942 Corridor Park Boulevard
Knoxville TN 37932 USA
Phone 865 218 8000
Fax 865 218 8001
perq.epri.com

Voltage Sag Compliance Certificate: IEEE 1668, SEMI F47, IEC 61000-4-11, and IEC 61000-4-34 EPRI PERQ™ Test Program

Certification Date: February 14th, 2025

Product Description	FP605 Series Variable Frequency Drives
Manufacturer	Yaskawa Electric Corporation 2-13-1, Nishimiyaichi, Yukuhashi, Fukuoka, 824-8511, Japan Phone: +81-930-25-2548
Applicable Catalog Codes	FP65X * Y, where * is any rating code 2011 ~ 2396, or 4005 ~ 4H12, Notes: • CIPR- prefix is optional for all catalog codes. • "X" denotes one character, A~Z • "Y" denotes multiple alphanumeric characters
Pass Criteria	IEC 61000-4-34:2005/AMD1:2009 and IEC 61000-4-11:2020, Class Three Phase-to-Phase Method B voltage sags: temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention (Section 9b criteria). Type II phase-to-phase sags done within accordance to Figure C.3. IEEE 1668-2017, Type II and Type III voltage sags: *Self-recovery:* The drive outputs vary outside the technical specification/limits, but equipment can automatically recover after the end of a voltage sag without any intervention from the user (Section 5.3.4.1, (b) criteria). SEMI F47-0706-0812RE, Type II voltage sags: May not perform at full rated operation but recovers operation without operator and/or host controller intervention. Must not send error signals to the equipment host controller indicating when full rated operation is not achieved. (Section 7.8.2, (b) criteria).
Programming requirements	The Single-Phase Foldback Selection parameter, YC-10, must be set to 0. The Carrier Frequency Reduction parameter, L8-38, must be set to 1.
Test Configuration	See Appendix 1 Test Configuration Details

EPRI tested and simulated a subset of 200V and 400V FP605 series drives to the referenced standards. Based on our thorough testing and analysis, it is highly expected that the entire line will be compliant under similar load, configuration, and test conditions. This letter certifies that the drive models referenced in this certificate comply with the criteria and standards indicated. Certification remains valid, provided that no component substitutions impacting the power structure or software modifications affecting the drive behavior during voltage sags are made.

Yaskawa FP605
Industrial Fan and Pump Drive

Certified by,

Aaron R. Winebarger, Engineer I, E.I.T.
Electric Power Research Institute, PERQ™ Compliance Program

942 Corridor Park Boulevard
Knoxville TN 37932 USA
Phone 865 218 8000
Fax 865 218 8001
perq.epri.com

Appendix 1: Test Configuration Details

Test Conditions	Drive samples No. 5 and 8 were tested on EPRI's large drive test stand at full load. Here a motor was connected to the output terminals of the drives and coupled to an eddy current brake. Drive Sample No. 2 was tested on EPRI's small drive test stand at full load. Here a motor was connected to the output terminals of the drive and coupled to a generator head powering an adjustable load. "Full load" was determined based on each drive's rated output power and was monitored via the drive's internal output power monitoring parameter, U1-08. Voltage sags were injected with a voltage sag generator compliant with the standards referenced above. The drives were tested with a modified parameter set wherein the single-phase foldback selection parameter, YC-10, was set to 0 and the carrier frequency reduction parameter, L8-38, was set to 1.
Units Tested	C/C: FP65U4014AFA, S/N: 1W2429064150111, EPRI Sample No. 2, 4014 C/C: FP65U2143AFA, S/N: 1W2489123870002, EPRI Sample No. 5, 2143 C/C: FP65U4124AFA, S/N: 1W2469121020026, EPRI Sample No. 8, 4124
Test Date	02/06/2025
Test Location	EPRI Knoxville Lab 942 Corridor Park BLVD Knoxville, TN 37932 (USA)
Nominal Voltages and Frequencies Tested	208 Vac, 3 Phase, 60 Hz 480 Vac, 3 Phase, 60 Hz *Note: Voltages applied, per drive ratings.*
Test Equipment	Voltage source 200A EPRI Portable Voltage Sag Generator HBM GEN3iA High Speed Mainframe Data Acquisition System SR661 Current Transducers *Note: The test equipment listed above fully complies with all requirements of IEC 61000-4-11, IEC 61000-4-34, and IEEE 1668-2017.*
Standards Referenced	SEMI F47-0706 (2012 publication) IEEE 1668-2017 IEC 61000-4-34:2005/AMD1:2009, IEC 61000-4-11:2020
Test Report	**EPRI Yaskawa FP605 Drive Series Test Reports:** IEC61000-4-11/34.15 IEEE1668.6 SEMI F47.205
Declaration of Equivalency	Based on the commonality of the drive design and EPRI's testing and analysis, one may associate the Applicable Catalog Codes listed with the specific test results for the select Catalog Codes Tested.