Automatic Switch-Over

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Compliance Standards

ICAO Aerodrome design manual, part 5
IEC (61820, 61821, 61822)

Applications

The ASO Automatic Switch Over has been designed to detect any failure or breakdown occurring to one constant current regulator from 4 or 5 which are monitored. If the failure causes the regulator to stop, the ASO will switch automatically its load toward another regulator called “stand-by” CCR.

The effective transfer of all remote control and signalling functions from the faulty CCR to the stand-by CCR can be also managed by the ASO, or can be carried out by the monitoring system.

In this manner, it ensures the quasi-instantaneous and correct replacement of the faulty regulator, without incidence for lighting other than a small decrease of the lighting flux during the over-switching, and the transferring time of the control lines by the monitoring system (if the stand-by CCR is not controlled by the ASO itself).

Advantages

- Absolute safety for critical functions :

  A regulator breakdown during an approach stage, for example, will not cause any more temporary breakdown of the function, with all its possible catastrophic implications and consequences (NOTAM, plane diversions, accidents...).

- Maintenance optimisation :

  The CCR’s maintenance is not subjected any more to the urgency of restoring the broken function : it can be shifted in time, or treated in a traditional way (schedules, personnel...).

  Manual mode : The local forcing of over-switching allows to carry out preventive maintenance actions on the regulators, without questioning of the operational service of the loops which they feed.

- Resolution of CAT problems :

  The use of ASO can replace the interleaving of some functions since a regulator breakdown will go non-critical (the airport lighting will be assured even in case of regulator’s fault).

ASO : Technical Characteristics

GENERAL PRESENTATION

Each ASO is delivered into a metal frame with lifting rings. It includes 3 distinct parts: an "electronic" compartment, a “Low voltage” compartment and a "high voltage" compartment . The frame has same dimensions and characteristics that regulators type DIAM4100, to which it can be attached.

- The **Electronic part** includes an electronic board whose design uses last numerical technologies; it is fixed at the front panel of the device. This front sheet supports the user interface delivering any useful information, and allowing all local or distant operations.
- The **Low voltage compartment** includes all components involved in supplying and controlling the device, as interface boards, fuses, terminals. It is located at the rear in the upper part, and can be acceded dismantling the roof top or the back door.
- The **High voltage compartment** is located at the lower part of the device, and includes components involved with lighting loops, such as : lightning arrestors, HV vacuum relays, load terminals. It can be acceded opening the front or the back door, and dismantling the transparent protection plate.

MECHANICAL FEATURES

- Protection : IP 21. (other on request)
- Dimensions : H = 1380 mm W = 500 mm D = 700 mm
- Axle track and wheelbase (If casters option): 355 mmm x 610 mm
- Use : Normal temperature : -20°C to +55°C, humidity max. : 95%. (Option FAA : -40°C)
- Natural air cooling.
- Necessary accessibility: For opening the front and back doors.

ASO : Technical Characteristics

ELECTRICAL FEATURES

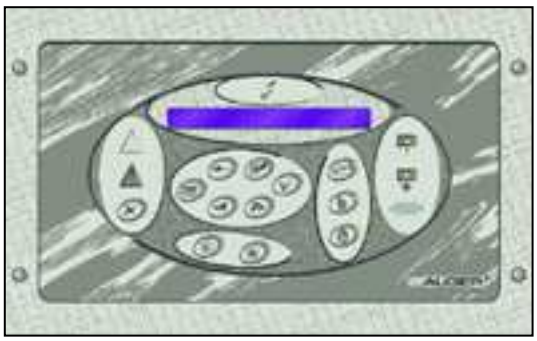
- Supply: Phase-phase 380/400/415 Vac or Single-phase 220/230/240 Vac ±10%, 50 or 60 Hz ±5%
- Nominal supply current : <1A
- Load power (maximum) : 30 kVA
- Nominal switched current (inputs for CCRs and outputs for loads) : 6.6A
- Number of managed regulators : 5 monitored CCRs + 1 stand-by CCR
- Remote control : Voltage, from 20V to 60V DC, or dry contacts or serial network RS485 / Ethernet
- Back indication: Static dry contacts, 125Vac/70Vdc, 0.1A max, or serial network RS485 / Ethernet

PROTECTIONS

- Lightning arrestors on HV outputs (option)
- Lightning arrestors on LV intputs (option)

USER INTERFACE

Made up of a flat polyester keypad on the front plate, it includes a wide display of 20 alphanumeric digits showing preferably the installation state, warning indicators and the keys used to make mode selection, local control or parameters setting, using simple menus.



ASO : Display and Menus

DISPLAY FUNCTIONALITY

The ASB carry out the monitoring of 5 operational regulators and a stand-by one. These information are displayed preferably and permanently, using an intuitive symbolic system allowing to know instantaneously the state of the concerned system. To do so, the monitored regulators are named A, B, C, D and E, and SB the Stand-by CCR.

