type: none"> • Enhancements in 60 Hz measurements • Extended Settings Range in Negative Sequence Overcurrent function (46) 	ALL	April 9 th 2003
1.33	2.30	<ul style="list-style-type: none"> • Forward Power function (32FP) • Demand 	ALL	May 9 th 2003
1.44	2.30	<ul style="list-style-type: none"> • 51PL function included (besides existing 51PH) • Control Events • Alarms • Modbus over TCP/IP 	ALL	July 24 th 2003
1.48	2.30	<ul style="list-style-type: none"> • Changes in 67 units in reverse mode • Modbus TCP/IP enhancement 	ALL	September 5 th 2003



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1.50	2.30	<p>PROTECTION The following operation curves have been added to F650 functionality:</p> <ul style="list-style-type: none"> • IEC Long-Time Inverse • IEC Short-Time Inverse • ANSI Extremely Inverse • ANSI Very Inverse • ANSI Normally Inverse • ANSI Moderately Inverse • Rectifier Curve • User Curve A/B/C/D - Flex Curve™ <p>Note: User Curves allow the user to program any non-standard curve type by selecting, point by point, the Operation time.</p> <p>HARDWARE</p> <ul style="list-style-type: none"> • Voltage Range: Voltage Metering Range expanded from (2 to 200 Volts) to (2 to 275V) <p>CIO Module: For those applications requiring a high number of inputs and outputs, F650 units can be connected to a CIO module (Remote CAN Bus I/O module) for using up to 2 additional boards.</p> <p>COMMUNICATIONS ModBus Protocol:</p> <ul style="list-style-type: none"> • Modbus User Map • Virtual Inputs (control over internal logic variables, which can be used in the configurable logic). <p>DNP 3.0 Protocol</p> <ul style="list-style-type: none"> • New Metering scale factors • Switchgear bits mapped to binary points • Possibility of restricting the binary points map by setting <p>USER INTERFACE HMI Configurable Main Screen:</p> <ul style="list-style-type: none"> • The main screen offers the possibility to select the initial logo, a simplified Metering screen showing primary values, or both. <p>Snapshot Events:</p> <ul style="list-style-type: none"> • Possibility of viewing snapshot events from the relay display in models without graphical display. 	ALL	October 31 st 2003
1.61	2.35	<p>COMMUNICATIONS Configuration:</p> <ul style="list-style-type: none"> • LED Reset by communications using the configurable logic <p>METERING</p> <ul style="list-style-type: none"> • Monitoring of phasor measurements in module and argument <p>REGISTER Snapshot Events:</p> <ul style="list-style-type: none"> • Possibility of reading the Snapshot events in Binary and ASCII format via Modbus <p>Oscillography:</p> <ul style="list-style-type: none"> • The oscillography function has been improved to offer the possibility of creating up to a maximum of 20 oscillography records, with possibility to create concatenated oscillographies. • Oscillography records can be obtained via communications using serial messaging (ModBus) or Ethernet (TCP/IP or TFTP). <p>Fault Report:</p> <ul style="list-style-type: none"> • This version incorporates the tool to visualize and store the information from 	ALL	April 30 th 2004



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		<p>the last ten faults produced. This report can be shown on the relay display. The fault report will be available on the relay display and via communications, either on ModBus (serial) or TCP/IP.</p> <p>Data Logger:</p> <ul style="list-style-type: none"> It allows registering 16 channels among all the available analog measures in the relay. The information provided by the data logger can be obtained via TCP/IP. <p>USER INTERFACE</p> <p>Fault Report screen on HMI:</p> <ul style="list-style-type: none"> Fault report information on display, selectable by setting <p>WEB SERVER</p> <p>Web server tool has been upgraded to provide visualization of:</p> <ul style="list-style-type: none"> Snapshot Events Control Events Alarms Oscillography Fault report Data Logger Metering 		
1.62	2.35	<ul style="list-style-type: none"> Internal file management enhancement. IP Address maintenance after firmware upgrading. Latched Virtual Inputs maintenance after powering off and on the relay. 	ALL	June 24 th 2004
1.70	2.35	<ul style="list-style-type: none"> Multilingual relay (French and English available) 	F650BABF1G0HIF F650MDF2G1LOF F650MFCF1G1LOF	August 5 th 2004
1.72	2.35	<p>COMMUNICATIONS</p> <ul style="list-style-type: none"> Multimaster DNP (3 masters) <p>METERING</p> <ul style="list-style-type: none"> Measurement enhancement <p>PROTECTION</p> <ul style="list-style-type: none"> Sensitive Directional Power unit is included (32) <p>REGISTER</p> <ul style="list-style-type: none"> Snapshot Events: Possibility to be enabled and disabled by setting. <p>USER INTERFACE</p> <p>HMI: Enhanced HMI meeting Energista F650 Setup structure.</p> <ul style="list-style-type: none"> Multilingual Option available: The relay can be ordered in languages different from English, the relay always has English as default <p>Languages Available now:</p> <p>French/English (F in ordering code request)</p> <p>English/English (former ordering code)</p> <p>ENERVISTA F650 SETUP</p> <ul style="list-style-type: none"> Multilingual unit (French and English available). <p>WEB SERVER</p> <ul style="list-style-type: none"> Multilingual visualization of snapshot events, control events, oscillography, fault recorder, data logger, metering. 	ALL	December 1 st 2004
1.80	2.35	<p>USER INTERFACE</p> <p>HMI: New languages available:</p> <p>Russian/English (P in ordering code, basic display only)</p> <p>Spanish/English (S in ordering code)</p> <p>ENERVISTA F650 SETUP</p>	ALL	March 1 st 2005



