AEC

PREMIUM SERIES

ONLINE UPS · Δ/Y ISOLATION TRANSFORMER

IST7-T

20–200 kVA

AEC's premium three-phase UPS. An IGBT rectifier that keeps the grid clean, true double conversion and a Δ/Y output transformer built into every model, with patented battery management and energy-storage functions. For industry, process and critical sites on demanding grids.



IST7T-20…80 · IST7T-100…200

Δ/Y
Output isolation transformer built into every model, 20 to 200 kVA

<5%
Input THDi, PF ≥ 0.99: IGBT rectifier, ±25% input window

100%
Three-phase unbalanced load; full kVA on non-linear load

0 ms
Transfer from mains to battery

WHY IST7-T

Key features
IST7-T 20–200 kVA

The IST7-T is AEC's top three-phase series: transformer-based reliability with the digital control, battery intelligence and energy functions of a new-generation UPS.

Δ/Y

Transformer built in

Δ/Y output transformer on every model: galvanic isolation of the inverter output, full kVA at 100% non-linear load, stronger against short circuit.

±25%

Made for difficult grids

IGBT rectifier with input PF ≥ 0.99 and THDi < 5%. Full load from −20% to +25% of rated voltage.

100%

Unbalanced loads

Withstands a 100% three-phase unbalanced load, on every model from 20 to 200 kVA.

Backfeed to grid

A battery test that saves energy

During the battery test the residual energy is fed back to the grid instead of being wasted.

Peak shift

Energy storage UPS

With lithium batteries the UPS charges off-peak and discharges at peak hours, on a plan curve or under EMS control.

Patented

Smart battery management

Patented smart charging and automatic battery tests, battery hibernation, cell voltage, internal resistance and temperature with the optional BMS.

PREDICTIVE MAINTENANCE

The UPS watches its own health

The UPS checks its own components and warns early, so service can be planned in advance.

Breaker

external battery breaker state detected, with alarm (option)

Capacitors

capacitor health monitored, with early warning

Fans

fan health monitored on 20–80 kVA, fan fault on a dry contact

Self-load

test mode simulates load on the inverter for on-site testing

DESIGNED FOR

Computer rooms · Communications · Finance & insurance · Railways · Medical care · Industry & mining

PREMIUM DETAILS

Design details
IST7-T 20–200 kVA

Beyond the transformer and the battery functions: the details that count when the IST7-T is installed, started and run on site.

Online

Parallel maintenance

A faulty unit leaves the parallel system by itself; units are removed or added online and share the load automatically.

N+x

Redundancy warning

In a parallel system a redundancy (N+x) warning can be enabled, set on the System management page.

Phase check

Input phase sequence

If the mains phases are connected in the wrong order, the phase sequence indicator on the panel goes on and the UPS does not power on normally.

Soft start

Rectifier soft start

At power-on the rectifier starts softly; the inverter output follows once the soft start is complete.

Switchgear

Switches on board

Mains, bypass, maintenance bypass and output disconnect switches inside the cabinet; breaker version on request (20–80 kVA).

Aux. supply

Power for instruments

An auxiliary power supply in the cabinet feeds external low-power instruments.

< 70 dB

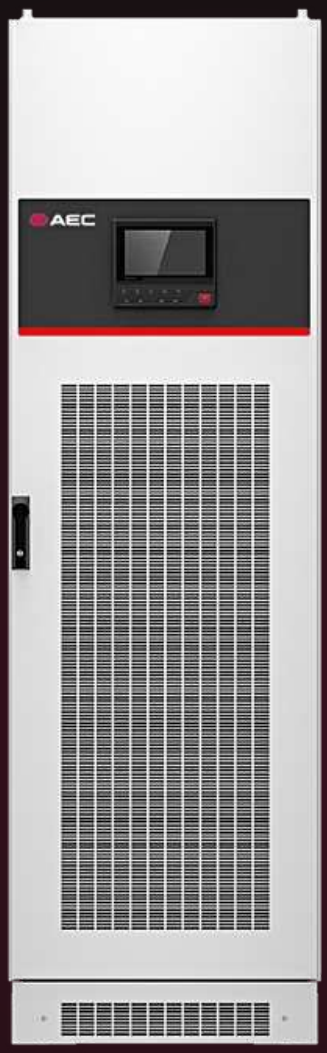
Quiet in operation

Noise below 65 dB on 20–80 kVA and below 70 dB on 100–200 kVA.

–20…55 °C

Storage range

Up to 6 months in storage; below –20 °C the UPS rests at 0 °C for at least 4 h before power-on.



