Industrial Power for
Business-Critical Continuity™

Chloride Apodys-E AC UPS 31 & 33

Product catalogue – 6 or 12 Pulses-1 or 3 phase output

CHLORIDE

EMERSON
Network Power

Chloride Apodys-E AC UPS

Uninterruptible Power Supply System
3-phase input – 6 or 12 Pulses - 1- or 3-phase output

1 Scope

This document describes a continuous duty three phases Alternating Current (AC) input, stand-alone, three-phase or one-phase AC output Uninterruptible Power System (UPS).

The Apodys-E UPS range meets customers' technical specifications for industrial applications such as petrochemical plants, oil and gas offshore developments (platforms, FPSO, etc...), power generation plants, mining, water desalination and treatment plants, aluminium smelters, other manufacturing plants (glass, steel...).

The Apodys AC UPS range is part of Chloride's know-how and long-time relationship with industrial businesses.

Chloride Industrial Power services include:

- Consultancy services
- Pre-engineering design and support
- Project Management (contract management, detailed engineering, documents for approval, manufacturing, product testing, witness-testing if requested, shipment, tailored user manual)
- Services (recommended commissioning spare parts, commissioning services, product lifetime spare parts, hotline, trainings, maintenance contracts, etc...)

2 General requirements

2.1. ISO certification

Chloride France S.A. is certified by the British Standard Institution (BSI), as a company with a total quality and environmental control system in accordance with the ISO 9001 and ISO 14001.

2.2. Applied standards

The Apodys-E AC UPS range shall have the CE mark in accordance with the Safety and EMC Directives 2006/95/EC and 2004/108/EC.
The Apodys-E AC UPS range is designed and manufactured in accordance with the following international standards:

- IEC60146 Semi conductor converters:
  - IEC60146-1-1 specifications of basic requirements
  - IEC60146-1-3 transformers and reactors
  - IEC60146-2 self-commutated semiconductor converters including direct dc converters.
- IEC60950 Safety of information technology equipment including electrical business equipment
- IEC60439 Low voltage switchgear and control gear assemblies
  - IEC60439-1 Type-tested and partially type-tested assemblies
  - IEC60439-2 Particular requirements for busbar trunking systems (busways)
  - IEC 60439-3 Particular requirements for LV switchgear and control gear assemblies intended to be installed in places where unskilled persons have access for their use – distribution boards
- IEC60529 Degrees of protection provided by enclosures (IP Code)
- IEC60726 Dry-type power transformers
- EN61000-6-2 Electromagnetic compatibility (EMC) Generic standards – Immunity for industrial environments
- IEC61000-6-4 Electromagnetic compatibility (EMC) Generic standards – Emission standard for industrial environments.

3 Range overview

The system described is a static UPS system as shown in Figure 1. The system operates on a microprocessor-based thyristors (SCR's) rectifier and microprocessor-based IGBTs inverter. By means of digital vector control technology the performance of the UPS are enhanced. By adding system components, such as paralleling kits, safety and disconnecting devices, distribution cubicles, as well as software and communications solutions, it is possible to set up elaborated systems ensuring complete AC load protection.

3.1. The system

The UPS provides high quality AC power for electronic equipment loads. It offers the following features:

- Increased AC power quality
- High input power factor
- Full compatibility with all types of loads
- Power blackout protection (for systems associated with battery)
- Lifetime of, at least, 20 years, combined with an appropriate preventive maintenance
- Operation temperature of 0 to 40°C permanent.

The UPS uses the double conversion topology. It converts AC power from an AC source into DC power to charge a battery and reconverts it into AC power to provide a clean and reliable AC output to power the AC load.

3.2. Models available

The Apodys-E UPS range includes several kVA ratings output models as specified in paragraph 8. It is of the single- or three-phase output type.

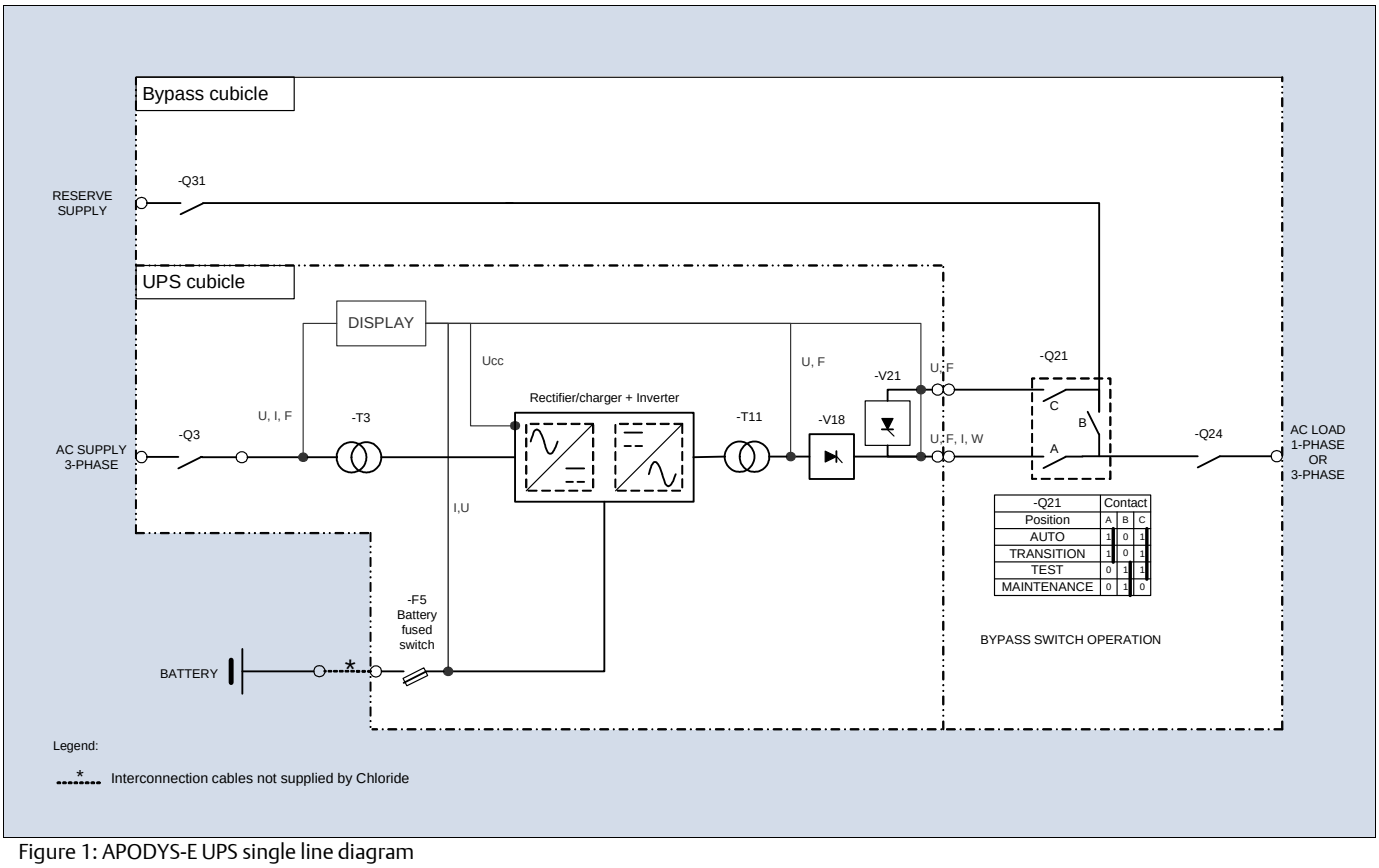


Figure 1: APODYS-E UPS single line diagram

4 System description

In this section, the main power electronic features and the operating modes of the Apodys-E UPS range are described.

4.1. General description

The three-phase current taken from the AC source is converter to a regulated DC voltage by a 6- or 12-pulse SCR (Silicon-Controlled Rectifier).

In order to protect the power components within the system, the rectifier bridge is fused with a fast acting fuse. A transformer is provided at the input of the rectifying bridge.

The DC current taken from the rectifier is converted to a sinusoidal and regulated AC voltage by an IGBTs inverter (Insulated Gate Bipolar Transistor), using PWM (Pulse Width Modulation). This means that the digital signal processor controls the IGBTs so that the DC input voltage is divided into pulsed voltage to generate a low distortion sinewave AC output voltage with good transient response voltage regulation.
A transformer is provided at the output of the inverter bridge.

4.2. Components

The UPS consists of the following major components:

- One input isolator
- One input transformer
- One SCR rectifier
- One IGBT charger/booster converter
- One IGBT inverter module
- One output transformer
- Electronic static switches
- Manual bypass switch
- Two control units, each based on one microprocessor and one Digital Signal Processor-DSP
- One control and visualisation unit

4.3. Operating modes

The Apodys-E UPS operates as follow:

4.3.1. Normal operation

The critical AC load is continuously supplied by the UPS inverter. The rectifier-charger derives power from the AC source and converts it into DC power for the inverter whilst simultaneously maintaining the battery in a fully charged and optimum operational condition (floating mode).

The inverter converts the DC power into clean and regulated AC power to supply the critical load through the static transfer switch. The power loading can reach up to 105% of the inverter nominal rating without considering the inverter in overload conditions.

While supplying the load, the inverter and static switch control unit monitors the reserve supply signal and ensures that the inverter bridge tracks the reserve supply frequency. Thus, any automatic transfer to the reserve supply (e.g. when an overload is detected) is frequency synchronised and does not cause an interruption to the load.

4.3.2. Overload operation

The UPS inverter is considered in overload conditions when the load is beyond 105% of the inverter nominal rating.

Two cases are considered:
Case 1: Reserve supply is available:

- Upon overload detection by the UPS inverter (above 105% of the inverter nominal rating), the static switch automatically transfers the load to reserve supply. The static switch automatically switches back the load to inverter 10 seconds after the UPS inverter is back to normal conditions.

The reserve supply withstands overload as shown on Figure 2.

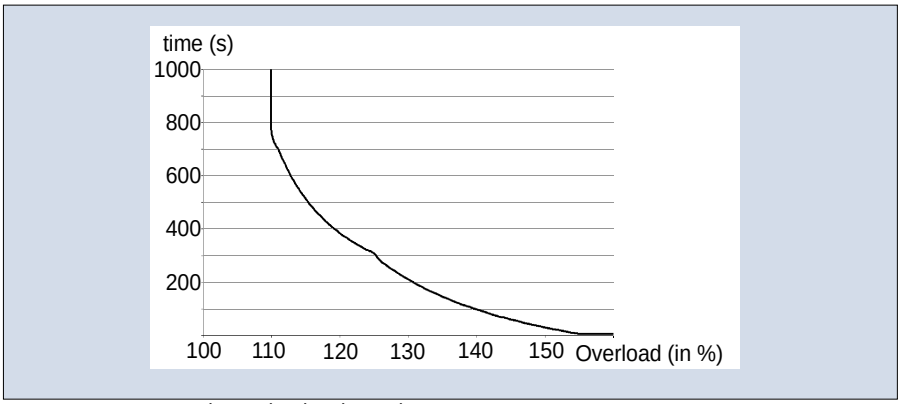


Figure 2: Reserve supply overload withstanding curve

Case 2: Reserve supply is not available:

- Upon overload detection by the UPS inverter (above 110% and up to 125% of the inverter nominal rating):
  - The system initiates a timer for a 10 minutes period.
  - The AC load remains powered by the UPS inverter for this 10 minutes period.
  - Upon expiration of the 10 minutes delay, the UPS inverter shuts down.
- Upon overload detection by the UPS inverter (above 125% and up to 150% of the inverter nominal rating):
  - The system initiates a timer for a 1 minute period.
  - The AC load remains powered by the UPS inverter for this 1 minute period.
  - Upon expiration of this minute delay, the inverter shuts down.
- Upon overload detection by the UPS inverter above 150% of the inverter nominal rating:
  - The UPS inverter keeps powering the AC load for 5 seconds after which it automatically shuts down.

