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IOGP S-701, Supplementary Specification to IEC 62040-3 for AC Uninterruptible Power Systems (UPS), Second Edition, January 2024

ADDENDUM 1

This addendum (Version 2.01) replaces Edition 2.0 published in January 2024.

NOTE: In addition to the updates listed below, minor editorial/typographical amendments may have been made.

List of updates

Clause/subclause	Update
2	Reference IEC 60364-4-44 added
3.0	Abbreviated terms IP and TCP added
5.1.2	First addition to subclause amended
7.1	New subclauses 7.1.6 and 7.1.7 added
7.3	New subclause 7.3.6 added
7.4	New subclause 7.4.11 added
7.5	New subclauses 7.5.4 and 7.5.5 added
7.7	New subclause 7.7.5 added
8.2	New subclause 8.2.7 added
8.3	New subclause 8.3.6 added
8.4	Subclauses 8.4.1.5 and 8.4.1.8 amended New subclause 8.4.1.10 added Subclause 8.4.2 amended
Bibliography	References ATEX Directive (2014/34/EU), Ecodesign Directive (2009/125/EC), Electromagnetic Compatibility Directive (EMCD) (2014/30/EU), IEC 62402, Low Voltage Directive (LVD) (2014/35/EU) and PIP ELSAP04 added

International Association of Oil & Gas Producers

SPECIFICATION
IOGP S-701

October 2025
Version 2.01

ADDENDUM 1 TO SECOND EDITION (JANUARY 2024)

Supplementary Specification to IEC 62040-3 for AC Uninterruptible Power Systems (UPS)

JIP33
JOINT INDUSTRY PROGRAMME

Revision history

VERSION	DATE	PURPOSE
2.01	October 2025	Addendum 1
2.0	January 2024	Second Edition
1.0	August 2020	First Edition

Acknowledgements

This IOGP Specification was prepared by a Joint Industry Programme 33 Standardization of Equipment Specifications for Procurement organized by IOGP with support by the World Economic Forum (WEF).

Foreword

This specification was prepared under Joint Industry Programme 33 (JIP33) "Standardization of Equipment Specifications for Procurement" organized by the International Oil & Gas Producers Association (IOGP) with the support from the World Economic Forum (WEF). Companies from the IOGP membership participated in developing this specification to leverage and improve industry level standardization globally in the oil and gas sector. The work has developed a minimized set of supplementary requirements for procurement, with life cycle cost in mind, resulting in a common and jointly agreed specification, building on recognized industry and international standards.

Recent trends in oil and gas projects have demonstrated substantial budget and schedule overruns. The Oil and Gas Community within the World Economic Forum (WEF) has implemented a Capital Project Complexity (CPC) initiative which seeks to drive a structural reduction in upstream project costs with a focus on industry-wide, non-competitive collaboration and standardization. The CPC vision is to standardize specifications for global procurement for equipment and packages. JIP33 provides the oil and gas sector with the opportunity to move from internally to externally focused standardization initiatives and provide step change benefits in the sector's capital projects performance.

This specification has been developed in consultation with a broad user and supplier base to realize benefits from standardization and achieve significant project and schedule cost reductions.

The JIP33 work groups performed their activities in accordance with IOGP's Competition Law Guidelines (November 2020).

This second edition cancels and replaces the first edition published in August 2020. Due to technical writing requirements leading to extensive changes, this second edition should be treated as a new document.

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Introduction

The purpose of the IOGP S-701 specification documents is to define a minimum common set of requirements for the procurement of AC uninterruptible power systems (UPSs) in accordance with IEC 62040-3, Edition 3.0, 2021-04, uninterruptible power systems (UPS) – Part 3: Method of specifying the performance and test requirements, for application in the petroleum and natural gas industries.

The IOGP S-701 specification documents follow a common structure (as shown below) comprising a specification, also known as a technical requirements specification (TRS), a procurement data sheet (PDS), an information requirements specification (IRS) and a quality requirements specification (QRS). These four specification documents, together with the purchase order, define the overall technical specification for procurement.

JIP33 Specification for Procurement Documents
Supplementary Technical Requirements Specification (TRS)

This specification is to be applied in conjunction with the supporting PDS, IRS and QRS as follows.

IOGP S-701: Supplementary Specification to IEC 62040-3 for AC Uninterruptible Power Systems (UPS)

This specification defines technical requirements for the supply of the equipment and is written as an overlay to IEC 62040-3, following the IEC 62040-3 clause structure. Clauses from IEC 62040-3 not amended by this specification apply as written. Modifications to IEC 62040-3 defined in this specification are introduced by a description that includes the type of modification (i.e. *Add*, *Replace* or *Delete*) and the position of the modification within the clause.

NOTE Lists, notes, tables, figures, equations, examples and warnings are not counted as paragraphs.

IOGP S-701D: Procurement Data Sheet for AC Uninterruptible Power Systems (UPS) (IEC)

The PDS defines application-specific requirements. The PDS is applied during the procurement cycle only and does not replace the equipment data sheet. The PDS may also include fields for supplier-provided information required as part of the purchaser's technical evaluation. Additional purchaser-supplied documents may also be incorporated or referenced in the PDS to define scope and technical requirements for enquiry and purchase of the equipment.

IOGP S-701L: Information Requirements for AC Uninterruptible Power Systems (UPS) (IEC)

The IRS defines information requirements for the scope of supply. The IRS includes information content, format, timing and purpose to be provided by the supplier, and may also define specific conditions that invoke the information requirements.

IOGP S-701Q: Quality Requirements for AC Uninterruptible Power Systems (UPS) (IEC)

The QRS defines quality management system requirements and the proposed extent of purchaser conformity assessment activities for the scope of supply. Purchaser conformity assessment activities are defined through the selection of one of four generic conformity assessment system (CAS) levels on the basis of evaluation of the associated service and supply chain risks. The applicable CAS level is specified by the purchaser in the PDS or in the purchase order.