20–200 kVA
seven ratings, two frames

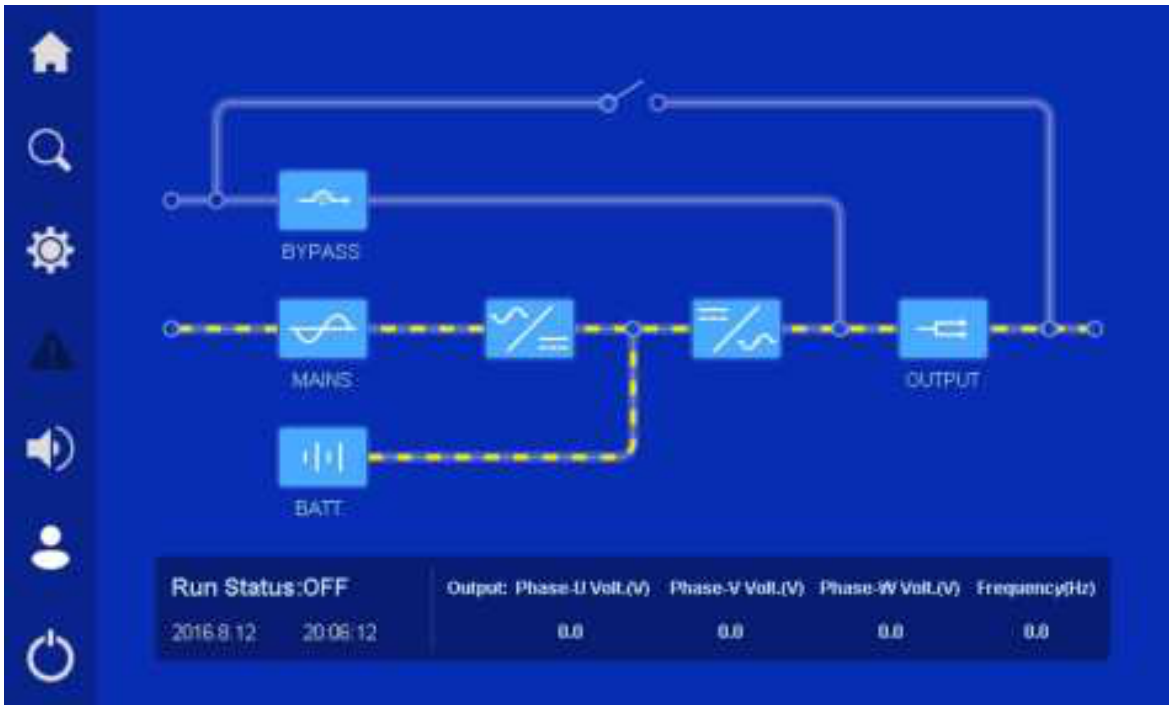
18–40
12 V blocks on one model: 216–480 V

Dual bus
2 or 4 UPS systems

1500 m
altitude without derating, 100–200 kVA

ARCHITECTURE

Operating principle
IST7-T 20–200 kVA



Separate bypass input as standard

Mains and bypass have their own input terminals, so they can come from two different sources. For a single-input installation the two inputs are linked with a jumper.

One converter for the battery

A bidirectional buck/boost DC/DC sits on the DC bus: it charges the battery and, when needed, feeds the DC bus from it. VRLA or lithium batteries.

380 · 400 · 415 V

Rated line voltage, input and bypass; output 220 / 230 / 240 V phase-to-neutral

3W + PE

Rectifier input without neutral; bypass input 3 phases + N + PE (4W + PE)

DSP

Inverter control, phase locking and logic fully controlled by the DSP

Four function blocks

AC → DC

IGBT rectifier

Input EMI filter and input contactor ahead of the three-phase PFC rectifier.

DC → AC

Inverter

High-efficiency IGBT inverter, sine wave with THDv < 1% on linear load. Zero phase-lag synchronisation between output and grid.

ISOLATION

Δ/Y transformer

Built in on every model, see p. 99.

BYPASS

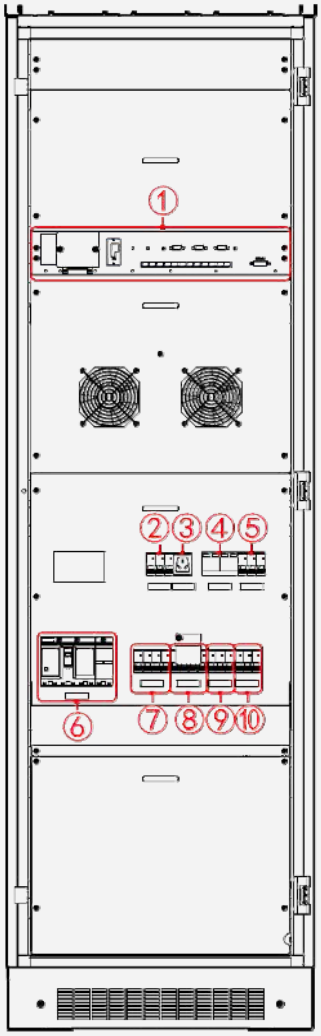
Static switch

1 ms transfer from inverter to bypass. Manual maintenance bypass to service the UPS with the load supplied.