This overload operation mode is shown in Figure 3.

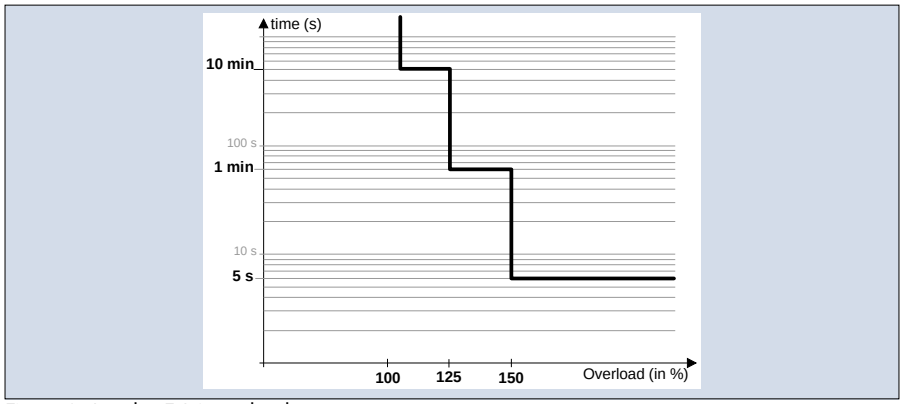


Figure 3: Apodys-E AC overload curve

4.3.3. Input supply failure

Upon fault of the input AC source, the rectifier-charger stops while the load remains supplied by the UPS inverter. Upon Mains input fault detection, the inverter immediately draws its power from the associated battery without switching. While the inverter is powered by the battery, indication is provided of the actual autonomy percentage remaining.

When reaching the end of battery autonomy, an alarm occurs and the static switch immediately switches the load onto reserve supply, without interruption. If for any reason, the reserve supply is not present or faulty and the battery is no longer available, the UPS automatically shuts down.

4.3.4. Battery recharge operation

After an AC input failure and upon its restoration, the rectifier-charger can be pre-set (according to customer's specification) to automatically restart in 2 ways:

1) Timer Recharge Mode:
If the Mains input failure was longer than 5 minutes, the rectifier charger automatically restarts in recharge mode for the pre-set recharge time. If the Mains input failure was less than 5 minutes, the rectifier-charger automatically restarts in floating mode.

2) Current Recharge Mode:
For any Mains input failure duration, the rectifier-charger restarts in recharge mode until the battery current is below a pre-set value. Then, the rectifier-charger automatically turns to floating mode.

3) Equalization mode
This operating mode is a specific mode dedicated to vented type batteries. It is used when boost charge or initial charge is requested. During Equalization mode, the voltage limitation is increased (up to 2.65V per cell for a Lead Acid battery and up to 1.7V per cell for a Nickel Cadmium battery). Restoration of the Floating mode is automatic after a preset typical time of 5 hours, unless the Floating mode is manually initiated by the operator through the control unit.

4.3.5. Maintenance bypass operation

If for any reason the UPS has to be taken out of service for

maintenance or repair, the Apodys-E UPS is provided with a manual bypass switch. The bypass switch enables a load transfer to reserve supply without power interruption for the load. Bypass isolation is then complete, all serviceable components such as fuses, power modules etc. are isolated.

The transfer/retransfer is based on the make-before-break principle in order to secure the critical load: the transfer/retransfer operation is automatically accomplished by paralleling and synchronising the inverter output to the reserve supply, before closing or opening the bypass switch as appropriate.

4.4. Electrical features

4.4.1. Total harmonic distortion of input voltage

The maximum voltage THD allowed on the rectifier input is 8% to guarantee the correct operation of the system (either from utility or from generator).

4.4.2. Charger current limitation

The battery charger current is limited to the nominal value either in floating, charge and equalization mode.

4.4.3. Battery current limitation

The battery current is limited to 0,1C (Pb) or 0,2C (NiCd) of the associated battery, in floating or charge modes. In equalization mode, the battery current is limited to 0,05C (Pb) or 0,1C (NiCd).

4.4.4. Over voltage protection

The rectifier and the charger of the UPS are automatically turned off if the DC voltage exceeds the maximum value associated to their operational status.

4.4.5. Output voltage harmonic distortion

The inverter provides harmonic neutralisation and filtering to limit the total harmonic distortion on the voltage to less than 3% with a linear load. For reference non-linear load the total harmonic voltage distortion is within limits defined by EN62040-1-2.

4.4.6. Inverter short-circuit capacity

The short-circuit capacity on the output of Apodys-E UPS is detailed in Figure 4 and 5 below.

4.4.7. Static Switch short-circuit capacity

The electronic static switch is capable of supporting the short-circuit currents as shown on Figure 6.

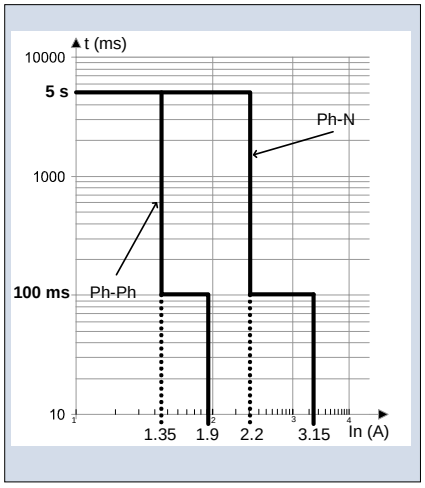


Figure 4: Apodys-E AC UPS 3-ph inverter short circuit capacity

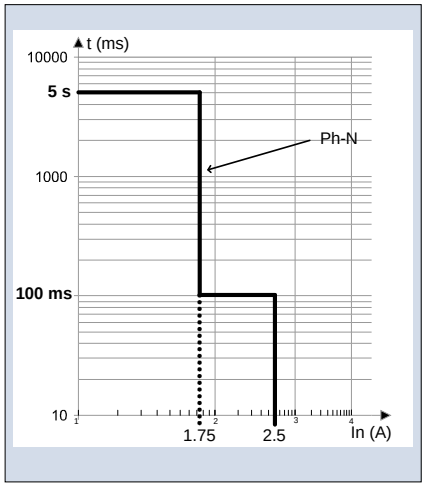


Figure 5: Apodys-E AC UPS 1-ph inverter short circuit capacity

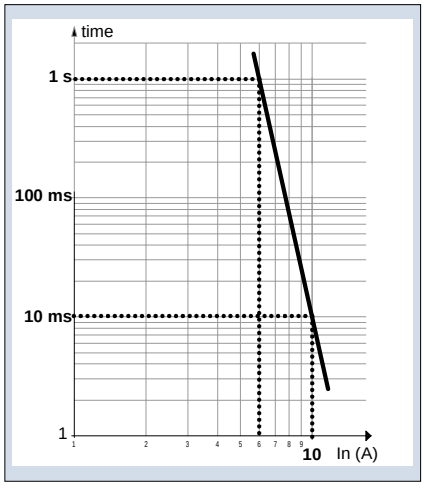


Figure 6: Apodys-E AC UPS reserve supply short circuit capacity

5 Monitoring and control interfaces

The UPS incorporates the necessary controls, instruments and indicators to allow the operator to monitor the system status and performance and take any appropriate action.
Furthermore, interfaces are available upon request, which allow extended monitoring and control, as well as service functions.

5.1. Light emitting diodes (LEDs)

The UPS includes 3 external Light Emitting Diodes (LEDs) to indicate the overall system operation status as well as the condition of the functional blocks. LEDs operation is described in Figure 7.
These LEDs shall interact with the active mimic diagram displayed on the graphical display.

5.2. Start and Stop push buttons

The Start and Stop push buttons are integrated into the mimic panel board, and operate as described on Figure 8.
The control incorporates a safety feature to prevent inadvertent operation yet still allow rapid shutdown in the event of an emergency. This is achieved by pressing the "STOP" button for 2 seconds before the module stops. « Rectifier OFF » or « Inverter OFF » is displayed on the LCD.

Symbol	LED colour	Description	Comments
	Green	UPS normal operation	Load supplied by inverter
	Green flashing	Load on reserve or on battery	Load powered by reserve or by battery
	Orange	UPS warning	One or more subassembly are affected but not stopped
STOP	Red	UPS fault	Subassembly are faulty and stopped or manually stopped

Figure 7: Apodys-E UPS– Light Emitting Diodes (LED) operation description

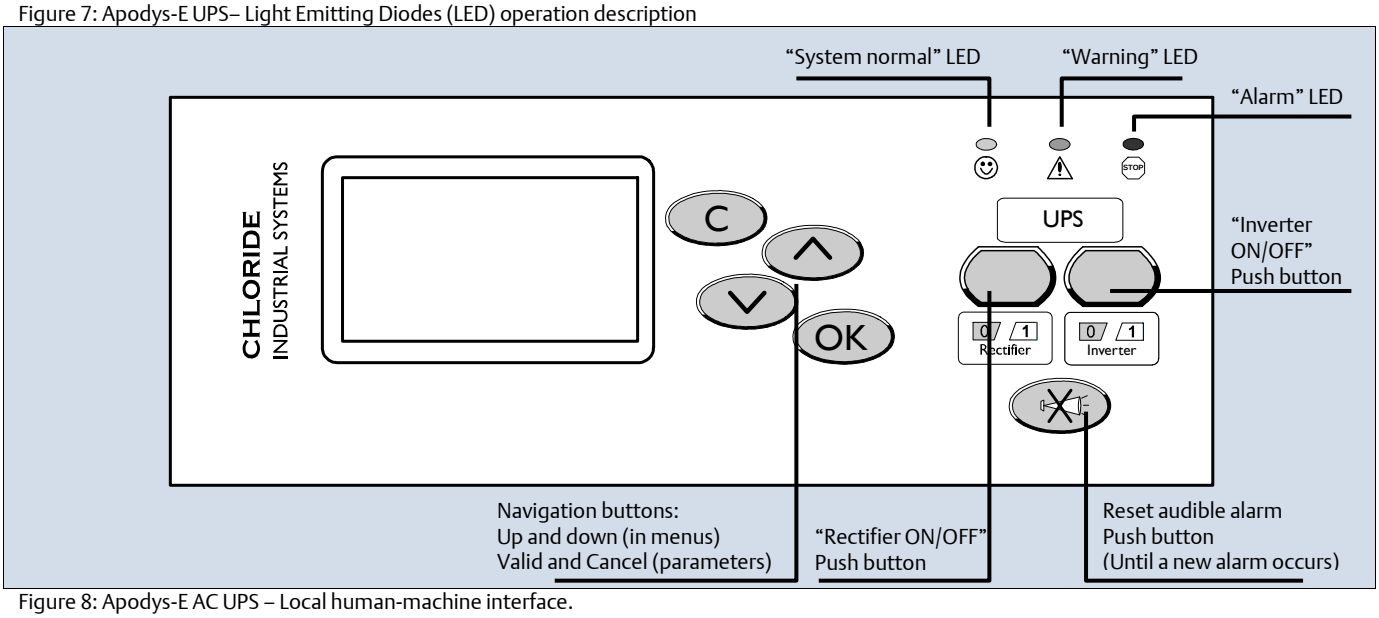


Figure 8: Apodys-E AC UPS – Local human-machine interface.

5.3. Display

A graphical (64 x 128 pixels) illuminated Liquid Crystal Display (LCD) is provided to enable the operating parameters, all the measurements and the active mimic diagram of the UPS to be monitored. The LCD messages are accessed by navigation buttons (see Figure 8). The text is available in English, unless otherwise mentioned.

By using the appropriate push-buttons it is possible to display the information described hereafter.

5.3.1. Default page

The default page displays the active mimic diagram of the UPS (see Figure 9).