The specification documents follow the editorial format of IEC 62040-3 and, where appropriate, the drafting principles and rules of ISO/IEC Directives Part 2.

The PDS and IRS are published as editable documents for the purchaser to specify application-specific requirements. The TRS and QRS are fixed documents.

The order of precedence of documents applicable to the supply of the equipment, with the highest authority listed first, shall be as follows:

a) regulatory requirements;

b) contract documentation (e.g. purchase order);

c) purchaser-defined requirements (e.g. PDS, IRS and QRS);

d) this specification;

e) IEC 62040-3.

1 Scope

Add to second paragraph

This specification additionally covers the AC UPS design and performance requirements for rectifiers, inverters, static switches, static and maintenance bypasses, battery isolator box, and functional requirements related to measurement, protection and alarms. Packing, handling, preservation and storage requirements are specified.

2 Normative references

Add to first paragraph

The following publications are referred to in this document, the PDS (IOGP S-701D) or the IRS (IOGP S-701L) in such a way that some or all of their content constitutes requirements of this specification.

Add to clause

IEC 60076-1, *Power transformers – Part 1: General*

IEC 60076-11, *Power transformers – Part 11: Dry-type transformers*

IEC 60076-12, *Power transformers – Part 12: Loading guide for dry-type power transformers*

IEC 60085, *Electrical insulation – Thermal evaluation and designation*

IEC 60092 (all parts), *Electrical installations in ships*

IEC 60364-4-44, *Low-voltage electrical installations - Part 4-44: Protection for safety - Protection against voltage disturbances and electromagnetic disturbances*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60721-2-6, *Classification of environmental conditions – Part 2-6: Environmental conditions appearing in nature – Earthquake vibration and shock*

IEC 60947-2, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*

IEC 60947-3, *Low-voltage switchgear and controlgear – Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units*

IEC 60947-4-1, *Low-voltage switchgear and controlgear – Part 4-1: Contactors and motor-starters – Electromechanical contactors and motor-starters*

IEC 61000-2-4:2002, *Electromagnetic compatibility (EMC) – Part 2-4: Environment – Compatibility levels in industrial plants for low-frequency conducted disturbances*

IEC 61892 (all parts), *Mobile and fixed offshore units – Electrical installations*

IEC 62040 (all parts), *Uninterruptible power systems (UPS)*

IOGP S-740, *Specification for Batteries (IEC)*

Replace Clause 3 title with

3 Terms, definitions and abbreviated terms

Add new subclause 3.0 to start of clause

3.0 Abbreviated terms

AC	alternating current
BMS	battery management system
CAS	conformity assessment system
DC	direct current
ECMS	electrical control and management system
ESD	emergency shutdown
FGS	fire and gas system
HMI	human machine interface
IP	internet protocol
IRS	information requirements specification
LED	light emitting diode
MCB	miniature circuit breaker
MCCB	moulded case circuit breaker
MCT	multi-cable transit
PCS	process control system
PDS	procurement data sheet
QRS	quality requirements specification
SIS	safety instrumented system
TCP	transmission control protocol
TRS	technical requirements specification
VRLA	valve-regulated lead-acid

3.2 Systems and components

Add new term 3.2.39

3.2.39
electrical control and management system
ECMS
system that automatically controls the electrical power and distribution system through instrumentation and control devices

Add new term 3.2.40

3.2.40
process control system
PCS
system that includes overall site-integrated process automation, control and/or monitoring

3.3 Performance of systems and components

Add new term 3.3.20

3.3.20
soft start
function that controls the gradual increase of AC input current within a specified time when the UPS starts or restarts

4 Environmental conditions

4.2 Normal conditions

4.2.2 Operation

4.2.2.1 Ambient temperature and relative humidity

Add to start of first paragraph

For industrial applications,

In first list item, replace "+15 °C to +30 °C" with

0 °C to +40 °C

In second list item, replace "10 % to 75 %" with

20 % to 80 %

5 Electrical conditions, performance and declared values

5.1 General

5.1.2 Markings and instructions

Add to subclause

The nameplate shall include the following information:

– item serial number;

– purchase order reference;

– month and year of manufacture;

– manufacturer's address;

– battery type;

– battery capacity (Ah).

Add to subclause

Caution, danger and warning labels shall display information in English and, if applicable, in an additional specified language.

Add new subclause

5.1.3 Electromagnetic compatibility

The AC UPS shall conform to the electromagnetic emission and immunity levels of IEC 62040-2 for the specified category level.

Add new subclause

5.1.4 Noise

The sound pressure level, measured at a distance of 1 m from the AC UPS in any direction, shall not exceed the specified value at load conditions ranging from no load to the rated load.

Add new subclause

5.1.5 UPS design basis

The operational life of the AC UPS components at the rated load shall be in accordance with Table 7.

Add new Table 7

Table 7 – UPS operational life

Components	Minimum operation life (years)
Rectifier unit, inverter unit and static switch unit	20
Cooling fan	5
AC capacitor and DC capacitor	7
Input isolation transformer and output isolation transformer	20
Bypass transformer	20

Add new subclause

5.1.6 Overload capacity

5.1.6.1

The AC UPS shall have an overload capacity of at least 125 % of the rated output current for 10 min.

5.1.6.2

The AC UPS shall have an overload capacity of at least 150 % of the rated output current for 1 min.

5.1.6.3

If no value is specified, the design value for the inverter short circuit shall be 200 % of the rated current for 0.1 s.

NOTE Battery sizing is independent of the output overload capacity of the AC UPS.