INSIDE THE CABINET

Cabinet layout
IST7-T 20–200 kVA

Mains, bypass, maintenance bypass and output switches and the communication module sit behind the front door; cable terminals are at the bottom, behind a sealing panel.



IST7T 20–80 kVA with door open, user manual Fig. 2-6 (numbers as in the manual). 100–200 kVA: same components in a 1000 mm cabinet, numbered differently in the manual; on 100–120 kVA the communication module sits behind a blanking plate.

1. **Communication module**
   Terminal block, dry contacts, touch-screen interface, optional SNMP card and parallel interface.
2. **Battery cold start switch**
   Optional, for the bus capacitor: starts the UPS from the battery with no mains or bypass.
3. **Auxiliary power supply**
   Supplies external low-power instruments.
4. **Surge protection device**
   Optional class C SPD.
5. **SPD switch**
   Optional overcurrent protection of the SPD circuit.
6. **Battery switch**
   Optional battery connection switch.
7. **Output switch**
   Connects the UPS output to the load.
8. **Maintenance bypass switch**
   Supplies the load directly during service.
9. **Bypass switch**
   Connects the bypass input.
10. **Mains switch**
    Connects the rectifier input.

Front door
switches and communication module behind it

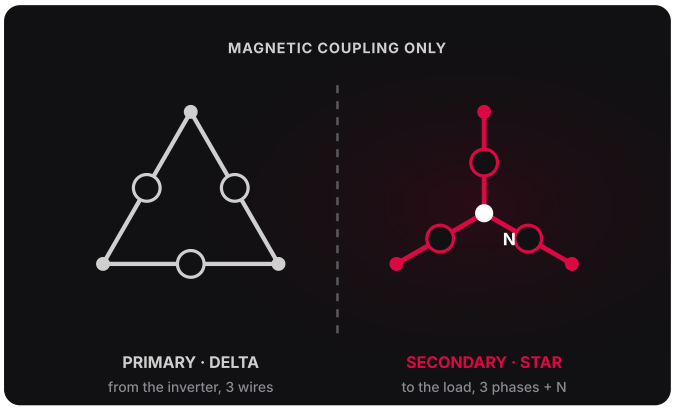
Copper busbar
output connection from 40 kVA; terminal block on 20 kVA

Top entry
cable entry optional up to 120 kVA; bottom entry as standard

IP20
IP21 with the optional waterproof top cover

Isolation transformer
IST7-T 20–200 kVA

The output isolation transformer is built into every IST7-T and matched to the inverter: no external transformer to add, size or install.



Δ/Y vector group: delta primary on the inverter, star secondary with the output neutral (schematic).

Where it sits

- Input EMI filter and contactor → three-phase PFC rectifier → DC bus → three-phase inverter
- **Δ/Y transformer** between the inverter and the output static switch
- Battery on the DC bus through the bidirectional buck/boost converter
- Bypass and maintenance bypass outside the inverter path

Order of the blocks as in the user manual, Fig. 2-14 (Architecture page).

1 **Galvanic isolation of the inverter output**
The transformer separates the load from the inverter and the battery DC circuit: power reaches the load through magnetic coupling only.

2 **Full kVA at 100% non-linear load**
The UPS runs heavily unbalanced loads and supplies its full kVA output capacity with 100% non-linear load.

3 **No inrush on the inverter**
Being matched to the inverter, it removes the effect of the excitation inrush current that an external high-power transformer produces at start-up.

4 **Stronger against short circuit**
Resistance to load short circuit is further improved, and so is the capacity for inductive loads.

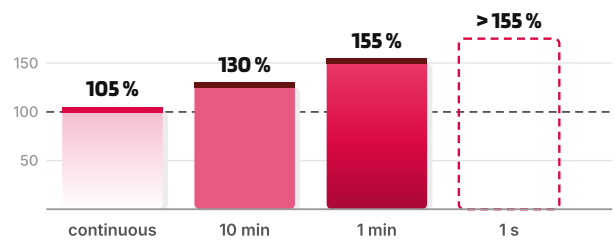
0.9
Output power factor (kW / kVA)

< 1%
Output voltage THD on linear load

±0.2%
Output frequency tolerance in battery mode, 50 Hz

Overload in inverter mode

Above the time limit the UPS transfers the load to the bypass.



