AEC

ONLINE UPS · DOUBLE CONVERSION

IST7

10–40 kVA

Three-phase online double-conversion UPS with output power factor 1: three-phase or single-phase output, internal or external batteries, touch-screen display.



IST7-30 · 40

IST7-10 · 20

96%

System efficiency up to 96% in double conversion · 99% in ECO mode (single UPS)

PF 1

Output power factor: kVA = kW, settable to 0.9

176–280 V

Full power input window; down to 80 V with linear derating

0.4%

Failure rate over 10,000 units sold in the last 2 years

KEY FEATURES

Key features
IST7 10–40 kVA

Technical values from the IST7 10–40 kVA user manual; failure rate from AEC sales and service records.

0.4%

Field failure rate

Failure rate of 0.4% over more than 10,000 IST7 units sold by AEC in the last two years.

3/3 · 3/1 · 1/1

Three input / output configurations

Three-phase or single-phase output from the same model; 10–20 kVA also single-phase in and out.

±96...240 V

Battery voltage set on site

From 16 (10 kVA) or 24 (20–40 kVA) up to 40 × 12 V blocks per string, set on site (page 68): the battery is matched to the site and the budget.

S + BB

Internal and external batteries

The same model with internal batteries (S) also takes an external battery cabinet for longer autonomy.

4 units

Up to 4 in parallel

With the optional parallel kit, up to four units work as one system, in redundant (N+1) or expand mode.

Touch

Touch-screen display

Every measurement, setting and record on one colour touch screen, with settings protected by an administrator login.

OPERATING COST

Annual losses at 32 kW

Losses are dissipated as heat: they are paid as energy consumption and again as cooling load.

		ENERGY LOST / YEAR	COST / YEAR
Online double conversion · 96 %	1.33 kW	11,680 kWh	≈ € 2,340
ECO mode · 99 %	0.32 kW	2,830 kWh	≈ € 570

IST7-40 at 80% load (32 kW), 8,760 h/year, € 0.20/kWh, cooling excluded; 96% (double conversion) and 99% (ECO, single UPS only). Losses = P × (1/η − 1). Indicative values.

TYPICAL APPLICATIONS

- Servers & data centres
- Telecom systems
- Finance & stock
- Networks
- Railway
- Postal services

RANGE

Models and dimensions
IST7 10–40 kVA

IST7-10 and IST7-20 share the 250 mm cabinet, IST7-30 and IST7-40 the 300 mm cabinet. Display, functions and options are identical; rating, dimensions and wiring differ.



Differences between the two cabinets

Difference	IST7-10 · 20	IST7-30 · 40
Ratings · kVA = kW	**10 · 20**	**30 · 40**
Input / output	**3/3 · 3/1 · 1/1**	**3/3 · 3/1**
Internal batteries (S), 12 V 9 Ah	**16 – 40 blocks (10) · 36 or 40 (20)**	**2 × 36 or 2 × 40 blocks**
Output distortion, resistive load	**≤ 2%**	**≤ 1%**
Max. input current, 3/3	**19.5 A (10) · 35.5 A (20)**	**65.7 A (30) · 81.7 A (40)**
Feet	**castors**	**castors and levelling feet**

Common to both cabinets

Touch-screen display · Output PF 1 · THDi ≤ 3% (≤ 5% non-linear) · Up to 4 in parallel · Dry contacts: 5 out, IN.1, EPO · RS485 + 2 slots · IP20 · < 55 dB · −5 … 40 °C

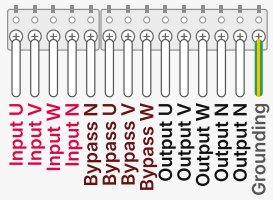
CONFIGURATION

Configurations
IST7 10–40 kVA

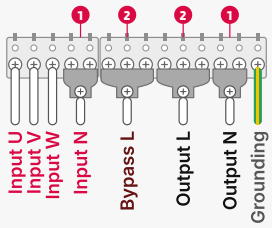
Input/output configuration, battery voltage and battery location are defined at installation: one model covers projects with different loads and autonomy requirements.

1 · Input / output configuration

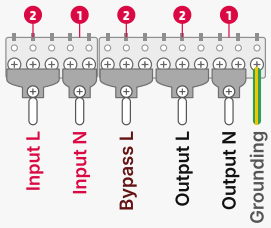
Set through the wiring, the optional connector jumpers, the screen and, on 30–40 kVA, the mode connector. 10–20 kVA terminal wiring from the user manual; circled 1 and 2 are the connector jumper types:



3/3
three-phase in and out
Fig. 3-14



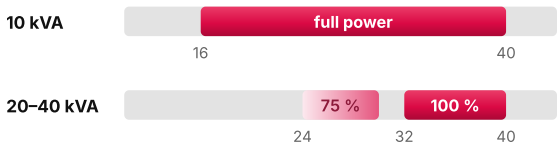
3/1
three-phase in, single-phase out
Fig. 3-16



1/1
single-phase in and out, 10–20 kVA only
Fig. 3-17

2 · Battery voltage set on site

The number of cells is set from the display: ±48 ... ±120 cells on 10 kVA, ±72 ... ±120 on 20–40 kVA, that is ±96 ... ±240 Vdc on 10 kVA and ±144 ... ±240 Vdc on 20–40 kVA. On 20–40 kVA, full power from ±96 cells (32 blocks); with ±72 ... ±90 cells (24–30 blocks) the output is limited to 75% of rating.