5.2 UPS input specification

5.2.1 Conditions for normal mode operation

In second list item of list item d), replace second paragraph (< 12 % with…) with

≤ 8 % in accordance with IEC 61000-2-4:2002, Table 5 with maximum level of individual harmonic distortion of voltages in accordance with IEC 61000-2-4:2002, Table 2, Table 3 and Table 4 for class 2 compatibility levels.

NOTE This requirement is applicable to onshore and offshore installations.

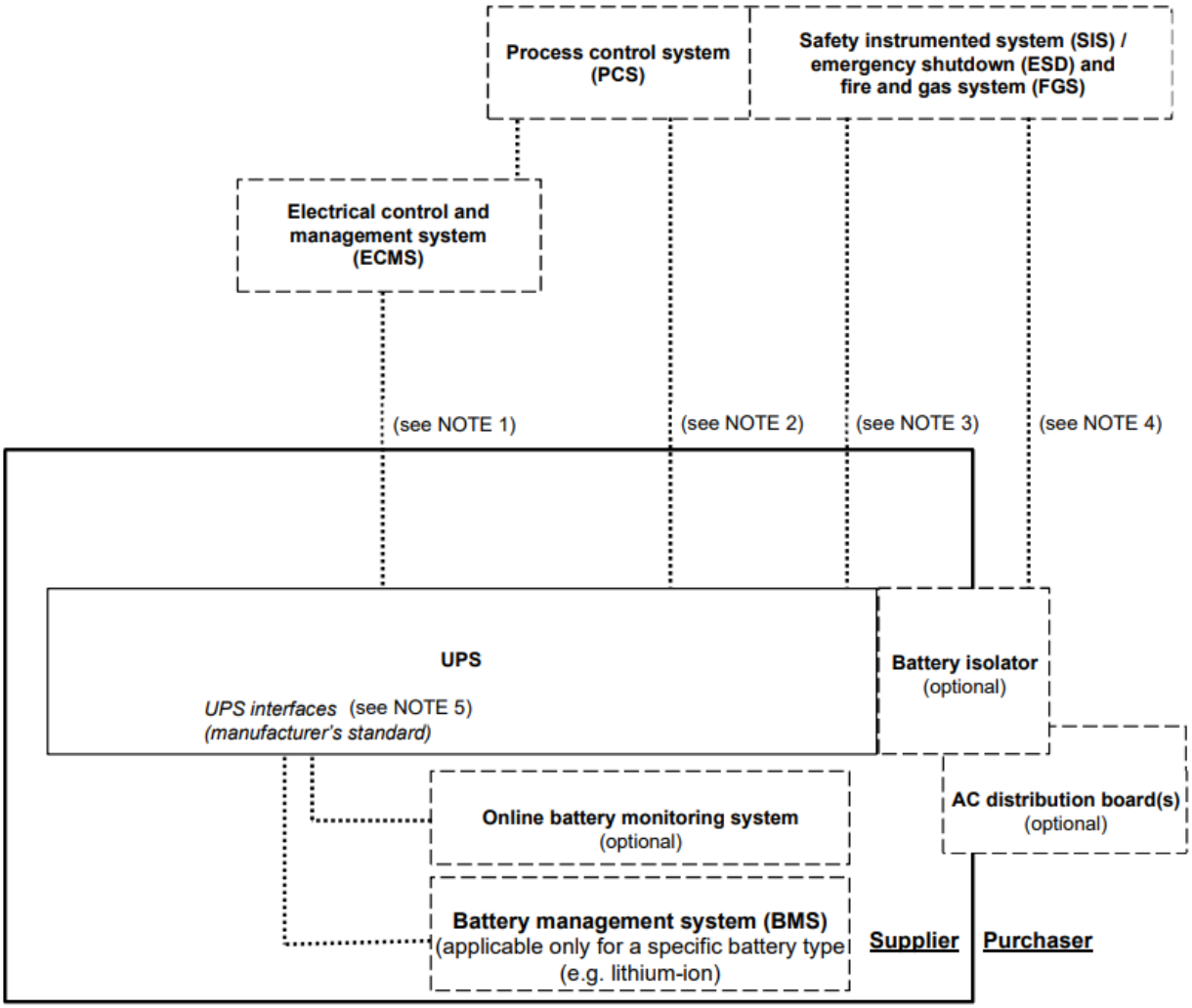
5.6 Signal, control and communication ports

Add to subclause

The AC UPS shall be provided with communication hardware compliant with the specified interface media and protocol.

NOTE See Figure 6 for a typical communication interface block diagram detailing data communication and signalling circuits intended to be exchanged between the AC UPS and other equipment.

Add new Figure 6



NOTE 1 Network connectivity interface for time synchronization, remote access and configuration.

NOTE 2 Direct interface for critical / safety critical status and alarms to PCS where the ECMS is not present, independent of the ESD system trip.

NOTE 3 Direct interface for the ESD trip and the FGS function (e.g. boost charge inhibit) / trip.

NOTE 4 Direct interface for ESD and FGS trips.

NOTE 5 Supplier standard interface for synchronization and load sharing between the UPSs (applicable for parallel systems), UPS battery monitoring system and BMS where applicable.

Figure 6 – Typical communication interface block diagram

6 UPS tests

6.5 Type tests – Environmental

6.5.3 Operation in dry heat, damp heat and cold environments

Replace list item c) 2) with

2) Damp heat at +30° C ±2° C at a humidity between 82 % and 88 % for a duration of 96 h using test method Cab of IEC 60068-2-78.

Add new clause

7 Design requirements

7.1 General

7.1.1

Components, printed circuit boards, connectors and terminals, including their locations, shall be identified with labels in accordance with IEC 62040-1.

7.1.2

Components requiring periodic replacement shall be listed in the spare parts list with the recommended replacement frequency.