then transfer to bypass · % of rated load

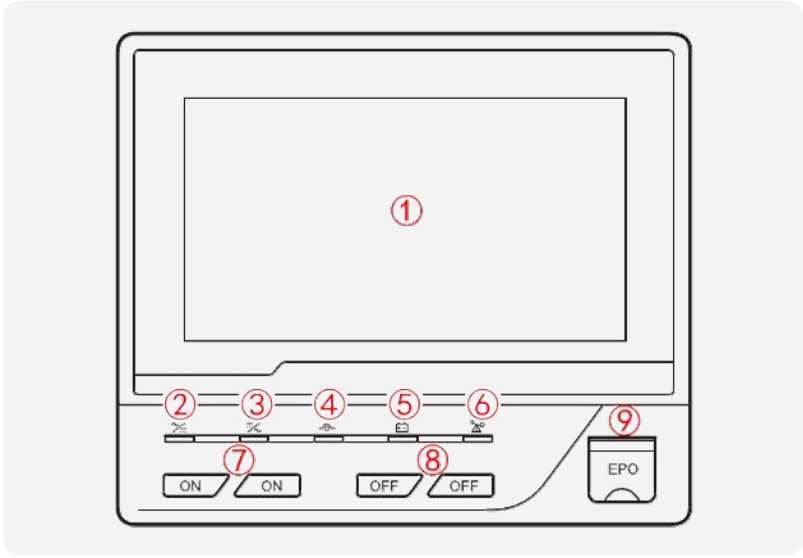
Output

- 220 / 230 / 240 V phase-to-neutral (380 / 400 / 415 V line).
- Sine wave; frequency tracks the bypass in normal mode.
- 1 ms transfer inverter → bypass.
- Zero phase-lag synchronisation between output and grid.
- Output on terminal block (20 kVA) or copper busbar (40–200 kVA).

OPERATING PANEL

Operator panel
IST7-T 20–200 kVA

A touch screen, five status indicators and paired ON / OFF buttons: on the panel, both buttons are pressed together. Power on and off is also available from the touch screen, with confirmation.

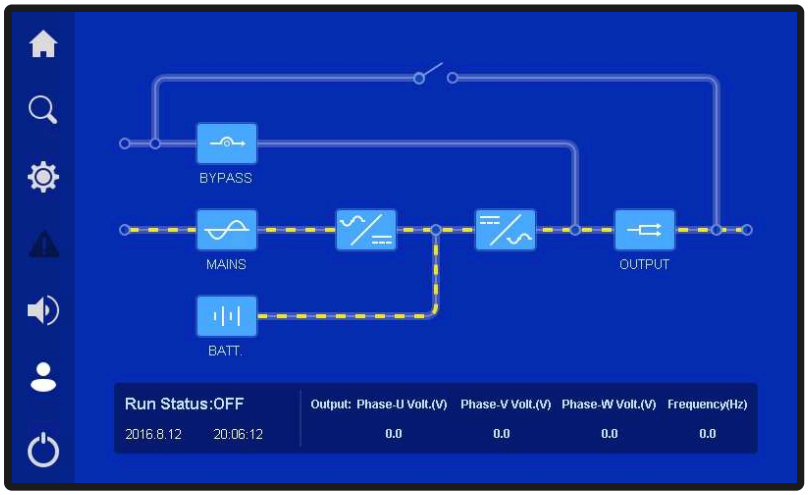


Operating panel, user manual Fig. 2-5 (numbers as in the manual).

1. **Touch-screen display**
   Operating parameters and status: voltage, current, load.
2. **Rectifier indicator**
   Green: running normally · red: abnormal · off: not running.
3. **Inverter indicator**
   Green: running normally · red: abnormal · off: not running.
4. **Bypass indicator**
   Green: bypass output · red: bypass abnormal · off: no bypass output.
5. **Battery indicator**
   Green: discharging normally · red: undervoltage protection · red blinking: battery abnormal · off: normal.
6. **Load indicator**
   Green: load normal · red: output overload · off: no output.
7. **ON**
   Power on: press both buttons together.
8. **OFF**
   Power off: press both buttons together.
9. **EPO**
   Emergency power off under a cover. Reserved function, disabled by default; enabled on request.

Home page

A live single-line diagram: the energy path is drawn in yellow, faulty blocks turn red. Below it, run status and output voltage and frequency per phase.



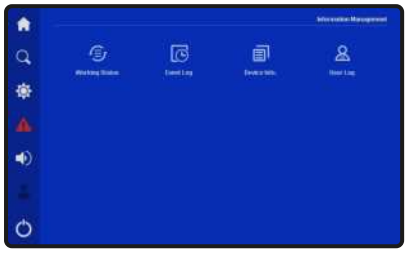
Side bar icons

- Home: system output status
- Information management
- Setting management
- Current fault
- Buzzer on / off
- Privileged login
- Power on / off

TOUCH SCREEN

Touch screen display
IST7-T 20–200 kVA

From the home page every block opens its own page: mains, bypass, battery and output. Settings sit behind the privileged login.



Information management

Working status, event log, device info and user log.



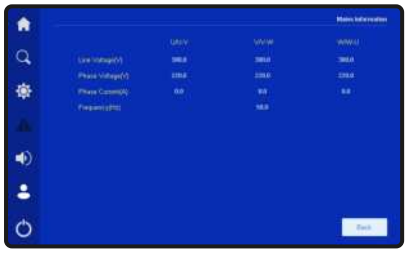
Working status

System, capacitor and fan status; mains, bypass, battery, output, load and loops.



Log management

Event log and user log: export or clear.



Mains

Line and phase voltage, phase current and frequency.