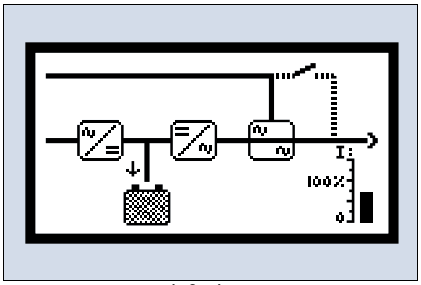


Figure 9: mimic default page.

By pressing the “OK”, “UP”, or “DOWN” buttons, the user enters the general menu. If the user is navigating in the menus, he may return to the active mimic diagram by pressing the “C” button.
If the user does not request any action (such as pressing a button) for 5 minutes while displaying the menus, the system will automatically return to the display of the default page active mimic diagram.

5.3.2. Active mimic diagram

The active mimic diagram displays the following information:

- Graphical view of the connected load
- Graphical view of the power flow
- Graphical view of the status of each functional block

The Figure 10 provides an example of an active mimic situation (1-ph output):

- AC Mains input failure
- Rectifier-charger stopped
- Battery discharging
- AC load still supplied by battery via the inverter
- Reserve supply available and in stand-by mode

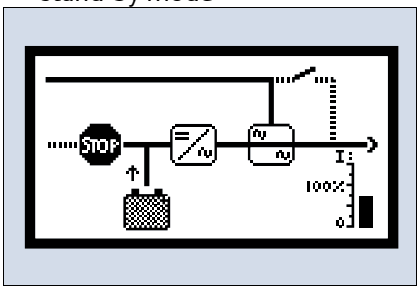


Figure 10: Active mimic panel, example of situation

5.3.3. General menu

Pressing any key from the default page (active mimic diagram) allows the user to access to the following general menu:

- Rectifier
- Charger / Battery
- Inverter
- Reserve supply
- AC load
- Reset
- Black Start (option)
- Event log
- Display setting
- Contact
- About

5.3.4. Menus of functional blocks

Each functional block (rectifier, charger / battery, inverter, reserve static switch, load) includes its own menu to provide the user with detailed information, such as:

- Block status
- Block measures
- Block faults
- Block warnings

By using these menus, the user can access to detailed information about each following component:

- Rectifier
- Charger / Battery
- Inverter
- Reserve supply
- AC Load

5.3.5. Rectifier information

Status indications:

Rectifier off
Initialisation
Rectifier Stop
Normal mode
Battery test mode*
Battery test imposed*
Test mode*

Measurements indications:

UDC (rectifier output voltage)
IDC (rectifier output current)
U12 (Input voltage ph 1 and 2)
U23 (Input voltage ph 2 and 3)
U31 (Input voltage ph 3 and 1)
I1 (input line current)
I2 (input line current)
I3 (input line current)
Freq (input frequency)
Number of Mains failures

Warning indications:

Test mode
Fan failure
DC voltage low
Overload transformer warning
Customised message 1*
Customised message 2*
Customised message 3*

* Optional messages (according to specification and system configuration)

Fault indications:

High DC voltage
High DC voltage memorised
Rectifier fuse blown
Input protection opened
Rectifier off
Rectifier remote switch off*
Rectifier AC supply fault
Rectifier wrong phase sequence
Rectifier AC supply voltage fault
Overload transformer fault
Customised message 1*
Customised message 2*
Customised message 3*

* Optional messages (according to specification and system configuration)

5.3.6. Charger / Battery information

Charger status indications:

Converter stop
Charger Stop
Equalisation mode
Equalisation imposed
Floating mode
Battery test mode
Battery test imposed
Initial charge mode
Charger in test mode

Battery status indications:

Normal
Discharging
Charging
Warning or Fault

Measurements indications:

Battery voltage
Battery current
Battery temperature
Battery autonomy (%)

Warnings indications:

DC earth fault*
Battery begin discharge
Imminent shutdown
Temp sensor fault memorised*
Charger in test mode
Charger low DC voltage
Customised message 1*
Customised message 2*
Customised message 3*

* Optional messages (according to specification and system configuration)

Faults indications:

Battery test fault memorised
Battery protection opened*
Battery high DC voltage
Battery high DC voltage memorised
Battery high current
Charger switch off
Batt End of discharge
Boost high DC voltage memorised
Customised message 1*
Customised message 2*
Customised message 3*

* Optional messages (according to specification and system configuration)

5.3.7. Inverter information

Status indications:

Inverter synchronised
Inverter on crystal
Inverter stop
Waiting for stop (only in parallel)*
Inverter switched off

Measurements indications:

UDC (inverter input voltage)
U (inverter output voltage)
Freq (output frequency)

Warning indications:

Commissioning
Software time out
Fan failure*
Inverter overload warning
Customised message 1*
Customised message 2*
Customised message 3*

Fault indications:

Inverter switched off
VCE bridge fault memorised
Inverter overload fault memorised
Over temperature fault memorised
Low DC voltage
Repeated low DC voltage memorised
High DC voltage memorised
Microcontroller fault memorised
High AC voltage memorised
Frequency fault memorised
Parallel communication fault memorised*
Low AC voltage memorised*
Customised message 2*
Customised message 3*

* Optional messages (according to specification and system configuration)

5.3.8. Reserve information

Status indications:

No warning; no fault
Warning; no fault
No warning; fault
Warning + fault

Measurements indications:

Reserve voltage
Reserve frequency

Warnings indications available:

Reserve voltage fault
Reserve frequency fault
Wrong phase sequence
Reserve inhibited
Parallel reserve fault memorised*
Customised warning message 1*
Customised warning message 2*
Customised warning message 3*

5.3.9. Load and static switch information

Status indications:

Load on inverter
Load on reserve
Manual bypass on
Load not supplied

Measurements indications:

Load voltage
Load current
Load frequency
Load power (in kVA)
Load power (in kW)
Total time on inverter
Load current ratio (%)
Power factor

Warning indications:

AC earth fault*
Manual bypass closed
Static switch overload
Customised message 1*
Customised message 2*
Customised message 3*

Fault indications:

Emergency power off*
Static switch overload fault memorised
Inverter static switch fault memorised
Reserve static switch fault memorised
Static switch hardware fault memorised
AC output voltage fault*
Customised load fault message 2*
Customised load fault message 3*

* Optional messages (according to specification and system configuration)

5.3.10. Event log

The Event Log function is available through the display and allows memorising each event into the historical record, in a chronological way.
The Event Log function can operate in 2 different ways:

- Saturable mode: It records a maximum of 100 events after the first event appearance.
- FIFO mode: After recording 100 events, the 101st event deletes the 2nd one and so on.

5.3.11. Black Start

The Black Start function, as available in the display, is only for paralleled UPS systems. It allows starting parallel inverters even if the reserve supply is not present. The Black Start function operates as follow: When 2 UPS systems are paralleled and the reserve supply is not present, it is possible to start both inverters simultaneously via the control panel of only one of the two inverters.

NOTE: This function differs from the one described in the Options section.

5.4. Remote signalling and control signal

5.4.1. Logic outputs for remote indications

Apodys-E is able to deliver several output information. These output information are made available on double-pole change-over (dpco) contacts (8A/250V AC1; 8A/30V DC1; 1A/60V DC1).

The following information is made available on voltage-free contacts:

UPS general alarm
Charger fault
Inverter fault
Reserve supply fault
Load on reserve
Imminent shutdown

Connection of the customer cables is achieved on the identified, screw-clamp terminal blocks of each relay-holder.

5.4.2. Logic inputs

The Apodys-E range allows the signalisation of specific alarms from the customer's environment and eventually takes the appropriate action on the UPS thanks to dedicated logic inputs.

As standard, the UPS includes the following input:

Emergency power off

Among all possible function, the following logic input can be wired upon request:

Remote control on/off

5.5. Communication interfaces (options)

5.5.1. Isolated RS 232 link

Upon request, Apodys-E can be equipped with one sub-D 9 points connector for direct (1 master, 1 slave, max 15 meters) serial RS232 communication.

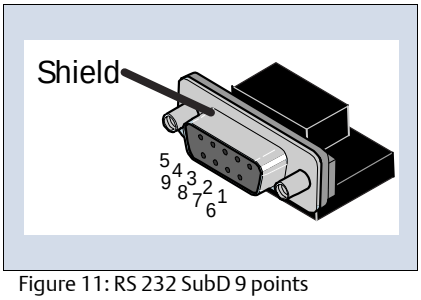


Figure 11: RS 232 SubD 9 points connector

Pin assignment is described in the Table 1 hereafter.

Pin	Signal	Explanation
1	Not used	
2	Tx	Transmission RS232
3	Rx	Reception RS232
4	Not used	
5	RS232 GND	Signal ground
6	Not used	
7	RTS	Clear to send RS232
8	Not used	
9	Not used	

Table 1: RS232 pin assignment

NOTE:
If simultaneous use of RS232 port and RS 485 is necessary, this will require 2 separate PCBs, one for RS232 and the other for RS485.

5.5.2. Isolated RS 485 link

Upon request, Apodys-E can be equipped with 6 points socket for multipoint (1 master, up to 31 slaves, max 1300 meters) serial RS485 communication.

Customer connection is easily achieved thanks to the screw-clamp connector provided (see figure below). Earth connection is achieved on the PCB through a 6.35 Faston lug.

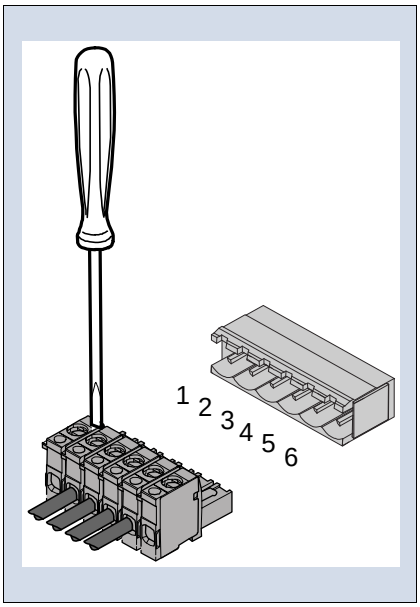


Figure 12: RS 485 6 points connector

The RS485 communication path may be used either in 4 wires mode or in 2 wires mode, as described in the Table 2 hereafter.

Pin	Signal	4-wires mode	2-wires mode
1	GND	Not used	Not used
2	Tx-	Transmission RS485/ neg.	Negative signal
3	Tx+	Transmission RS485/ pos.	Positive signal
4	Rx-	Reception RS485/ neg.	Not used
5	Rx+	Reception RS485/ pos.	Not used
6	+5V	Not used	Not used

Table 2: RS 485 pin assignment

6 Mechanical data

6.1. Enclosure

The Apodys-E UPS is housed in a space-saving enclosure including front doors and removable panels (standard external protection IP 42). The enclosure is made of sheet steel. The doors can be locked. The enclosure is of the floor mounted type.

6.2. Ventilation

Fan-assisted air cooling is standard on the Apodys-E range, exception made for few ratings which are in natural cooling. The cooling air entry is in the base and the air exit at the top of the device. It is recommended that the enclosure is installed with at least 400 mm of free space between device and ceiling at the top in order to allow an unhindered cooling air exit.

6.3. Cable entry

Cable entry is achieved via the bottom of the cabinet. Top cable entry is also available in option.

6.4. Enclosure design

All the surfaces of the enclosure are finished with an electrostatically applied powder-epoxy-polyester coat, cured at high temperature. The coating has a thickness of 50 microns. Colour of the enclosure is RAL 7032 (pebble grey) textured semi-gloss.
For uniformity of the UPS with other equipments in electrical rooms, the surface finishing and the colour of the enclosure may be tailored according to the customer's specification and upon request.

6.5. Components identification

Main components are identified by engraved traffolyte labels as standard (black characters on white background).

6.6. Cabling

Internal cables are halogen-free cables. These cables are of the flame-retardant type according to IEC 332-3 standard (LSF – Low Smoke Fume).

6.7. Internal cables connection

Connection of cables is achieved by inserting cables directly in screw-clamps.