7.1.3

An obsolescence management plan in accordance with an industry recognized system (e.g. IEC 62402) shall be provided for all AC UPS assembly components.

7.1.4

Components weighing more than 25 kg shall have provisions for mechanical handling.

7.1.5

If supplied, the battery bank shall comply with the requirements of IOGP S-740.

7.1.6

Cabling between components shall consist of one continuous length without splicing.

7.1.7

Nameplates on compartment doors and panels shall be mounted with stainless steel screws.

7.2 Enclosure

7.2.1

The AC UPS shall be installed in steel cabinet enclosures.

7.2.2

The enclosure shall have an external degree of protection of at least IP31 with doors closed in accordance with IEC 60529.

7.2.3

Undrilled removable gland plates or multi-cable transits (MCTs) shall be used for cable entry.

7.2.4

Gland plates for single-core cable entries shall be made of non-magnetic material.

7.3 Accessibility and maintenance safety

7.3.1

Access for operation and maintenance shall be from the AC UPS cabinet front only.

7.3.2

AC UPS assemblies shall provide a minimum internal degree of protection in accordance with Table 8.

Add new Table 8

Table 8 – Internal degree of protection

Location	Minimum degree of protection
Between panels or cabinet enclosures	IP 2X
Between compartments of each functional unit and other compartments	IP XXB
Fuse-links and associated fuse carriers	IP XXB
Air-insulated live parts inside enclosures or on the inside face of compartment doors that are accessible with the compartment door open	IP XXB
NOTE IPXXB is stipulated in accordance with IEC 60529 as distinct to the use of designation IP2X when the door is open and the danger is access to hazardous parts within. IPXXB provides finger "touch-safe" protection against contact with live parts and electric shock equivalent to IP2X.	

7.3.3

The maintenance bypass switch and bypass transformer shall be located in a separate compartment in accordance with the arrangement shown in Figure C.3 for servicing purposes.

7.3.4

Isolating switches that enable the maintenance bypass mode of operation shall have a facility for padlocking in the open position.

7.3.5

Terminals shall be provided in the external maintenance bypass compartment for wiring to and from the AC UPS rectifier/inverter/static bypass compartments to enable complete isolation during maintenance of the AC UPS.

7.3.6

Warning labels shall be provided on access doors of compartments containing external AC and DC voltage sources.

7.4 Components

7.4.1

Main circuit breakers and isolation switches shall have a facility for padlocking in the open position.

7.4.2

Mechanical-type main circuit switches shall be in accordance with IEC 60947-3.

7.4.3

Main circuit switches shall comply with utilization category AC-22A and DC-22A for AC and DC switches respectively in accordance with IEC 60947-3.

7.4.4

Main circuit breakers and isolation switches shall be manually operated.

7.4.5

Main circuit breakers and isolation switches shall be of air-break type for continuous duty.

7.4.6

Miniature circuit breakers (MCBs) and moulded case circuit breakers (MCCBs) shall comply with the requirements of IEC 60947-2.

7.4.7

Contactors shall be rated for continuous duty in accordance with IEC 60947-4-1.

7.4.8

Contactors shall comply with utilization categories AC-1 and DC-1 for AC and DC contactors in accordance with IEC 60947-4-1.

7.4.9

Transformers and reactors shall be of air-cooled type in accordance with IEC 60076-1, IEC 60076-11 and IEC 60076-12.

7.4.10

The transformer insulation material shall have a minimum rating of thermal class 180 (H) in accordance with IEC 60085.

7.4.11

If anti-condensation heaters are specified, the external power supply to the heating resistor shall be accessible during transportation and storage without removal of packaging.

7.5 Internal wiring and terminals

7.5.1

Wiring shall be labelled with alphanumeric characters located adjacent to the terminals.

7.5.2

Wiring for external connections shall be routed to individual terminals on an accessible terminal block.

7.5.3

The separation distance between the cable entry and the associated connection terminals within the cabinet shall permit the required cable core bending radius.

7.5.4

Wiring penetrations through compartment or cubicle sections shall be fitted with protective strips or alternative means to prevent insulation damage.

7.5.5

Wiring identification shall be on ferrules made of insulated material.

7.6 Earthing

7.6.1

A main protective earthing arrangement shall be provided inside the enclosure in close proximity to the cable entry location.

NOTE The main protective earthing arrangement can be a copper bar, conductor or terminal, as appropriate.

7.6.2

The AC UPS enclosure shall be bonded to the main protective earthing arrangement in accordance with IEC 62040-1.

7.6.3

Exposed, non-current carrying parts of the AC UPS inclusive of the enclosure, frame, components, gland plates (or MCTs) and doors shall be bonded to main protective earth.

7.6.4

If neutral is required for the AC output distribution system, the inverter output and bypass transformer neutrals shall be connected to the main protective earthing arrangement by a removable link within the enclosure.

7.7 Ventilation

7.7.1

Cooling fans shall be installed with a redundant "n+1" configuration where "n" is the number of fans required to support the AC UPS.

7.7.2

Fans shall be equipped with monitoring facilities to provide an alarm in the event of fan failure.

7.7.3

Cooling air filters shall be replaceable while the AC UPS remains in service.

7.7.4

If a cooling fan is out of service, the AC UPS shall continue to deliver the rated load without switching to bypass mode.

7.7.5

When the cooling system design incorporates standby fans, the standby fans shall start automatically in the event of main fan failure.

7.8 Additional requirements for offshore (fixed and floating) installations

For offshore installations, the AC UPS and associated equipment and components shall be in accordance with the general requirements of IEC 62040 (all parts) and the following:

– requirements of IEC 61892 (all parts) for mobile and fixed units; or

– requirements of IEC 60092 (all parts except 301, 305, 306, 501, 502 and 503) for electrical installations in ships.