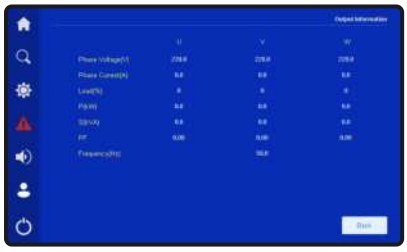
Bypass

Phase voltage and frequency of the bypass input.



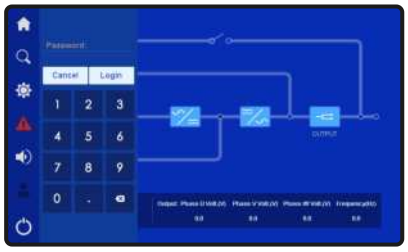
Battery

Voltage, current, temperature, remaining capacity and time, battery status and loop.



Output

Phase voltage and current, load %, kW, kVA, power factor and frequency.



Privileged login

Password keypad: settings are protected from unauthorised changes.



Setting management

System, battery, battery test, logs, communication, screen, password, energy storage.

Live
single-line diagram on the home page

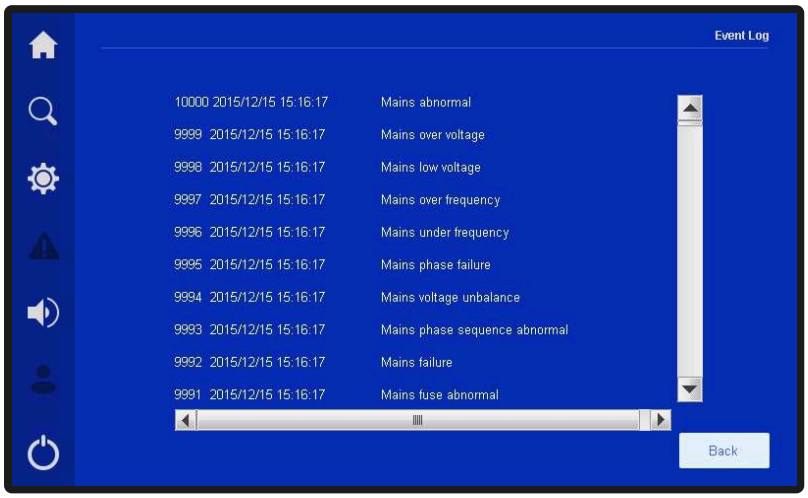
Password
privileged login protects every setting

Language
selected on the Screen setting page

Buzzer
silenced from the side bar

Menu settings and records
IST7-T 20–200 kVA

When the history record is full, the oldest events are overwritten. A separate user log records user actions and setting changes.



10,000

events in the history record, numbered and time-stamped

- Event log: alarms and faults by time
- User log: every parameter change
- Log management: clear or export records



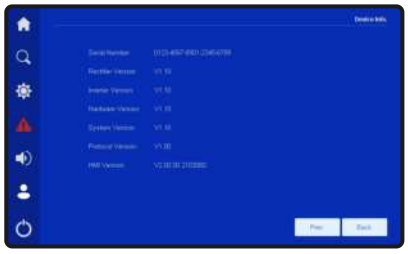
User log

What changed and when: on / off, mains and bypass limits, ECO, N+x warning, reset to default.



Working status

Mains, bypass, battery, output, load, AC/DC and DC/AC status, system mode, parallel address.



Device information

Serial number and rectifier, inverter, hardware, system, protocol and HMI versions.



System management

Mains and bypass voltage limits, bypass frequency range, ECO mode and limits, N+x warning.



Communication

Modbus or SNMP protocol, Modbus address, baud rate, remote timeout.



Screen setting

Date and time, language, screensaver and backlight brightness.

Device info
HMI and protocol versions of the unit

User log
user actions and setting changes

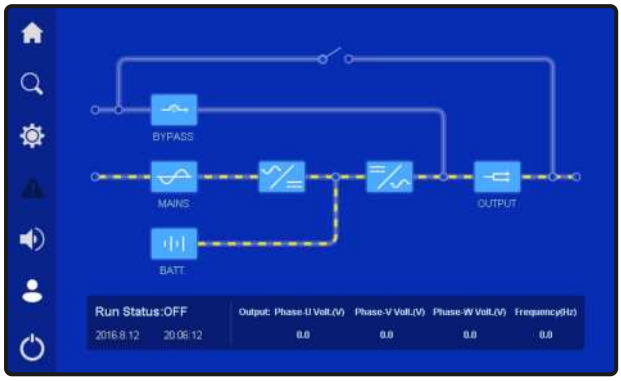
Export
records from Log management

Modbus · SNMP
protocol selected on the screen

OPERATING MODES

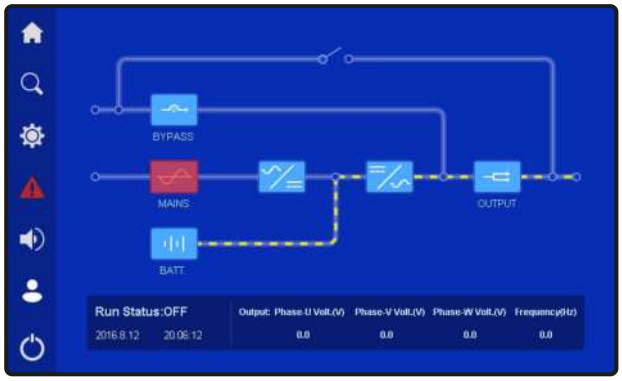
Operating modes
IST7-T 20–200 kVA

Five operating modes: normal, battery, bypass, ECO and maintenance bypass. The home page shows which path is active.