6.8. Access to integrated subassemblies

All internal subassemblies are accessible for typical and most frequent maintenance from the front of the unit. Top access is available for replacement of cooling fans. Rear access is not required for installation or servicing. In any case and if side or rear access is required, the side and rear panels are removable.

6.9. Installation

The UPS is forkliftable from the front. Upon request, it can be equipped with lifting lugs to facilitate its installation on site.

7 Environmental conditions

The Apodys-E UPS is capable of withstanding any combination of the following environmental conditions. It operates without mechanical or electrical damage or degradation of operating characteristics.

7.1. Ambient temperature

The UPS is capable of operating permanently from 0° to 40°C.

7.2. Relative humidity

The UPS is capable of withstanding up to 90% humidity level (non-condensing) for an ambient temperature of 20°C.

7.3. Altitude

The maximum altitude without derating is 1000 metres above sea level.
Please consult us for operating the system above 1000 metres.

8 Technical data

Data common to the complete Apodys-E AC UPS range		
Rectifier input		
Nominal input voltage	(V)	400 [380 / 415]
Input phases		3 ph or 3 ph + N
Input voltage tolerance	(%)	+10 / -10 (with 400V input)
Nominal frequency	(Hz)	50 / 60 (factory setting selectable)
Tolerance on frequency	(%)	+5 / -5
Rectifier type		SCR (thyristors)
Input power factor		Up to 0.94
soft start	(s)	5
Isolation transformer		Standard
Maximum allowed voltage distortion (THD) from Mains (or generator) on the input of the rectifier	(%)	8
Charger output		
DC voltage stability	(%)	+/- 1
DC voltage ripple in float (with connected battery)	(% rms)	≤0.25
Inverter output		
Nominal output voltage		See tables on the following pages
Nominal output frequency	(Hz)	50 / 60 [factory setting selectable]
Overload at cos phi = 0.8	(%)	125 (10 min) / 150 (1 min)
Isolating transformer		Standard on the complete range
Short circuit capacity (1-phase output)	(%)	250 (100 ms) / 175 (5 s)
Short circuit capacity (3-phase output)	(%)	315 (100 ms) / 220 (5 s)
Voltage stability (for 100% load variation):		
◆ Static	(%)	+/- 1
◆ Dynamic	(%)	Complies with IEC/EN 62040-3, class 1
Frequency response	(Hz/s)	0.1
Frequency stability:		
◆ with own oscillator	(%)	+/- 0.05
◆ with reserve supply synchronisation	(%)	+/- 4 [adjustable from 1.2 to 6]
Harmonic voltage distortion:		
◆ with 100% linear load	(%)	< 3
◆ with 100% non linear load	(%)	Complies with IEC 62040-1-2
Output crest factor admissible		3/1
Load power factor		0.5 lag to 0.5 lead
Reserve supply input		
Reserve input voltage	(V)	See tables on the following pages
Reserve input voltage tolerance	(%)	+/- 10 [adjustable from +/-5% to +/-20%]
Reserve input frequency	(Hz)	50 / 60 [factory setting selectable]
Reserve input frequency tolerance	(%)	+/- 3 [adjustable from +/-0.2% to +/-5%]
System data		
External protection degree		IP 42
Internal protection degree		IP 20
Cable entry		Bottom
Access		Front
System design life	(years)	20
Environmental data		
Operating temperature	(°C)	0 to 40 (permanent operation)
Storage temperature	(°C)	-20 to +70
Maximum relative humidity (non condensing)	(%)	<90
Operating altitude		1000 m (without system derating)

Data for 1 x 230 VAC output / 110 VDC battery voltage

Input voltage: 400 VAC [380, 415] three phase
Battery voltage: 110 VDC
Output voltage: 230 VAC [220, 240] single phase

Ratings (kVA)	5	10	20	30
UPS input				
Rectifier technology	6-pulse SCR or 12-pulse SCR (12P option)			
Nominal input voltage, frequency, tolerances	See page 15			
Maximum current consumption @ 3x400VAC supply (A)	14	27	53	78
Current consumption (battery in floating) (A)	8	16	31	45
Recommended type for UPS input protection	D curve (circuit breakers)			
Battery				
Battery nominal voltage (V)	110			
Battery voltage range (V)	88 – 157			
Recommended number of cells (VRLA)	52 – 60			
Recommended number of cells (WET)	52 – 58			
Recommended number of cells (NiCd)	86 – 92			
Battery recharge current available (up to) (A)	22	43	86	127
UPS output				
Nominal output voltage AC (V)	230 [220, 240] – 1 phase + neutral			
Output voltage tolerance (%)	+/- 1%			
Nominal output frequency (Hz)	50 [60]			
Nominal output current at full load (cos phi 0.8) and nominal output voltage (A)	22	43	87	130
Reserve static switch				
Nominal voltage AC (V)	230 [220, 240] – 1 phase + neutral			
Nominal frequency (Hz)	50 [60]			
Frequency tracking range (%)	+/- 3%			
Recommended type for reserve input protection	D curve (circuit breakers)			
UPS System data				
Heat dissipation system	natural	forced cooling with redundant monitored fans		
UPS system losses in floating at full load and nominal output voltage (for air cond. calculation) (W)	1063	1639	3048	3586
AC/AC efficiency 100% load (1) (%)	79	83	84	87
AC/AC efficiency 75% load (1) (%)	80	83	84	86
AC/AC efficiency 50% load (1) (%)	80	81	83	85
AC/AC efficiency 25% load (1) (%)	72	75	77	80
Battery/AC efficiency 100% load (1) (%)	84	86	87	89
Battery/AC efficiency 75% load (1) (%)	84	86	87	89
Battery/AC efficiency 50% load (1) (%)	83	83	84	88
Battery/AC efficiency 25% load (1) (%)	75	79	82	85
UPS system noise (dB)	61	62	64	65
Height (mm)	1982	1982	1982	1982
Width (UPS + by-pass cubicle with reserve transf.) (mm)	800+400	800+400	800+400	800+600
Depth (mm)	808	808	808	808
Footprint (m²)	0.97	0.97	0.97	0.97
Weight (UPS + by-pass cubicle with reserve transf.) (kg)	350+160	390+185	515+240	625+290
Drawing code (see page 29)				
Code for general arrangement	A0	A0	A0	B0
Dual UPS System data (centralised or distributed with 1 reserve line)				
Width (UPS + bypass with reserve transf. + UPS) (mm)	800+600+800	800+600+800	800+600+800	800+600+800
Code for general arrangement	C0	C0	C0	C0
Dual UPS System data (distributed with 2 reserve lines)				
Width (mm)	width of a single unit x2			

(1) For tolerance, see IEC/EN60146-1-1

Data for 1 x 230 VAC output / 220 VDC battery voltage

Input voltage: 400 VAC [380, 415] three phase
Battery voltage: 220 VDC
Output voltage: 230 VAC [220, 240] single phase

Ratings	(kVA)	10	20	30
UPS input				
Rectifier technology		6-pulse SCR or 12-pulse SCR (12P option)		
Nominal input voltage, frequency, tolerances		See page 15		
Maximum current consumption @ 3x400VAC supply	(A)	26	51	75
Current consumption (battery in floating)	(A)	16	31	45
Recommended type for UPS input protection		D curve (circuit breakers)		
Battery				
Battery nominal voltage	(V)	220		
Battery voltage range	(V)	176 – 305		
Recommended number of cells (VRLA)		104 – 114		
Recommended number of cells (WET)		104 – 114		
Recommended number of cells (NiCd)		168 – 176		
Battery recharge current available (up to)	(A)	21	42	62
UPS output				
Nominal output voltage AC	(V)	230 [220, 240] – 1 phase + neutral		
Output voltage tolerance	(%)	+/- 1%		
Nominal output frequency	(Hz)	50 [60]		
Nominal output current at full load (cos phi 0.8) and nominal output voltage	(A)	43	87	130
Reserve static switch				
Nominal voltage AC	(V)	230 [220, 240] – 1 phase + neutral		
Nominal frequency	(Hz)	50 [60]		
Frequency tracking range	(%)	+/- 3%		
Recommended type for reserve input protection		D curve (circuit breakers)		
UPS System data				
Heat dissipation system		forced cooling with redundant monitored fans		
UPS system losses in floating at full load and nominal output voltage (for air cond. calculation)	(W)	1638	3047	3586
AC/AC efficiency 100% load (1)	(%)	83	84	87
AC/AC efficiency 75% load (1)	(%)	83	84	86
AC/AC efficiency 50% load (1)	(%)	81	83	85
AC/AC efficiency 25% load (1)	(%)	75	77	80
Battery/AC efficiency 100% load (1)	(%)	87	88	90
Battery/AC efficiency 75% load (1)	(%)	87	88	90
Battery/AC efficiency 50% load (1)	(%)	84	85	89
Battery/AC efficiency 25% load (1)	(%)	80	83	86
UPS system noise	(dB)	62	64	65
Height	(mm)	1982	1982	1982
Width (UPS + by-pass cubicle with reserve transf.)	(mm)	800+400	800+400	800+600
Depth	(mm)	808	808	808
Footprint	(m^2)	0.97	0.97	0.97
Weight (UPS + by-pass cubicle with reserve transf.)	(kg)	385+185	505+240	615+290
Drawing code (see page 29)				
Code for general arrangement		A0	A0	B0
Dual UPS System data (centralised or distributed with 1 reserve line)				
Width (UPS + bypass with reserve transf. + UPS)	(mm)	800+600+800	800+600+800	800+600+800
Code for general arrangement		C0	C0	C0
Dual UPS System data (distributed with 2 reserve lines)				
Width	(mm)	width of a single unit x2		

(1) For tolerance, see IEC/EN60146-1-1

Data for 1 x 110 VAC output / 110 VDC battery voltage

Input voltage: 400 VAC [380, 415] three phase
Battery voltage: 110 VDC
Output voltage: 110 VAC [115, 120] single phase

Ratings	(kVA)	5	10	20	30
UPS input					
Rectifier technology		6-pulse SCR or 12-pulse SCR (12P option)			
Nominal input voltage, frequency, tolerances		See page 15			
Maximum current consumption @ 3x400VAC supply	(A)	14	27	54	79
Current consumption (battery in floating)	(A)	8	16	31	46
Recommended type for UPS input protection		D curve (circuit breakers)			
Battery					
Battery nominal voltage	(V)	110			
Battery voltage range	(V)	88 – 157			
Recommended number of cells (VRLA)		52 – 60			
Recommended number of cells (WET)		52 – 58			
Recommended number of cells (NiCd)		86 – 92			
Battery recharge current available (up to)	(A)	22	43	86	127
UPS output					
Nominal output voltage AC	(V)	230 [220, 240] – 1 phase + neutral			
Output voltage tolerance	(%)	+/- 1%			
Nominal output frequency	(Hz)	50 [60]			
Nominal output current at full load (cos phi 0.8) and nominal output voltage	(A)	45	91	182	273
Reserve static switch					
Nominal voltage AC	(V)	110 [115, 120] – 1 phase + neutral			
Nominal frequency	(Hz)	50 [60]			
Frequency tracking range	(%)	+/- 3%			
Recommended type for reserve input protection		D curve (circuit breakers)			
UPS System data					
Heat dissipation system		natural	forced cooling with redundant monitored fans		
UPS system losses in floating at full load and nominal output voltage (for air cond. calculation)	(W)	1096	1697	3162	3745
AC/AC efficiency 100% load (1)	(%)	78.5	82.5	83.5	86.5
AC/AC efficiency 75% load (1)	(%)	79.5	82.5	83.5	85.5
AC/AC efficiency 50% load (1)	(%)	79.5	80.5	82.5	84.5
AC/AC efficiency 25% load (1)	(%)	71.5	74.5	76.5	79.5
Battery/AC efficiency 100% load (1)	(%)	83.5	85.5	86.5	88.5
Battery/AC efficiency 75% load (1)	(%)	83.5	85.5	86.5	88.5
Battery/AC efficiency 50% load (1)	(%)	82.5	82.5	83.5	87.5
Battery/AC efficiency 25% load (1)	(%)	74.5	78.5	81.5	84.5
UPS system noise	(dB)	61	62	64	65
Height	(mm)	1982	1982	1982	1982
Width (UPS + by-pass cubicle with reserve transf.)	(mm)	800+400	800+400	800+600	800+600
Depth	(mm)	808	808	808	808
Footprint	(m^2)	0.97	0.97	0.97	0.97
Weight (UPS + by-pass cubicle with reserve transf.)	(kg)	350+165	395+190	515+270	630+305
Drawing code (see page 29)					
Code for general arrangement		A0	A0	B0	B0
Dual UPS System data (centralised or distributed with 1 reserve line)					
Width (UPS + bypass with reserve transf. + UPS)	(mm)	800+600+800	800+600+800	800+600+800	800+800+800
Code for general arrangement		C0	C0	C0	D0
Dual UPS System data (distributed with 2 reserve lines)					
Width	(mm)	width of a single unit x2			