12 V blocks per string (± half on each side of N)

3 · Internal and external batteries, same model

A standard model works with an external cabinet; an S model has its batteries inside and grows with a BB4 (a BB5 for the largest 9 Ah totals) for longer back-up time.



Standard + external cabinet

No internal batteries: BB5 to BB8 cabinets, sized for the autonomy needed.

IST7-20-32X40 · BB5, 32 × 12 V 40 Ah



S model, internal batteries

Batteries inside the UPS cabinet: compact, no extra floor space.

IST7-10-32X9 · 32 × 12 V 9 Ah inside



THE STANDARD BUNDLE

S model + BB4

An S model is extended with a BB4 (up to 80 blocks): the same 12 V 9 Ah blocks and string voltage as the internal battery, so the strings work as one. The BB4 cabinet matches the IST7 10–20 kVA style: 255 × 755 × 880 mm, on wheels. For 150–200 blocks, a BB5 (up to 120 × 9 Ah).

CODES IST7-10 / -20-... (* IST7-30 / -40-...) · INTERNAL + BB4

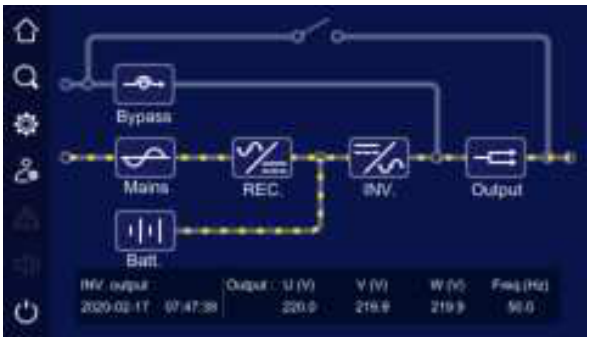
60X9 30 + 30	**64X9** 32 + 32	**72X9** 36 + 36	**80X9** 40 + 40	**96X9** 32 + 64
108X9 36 + 72	**120X9** 40 + 80	**144X9*** 72 + 72	**160X9*** 80 + 80	

Codes from the AEC code list (* IST7-30 and IST7-40). Battery strings with the neutral at the midpoint.

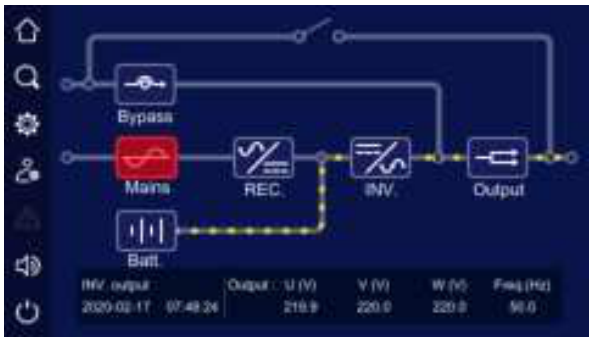
ARCHITECTURE

Operating principle
IST7 10–40 kVA

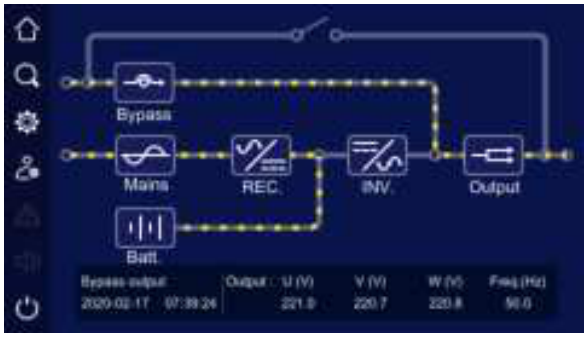
Mains mode



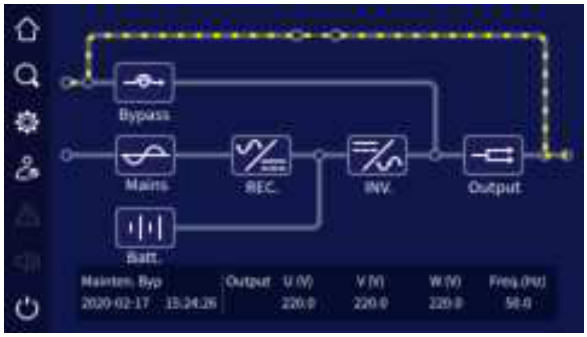
Battery mode



Bypass mode



Maintenance bypass



Mains mode

The rectifier/PFC converts the mains to a DC bus; the inverter rebuilds a pure sine wave for the load. The charger charges the battery at the same time.

Battery mode

When the mains is abnormal the rectifier switches to the battery input and boosts the battery voltage onto the DC bus: the inverter output continues without a break.

Bypass and maintenance

The static switch transfers the load to the bypass on overload or inverter fault. The maintenance bypass supplies the load while the UPS is de-energised.

220 · 230 · 240 V

Output phase voltage set from the screen (380 / 400 / 415 V line), output voltage adjustment −5 … +5 V

50 / 60 Hz

Output frequency, set from the screen

3 + N + PE

Input and output; settable to 1 + N + PE on 10–20 kVA

Four function modules

AC → DC

Rectifier / PFC

Input power factor ≥ 0.99, THDi ≤ 3% at resistive full load. In battery mode it boosts the battery voltage onto the DC bus.

