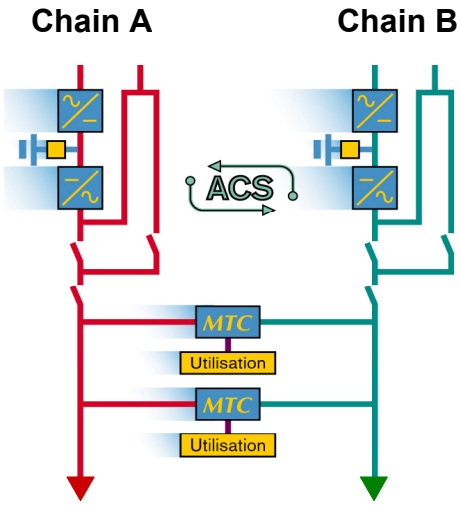
1. ACS GENERAL DEFINITION

The ACS is an optional function of Delphys DS UPS range, which fits different types of installations : single unit, parallel with centralised by-pass or modular parallel.

The ACS function provides synchronisation :

- between two Delphys DS UPS when by-pass mains is absent,
- between a Delphys DS UPS and an external source (a generating set, a transformer or another brand UPS),
- in forced mode in case of specific operating.

Example of application :



2. ACS COMPOSITION

The ACS is composed of :

- an adapting interface of the external reference signal called "external synchronisation interface",
- a wiring link protected by fuses for the voltage reference [1].

Each chain is fitted with one (or several) "external synchronisation interface" board(s).
The ACS function is installed in each UPS cabinet (in case of single unit or modular parallel UPS), or in the common cabinet in case of parallel UPS with centralised by-pass.

This principle ensures an autonomous operating without single point of failure.

[1] In case of three-phase systems, voltage between L1 and L3 phases.
In case of single-phase systems, voltage between phase and neutral.

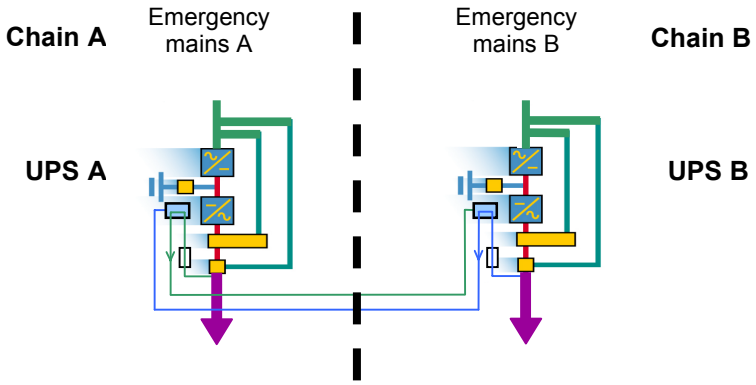
Specific operating with a generator set

If the UPS is supplied by an emergency set, and a generator set operating information is available, this information can be transferred to the "emergency set" input[2].
The UPS will in this way distinguish the emergency mains supply or the emergency set supply.

If the stability of the emergency set is not sufficient for the load, the UPS has an "inverter desynchronisation when generator set activated" and a "bypass locked" configurations.
If these configurations are activated, and the UPS supplied by the emergency set, the UPS operates on internal frequency and its bypass is locked.
The configurations settings must be the same for the two chains.

Operating in forced mode

Example of specific operating :



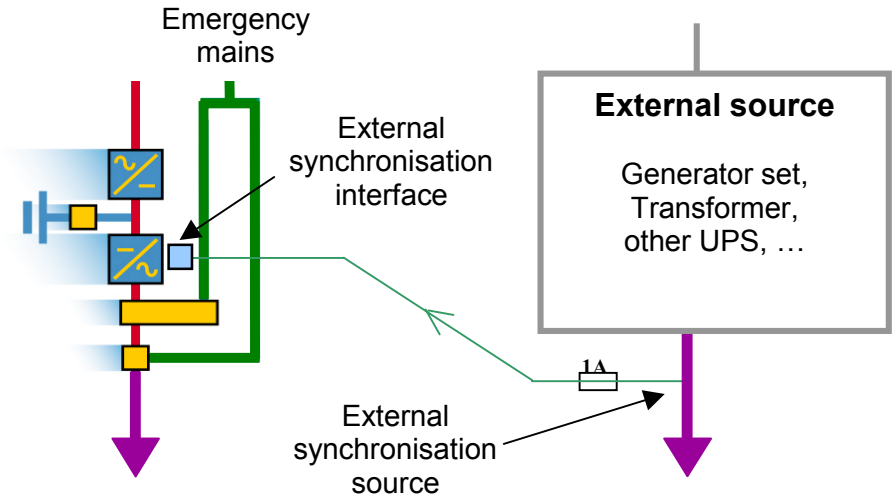
If A and B emergency mains are present and within tolerances, UPS A is synchronised on the emergency mains A and UPS B is synchronised on emergency mains B.
It is possible to force the synchronisation on the output of the other chain via a dry contact[2] . For example, it is possible to synchronise UPS B output on UPS A output while the emergency mains is present.