7.9 External battery isolator box (if specified)

7.9.1

The battery isolator shall be lockable in the open position using a padlock.

7.9.2

The battery isolator box shall provide an external degree of protection of at least IP31 with the enclosure closed in accordance with IEC 60529.

7.9.3

If the battery isolator box has an indirect cable entry via an "ex e" enclosure, the enclosure shall have an undrilled, removable gland plate for the cable entry.

7.9.4

The battery isolator shall be selected for the rated DC voltage and DC current.

7.9.5

The auxiliary supply voltage for the MCCB control element (under voltage coil and/or shunt trip coil) shall be derived from the MCCB terminals connected to the AC UPS.

7.9.6

If specified, potential free status contacts of the battery isolator shall be wired to the terminals.

Add new clause

8 Functional requirements

8.1 Rectifier

8.1.1 Rectifier components

8.1.1.1

The rectifier unit and components on the input side of the AC UPS shall be sized to supply the rated output and simultaneously boost charge the battery at the highest permissible current rating.

8.1.1.2

If an AC UPS with a bi-directional rectifier is specified, the rectifier shall be provided with an on-line battery capacity discharge test feature by feeding the power back to the mains supply.

8.1.1.3

When an on-line battery monitoring system is specified, the AC UPS shall generate an alarm if the battery parameters exceed the tolerance limit specified by the battery manufacturer.

8.1.1.4

The total AC ripple at the battery terminals, including that generated by the inverter and load, shall not exceed the tolerance limits specified by the battery manufacturer.

8.1.1.5

The AC UPS shall interface with the BMS to continuously monitor, control and protect the battery bank for the functional safety of the specific battery type (e.g. lithium-ion).

8.1.2 Operation

8.1.2.1

The rectifier unit shall be provided with constant voltage, current limiting and soft start functionality.

8.1.2.2

The rectifier unit shall restart automatically upon restoration of the input power supply following a power interruption.

8.1.2.3

The rectifier unit shall be rated to recharge the battery to the nominal value of Ah capacity following a discharge at rated load for the specified autonomy time, simultaneously meeting the inverter input requirements while the inverter is delivering the rated output.

8.1.2.4

Depending on the type of battery selected for energy storage, the rectifier shall perform battery charging at float, boost and equalization charge, or float and equalization charge, in manual and auto modes.

8.1.2.5

Manual initiation of float and boost modes of operation on the rectifier shall be provided.

8.1.2.6

Upon restoration of the input power supply following a power interruption, if the rectifier is in automatic mode, the rectifier unit shall initiate the boost charge cycle.

NOTE Boost charge initiation depends on the state of charge or type of battery selected for energy storage.

8.1.2.7

The duration of the boost charging shall be controlled by one of the following options:

– automatic timer; or

– feedback of the battery current and voltage indicating that the required adequate battery charge has been achieved.

8.1.2.8

The rectifier unit shall revert automatically to float charging upon completion of the boost charging or equalization charging.

8.1.2.9

The rectifier unit shall have provision to inhibit boost charging using an external signal (e.g. ventilation failure or H2 detection within the battery room).

8.1.2.10

The rectifier unit shall have provision for accepting temperature compensation input for batteries to control the battery charging voltage with an accuracy of ±1 %.

8.1.2.11

If specified, the AC UPS shall permit a black start delivering power to the load from the batteries at the rated output without mains supply.

8.1.2.12

The rectifier shall restrict the battery charging current to a safe value specified by the battery manufacturer, depending on the mode of operation.

8.2 Inverter

8.2.1

The inverter shall be short-circuit-proof with a current limiting design.

8.2.2

The output voltage regulation shall be maintained within ±1 % of the rated output voltage while operating in non-synchronous conditions.

8.2.3

The waveform of the AC UPS output voltage shall be sinusoidal with a THD not exceeding 4 % for linear and 5 % for non-linear loads unless another value is specified.

8.2.4

The inverter output frequency shall be maintained within ±0,1 % of the rated output frequency while operating in non-synchronous conditions.

8.2.5

The inverter unit shall control the output of the AC UPS to maintain synchronism with the bypass voltage during variations in bypass supply frequency, within the specified tolerance limits.

8.2.6

If the bypass supply frequency variation exceeds the defined synchronization limits, the inverter shall revert to free-running operation, i.e. non-synchronous operation.

8.2.7

The UPS system shall withstand a minimum load crest factor of 3:1 (Ipeak/Irms).

8.3 Static and maintenance bypass

8.3.1

The switching devices of the static bypass unit at the inverter output and at the bypass path shall be sized for a continuous current rating equivalent to the rated output of the AC UPS.

8.3.2

The static bypass circuit shall have a short-time current rating of:

– 1 000 % of the AC UPS current rating for 50 ms; and

– 150 % of the AC UPS current rating for 60 s.

8.3.3

The protection device used in the static bypass circuit shall permit the short-time rated current required to clear the fault at downstream of the output protective device.

8.3.4

The protection device used in the static bypass circuit shall prevent damage to the static switch when the overcurrent persists for longer than the specified time.

8.3.5

The AC UPS shall be provided with the facility to initiate a manual transfer from the inverter supply to the bypass supply and vice-versa, even in case of HMI failure.

8.3.6

Manual transfer shall be inhibited under inverter fault conditions.

8.4 Measurement, protection and control

8.4.1 Indication and display

8.4.1.1

The AC UPS shall have a real time interactive operator interface using a microprocessor-based HMI mounted on the front door.

8.4.1.2

The HMI shall indicate the AC UPS operation status.

8.4.1.3

The HMI shall accept operational input commands.

8.4.1.4

The HMI shall monitor operating parameters and display alarms, events and fault diagnostics.