(1) For tolerance, see IEC/EN60146-1-1

Data for 1 x 110 VAC output / 220 VDC battery voltage

Input voltage: 400 VAC [380, 415] three phase
Battery voltage: 220 VDC
Output voltage: 110 VAC [115, 120] single phase

Ratings	(kVA)	10	20	30
UPS input				
Rectifier technology		6-pulse SCR or 12-pulse SCR (12P option)		
Nominal input voltage, frequency, tolerances		See page 15		
Maximum current consumption @ 3x400VAC supply	(A)	26	51	76
Current consumption (battery in floating)	(A)	16	31	46
Recommended type for UPS input protection		D curve (circuit breakers)		
Battery				
Battery nominal voltage	(V)	220		
Battery voltage range	(V)	176 – 305		
Recommended number of cells (VRLA)		104 – 114		
Recommended number of cells (WET)		104 – 114		
Recommended number of cells (NiCd)		168 – 176		
Battery recharge current available (up to)	(A)	22	42	62
UPS output				
Nominal output voltage AC	(V)	110 [115, 120] – 1 phase + neutral		
Output voltage tolerance	(%)	+/- 1%		
Nominal output frequency	(Hz)	50 [60]		
Nominal output current at full load (cos phi 0.8) and nominal output voltage	(A)	91	182	273
Reserve static switch				
Nominal voltage AC	(V)	110 [115, 120] – 1 phase + neutral		
Nominal frequency	(Hz)	50 [60]		
Frequency tracking range	(%)	+/- 3%		
type for reserve input protection		D curve (circuit breakers)		
UPS System data				
Heat dissipation system		forced cooling with redundant monitored fans		
UPS system losses in floating at full load and nominal output voltage (for air cond. calculation)	(W)	1697	3162	3745
AC/AC efficiency 100% load (1)	(%)	82.5	83.5	86.5
AC/AC efficiency 75% load (1)	(%)	82.5	83.5	85.5
AC/AC efficiency 50% load (1)	(%)	80.5	82.5	84.5
AC/AC efficiency 25% load (1)	(%)	74.5	76.5	79.5
Battery/AC efficiency 100% load (1)	(%)	86.5	87.5	89.5
Battery/AC efficiency 75% load (1)	(%)	86.5	87.5	89.5
Battery/AC efficiency 50% load (1)	(%)	83.5	84.5	88.5
Battery/AC efficiency 25% load (1)	(%)	79.5	82.5	85.5
UPS system noise	(dB)	62	64	65
Height	(mm)	1982	1982	1982
Width (UPS + by-pass cubicle with reserve transf.)	(mm)	800+400	800+600	800+600
Depth	(mm)	808	808	808
Footprint	(m^2)	0.97	0.97	0.97
Weight (UPS + by-pass cubicle with reserve transf.)	(kg)	390+190	505+270	620+305
Drawing code (see page 29)				
Code for general arrangement		A0	B0	B0
Dual UPS System data (centralised or distributed with 1 reserve line)				
Width (UPS + bypass with reserve transf. + UPS)	(mm)	800+600+800	800+600+800	800+800+800
Code for general arrangement		C0	C0	D0
Dual UPS System data (distributed with 2 reserve lines)				
Width	(mm)	width of a single unit x2		

(1) For tolerance, see IEC/EN60146-1-1

Data for 3 x 400 VAC output / 110 VDC battery voltage

Input voltage: 400 VAC [380, 415] three phase
Battery voltage: 110 VDC
Output voltage: 400 VAC [380, 415] three phase

Ratings	(kVA)	10	20	30
UPS input				
Rectifier technology		6-pulse SCR or 12-pulse SCR (12P option)		
Nominal input voltage, frequency, tolerances		See page 15		
Maximum current consumption @ 3x400VAC supply	(A)	27	53	78
Current consumption (battery in floating)	(A)	16	31	45
Recommended type for UPS input protection		D curve (circuit breakers)		
Battery				
Battery nominal voltage	(V)	110		
Battery voltage range	(V)	88 – 157		
Recommended number of cells (VRLA)		52 – 60		
Recommended number of cells (WET)		52 – 58		
Recommended number of cells (NiCd)		86 – 92		
Battery recharge current available (up to)	(A)	43	86	127
UPS output				
Nominal output voltage AC	(V)	400 [380, 415] – 3 phases + neutral		
Output voltage tolerance	(%)	+/- 1%		
Nominal output frequency	(Hz)	50 [60]		
Nominal output current at full load (cos phi 0.8) and nominal output voltage	(A)	14	29	43
Reserve static switch				
Nominal voltage AC	(V)	400 [380, 415] – 3 phases + neutral		
Nominal frequency	(Hz)	50 [60]		
Frequency tracking range	(%)	+/- 3%		
Recommended type for reserve input protection		D curve (circuit breakers)		
UPS System data				
Heat dissipation system		forced cooling with redundant monitored fans		
UPS system losses in floating at full load and nominal output voltage (for air cond. calculation)	(W)	1638	3048	3587
AC/AC efficiency 100% load (1)	(%)	83	84	87
AC/AC efficiency 75% load (1)	(%)	83	84	86
AC/AC efficiency 50% load (1)	(%)	81	83	85
AC/AC efficiency 25% load (1)	(%)	75	77	80
Battery/AC efficiency 100% load (1)	(%)	86	87	89
Battery/AC efficiency 75% load (1)	(%)	86	87	89
Battery/AC efficiency 50% load (1)	(%)	83	84	88
Battery/AC efficiency 25% load (1)	(%)	79	82	85
UPS system noise	(dB)	62	64	65
Height	(mm)	1982	1982	1982
Width (UPS + by-pass cubicle with reserve transf.)	(mm)	800+400	800+600	800+600
Depth	(mm)	808	808	808
Footprint	(m^2)	0.97	0.97	0.97
Weight (UPS + by-pass cubicle with reserve transf.)	(kg)	420+195	560+270	685+310
Drawing code (see page 29)				
Code for general arrangement		A0	B0	B0
Dual UPS System data (centralised or distributed with 1 reserve line)				
Width (UPS + bypass with reserve transf. + UPS)	(mm)	800+600+800	800+600+800	800+600+800
Code for general arrangement		C0	C0	C0
Dual UPS System data (distributed with 2 reserve lines)				
Width	(mm)	width of a single unit x2		

(1) For tolerance, see IEC/EN60146-1-1

Data for 3 x 400 VAC output / 220 VDC battery voltage

Input voltage: 400 VAC [380, 415] three phase
Battery voltage: 220 VDC
Output voltage: 400 VAC [380, 415] three phase

Ratings	(kVA)	10	20	30
UPS input				
Rectifier technology		6-pulse SCR or 12-pulse SCR (12P option)		
Nominal input voltage, frequency, tolerances		See page 15		
Maximum current consumption @ 3x400VAC supply	(A)	26	10	75
Current consumption (battery in floating)	(A)	16	31	45
Recommended type for UPS input protection		D curve (circuit breakers)		
Battery				
Battery nominal voltage	(V)	220		
Battery voltage range	(V)	176 – 305		
Recommended number of cells (VRLA)		104 – 114		
Recommended number of cells (WET)		104 – 114		
Recommended number of cells (NiCd)		168 – 176		
Battery recharge current available (up to)	(A)	21	42	62
UPS output				
Nominal output voltage AC	(V)	400 [380, 415] – 3 phases + neutral		
Output voltage tolerance	(%)	+/- 1%		
Nominal output frequency	(Hz)	50 [60]		
Nominal output current at full load (cos phi 0.8) and nominal output voltage	(A)	14	29	43
Reserve static switch				
Nominal voltage AC	(V)	400 [380, 415] – 3 phases + neutral		
Nominal frequency	(Hz)	50 [60]		
Frequency tracking range	(%)	+/- 3%		
Recommended type for reserve input protection		D curve (circuit breakers)		
UPS System data				
Heat dissipation system		forced cooling with redundant monitored fans		
UPS system losses in floating at full load and nominal output voltage (for air cond. calculation)	(W)	1696	3161	3745
AC/AC efficiency 100% load (1)	(%)	82.5	83.5	86.5
AC/AC efficiency 75% load (1)	(%)	82.5	83.5	85.5
AC/AC efficiency 50% load (1)	(%)	80.5	82.5	84.5
AC/AC efficiency 25% load (1)	(%)	74.5	76.5	79.5
Battery/AC efficiency 100% load (1)	(%)	86.5	87.5	89.5
Battery/AC efficiency 75% load (1)	(%)	86.5	87.5	89.5
Battery/AC efficiency 50% load (1)	(%)	83.5	84.5	88.5
Battery/AC efficiency 25% load (1)	(%)	79.5	82.5	85.5
UPS system noise	(dB)	62	64	65
Height	(mm)	1982	1982	1982
Width (UPS + by-pass cubicle with reserve transf.)	(mm)	800+400	800+600	800+600
Depth	(mm)	808	808	808
Footprint	(m^2)	0.97	0.97	0.97
Weight (UPS + by-pass cubicle with reserve transf.)	(kg)	415+195	550+270	675+310
Drawing code (see page 29)				
Code for general arrangement		A0	B0	B0
Dual UPS System data (centralised or distributed with 1 reserve line)				
Width (UPS + bypass with reserve transf. + UPS)	(mm)	800+600+800	800+600+800	800+600+800
Code for general arrangement		C0	C0	C0
Dual UPS System data (distributed with 2 reserve lines)				
Width	(mm)	width of a single unit x2		

(1) For tolerance, see IEC/EN60146-1-1

Data for 3 x 220 VAC output / 110 VDC battery voltage

Input voltage: 400 VAC [380, 415] three phase
Battery voltage: 110 VDC
Output voltage: 220 VAC [190, 208] three phase