DC → AC

Inverter

Three-level inverter, pure sine wave, output PF 1 (settable 0.9). Voltage distortion ≤ 1% (30–40 kVA) or ≤ 2% (10–20 kVA) at resistive full load.

DC → DC

Charger

Charges the battery while the mains is normal: equalising and floating charge, with the charge current set on site (page 77).

BYPASS

Static switch

Transfers the load to the bypass on overload or fault (transfer times on page 75). Maintenance bypass for service.

DIMENSIONS AND INSTALLATION

Front and rear views
IST7 10–40 kVA

Two cabinets with the same front, display and rear layout: 250 mm wide for 10–20 kVA, 300 mm wide and taller for 30–40 kVA.



10–20 kVA · FRONT · REAR

30–40 kVA · FRONT · REAR

10–20 kVA

250 mm

width
depth 806 mm
height 880 mm
64 kg standard

30–40 kVA

300 mm

width
depth 842 mm
height 1250 mm
102.5 kg standard

Views not to the same scale.

REAR PANEL · 10–20 kVA

- **1–6** **Communication ports** card slots, parallel port, RS485 and dry contacts: see page 78
- **7** **Input breaker**
- **8** **External battery port**
- **9** **Bypass breaker**
- **10** **Battery breaker**
- **11** **Output breaker**
- **12** **Gate-controlled switch** releases when the maintenance breaker cover is removed
- **13** **Maintenance breaker** behind a cover
- **14** **Wiring terminals** input, bypass, output, PE

Numbers as in the user manual, Fig. 2-4. The 30–40 kVA rear has the same functions in the taller cabinet (Fig. 2-6).

Dimensions and weight

Model	Size W × D × H (mm)	Standard	S
IST7-10	250 × 806 × 880	64 kg	95 kg
IST7-20	250 × 806 × 880	64 kg	137.6 kg
IST7-30	300 × 842 × 1250	102.5 kg	249.7 kg
IST7-40	300 × 842 × 1250	102.5 kg	249.7 kg

Standard: without internal battery. S: with internal battery.
IST7-40 T (internal transformer): 222 kg.

Installation

- IP20, on a flat floor without vibration, gradient < 5°
- Operating temperature −5 ... 40 °C (recommended 20–25 °C), humidity 0–95% non-condensing
- Noise < 55 dB (25 °C)
- Up to 2000 m; above, derating to IEC 62040-3

Free space

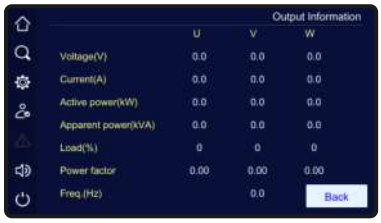
300 mm

minimum from the rear panel to the wall or other equipment; 300–500 mm at the rear and sides for ventilation.

Technology
IST7 10–40 kVA

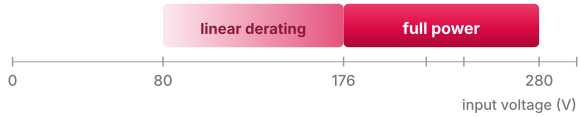
Three-level inverter with PFC rectifier

Three-level inverter technology with PFC control: clean output voltage wave and high system efficiency. The output page shows voltage, current, power, load and frequency live.



Input voltage range

Full power from 176 to 280 V input; from 176 V down to 80 V the rated power decreases linearly. At low load the battery does not discharge while the mains is above 80 V, so it stays fully charged.



≤1%
Output voltage distortion at resistive full load, 30–40 kVA (≤ 2% on 10–20 kVA)

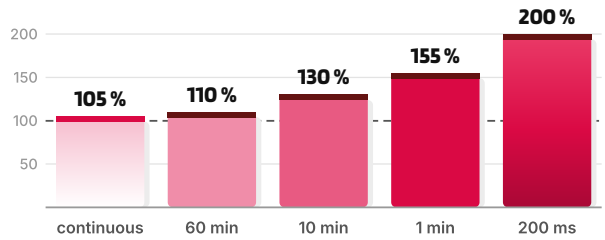
≤4%
Output voltage distortion at non-linear full load, all ratings

±0.1 Hz
Output frequency, 50 or 60 Hz, when the bypass is absent or out of range

Overload capacity

Overload capacity of inverter and bypass from the technical data, with output power factor 1.

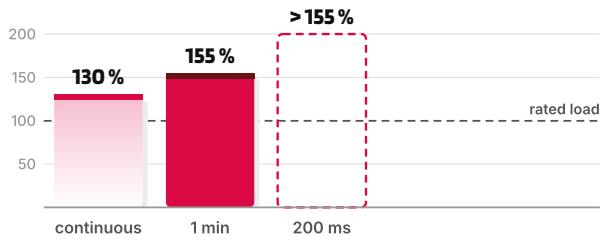
Inverter



> 200 % · immediate protection · output PF 1

With PF 0.9: < 105% continuous · 115–130% 15 min · 130–155% 1 min · 155–200% 200 ms.