8.4.1.5

The following status shall be displayed on the HMI or by discrete light emitting diode (LED) indication lights located on the AC UPS front panel:

– AC input power supply healthy;

– bypass power supply healthy;

– rectifier ON;

– inverter ON;

– battery breaker ON;

– boost/float/equalize mode;

– load on inverter;

– load on bypass;

– inverter/static bypass synchronized;

– battery discharging;

– fan failure (where applicable);

– over-temperature;

– common AC UPS alarm (LED signalling light);

– discharged battery.

8.4.1.6

Failure of the HMI display or indicating device on the AC UPS shall not compromise the autonomous operation of the AC UPS.

8.4.1.7

The HMI shall have password-protected multiple levels of access as follows:

– for viewing, by the operator;

– for settings, by trained operating personnel;

– for service, by the manufacturer's personnel.

8.4.1.8

The AC UPS shall have non-volatile memory for retaining the following:

– event/alarm/trip logging with time and date stamping;

– historical trending for assisting troubleshooting and failure analysis;

– UPS configuration parameters.

8.4.1.9

The AC UPS shall have communication facilities as specified for remote monitoring and interface including real time clock synchronization.

8.4.1.10

The HMI display shall be backlit.

Justification

8.4.2 Measurements

As a minimum, the following measurement data shall be displayed on the HMI by discrete measuring or display instruments located on the front panel of the AC UPS:

– AC UPS input voltage per phase;

– AC UPS input current per phase;

– DC voltage;

– battery charging current;

– battery discharging current;

– AC UPS output voltage per phase;

– AC UPS output current per phase;

– AC UPS output frequency;

– remaining autonomy time of the battery in percentage or minutes.

8.4.3 Alarms and protection

8.4.3.1

Alarm and trip functions shall be provided in accordance with Table 9.

Add new Table 9

Table 9 – Minimum alarm and trip functions

Trouble description	Alarm	Rectifier trip	Inverter trip
AC input power supply – undervoltage	x	Off [a, b]	
Input isolation transformer overtemperature	x [c]		
Rectifier failure	x	x	
DC link overvoltage	x	x	
DC link undervoltage	x		x
Battery discharging	x		
Battery breaker off / battery disconnected	x		
Battery temperature high – valve-regulated lead-acid (VRLA) batteries only	x		
Cooling fan failure	x		
Inverter failure	x		x
Inverter overcurrent	x		
Inverter output voltage deviation	x		x
Inverter/bypass unsynchronized	x		
Power module overtemperature	x		x
Output isolation transformer overtemperature	x [c]		

[a] When the AC input power supply falls below allowable limits, the rectifier shuts down.

[b] When the AC input power supply resumes and remains within allowable limits, the rectifier starts automatically and no reset is required.

[c] Applicable only when a transformer is supplied.

8.4.3.2

Alarms and trip functions shall be reset manually, locally or remotely, except for the rectifier shutdown due to AC input power supply undervoltage (see Table 9).

8.4.4 Controls

8.4.4.1

The settings and threshold limits of parameters shall be adjustable on-line without requiring an outage of the AC UPS.

8.4.4.2

The internal control supply of the AC UPS shall be available provided that at least one of the input supply sources to the AC UPS is present.

Add new clause

9 Packing, handling, preservation and storage

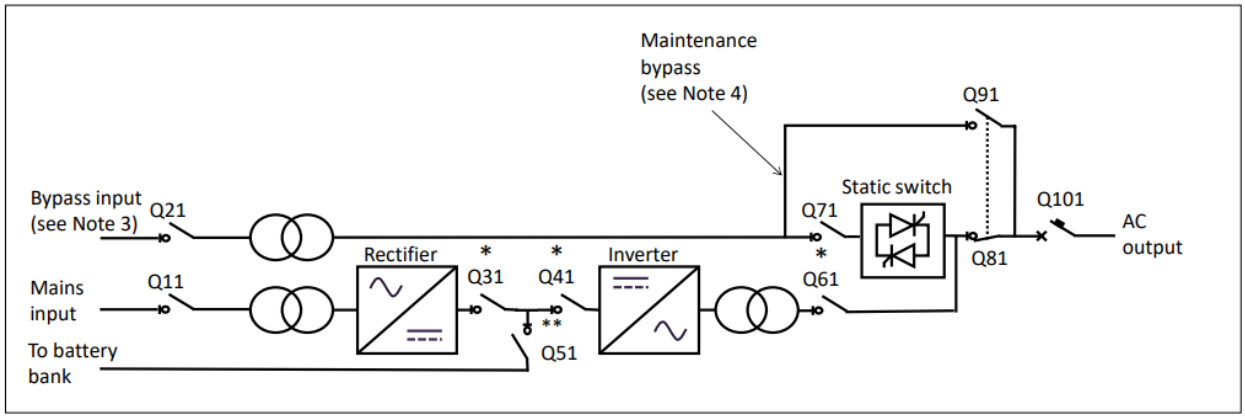
The AC UPS and associated equipment and components shall be packed to ensure protection against damage during transportation.

Annex A
(informative)
Configurations – Uninterruptible power system (UPS)

A.2 Single output bus UPS

A.2.3 Single UPS with bypass

In Figure A.2, replace drawing with



Add new notes to Figure A.2

* Switches should be installed where rectifier, inverter and static switch sections have physical separation for complete supply isolation and to prevent access to live parts.

** The switch is installed inside the AC UPS, while the battery isolator (see 7.9) is external to (i.e. outside) the AC UPS.