Ratings	(kVA)	10	20	30
UPS input				
Rectifier technology		6-pulse SCR or 12-pulse SCR (12P option)		
Nominal input voltage, frequency, tolerances		See page 15		
Maximum current consumption @ 3x400VAC supply	(A)	27	53	78
Current consumption (battery in floating)	(A)	16	31	46
Recommended type for UPS input protection		D curve (circuit breakers)		
Battery				
Battery nominal voltage	(V)	110		
Battery voltage range	(V)	88 – 157		
Recommended number of cells (VRLA)		52 – 60		
Recommended number of cells (WET)		52 – 58		
Recommended number of cells (NiCd)		86 – 92		
Battery recharge current available (up to)	(A)	43	86	127
UPS output				
Nominal output voltage AC	(V)	220 [190, 208] – 3 phases + neutral		
Output voltage tolerance	(%)	+/- 1%		
Nominal output frequency	(Hz)	50 [60]		
Nominal output current at full load (cos phi 0.8) and nominal output voltage	(A)	26	52	79
Reserve static switch				
Nominal voltage AC	(V)	220 [190, 208] – 3 phases + neutral		
Nominal frequency	(Hz)	50 [60]		
Frequency tracking range	(%)	+/- 3%		
Recommended type for reserve input protection		D curve (circuit breakers)		
UPS System data				
Heat dissipation system		forced cooling with redundant monitored fans		
UPS system losses in floating at full load and nominal output voltage (for air cond. calculation)	(W)	1696	3162	3745
AC/AC efficiency 100% load (1)	(%)	82.5	83.5	86.5
AC/AC efficiency 75% load (1)	(%)	82.5	83.5	85.5
AC/AC efficiency 50% load (1)	(%)	80.5	82.5	84.5
AC/AC efficiency 25% load (1)	(%)	74.5	76.5	79.5
Battery/AC efficiency 100% load (1)	(%)	85.5	86.5	88.5
Battery/AC efficiency 75% load (1)	(%)	85.5	86.5	88.5
Battery/AC efficiency 50% load (1)	(%)	82.5	83.5	87.5
Battery/AC efficiency 25% load (1)	(%)	78.5	81.5	84.5
UPS system noise	(dB)	62	64	65
Height	(mm)	1982	1982	1982
Width (UPS + by-pass cubicle with reserve transf.)	(mm)	800+400	800+600	800+600
Depth	(mm)	808	808	808
Footprint	(m^2)	0.97	0.97	0.97
Weight (UPS + by-pass cubicle with reserve transf.)	(kg)	420+200	560+280	685+325
Drawing code (see page 29)				
Code for general arrangement		A0	B0	B0
Dual UPS System data (centralised or distributed with 1 reserve line)				
Width (UPS + bypass with reserve transf. + UPS)	(mm)	800+600+800	800+600+800	800+600+800
Code for general arrangement		C0	C0	C0
Dual UPS System data (distributed with 2 reserve lines)				
Width	(mm)	width of a single unit x2		

(1) For tolerance, see IEC/EN60146-1-1

Data for 3 x 220 VAC output / 220 VDC battery voltage

Input voltage: 400 VAC [380, 415] three phase
Battery voltage: 220 VDC
Output voltage: 220 VAC [190, 208] three phase

Ratings	(kVA)	10	20	30
UPS input				
Rectifier technology		6-pulse SCR or 12-pulse SCR (12P option)		
Nominal input voltage, frequency, tolerances		See page 15		
Maximum current consumption @ 3x400VAC supply	(A)	27	53	78
Current consumption (battery in floating)	(A)	16	31	46
Recommended type for UPS input protection		D curve (circuit breakers)		
Battery				
Battery nominal voltage	(V)	220		
Battery voltage range	(V)	176 – 305		
Recommended number of cells (VRLA)		104 – 114		
Recommended number of cells (WET)		104 – 114		
Recommended number of cells (NiCd)		168 – 176		
Battery recharge current available (up to)	(A)	22	42	62
UPS output				
Nominal output voltage AC	(V)	220 [190, 208] – 3 phases + neutral		
Output voltage tolerance	(%)	+/- 1%		
Nominal output frequency	(Hz)	50 [60]		
Nominal output current at full load (cos phi 0.8) and nominal output voltage	(A)	26	52	79
Reserve static switch				
Nominal voltage AC	(V)	220 [190, 208] – 3 phases + neutral		
Nominal frequency	(Hz)	50 [60]		
Frequency tracking range	(%)	+/- 3%		
Recommended type for reserve input protection		D curve (circuit breakers)		
UPS System data				
Heat dissipation system		forced cooling with redundant monitored fans		
UPS system losses in floating at full load and nominal output voltage (for air cond. calculation)	(W)	1638	3048	3586
AC/AC efficiency 100% load (1)	(%)	83	84	87
AC/AC efficiency 75% load (1)	(%)	83	84	86
AC/AC efficiency 50% load (1)	(%)	81	83	85
AC/AC efficiency 25% load (1)	(%)	75	77	80
Battery/AC efficiency 100% load (1)	(%)	87	88	90
Battery/AC efficiency 75% load (1)	(%)	87	88	90
Battery/AC efficiency 50% load (1)	(%)	84	85	89
Battery/AC efficiency 25% load (1)	(%)	80	83	86
UPS system noise	(dB)	62	64	65
Height	(mm)	1982	1982	1982
Width (UPS + by-pass cubicle with reserve transf.)	(mm)	800+400	800+600	800+600
Depth	(mm)	808	808	808
Footprint	(m^2)	0.97	0.97	0.97
Weight (UPS + by-pass cubicle with reserve transf.)	(kg)	415+200	550+280	675+325
Drawing code (see page 29)				
Code for general arrangement		A0	B0	B0
Dual UPS System data (centralised or distributed with 1 reserve line)				
Width (UPS + bypass with reserve transf. + UPS)	(mm)	800+600+800	800+600+800	800+600+800
Code for general arrangement		C0	C0	C0
Dual UPS System data (distributed with 2 reserve lines)				
Width	(mm)	width of a single unit x2		

(1) For tolerance, see IEC/EN60146-1-1

9 Parallel operation

The Apodys-E UPS systems have the capability to be connected in parallel for dual configurations between units of the same rating. The parallel connection of Apodys-E UPS increases reliability for the AC load.

9.1. Centralized parallel configuration

The Apodys-E range is capable of operating in centralized parallel configuration as shown on Figure 13 and 14. Hereby the reserve supply to the load works with one central reserve cubicle.

Provided each Apodys-E UPS is supplied with the parallel kit option, equal UPS units of the same rating can be operated in parallel for power upgrade or increase of redundancy. A dual system is controlled and monitored automatically by controlling each individual UPS.

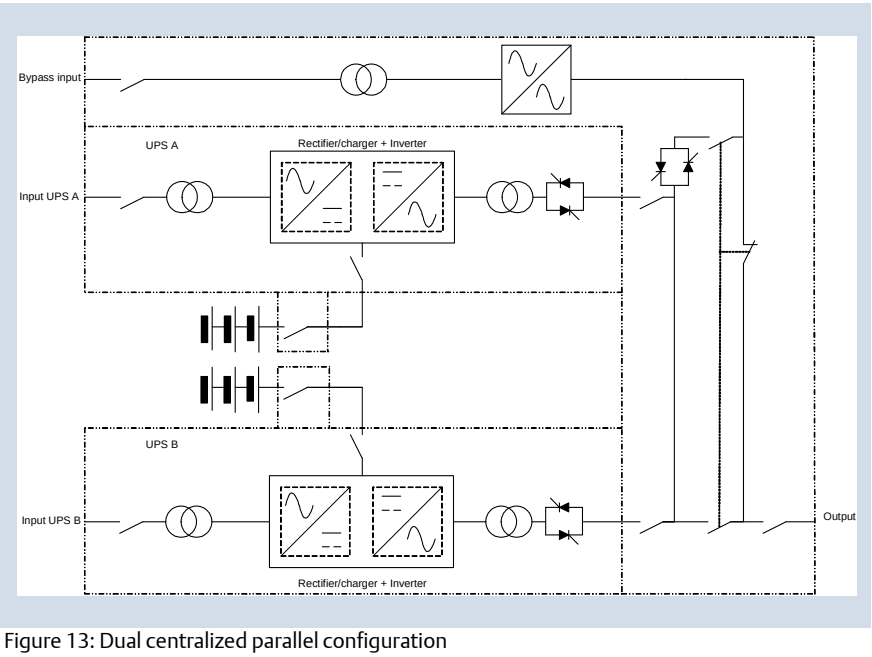


Figure 13: Dual centralized parallel configuration

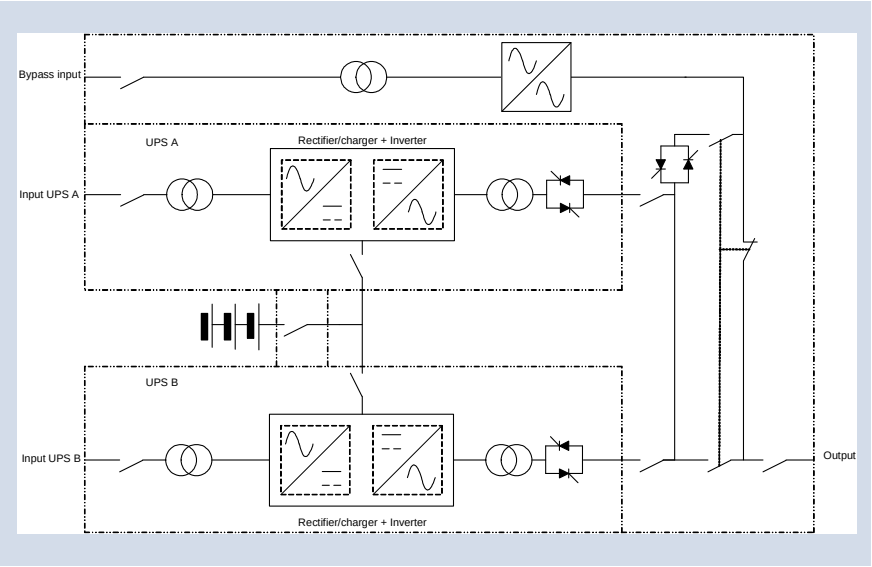


Figure 14: Dual centralized parallel configuration with common battery.

9.2. Distributed parallel configuration with one reserve line

The Apodys-E range is capable of operating in distributed parallel configuration as shown on Figure and Figure.

NOTE:

Figure 15 and Figure 16 show a common battery for the 2 UPS. Obviously, the dual distributed parallel configurations also allow the connection of 2 separate batteries as shown on Figure 13.

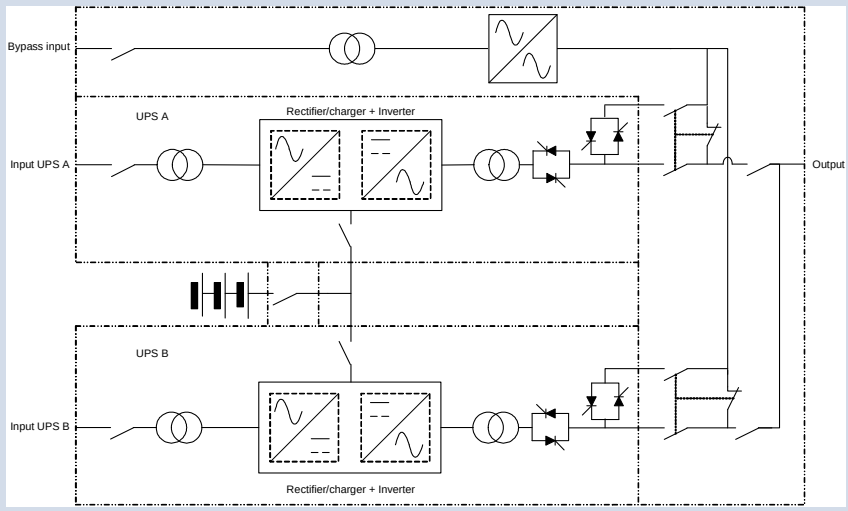


Figure15: Dual distributed parallel configuration with 1 by-pass line and 1 UPS output

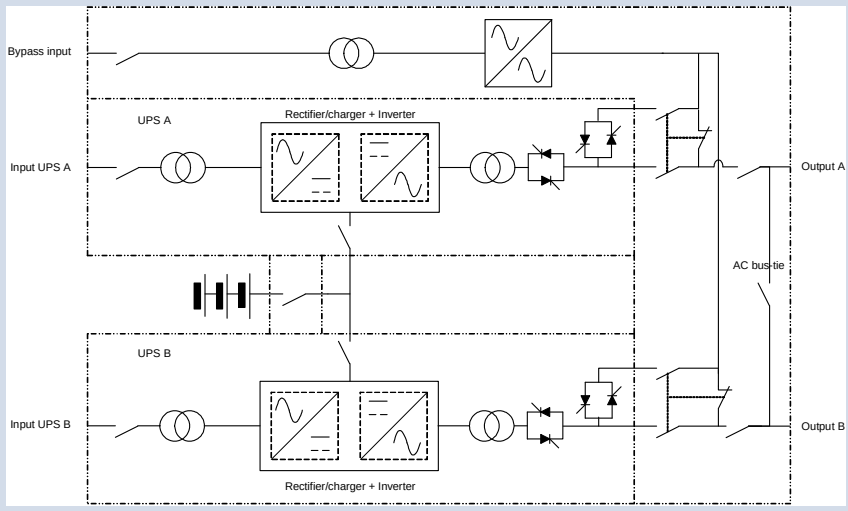


Figure16: Dual distributed parallel configuration with 1 by-pass line, 2 UPS outputs and AC bus-tie

9.3. Distributed parallel configuration with two reserve line

The Apodys-E range is capable of operating in distributed parallel configuration as shown on Figure 17 and Figure18.