Bypass



> 155 % · 200 ms

Input and bypass frequency limits

The rectifier accepts any input frequency from 39.5 to 70.5 Hz: inside this window the load stays on the inverter without using the battery. The bypass has its own, narrower limits, set from the screen: frequency ± 5 or 10%, voltage 10, 15 or 20% (default 20%).

Protections

- Battery under-voltage
- Overload and short-circuit
- Over-temperature
- Input over-voltage
- Communication abnormal

OPERATOR PANEL

Operator panel
IST7 10–40 kVA

Colour touch screen, five status LEDs and paired ON/OFF keys on the front panel. EPO for emergency shutdown and BATT. Start for a start without mains.



1. **Colour touch screen**
   Live topology, measurements, settings and records.
2. **Five status LEDs**
   AC/DC · DC/AC · BYP. · BATT. LOW · OVERLOAD, each with its symbol. Green normal, red abnormal.
3. **ON key pair**
   Press both keys until the beep: the UPS powers on. No accidental switching.
4. **OFF key pair**
   Press both keys for 3 s: the UPS powers off.
5. **EPO**
   Emergency power off: the output is cut at once.
6. **BATT. Start**
   Below the panel. Hold 7 s, then ON: start from the battery without mains.

LED	● green	● red
AC/DC	rectifier normal	rectifier abnormal
DC/AC	inverter normal	inverter abnormal
BYP.	bypass output	bypass abnormal
BATT. LOW	—	battery low voltage
OVERLOAD	—	overload or overload protection

Access, alarms and screen settings



Screen settings
Date, time, language, backlight time and brightness, set on the HMI setting page.



Current fault
The fault icon lights when a fault is active; the page lists the active faults with date and time.



Command confirmation
ON and OFF commands from the screen are executed only after confirmation.

5
status LEDs: AC/DC, DC/AC, BYP., BATT. LOW, OVERLOAD

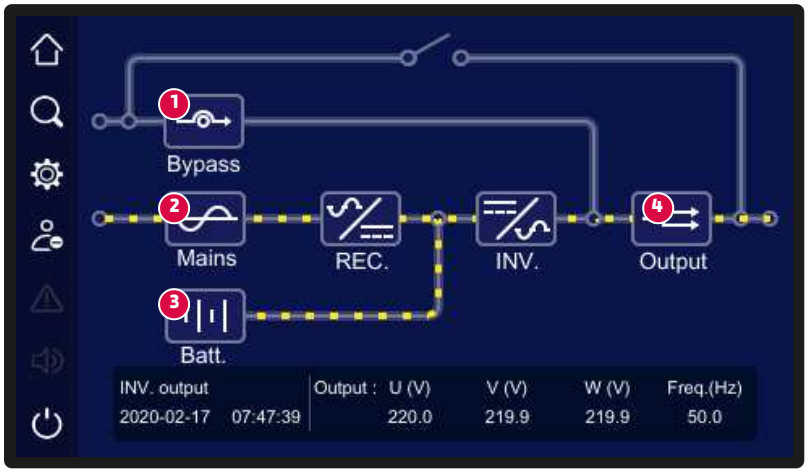
2
key pairs, ON and OFF, to prevent accidental switching

3 s
OFF key pair held to switch the UPS off

7 s
BATT. Start held to start the UPS from the battery

TOUCH SCREEN

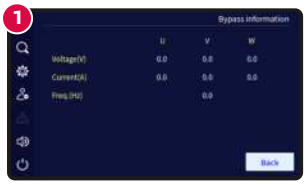
Touch screen display
IST7 10–40 kVA



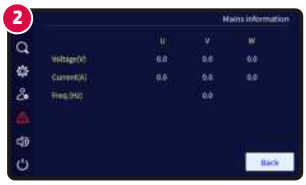
Home page: live single-line diagram

The home page shows the UPS topology in real time. The dotted line traces the active power path; a block turns red when its section is abnormal. The bottom line shows operating mode, date, time, output voltage per phase and frequency.

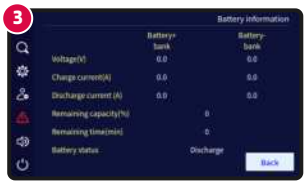
Touch a block to open its information page (1–4 below). The icons on the left open information, settings, current fault, buzzer, login and ON/OFF.



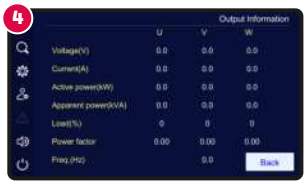
Bypass
Phase voltage, current and frequency of the bypass input



Mains
Phase voltage, current and frequency of the mains input



Battery
Voltage and current of both battery groups, remaining capacity and time, status



Output
Voltage, current, active and apparent power, load, power factor, frequency

Menus



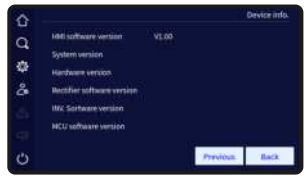
Information menu
Run info, history record, user log, device info



Settings menu
System, battery, battery test, dry contacts, communication, HMI, password, device configuration, dedust, records



Run info
Status of mains, bypass, battery, output, load, rectifier and inverter; work mode



Device info
Model, serial number and software versions of rectifier, inverter, system and HMI

4
touch blocks: bypass, mains, battery, output

6
operating states shown on the home page

10
setting pages, administrator access

2
access levels: user reads, administrator reads and sets

RECORDS

Event records and export
IST7 10–40 kVA

The UPS stores faults, alarms and operator actions with date and time. Records are read on the touch screen and exported to a USB flash drive for service analysis.