Add key to Figure A.2

Key

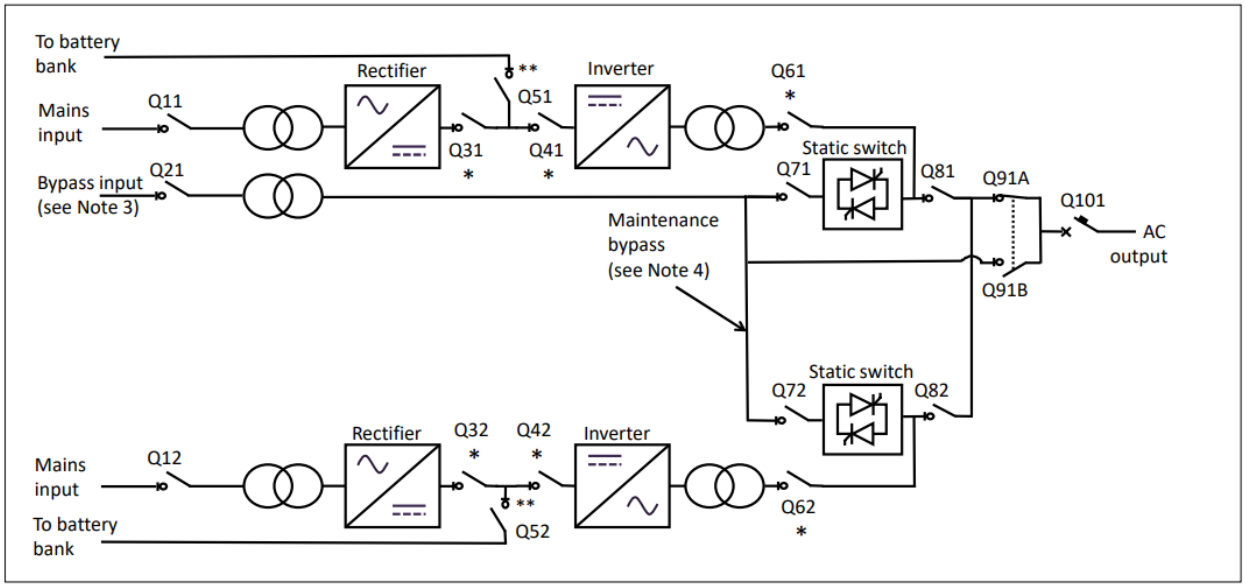
Q11	mains input breaker or switch
Q21	bypass input breaker or switch
Q31, Q41, Q61, Q71	internal isolator switch
Q51	internal battery circuit isolator switch
Q81 and Q91	interlocked maintenance bypass breaker or switch
Q101	AC output circuit breaker or switch

Figure A.2 – Simplified single UPS with bypass

A.3 Parallel UPS

A.3.2 Parallel UPS with common bypass

Replace Figure A.3 with Figure A.3 a) and Figure A.3 b)



NOTE Figure A.2, notes 1 to 5 apply.

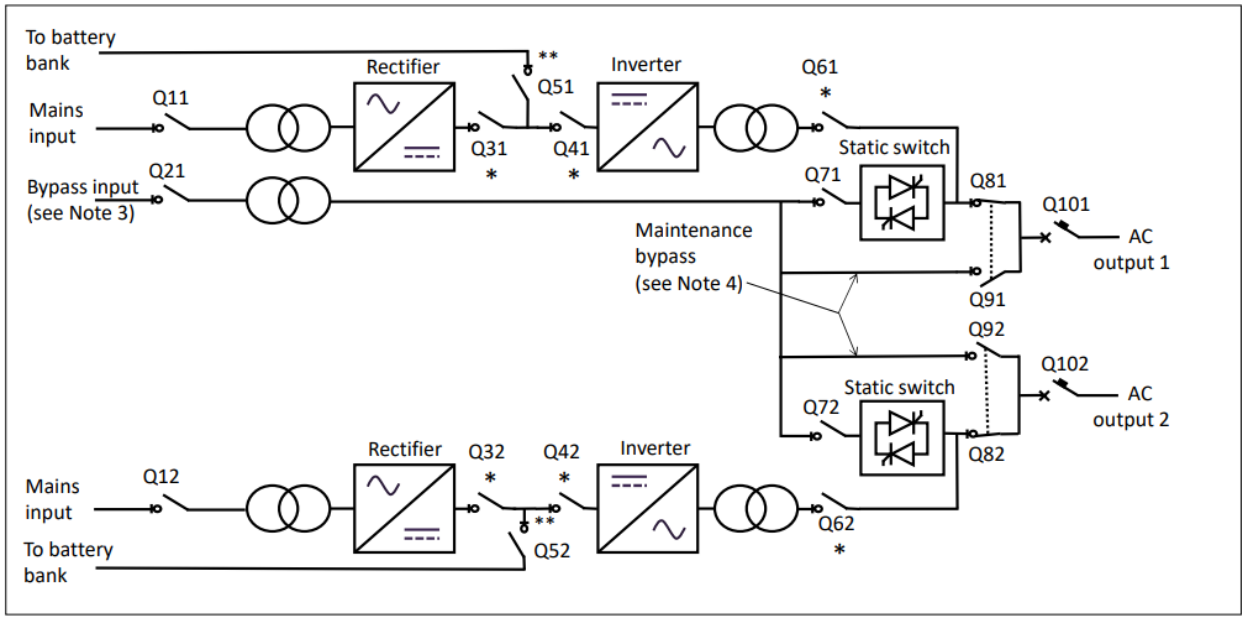
* Switches should be installed where rectifier, inverter and static switch sections have physical separation for complete supply isolation and prevent access to live parts.

** The switch is installed inside the AC UPS, while the battery isolator (see 7.9) is external to (i.e. outside) the AC UPS.

Key

Q11, Q12	mains input breaker or switch
Q21	common bypass input breaker or switch
Q31, Q32, Q41, Q42, Q61, Q62, Q71, Q72	internal isolator switch
Q51, Q52	internal battery circuit isolator switch
Q81, Q82	individual module output isolator switch
Q91A and Q91B	interlocked maintenance bypass breaker or switch
Q101	AC output circuit breaker or switch

Figure A.3 a) – Simplified parallel UPS with common bypass and common output



NOTE Figure A.2, notes 1 to 5 apply.