DISPLAY EXAMPLES :

- CCR A, B, C, D, SB are enabled, in remote position without any fault, and CCR E is disabled:

- CCR A is in stop or local mode, CCR B, C, D are in remote position, enabled without any fault:

- CCR C is faulty and the C loop is switched toward the SB CCR:

- CCR A, C, D, SB are enabled, in remote position without any fault; CCR B and E are disabled; not to be taken into account by the ASO:

- The ASO switch over is in stop or local mode, no scan of any CCR can occur :

DETECTED FAULTS

The "*Detected Faults*" menu allows validation or invalidation of some faults, in the logical equation used to determine if there is a failure or not. The faults which can be taken under consideration are :

- Over-current
- Open circuit
- Power supply warning

The faults : « Loss of serial communication » or « total loss of supply » cannot be invalidated, and will cause automatically switching of the load.

CONFIGURATION MENU

The "*Configuration*" menu allows to change :
Frequency, in Hz: *50 or 60*
All operations used to re-load or upload the embedded software.

ASO : Display and Menus

VALIDATION / INVALIDATION MENU

The "*CCR validation.*" menu is used to validate/invalidate any CCR. When a regulator is indicated as invalidate, it will be no more monitored nor seen by the ASO, and its load cannot be switched.
Stand-by CCR :
The ASO has to be invalidated in order to prevent any switching (maintenance operation or replacement, for example).

OPTION MENU

The "*Option*" menu allows the following definitions:

- Parameter access: *No*

The change from *No* to Yes allows to change all other parameters of the ASO.

- System access: *No*

When parameter is *No*, the ASO is in "master" mode, in order to write/read into the monitored CCRs.
Changing that parameter in *Yes* makes the ASO switch to "slave" mode. The purpose of this mode is to enable the remote control system to modify the ASO parameter setting through the communication network.

REGULATOR' STATE

The "*CCRs state.*" Can be used to read the present state of CCRs. For a given regulator, the display can show :

- Stop mode
- Local mode
- Remote mode (Normal mode)
- Invalidated ! (CCR not seen by the ASO)
- Failure ! (CCR is faulty)
- No response ! (No communication between CCR and ASO)

COMMUNICATION PARAMETERS

The "*Com. Parameters*" menu allows to change the communication parameters between CCRs and ASO (Baud rate, time-out, Id, repetitions, etc.)

LOCAL MODE

The "*local* " menu can be used to switch any load toward the SB CCR.
That menu can be directly and fastly acceded pushing the short-cut key :

It allows to switch any load at any moment to the stand-by regulator.

Automatic Switch Over - ASO

ORDERING INFORMATION

The Automatic Switch-Over is identified by an ordering code which indicates its type and particularity. If needed, add all useful precision and options

Example : S40-IEC-1-4-50-15-400-A1B-001 = ASO compliant to IEC, 6.6A, 50Hz/400V for 15kVA CCRs, with a serial network to monitor the 4 CCRs, ASO monitored by serial link, no brightness control of the SB CCR, and with same lightning arrestors on each way :

S	4	0	-	I	E	C	-	1	-	4	-	5	0	-	1	5	-	4	0	0	-	A	1	B	-	0	0	1

Family S40 : S4000 Automatic-Switchover family, (same cabinet as DIAM4100 CCR)

Type
IEC : Compatible with CCR compliant to IEC (-20°C +55°C, supply +-10%, dielectric 2 x Un + 2500 V)
FAA : Compatible with CCR compliant to FAA (-40°C +55°C, supply +10/-5%, dielectric 5 x Un)

Current
1 : nominal switchable current 6.6A
2 : nominal switchable 20A

Nb. Ways
4 : 4 CCR monitored (not including the SB CCR)
5 : 5 CCR monitored (not including the SB CCR)

Frequncy
50 : 50Hz
60 : 60Hz

Power
15 : For 15 kVA max. CCRs and loops
30 : For 30 kVA max. CCRs and loops

Supply XXX : Input voltage : 208, 220, 230, 240, 277, 380, 400, 415 or 480 Vac –5% +10% (FAA) or +/-10% (IEC)

Control

AXX : CCR's Monitoring : Jbus RS485	X0X : Back indication : contacts	XXA : SB control : dedicated JBus
BXX : CCR's Monitoring : dry contacts	X1X : Back indication : JBus RS485	XXB : No brightness control
CXX : Monitoring contacts + dedicated Jbus	X2X : Back indication : ETHERNET	XXC : SB control : SOURIAU plugs
		XXD : SB control : Dry Contacts

Options

0XX : No cut out option	X0X : No lightning arrestors on supply.	XX0 : No lightning arrestors on loops
1XX : Cut-out/short-circuit for Loops and SB	X1X : With lightning arrestors on supply	XX1 : with same lightning arrestors
		XX2 : Dedicated lightning arrestors (*)

(*) : Please indicate CCR power (A, C, B, D, E)