Warning : it is not possible to force the synchronisation on the output of the other chain from both UPS simultaneously.

[2] available on Delphys DS UPS "Input/Output interface" board and activated via a dry contact NO/NC (settable).

3. OPERATING PRINCIPLE

3.1. Synchronisation with an external source



Normal operating conditions :

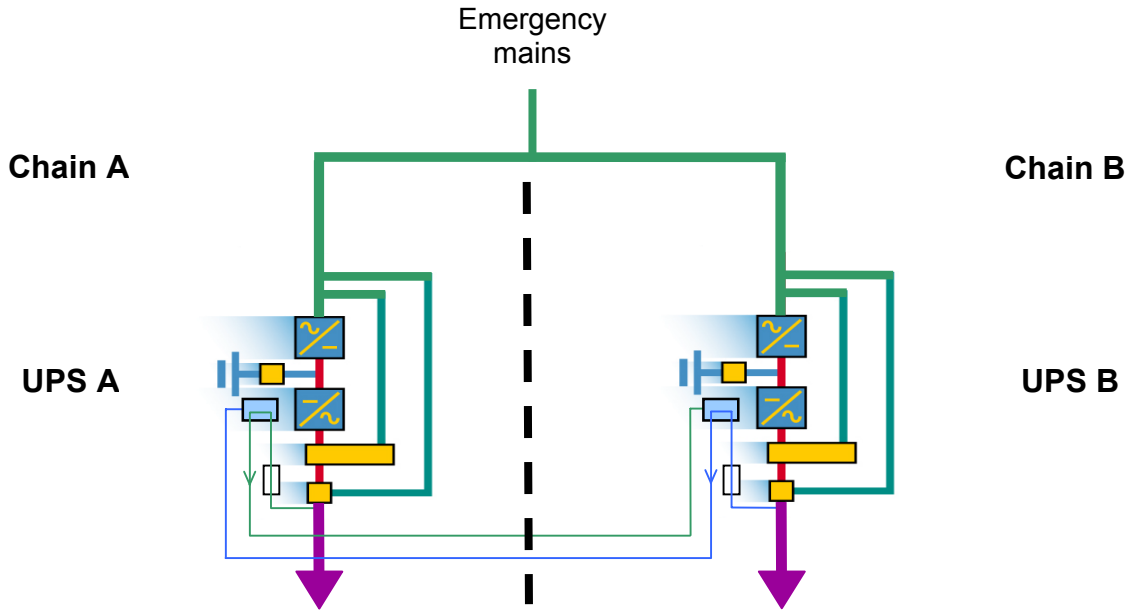
The load is supplied by the inverter.
The ACS controls permanently the reference signal input (voltage and frequency).

- if the external synchronisation source is present and within tolerances, the UPS is synchronised on the external synchronisation source,

- if the external synchronisation source is absent or out of tolerances :
  - if the emergency mains is present and within tolerances, the UPS is synchronised on the emergency mains,
  - if the emergency mains is absent or out of tolerances, the UPS operates on internal frequency.

  Operating with generator set
  - if the inverter desynchronisation is activated, the UPS operates on internal frequency and its bypass is locked,
  - if the inverter desynchronisation is not activated, the UPS is synchronised on the emergency set.

3.2. Synchronisation between two UPS systems with common mains



Normal operating conditions :