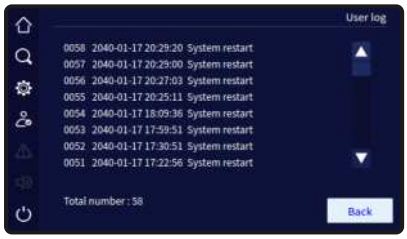


History record

Fault and alarm information listed by time, newest first, with the total number of records at the bottom of the page.

User log

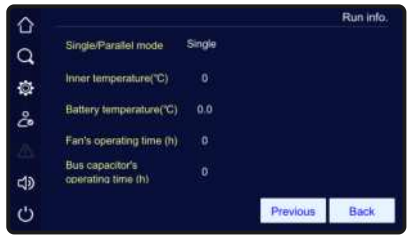
Operations and setting changes, such as ON/OFF commands and mains or bypass voltage range settings, listed by time, newest first.



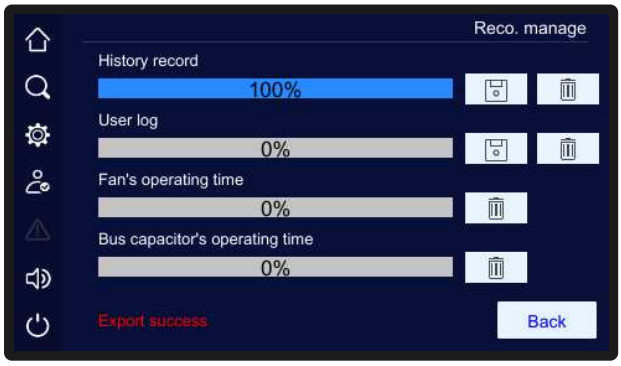
User log
Each operation with date and time.



Current fault
Active faults, opened from the fault icon.



Run info, page 2
Inner and battery temperature, fan and bus-capacitor operating time.



Record management and USB export

On the record management page the administrator exports the history record and the user log to a USB flash drive, or clears them after a confirmation prompt.

- Export of history record and user log to USB
- Clearing only after a confirmation window
- Status line: export success or USB drive not inserted
- Reset of fan and bus-capacitor operating time after replacement

HOW THE RECORDS ARE USED

Fault diagnosis

AEC service reads the history record to identify the cause and sequence of an event.

Traceability

The user log documents which setting was changed and when.

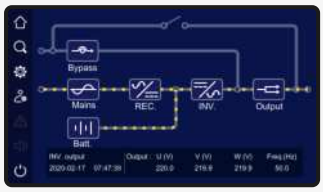
Maintenance planning

Fan and bus-capacitor operating times show when components are due for replacement.

OPERATING MODES

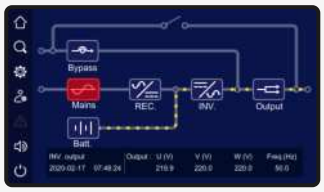
Operating modes and transfer times
IST7 10–40 kVA

The home page shows the active operating mode. Screens of the IST7 10–40 kVA; the dotted line marks the active power path.



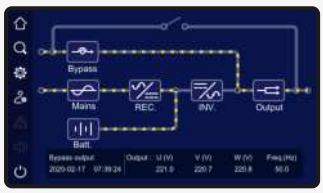
Online double conversion

Normal mode. Rectifier/PFC and inverter supply the load with a regulated sine wave; the charger keeps the battery charged.



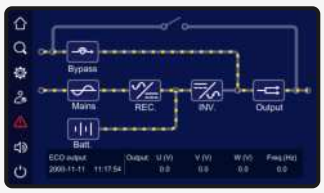
Battery mode

Mains abnormal (mains block in red). The battery supplies the DC bus through the rectifier; the output continues without interruption.



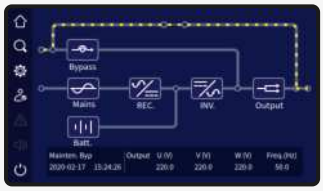
Bypass output

The static switch supplies the load from the bypass line, for example on overload or inverter fault.



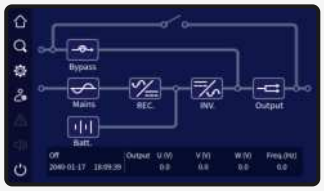
ECO mode

Single UPS only. The load runs on the bypass while voltage and frequency are within the ECO window; efficiency up to 99%.



Maintenance bypass

Maintenance breaker closed: the load is supplied directly from the bypass line while the UPS is de-energised.



UPS off

No energy transmission to the output: state before start-up or after shutdown.

TRANSFERS BETWEEN MODES

0 ms
mains → battery: the rectifier switches to the battery input without interruption

<1 ms
inverter ↔ bypass, synchronised (<10 ms not synchronised)

Auto
return to mains mode when the mains recovers

5×
same inverter fault more than 5 times in a short time: the UPS stays on bypass

Maintenance without interruption

Built-in maintenance bypass with gate-controlled switch: the load stays supplied during service.