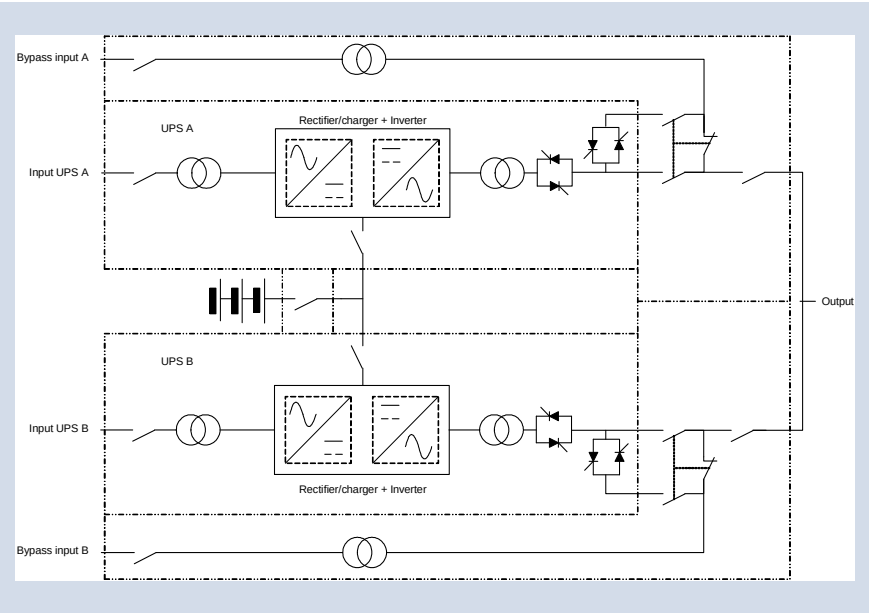


Figure17: Dual distributed parallel configuration with 2 by-pass lines and 1 UPS output

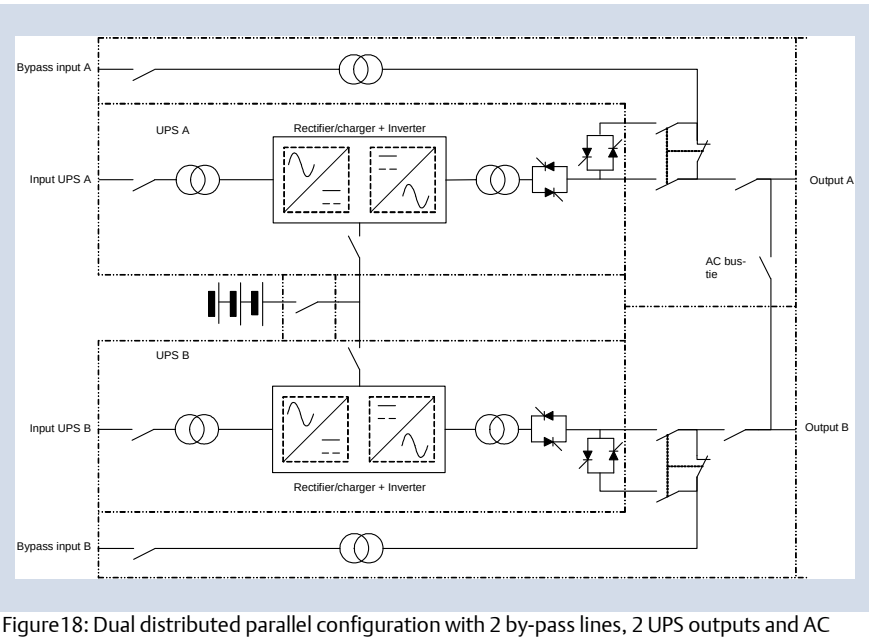


Figure18: Dual distributed parallel configuration with 2 by-pass lines, 2 UPS outputs and AC bus-tie

10 Options

10.1. Main electrical options

The list of options described in this section is non-exhaustive. Please consult us for any other requirement.

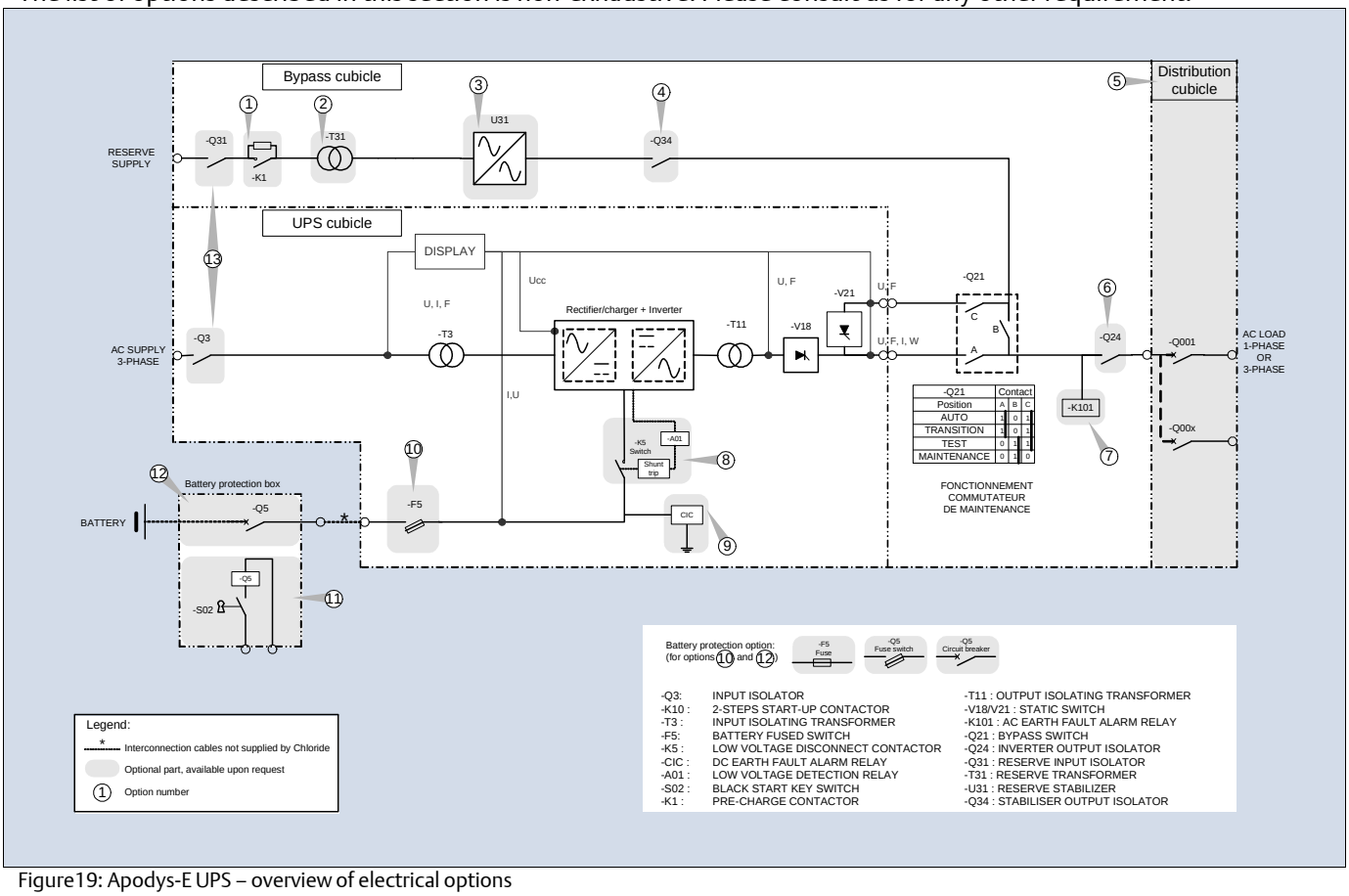


Figure19: Apodys-E UPS – overview of electrical options

Option No.	Option name	Function / description
①	Two-steps start-up contactor	Limit the inrush current on by-pass line when starting up the system. Addition of a two-steps start-up device to limit the inrush current due to the magnetisation of the by-pass transformer (if provided). The device uses a timing relay to firstly magnetise the input transformer through resistors. The contactor is then switched to close position to allow starting up the charger part of the UPS. *This option is integrated within the Bypass cabinet.*
②	Reserve supply transformer	Provide full galvanic isolation between the input and the output of the UPS. This transformer is of the type 3-phase input / 3-phase output, with insulation class H. *This option is integrated within the Bypass cabinet.*
③	Reserve supply stabiliser	Adjust the reserve supply voltage. The reserve supply voltage adjustment ensures the output voltage is within the tolerance accepted by the connected AC load. The stabiliser can be of the electronic type or electro-mechanical type. *This option is integrated within the Bypass cabinet.*

Option No.	Option name	Function / description
④	Stabiliser output isolator	Isolate the output of the stabiliser to be able to safely maintain it. This isolator is usually a fully rated switch. By opening the reserve input circuit breaker and this isolator, it is possible to completely isolate the reserve stabilizer. *This option is integrated within the Bypass cabinet.*
⑤	AC distribution	Ensure the distribution, protection and segregation of the AC load. Distribution boards may be included in the UPS system or installed in a separate cabinet. These distribution boards may be customised (form 1 to form 4) according to the customer's requirements. MCB, MCCB, or fuses are available. *This option may affect the overall dimensions of the system.*
⑥	Output protection	Protect and isolate the output of the UPS system. 3 types of protections are made available: – Switch: the standard configuration includes a fully rated switch with auxiliary contact for the monitoring of its operating status. – Fuse switch: fully rated fuse switch with auxiliary contact for the monitoring of its operating status. – Circuit breaker: fully rated circuit breaker and an additional auxiliary contact for the monitoring of its position.
⑦	AC earth fault alarm	Monitor the insulation resistance on the AC output circuit. Used in conjunction with the isolation transformer, this option is made of an electronic circuit CIC (or equivalent). It is fitted into the IPC cubicle and delivers remote indication by a changeover voltage-free contact. Local indication (inside the cabinet) by two LED's is available on the PCB (or moulded device) to indicate the polarity on fault. A local test push-button is also available on the device to simulate fault conditions.
⑧	Low voltage disconnect contactor (LDV)	Protect the battery from deep discharges and thus enhance battery lifetime. The LDV option includes an output contactor controlled by voltage relay in order to disconnect the load at the end of battery autonomy period. Reconnection of the load is automatic at the charger restoration and upon the resumption of normal conditions.
⑨	Earth leakage monitor (DC earth fault alarm)	Monitor the insulation resistance on the DC bus. Used in conjunction with the isolation transformer, this option is made of an electronic circuit "Chloride CIC" (or equivalent). It is fitted into the IBC cubicle and delivers remote indication by a changeover voltage-free contact. Local indication (inside the cabinet) by two LED's is available on the PCB (or moulded device) to indicate the polarity on fault. A local test push-button is also available on the device to simulate fault conditions (+ or -).
⑩	Battery protection	Prevent any short-circuit that could occur on the battery circuit and therefore prevent the battery cables from fire risks. This option is either fitted into the IBC cabinet or externally (battery cabinet or battery protection box). It can not be used with the option N°13. 3 types of protections are made available: – Fuse: fully rated fuse with auxiliary contact for the monitoring of its operating status. – Fuse switch: fully rated fuse switch with auxiliary contact for the monitoring of its operating status. – Circuit breaker: fully rated circuit breaker and an additional auxiliary contact for the monitoring of its position.
⑪	Manual Black Start	Start-up of the UPS (inverter part only) to provide power to the load, after a process shutdown when the Main is not present on the input of the UPS. This option is made of a manual key switch. It allows a manual restart of the inverter from the battery.
⑫	External battery protection	Protect the battery circuit as for option 11, but can not be used in conjunction with option N°11. The battery protection device is housed in a wall-mounted metal box for battery systems mounted on racks and it is supplied with the battery cabinet, when the battery is fitted in a matching cubicle. Furthermore, this device serves as a safety element for the cross section of the power cable between the UPS and the remotely placed battery system. Therefore, the wall-mounted box must be installed as close as possible to the battery and the length of cables between battery and UPS system must be the shortest.
⑬	Input protections	Protect and isolate the inputs of the system. The standard input isolator is replaced by a fully rated input circuit breaker plus an auxiliary contact for the monitoring of its position.