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		<ul style="list-style-type: none"> New languages available: Russian and Spanish. Passwords included in EnerVista F650 Setup. WEB SERVER <ul style="list-style-type: none"> Multilingual visualization of snapshot events, control events, oscillography, fault recorder, data logger, metering. New languages available: Russian and Spanish. COMMUNICATIONS <ul style="list-style-type: none"> Modbus TCP communications enhancement. External CAN interruptions management enhancement. METERING <ul style="list-style-type: none"> Decimal point included in PT and CT ratios. Power Factor measurement enhancement. PROTECTION <ul style="list-style-type: none"> Function 48 included. I2/I1 setting to select the minimum I1 inhibition current level of the unit . TOC operation level at 1.03 times the pickup (1.05 in previous releases). Neutral units measures management enhancement. Startup Enhancement. (product notification 1.72) REGISTER <ul style="list-style-type: none"> Time Stamp for switchgear control events enhancement. 		
2.00	3.00	HARDWARE New options for Rear Serial Comm. Board 1 C: cable remote CAN bus I/O M: RS485 + cable remote CAN bus I/O New options for Rear Ethernet Comm. Board 2 E: Redundant 10/100 Base TX New options for I/O Boards (available for slot G and CIO modules) 4: 32 digital inputs 5: 16 digital inputs + 8 analog inputs COMMUNICATIONS Protocol IEC 61850 GSSE Client/server implementation SNTP Synchronization (Clock time obtained over an Ethernet network).	ALL	June 30 th 2005
1.82	4.00	File system management enhancement in boot code 4.00 Measurements enhancement in 1.82 firmware version	All models, excepting: Options 4 and 5 for inputs outputs boards. Option 6 for IEC61850 protocol 5.	October 17 th 2005
2.20	4.00	USER INTERFACE ENERVISTA F650 SETUP <ul style="list-style-type: none"> Data Logger visualization changes. File name available in "Config file converter" tool. COMMUNICATIONS <ul style="list-style-type: none"> DNP Scale factor correction. IRIGB synchronization: <ul style="list-style-type: none"> Date and time synchronization available. 980 ms delay correction. INPUTS/OUTPUTS <ul style="list-style-type: none"> Inputs Activation/Deactivation correction. 	All models with hardware version 00 (See Note 1) Models not included: - Options 4 and 5 for inputs outputs boards - Option 6 for IEC61850 protocol.	November 25 TH 2005



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		<ul style="list-style-type: none"> Voltage threshold setting range from 20 to 230 Vdc. Debounce time settings: <ul style="list-style-type: none"> Timestamp before debounce time Setting range from 1 to 50 ms. <p>METERING</p> <ul style="list-style-type: none"> Power calculations using ARON method. New measurements provided when using Delta connection and VN as auxiliary voltage input: <ul style="list-style-type: none"> Neutral voltage available. Phase to ground voltages available. Single phase power measurements available. <p>PROTECTION</p> <ul style="list-style-type: none"> Neutral, ground and sensitive ground directional units available with delta connection and VN as auxiliary voltage input. Minor changes in Forward Power elements. <p>REGISTER</p> <ul style="list-style-type: none"> Ground current available in Fault report. Corrected 150 ms delay in Snapshot events measurements. 		
3.00	4.00	<p>ENERVISTA F650 SETUP</p> <ul style="list-style-type: none"> Data Logger visualization changes. File name available in "Config file converter" tool. <p>INPUTS/OUTPUTS</p> <ul style="list-style-type: none"> Inputs Activation/Deactivation correction. Voltage threshold setting range from 20 to 230 Vdc. Debounce time settings: <ul style="list-style-type: none"> Timestamp before debounce time Setting range from 1 to 50 ms. <p>METERING</p> <ul style="list-style-type: none"> Power calculations using ARON method. New measurements provided when using Delta connection and VN as auxiliary voltage input: <ul style="list-style-type: none"> Neutral voltage available. Phase to ground voltages available. Single phase power measurements available. <p>PROTECTION</p> <ul style="list-style-type: none"> Neutral, ground and sensitive ground directional units available with delta connection and VN as auxiliary voltage input. Minor changes in Forward Power elements. <p>REGISTER</p> <ul style="list-style-type: none"> Ground current available in Fault report. Corrected 150 ms delay in Snapshot events measurements. <p>COMMUNICATIONS</p> <p>DNP 3.0 Protocol:</p> <ul style="list-style-type: none"> DNP Scale factor correction. <p>IEC 61850 Protocol:</p> <p>NEW FEATURES:</p> <ul style="list-style-type: none"> New GSSE Control block added in LLN0 logical node. Unbuffered Reports (besides buffered reports available in former 2.00 version) New Data Set for contact inputs and report control blocks. 	All models with hardware version 01 (See Note 1)	December 23rd 2005