01 Remove the cover
Removing the maintenance breaker cover releases the gate-controlled switch.

02 Inverter off
The UPS switches off the inverter and transfers the load to the bypass.

03 Maintenance breaker on
Then input, bypass and output breakers off: no voltage inside the UPS.

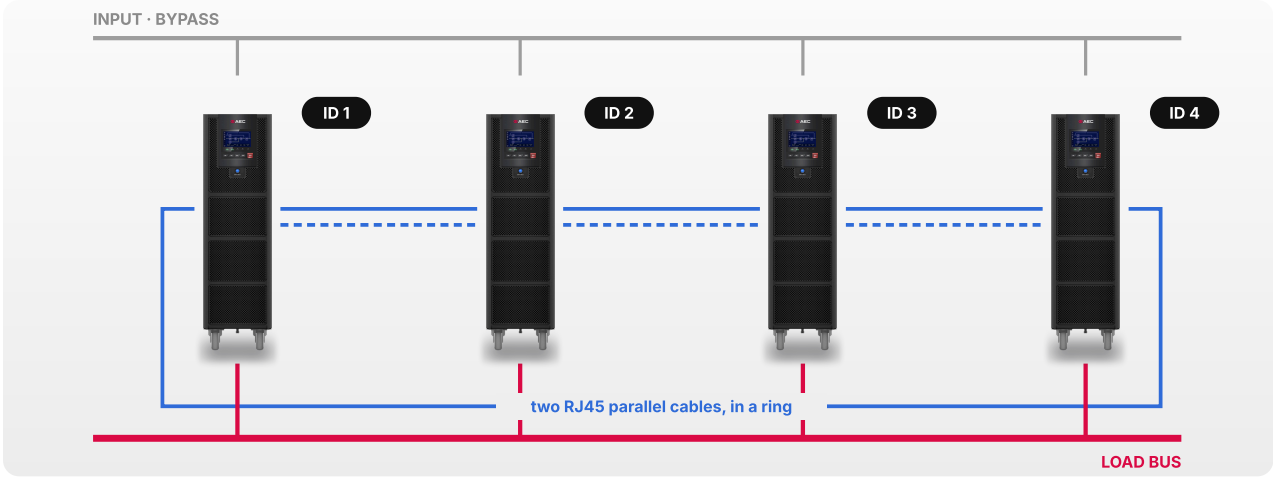
04 Return to normal
Breakers on, maintenance breaker off when the bypass voltage is present, cover refitted, ON.

End of autonomy and restart

Sequence after a mains failure longer than the battery autonomy.

- **Mains lost** — battery mode, no break
- **Alarm** — acoustic and visual
- **Low-voltage point** — the UPS stops the output
- **≈ 1 min** — complete shutdown
- **Mains back** — automatic restart

Parallel operation
IST7 10–40 kVA



From single unit to parallel system

The standard UPS is a single unit. The optional parallel kit is a built-in card for CAN communication between the units: it is installed in the parallel port with the UPS off, then the parallel mode is set from the screen.

Redundant parallel communication

The two RJ45 parallel ports are identical and redundant: they back each other up to increase reliability. The UPS raises an alarm if one of them is not connected.

N+1 redundancy

The total output is kept within N times the rating of one UPS. A faulty unit can leave or rejoin the system without affecting the load. Above that limit each unit raises an alarm: with two units in redundancy, it comes when each unit carries more than 50% of its rating (total load above the rating of one unit).



Run info of a parallel unit: single / parallel mode, redundant.

Settings

Item	Settable value
Parallel mode	Redundant, Single, Expand, BSC
Parallel UPS ID	1–4
Work configuration	3/3, 3/1 (10–20 kVA also 1/1)



Shared battery

Units in parallel can share battery groups; each UPS must have the same battery amount and the same battery parameters.

Same wiring

Wiring and phase sequence must be strictly the same on every unit, so the bypass of the system is in phase.

ECO and parallel

ECO mode is for a single UPS. Start, shutdown and exit of one unit follow the parallel procedures in the manual.

EXAMPLE

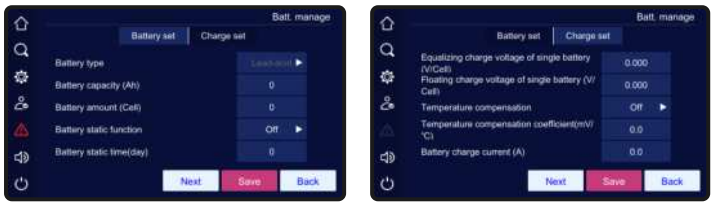
N+1 in practice: four 20 kVA units carry a 60 kVA load with one unit spare, so any unit can stop for service while the load stays protected.

BATTERIES

Battery management
IST7 10–40 kVA

Split battery, neutral at the midpoint

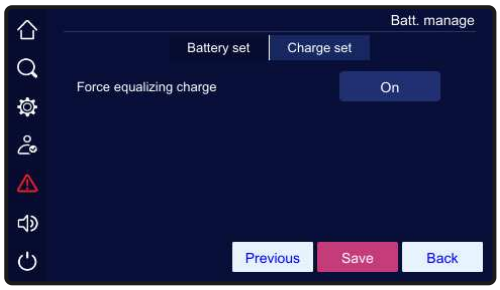
Positive and negative battery groups with the neutral at the midpoint. Default 10 kVA: ±48 cells; 20–40 kVA: ±96 cells. Number of cells, capacity, charge voltages and charge current are set on the battery management pages.