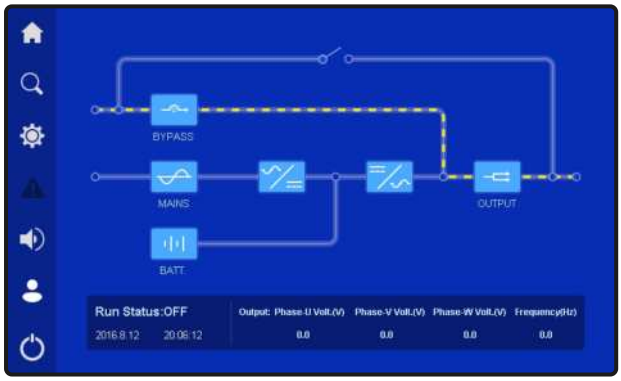
Normal mode

The rectifier feeds the inverter and charges the battery; the load receives clean AC through the transformer.



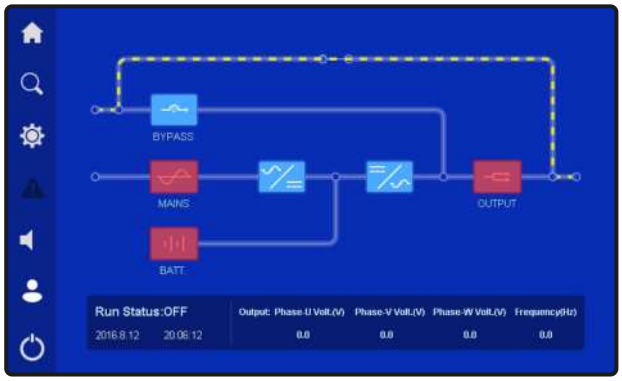
Battery mode

Mains abnormal (red): the battery feeds the inverter through the DC/DC circuit, with no break in the output.



Bypass mode

On over-temperature, short circuit, abnormal output voltage or overload beyond the inverter limit, the static switch transfers the load to the bypass, provided the mains is normal.



Maintenance bypass

For service: the load is fed through the maintenance bypass switch; no residual current inside the UPS except N.

ECO mode

When the bypass voltage and frequency are within the ECO range, the load is fed from the bypass. If the bypass goes out of range, the inverter starts and takes the load. ECO limits are set on the System management page.

Self-load test (function)

Not an operating mode: in test mode the UPS simulates the inverter output under load, so the system can be checked on site before the real load is connected.

0 ms
mains → battery

1 ms
inverter → bypass

5 modes
normal · battery · bypass · ECO · maintenance

ECO
inverter in cold standby while the bypass feeds the load

Energy functions
IST7-T 20–200 kVA

During the battery test the IST7-T feeds the residual energy back to the grid, and with lithium batteries it can shift energy from off-peak to peak hours.



Battery manage page: discharge current, test time and record interval.

Backfeed to grid

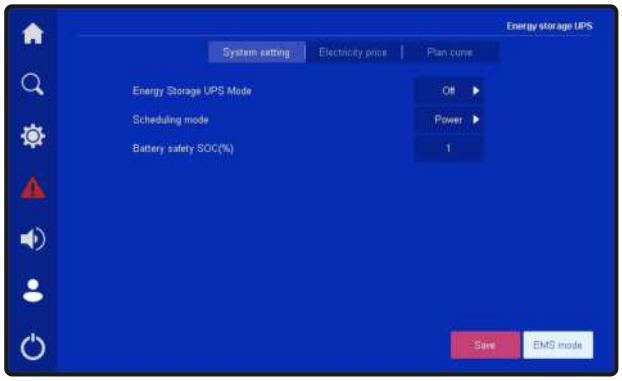
During the battery test the residual energy is fed back to the grid without waste. Three battery tests are available from the screen:

- **Standard test**
- **Depth-of-discharge test**
- **Constant-current discharge test**: discharge current, time and end voltage set on the Battery management page; requires "Backfeed to grid" enabled, the authorisation countdown above 0 days, the UPS powered on and the battery voltage above the end voltage.



Battery test page

Test status, consumed capacity, battery current and test time; conditions that block a test are listed.



Energy storage settings

Mode (plan curve or EMS), scheduling mode (current or power) and battery safety SOC.