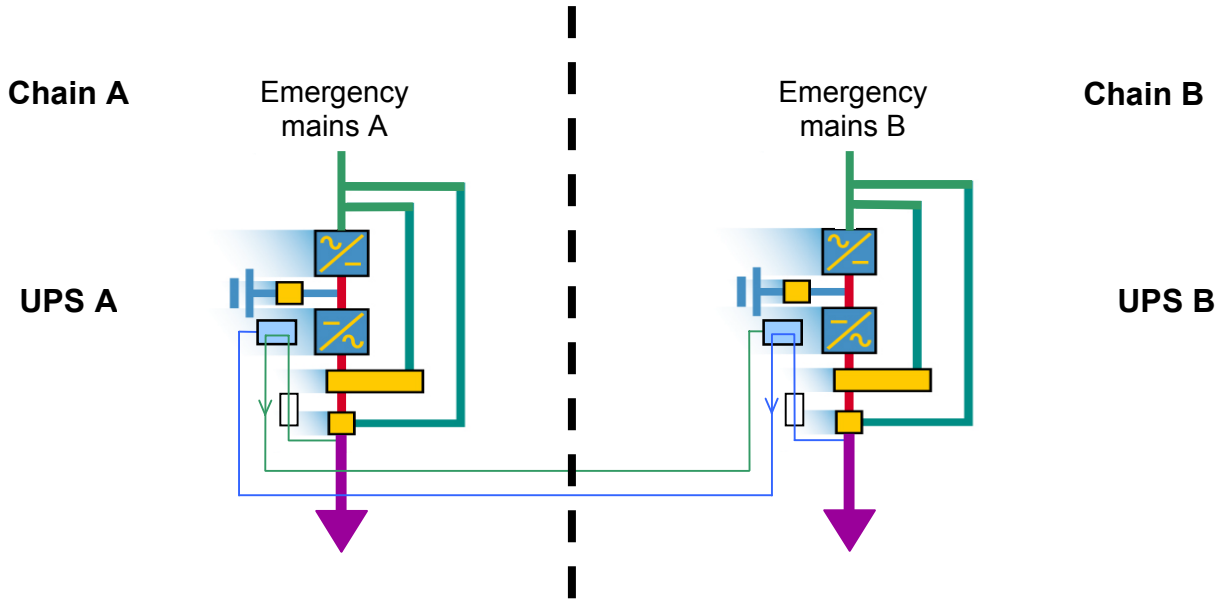
The UPS are synchronised on the emergency mains (bypass input).
The load is supplied by the inverter.
The ACS controls permanently the reference signal input (voltage and frequency).

- if the emergency mains is present and within tolerances, the UPS are synchronised on the emergency mains,
- if the emergency mains is absent or out of tolerances, UPS A operates on internal frequency and UPS B is synchronised on UPS A output,
- if the emergency mains is absent or out of tolerances on UPS A, UPS A is synchronised on UPS B output and vice-versa.

Operating with one single generator set
The generator set's configurations should be the same for both UPS.

- if the inverter desynchronisation is activated, UPS A operates on internal frequency, UPS B is synchronised on UPS A output and the bypass are locked,
- if the inverter desynchronisation is not activated, UPS A is synchronised on the emergency set and UPS B is synchronised on UPS A output.

3.3.Synchronisation of 2 UPS systems with separated mains



Normal operating conditions :

The UPS are synchronised on the emergency mains (bypass input).
The load is supplied by the inverter.
The ACS controls permanently the reference signal input (voltage and frequency).

- if the emergency mains are present and within tolerances, the UPS are synchronised on their emergency mains,
  Warning : the 2 outputs are not synchronised when :
  - Generator sets are not synchronised and "emergency set" contacts are not activated,
  - Emergency set A ("generator set" contact not activated) and chain B emergency mains are not synchronised and vice versa.

- if emergency mains A is absent or out of tolerances, UPS A is synchronised on chain B output and vice-versa.
- if A and B emergency mains are absent or out of tolerances, UPS A operates on internal frequency and UPS B is synchronised on UPS A output.

Operating with a generator set
The emergency set configurations should be the same for both UPS.

- If the inverter desynchronisation is activated and generator set A is supplying UPS A :

- *when emergency mains B is present and within tolerances* :
  UPS A is synchronised on UPS B output and UPS A bypass is locked. UPS B is synchronised on emergency mains B.

- *when emergency mains B is absent or out of tolerances :*
  UPS A operates on internal frequency. UPS B is synchronised on UPS A output. The bypass are locked.

- *when emergency set B supplies UPS B :*
  UPS A operates on internal frequency and UPS B is synchronised on the output of UPS A. The bypass are locked.

- If the inverter desynchronisation is not activated and emergency set A is supplying UPS A :

- *when emergency mains B is present and within tolerances* :
  UPS A is synchronised on UPS B output and UPS B is synchronised on emergency mains B.

- *when emergency mains B is absent or out of tolerances :*
  UPS A is synchronised on emergency set A and UPS B is synchronised on UPS A output and UPS B bypass is locked.

- *when emergency set B supplies UPS B :*
  UPS A is synchronised on emergency set A and UPS B is synchronised on UPS A output and UPS B bypass is locked.