Battery set and charge set pages.

Equalising, floating, forced

The charger runs equalising and floating charge at the voltages set per cell. An equalising charge can also be forced from the charge settings page.



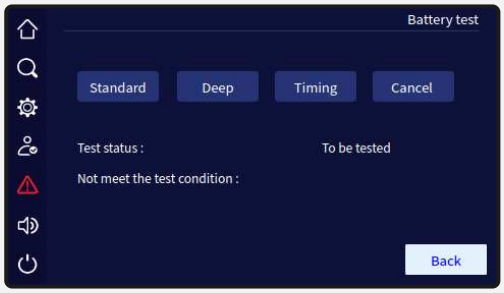
Charge set page: force equalising charge.

Battery management settings

Battery type	**Lead-acid**
Battery capacity	**1–2000 Ah**
Battery amount (2 V cells)	**±48 … ±120 (10 kVA) · ±72 … ±120 (20–40 kVA)**
Equalising charge voltage	**2.083–2.417 V/cell**
Floating charge voltage	**2.083–2.333 V/cell**
Low-voltage protection	**1.667–1.867 V/cell**
Test ending voltage	**1.667–1.867 V/cell**
Temperature compensation	**On / off, 0–5.0 mV/°C**
Charge current	**1–10 A (10–20 kVA) · 1–20 A (30–40 kVA)**

Battery test

Standard test or deep test, started and cancelled from the screen. The page shows test status, battery current, consumed capacity and test time.



Battery test page: standard, deep, timing or cancel.

Battery maintenance intervals

10 h
first charge of internal batteries before use; the UPS can be used meanwhile

4–6 months
one full discharge and recharge (every 2 months in hot areas)

3 months
recharge of more than 10 h if the UPS is not used

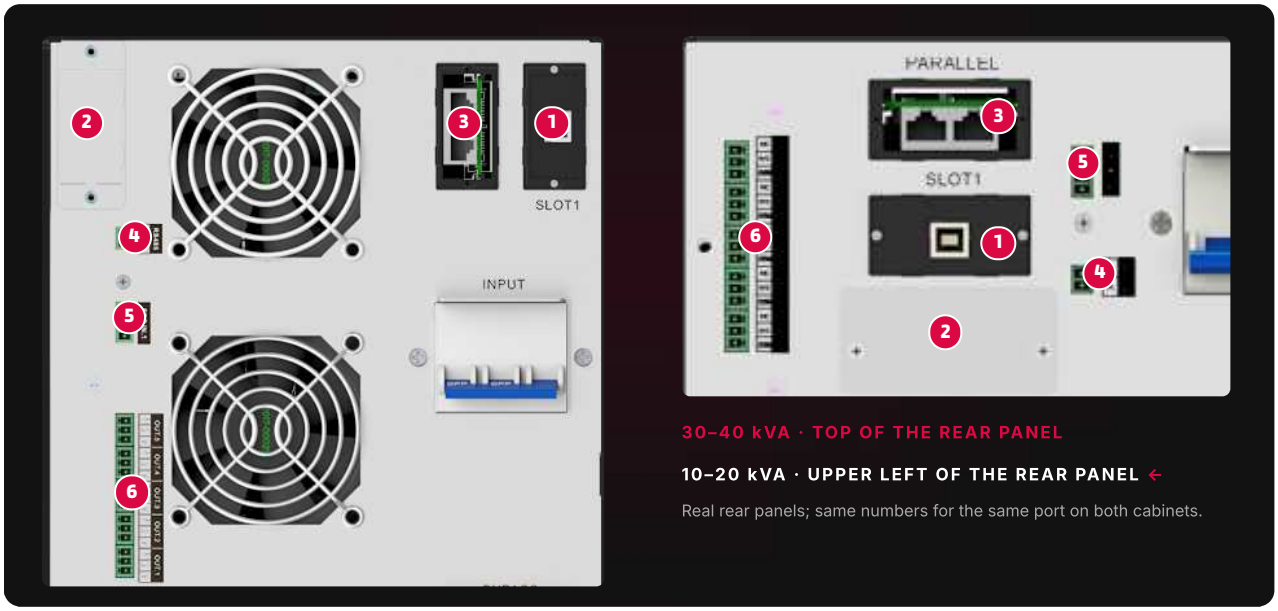
3–5 years
typical battery life, depending on temperature and discharges

Battery replacement by authorised personnel only. Batteries of one string must be of the same type, model and manufacturer.

COMMUNICATION

Communication and connectivity
IST7 10–40 kVA

All communication ports are on the rear, in the same set on both cabinets: two card slots, parallel port, RS485 and two dry-contact blocks.



1 **Intelligent slot 1**
SNMP, dry-contact or protocol card

2 **Intelligent slot 2**
second optional card

3 **Parallel port**
two RJ45, with the parallel kit

4 **RS485**
to a PC or a BMS: A to A(+), B to B(−)

5 **Dry contact 2**
EPO and programmable input IN.1

6 **Dry contact 1**
five relay outputs OUT.1 … OUT.5

The rear RS485 port cannot be used when slot 2 is in use. Manual numbering differs (Fig. 2-4 and 2-6). Optional cards and the parallel kit are available from AEC.