Energy storage UPS

With a lithium battery the UPS charges at off-peak hours and discharges at peak hours: peak load shifting, with the yield calculated from the electricity prices set per period.

- **Plan curve**: up to 8 periods with start and end time, charge / discharge power or current.
- **EMS mode**: the upper computer sets mode, power and current over Modbus.
- A safe SOC threshold prevents over-discharge in both modes.

3 tests
standard · depth · constant current

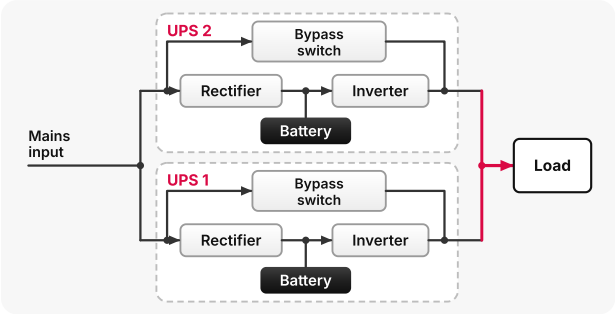
Back to grid
battery test energy fed back

Safe SOC
over-discharge protection

EMS
remote control over Modbus

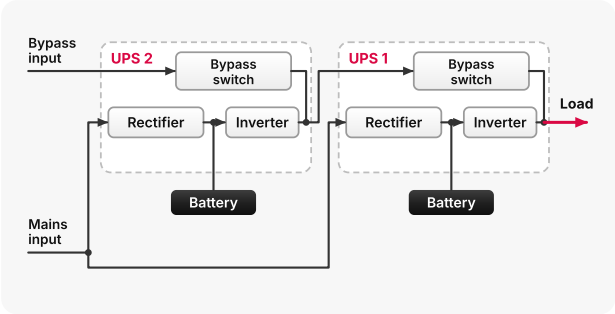
System configurations
IST7-T 20–200 kVA

Parallel, series hot standby and dual-bus systems, with a common battery pack when required.



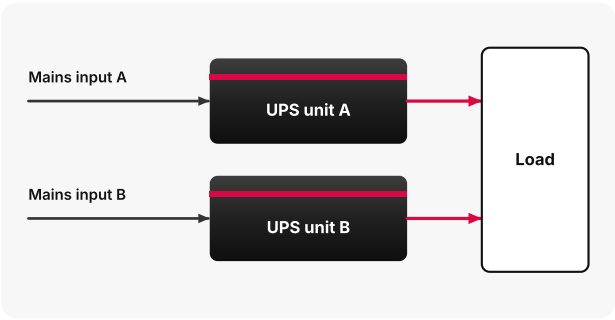
Parallel system

Digital master-slave adaptive parallel technology for redundancy. Units connect through the parallel interfaces PALL.1 and PALL.2 with shielded cables; a parallel redundancy (N+x) alarm can be enabled.



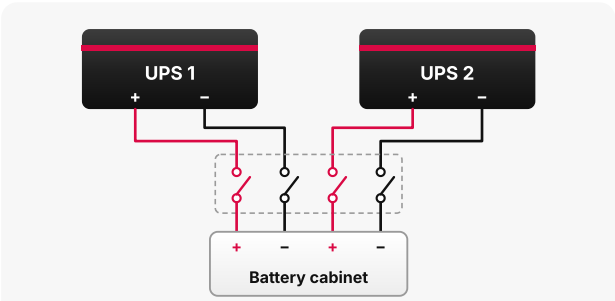
Series hot standby

The output of UPS 2 feeds the bypass input of UPS 1. If UPS 1 fails, the load stays on the inverter of UPS 2; only if both fail is the load fed from the mains.



Dual-bus redundancy (optional)

For loads with two power inputs. Two independent systems A and B, single units or parallel systems (two or four UPS in total), phase- and frequency-synchronised through the LBS interface.



Common battery pack

UPS units in a parallel system can share one battery pack, with dedicated common-battery cabling.

Block diagrams from the user manual: Fig. 2-15 parallel, Fig. 2-16 series hot standby, Fig. 2-17 dual bus, Fig. 3-33 common battery pack.

Parallel
master-slave adaptive

Hot standby
UPS 2 backs up UPS 1

Dual bus
2 or 4 UPS systems

Common battery
one pack for a parallel system

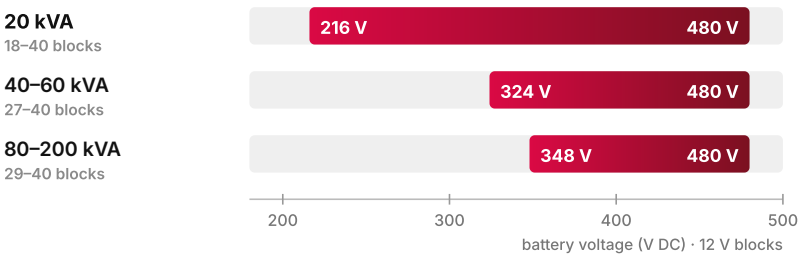
DID YOU KNOW?
In a parallel system the AC inputs of every unit keep exactly the same connection and phase sequence, so that all units see the bypass power with the same phases.