10.2. Environment-related options

10.2.1. Special enclosure finishing

Standard finishing of the enclosure is RAL 7032 (grey) textured semi gloss. Any other type of painting specification is also achievable upon request, in compliance with AFNOR, RAL or BS standards.

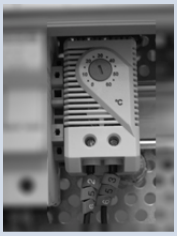
10.2.2. Specific ambient operation conditions

- Specific temperature conditions: Upon request, the Apodys-E is able to operate above 40°C (and up to 55°C) or below 0°C.
- Special seismic design: Specific modifications of the system may be added to allow the UPS to operate in seismic risks areas. Please consult us. In such extreme conditions, the customer must specify the required service conditions, as specified in IEC 60146-2, §5.

10.2.3. Anti-condensation heater

This option includes a heater which is fitted inside the cubicle, to prevent internal components from condensation, mainly when the UPS is stored for a long period.

10.2.4. Temperature monitoring



This option consists in a thermostat fitted inside the cubicle to indicate abnormal heating in the UPS. This device is adjustable below 90°C and includes a remote indication available on a normally open, voltage-free contact.

10.3. Remote monitoring options

10.3.1. Customer interface relays

It is possible to increase the number of inputs/outputs described in paragraph 5.4 by providing an additional board with corresponding output relays. These input/outputs can be used to monitor several parameters specified by the user.
Each board includes:
3 inputs (from voltage free contacts – Not provided)

Twenty outputs to drive voltage free contacts (provided). The requested number of output information will be made available on double-pole change-over (dpco) contacts (8A/250V AC1; 8A/30V DC1; 1A/60V DC1).

10.3.2. Modbus / Jbus

Upon request, Apodys-E is able to remotely deliver information through Modbus/Jbus protocol (2 or 4 wires).

This additional feature includes:
A hardware kit: an additional communication slot is included into the Apodys-E and is fitted in the slot card bay.

A software kit: The Apodys-E is delivered with Chloride's standard Modbus/Jbus code (embedded into the system) and fully detailed protocol coding documentation.

NOTE:
The communication cable between the UPS and the monitoring station is not part of Chloride's supply.

10.4. Other options

10.4.1. Top cable entry

The option allows power cable entry from the top of the UPS, by adding an external cabinet to drive the cables down to the bottom of the UPS.

IMPORTANT NOTE
This option affects the overall dimensions of the system.

10.4.2. Internal lighting

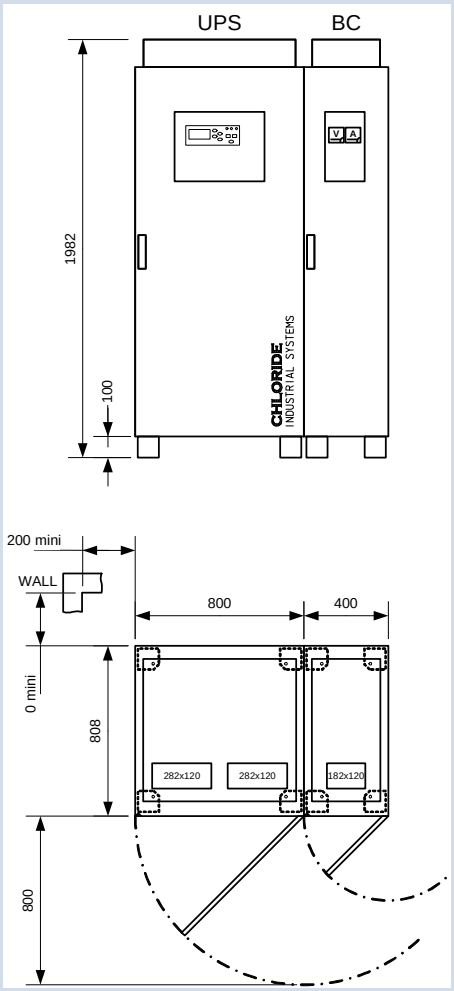
Internal lighting is available upon request to improve internal visibility of the system.

10.4.3. Lifting eyes

Upon request, the UPS cubicle can be equipped with lifting eyes to facilitate its installation on site.

11 General arrangement drawings

A0



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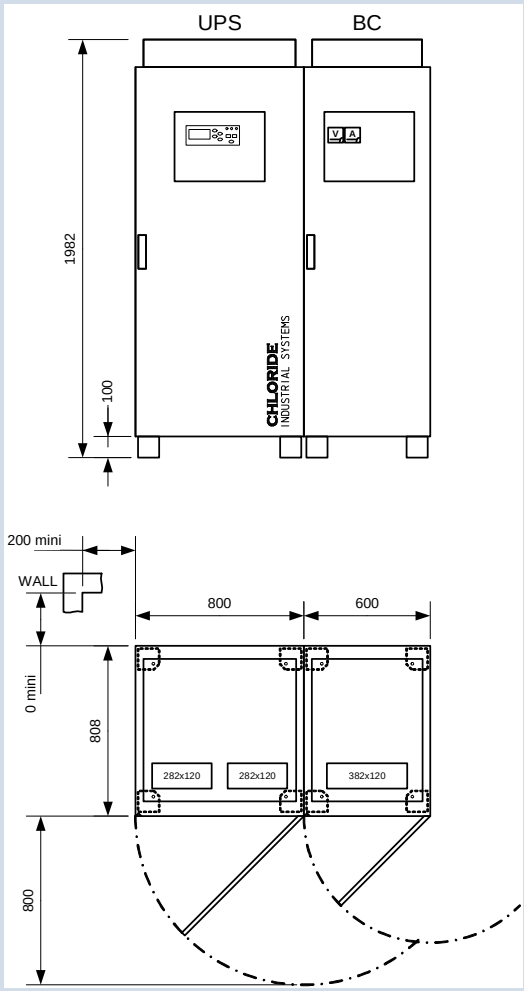

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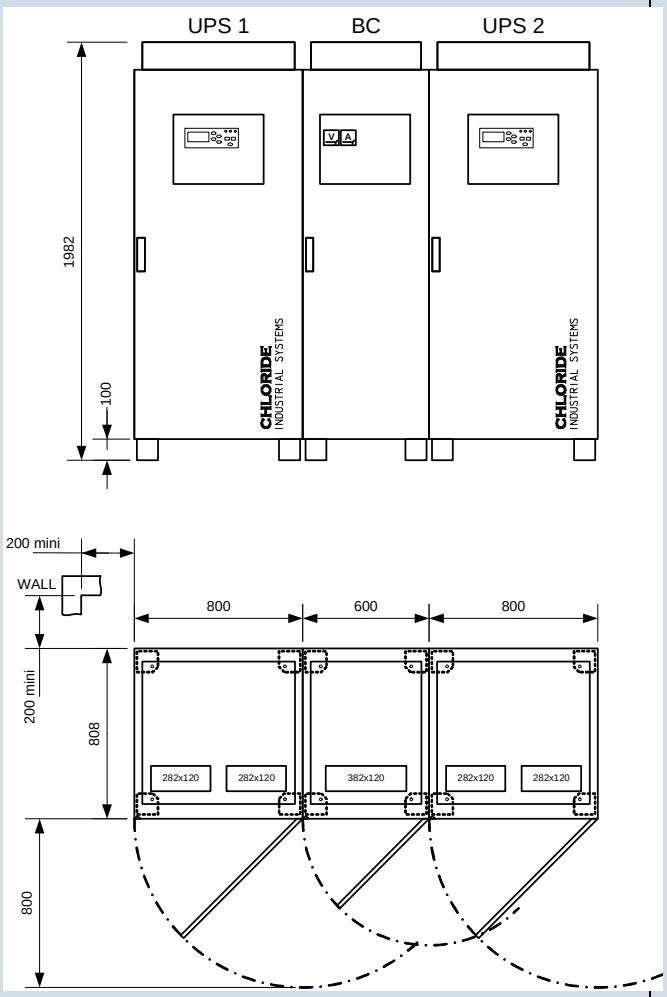
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UPS 2
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CHLORIDE INDUSTRIAL SYSTEMS
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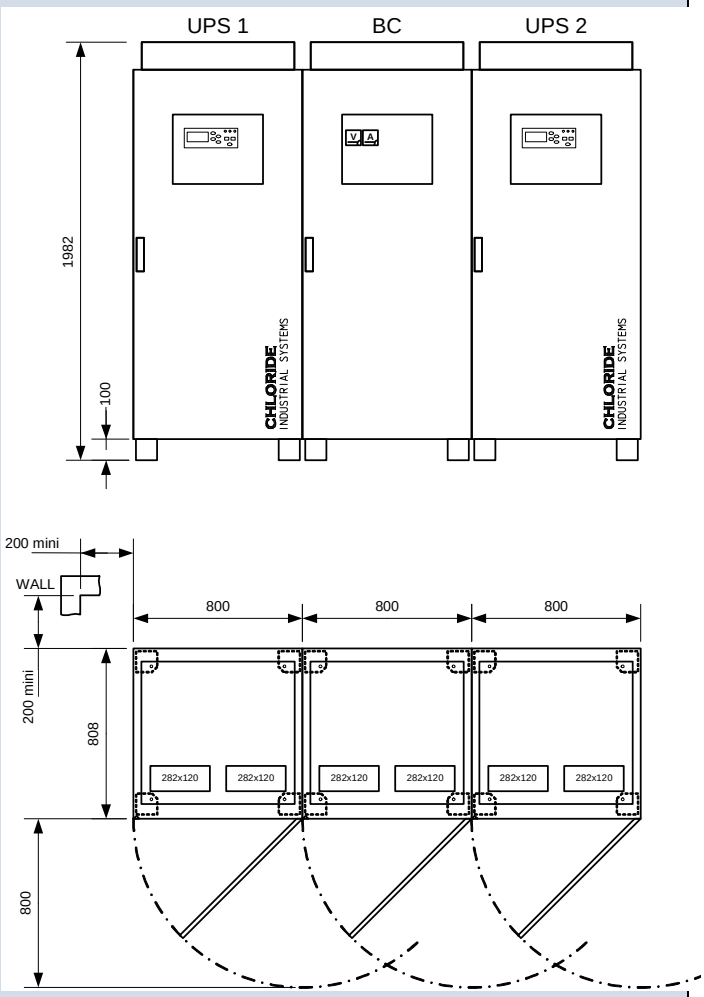
UPS 1
BC
UPS 2
1982
100
CHLORIDE INDUSTRIAL SYSTEMS
200 mini
WALL
800
800
800
200 mini
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800

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