1 input + EPO · 6 functions

IN.1 assigned from the display, NC or NO; default charge forbidden.

- Charge disabled
- External MBB on
- External BB status
- UPS remote ON/OFF
- Batt. ground fault
- Discharge disabled

5 outputs (NO / NC / COM) · 13 functions

NO / NC / COM, each assigned from the display. Defaults: mains, bypass, battery, output abnormal, overload.

- Mains abnormal
- Bypass abnormal
- Battery abnormal
- Output abnormal
- Overload abnormal
- General abnormal
- Normal operation
- Battery operation
- Bypass operation
- UPS ON/OFF status
- Battery low
- ECO mode
- Fan fault

Contacts in detail

Relay rating
277 Vac / 30 Vdc / 10 A per contact; relay coil voltage 12 V.

Output logic
When a signal is valid, NO closes to COM and NC opens. “Battery abnormal” covers low voltage, over-voltage, over-temperature and a disconnected battery.

EPO
Closed for normal operation. Opening it shuts down inverter and bypass output; the EPO fault clears once the UPS is fully off and the contact is closed again.

External MBB on
Signal from an external maintenance bypass breaker: the UPS raises an alarm, turns off the inverter and transfers the load to the bypass.

TECHNICAL DATA

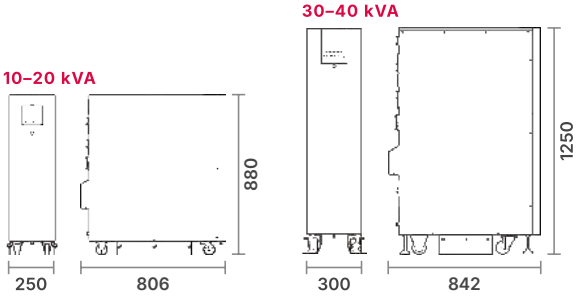
IST7 10–40 kVA

Model	IST7-10	IST7-20	IST7-30	IST7-40
Rated power (kVA / kW)	10 / 10	20 / 20	30 / 30	40 / 40
Input / output configuration	3/3 · 3/1 · 1/1		3/3 · 3/1	
INPUT				
Connection	3 + N + PE (settable 1 + N + PE)		3 + N + PE	
Voltage range	176–280 V at 100% load · 80–176 V with linear derating			
Frequency range	39.5–70.5 Hz			
Bypass synchronisation range · bypass voltage range	50 / 60 Hz ± 10% (self-adapting) · 10 / 15 / 20% (default 20%)			
Power factor · THDi	≥ 0.99 · ≤ 3% resistive full load, ≤ 5% non-linear full load			
BATTERY				
Battery voltage (Vdc)	± 96 … ± 240	± 144 … ± 240	± 144 … ± 240	± 144 … ± 240
Cells (2 V), settable · default	± 48 … ± 120 · ± 48	± 72 … ± 120 · ± 96	± 72 … ± 120 · ± 96	± 72 … ± 120 · ± 96
Charge current (A)	1–10 (default 1)		1–20 (default 2)	
OUTPUT				
Connection	3 + N + PE (settable 1 + N + PE)		3 + N + PE	
Voltage	L-N 220 / 230 / 240 V · L-L 380 / 400 / 415 V			
Frequency	tracks the bypass; with bypass absent or out of range 50 ± 0.1 or 60 ± 0.1 Hz (default 50)			
Waveform · power factor	sine wave · 1 (settable 0.9)			
Voltage distortion (resistive / non-linear)	≤ 2% / ≤ 4%		≤ 1% / ≤ 4%	
Transfer time inverter ↔ bypass	< 1 ms synchronised · < 10 ms not synchronised			
Inverter overload (PF 1)	< 105% continuous · 105–110% 60 min · 110–130% 10 min · 130–155% 1 min · 155–200% 200 ms · > 200% immediate			
Bypass overload	< 130% continuous · 130–155% 1 min · > 155% 200 ms			
SYSTEM				
System efficiency	up to 96% · 99% in ECO mode (single UPS)			
Parallel	up to 4 units with the optional parallel kit			
Display · communication	touch screen · RS485 · dry contacts: EPO, 1 input, 5 outputs · optional cards: SNMP, protocol transfer, dry-contact kit			
DC start · alarms	battery start equipped · battery low voltage, mains abnormal, UPS fault, output overload			
Environment	−5 … 40 °C · 0–95% RH non-condensing · IP20 · noise < 55 dB (25 °C) · up to 2000 m			
Dimensions W × D × H	250 × 806 × 880 mm		300 × 842 × 1250 mm	
Weight standard / S	64 / 95 kg	64 / 137.6 kg	102.5 / 249.7 kg	102.5 / 249.7 kg

20–40 kVA with ±72 … ±90 cells (24–30 blocks): output 75% of rating. S: with internal battery. IST7-40 T (internal transformer): 222 kg. Specifications are subject to change without notice.

Two frames

Outer dimensions in mm, to one scale (user manual Fig. 3-6 and 3-7).



Good to know

- Ratings are kVA = kW at output PF 1; PF 0.9 settable
- 10–20 kVA: single-phase input (1/1) also possible
- Battery voltage and capacity set on the screen at commissioning
- Ordering codes and battery configurations: see the ordering guide