BATTERY

Battery configuration
IST7-T 20–200 kVA

External battery: the number of batteries and the battery voltage are chosen per site within the window of each size.

Battery voltage window



18–40
batteries per string (20 kVA)

29–40
batteries per string (80–200 kVA)

Lithium
lithium battery systems supported

100–200 kVA: 32 batteries by default.



Cell information (optional BMS)
With the battery logger, voltage, internal resistance and temperature of every cell are shown on the UPS screen.



Battery management
Equalising and floating charge voltage, charge current, test end voltage, low-voltage warning and protection, temperature compensation, forced equalising charge.

Battery cold start
Optional cold start switch and battery switch: start the UPS from the battery when mains and bypass are absent.

Battery switch release
Optional: opens the battery switch on battery or bus undervoltage, on EPO or on an external signal.

Breaker detector
Optional detector of the external battery circuit breaker state, with alarm when it is faulty.

Temperature sensor
Optional battery temperature detection on terminal pins 3–4, for charge compensation.

BMS link
Optional battery logger on pins 1–2 (9600 bps, slave address 11).

Best at 20–30 °C
Above 30 °C battery life shortens; below 20 °C backup time shortens.

A bipolar disconnect switch must be installed on the external DC distribution circuit.

TECHNICAL DATA

IST7-T 20–200 kVA

Model	IST7T-20	IST7T-40	IST7T-60	IST7T-80	IST7T-100	IST7T-120	IST7T-200
Rated power (kVA / kW)	20 / 18	40 / 36	60 / 54	80 / 72	100 / 90	120 / 108	200 / 180
RECTIFIER INPUT							
Technology	current-type IGBT rectifier, three-phase PFC · input EMI filter and input contactor						
Rated voltage · range	380 / 400 / 415 V L-L · ± 25% (full load from −20% to +25%; −25 … −20% current-limited)						
Connection · frequency	3Φ3W + PE, no neutral needed · 45–55 or 54–66 Hz						
Power factor · THDi	≥ 0.99 · < 5%						
AC input / output current (A)	30.8	60.9	91	121	180	216	355
BYPASS INPUT							
Rated voltage · connection	380 / 400 / 415 V L-L · 3Φ4W + PE · separate bypass input as standard (jumper for single input)						
Synchronisation range	50 (60) Hz ± 10% (± 5% optional)				50 Hz ± 10% (± 5% optional)		
Static bypass	SCR static switch · manual maintenance bypass built in						
BATTERY							
Battery converter	bidirectional buck / boost DC/DC on the DC bus · VRLA or lithium						
Battery voltage (V DC)	216–480	324–480			348–480		
Number of 12 V batteries	18–40	27–40	27–40	29–40	29–40 (default 32)		
Battery current (A)	49.9	99.7	150	200	278	333	499
Battery management	patented smart charging · equalise / float · temperature compensation · hibernation · standard, depth and constant-current tests · cell data with BMS						
Energy functions	backfeed to grid during the battery test · energy-storage UPS with lithium (plan curve, 8 periods, or EMS over Modbus)						
OUTPUT							
Voltage · power factor	220 / 230 / 240 V L-N (380 / 400 / 415 V L-L) · 0.9 (kW / kVA)						
Waveform · frequency	sine wave, THDv < 1% (linear load) · tracks the bypass in normal mode · 50 Hz ± 0.2% in battery mode						
Isolation	Δ/Y output transformer built in, between inverter and inverter static switch						
Transfer time	0 ms mains → battery · 1 ms inverter → bypass						
Overload (inverter mode)	101–105% alarm, continuous · 106–130% 10 min · 131–155% 1 min · > 155% 1 s, then bypass						
Unbalanced · non-linear load	100% three-phase unbalanced · full kVA at 100% non-linear load						
Operating modes	normal · battery · bypass · ECO (inverter in cold standby) · maintenance bypass · self-load test						
SYSTEM							
Control · display	fully digital DSP · touch screen, power-on password, user and administrator levels · 10,000 events, user log						
Communication	RS232 / RS485 Modbus RTU · 8 output and 4 input dry contacts (24 V DC / 1 A) · SNMP card, serial server TCP/IP optional						
Parallel · systems	master-slave adaptive digital parallel, N+x warning, online exit and add · series hot standby · dual bus with LBS (optional)						
Protections	battery undervoltage, overload, short circuit, over-temperature, input over- and undervoltage						
Standards	CE · EN / IEC 62040-1 (safety) · EN / IEC 62040-2 (EMC), category C3						
MECHANICAL							
Dimensions H × W × D (mm)	2000 × 600 × 800				2000 × 1000 × 800		
Weight (kg, ± 5 %)	345	405	470	505	720	780	1280

Figures from the IST7T user manual (4402-06410, issue 002), appendix A.