* Switches should be installed where rectifier, inverter and static switch sections have physical separation for complete supply isolation and prevent access to live parts.

** The switch is installed inside the AC UPS, while the battery isolator (see 7.9) is external to (i.e. outside) the AC UPS.

Key

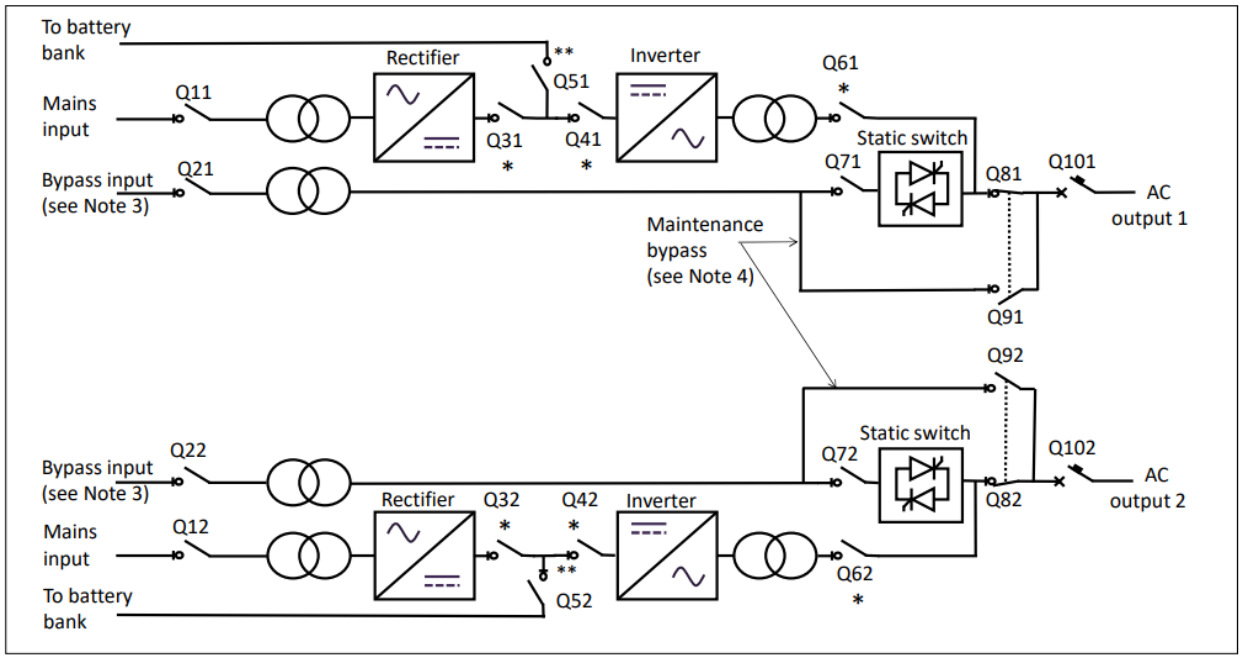
Q11, Q12	mains input breaker or switch
Q21	common bypass input breaker or switch
Q31, Q32, Q41, Q42, Q61, Q62, Q71, Q72	internal isolator switch
Q51, Q52	internal battery circuit isolator switch
Q81 and Q91, Q82 and Q92	interlocked maintenance bypass breaker or switch
Q101, Q102	AC output circuit breaker or switch

Figure A.3 b) – Simplified parallel UPS with common bypass and separate output

A.4 Dual bus UPS

A.4.1 Basic dual bus UPS

Replace Figure A.6 with



NOTE Figure A.2, notes 1 to 5 apply.

* Switches should be installed where rectifier, inverter and static switch sections have physical separation for complete supply isolation and prevent access to live parts.

** The switch is installed inside the AC UPS, while the battery isolator (see 7.9) is external to (i.e. outside) the AC UPS.

Key

Q11, Q12	mains input breaker or switch
Q21, Q22	bypass input breaker or switch
Q31, Q32, Q41, Q42, Q61, Q62, Q71, Q72	internal isolator switch
Q51, Q52	internal battery circuit isolator switch
Q81 and Q91, Q82 and Q92	interlocked maintenance bypass breaker or switch
Q101, Q102	AC output circuit breaker or switch

Figure A.6 – Simplified dual bus UPS with bypass

Annex D
(informative)
Purchaser specification guidelines

D.5 UPS technical data sheet – Manufacturer's declaration

Replace second sentence with

The manufacturer's equipment data sheet submitted post order shall contain the AC UPS technical data in accordance with Table D.1.

Bibliography

Add to start of Bibliography

The following documents are informatively cited in the text of this document, IEC 62040-3, the PDS (IOGP S-701D) or the IRS (IOGP S-701L).

Add to Bibliography

ATEX Directive (2014/34/EU), *Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres*

Ecodesign Directive (2009/125/EC), *Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products*

Electromagnetic Compatibility Directive (EMCD) (2014/30/EU), *Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility*

IEC 61439-2:2020, *Low-voltage switchgear and controlgear assemblies – Part 2: Power switchgear and controlgear assemblies*

IEC 62402, *Obsolescence management*

IEEE 802.3, *IEEE Standard for Ethernet*

ISO/IEC Directives, Part 2, *Principles and rules for the structure and drafting of ISO and IEC documents*

Low Voltage Directive (LVD) (2014/35/EU), *Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits*

PIP ELSAP04 *, *Uninterruptible Power Supply (UPS) System Specification*

* Cited in IOGP S-701J only.

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