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		<p>IMPROVEMENTS IN REPORT CONTROL BLOCKS:</p> <ul style="list-style-type: none"> The minimum value for the TrgOps parameter of Report control blocks have been reduced from 5000 to 500. Element BufTm naming modified (from BufTim to BufTm). The length of the OptFlds element has been resized from 9 to 10 bits. Flag BufOvfl correctly erased after PurgeBuf. Same entry times for all report segments. Buffered Reports are only sent if some bit is set in TrgOps (if IntgPd is set in BRCB) <p>OTHER IMPROVEMENTS IN REPORT CONTROL BLOCKS:</p> <ul style="list-style-type: none"> Buffer size reduction from 100 Kbytes to 50 Kbytes for Buffered Reports. Appropriate error codes returned for error messages. Minor changes in TCP/IP timed out connections. Minor changes in icd file for parse purposes and communication part addition. MMXU Logical node enhancement in measurements reading. Changes in commands execution for XCBR logical node. 		
3.20	4.10	<p>BOOTCODE</p> <ul style="list-style-type: none"> Changes in the startup process for COM2 in 4.10 boot code version. <p>USER INTERFACE</p> <p>ENERVISTA 650 SETUP</p> <p>NEW FEATURES:</p> <ul style="list-style-type: none"> IEC symbols in graphical display supported (N in ordering code). <p>IMPROVEMENTS:</p> <ul style="list-style-type: none"> "Config file converter" tool improvement for CIO settings and configuration. Operating system upgrading process improvement. Settings files printing mode enhancement. Improved configuration in HMI for: <ul style="list-style-type: none"> § Switchgear § AR Status, AR Lockout, AR block and Fault type data. Confirmation request for saving files. Off line communication status enhancement. Texts Management in Configuration files for Chinese Language <p>FIRMWARE</p> <p>HMI</p> <p>NEW FEATURES:</p> <ul style="list-style-type: none"> IEC symbols in graphical display (N in ordering code). HMI management: <ul style="list-style-type: none"> Local/ remote /off by communications Switch off/on backlight by communications <p>IMPROVEMENTS:</p> <ul style="list-style-type: none"> Red Leds lighting improvement. Available now configurable keys in chinese language. <p>METERING</p> <ul style="list-style-type: none"> Two new measurements available in the synchrocheck module: <ul style="list-style-type: none"> Voltage difference (ΔV). Frequency difference (Δf). Enhanced Offset Calibration mode. <p>PROTECTION AND CONTROL</p> <p>NEW FEATURES:</p>	<p>All models with hardware version 01 and 02. N option (IEC Symbols) only available for hardware version 02. (See Note 1)</p>	<p>April 21st 2006</p>



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		<ul style="list-style-type: none"> • Frequency rate of change function available (up to 3 units). • Load Encroachment function available (up to 3 units) • Maximum number of starts function available (1 unit) • Analog Comparators available (up to 20). <p>IMPROVEMENTS:</p> <ul style="list-style-type: none"> • AR BLOCK mode enhancement. • Syncrocheck settings enhancement. <p>REGISTER</p> <p>NEW FEATURES:</p> <ul style="list-style-type: none"> • Pulse Counters available (up to 8). <p>IMPROVEMENTS:</p> <ul style="list-style-type: none"> • Changes in the naming of Energy frozen values. • Fault report and oscillography trigger date accuracy enhancement. <p>COMMUNICATIONS</p> <p>DNP 3.0 Protocol:</p> <ul style="list-style-type: none"> • Last fault data available.. <p>IEC 61850 Protocol:</p> <p>NEW FEATURES:</p> <ul style="list-style-type: none"> • Goose messages implementation. • New Data Set for metering. • Integrity report. <p>IMPROVEMENTS:</p> <ul style="list-style-type: none"> • Analog reports improvement. • Virtual inputs Self-Reset management improvement. • Writing procedure enhancement. • XCBR and RREC operations enhancement. 		

Note (1):

Hardware Version:

HW: 00  incorporates standard CPU board.

HW: 01  incorporates enhanced CPU board.

HW: 02  incorporates enhanced CPU board and enhanced HMI supporting IEC symbols for graphical display option. (N in ordering code)

The hardware version of the relay can be verified in the identification label or in the bottom bar of EnerVista 650 Setup software version 3.00 or later when communicating with the relay.

Note (2): Boot code 4.10 and firmware 3.20 must be upgraded from former versions using EnerVista 650 Setup 3.20 or later.