

SECTION -1: GENERAL SPECIFICATIONS**1.1 Scope**

These specifications cover the technical requirements for supply Fifty General ATS Panels.

This ATS Panel Should be general design for used it with any two Diesel Generators Sets (15kVA) or one Diesel Generator Set (15kVA) with mains.

- This ATS panel should be transmit and received signal from any Gen-Set control card (differential models) to start and shutdown Gen- set or connect loads.
- This ATS in PART- B should be suitable with **Generator Control Panel** in PART-A

1.2 Documentations and Drawings Supplies with offer:

I. Documents: for approval shall include with the tender offer:

- ATS Technical data , design , Specifications (tabulated data that identifies make , model and country of origins) for all components:
 - a) Panel (Cabinet)
 - a) PLC card
 - b) Contactors
 - c) Selector Switches
 - d) Relays
 - e) Automatic Battery Charger (220VAC-12Vdc).
 - f) Protective devices.
 - g) Relays, Display unit, Indication lamps, terminals, etc.

II. Drawings:

- The tenderer shall provide the following:
- Single line diagram for ATS and
- Control schematics showing terminal and wire numbering.
- Wiring diagram showing all equipment and devices in their relative physical positions and wiring up to the terminal blocks.
- Panel dimensions.

1.3 Standard complains and codes:

ATS design and all components should be complied with requirements of international and European codes.

1.4 Warranty Statements

All ATS Panels shall be under 5 months on site comprehensive warranty support from the date installation and operation or one year from date of final acceptance for the tender.

Notes: Any submitted offer without complete technical data for all units and parts will be ignored and rejected.

SECTION-2

Technical Specifications of Automatic Transfer Switch (ATS)

2.1 General

The ATS unit shall be separated; floor mounted, supported by a stand and can be fixed to the wall if needed. ATS shall be supplied to contain all equipment as a one set from the manufacturer.

- ATS panel shall control the operation and the protection for two sources and the load, **and it should be equipped to handle 15 kVA capacity in case this panel would be used with either 10 kVA or 15 kVA gen-sets capacities.** The type of the sources can be whether two generators or mains and one generator.

2.2 Enclosures:

a). Dimensions:

The enclosure dimensions should not be less than (W x D x H) = 800 x 300 x800 mm.

b). Design and features:

- General purpose type, suitable for relevant ambient conditions, flush or surface mounted as shown on the comprising of box, trim and door to approved manufacturer's standards and sizes.
- Box, trim and doors should be electro-galvanized steel sheet more than 1.5mm thickness according to the standards.

c). Color:

- The color of the enclosure shall be standard grey color.

2.3 ATS Components and features:

All components and control equipment shall be mounted inside the enclosure and shall be provide with and able to functions as follows.

I. PLC Card:

This type of ATS shall be equipped with:

- One-High efficiency 12-Volt DC electronic programmable logic controller (PLC) with display to control the two sources working in two main operation modes (Auto/Manual).
- The PLC timer should be protected from reverse polarity of its supply.
- The PLC timer shall stand the dip in voltage during starting processes in order to not be affected during the cranking period of a Gen-set, especially one source only is Gen-set and the other is mains. And it shall be isolated by external switch

- The PLC shall have interface port suitable for inserting external back -up Memory and/or connecting PC interface Cable. Also, the PLC device shall be functioned to be programmed or modified without connecting to PC.
- Each PLC shall be equipped with, programming-supervision software and connecting cable.
- A battery shall be provided of 12 Volt and not less than 7-AmpHours.

II. Contactors:

- Two contactors, 4pole, 25A.
- It should be provided with mechanically and electrically interlock.

III. Selector switches:

Four selector switches should be used and each one with different functions as follows:

- 1) **Switch_1:** Three positions selector switch (**Auto/Off/Manual**) to choose an option of the system operation mode.
- 2) **Switch_2:** Two positions selector switch (**Mains Mode / Gen-Set Mode**) to choose the type of source.
 - a) The first position (**Mains Mode**) means the system is mains electricity and one generator.
 - b) The second position (**Gen-Set Mode**) means the system is two generators.
- 3) **Switch_3:** Two positions selector switch (**Gen-1 / Gen-2**) to choose the **priority** between the two generators in case the operation mode is Auto.
- 4) **Switch_4:** Three positions selector switch (**Source1 Loading / Off / Source2 Loading**) to choose the **manual loading** of the two sources in case the operation mode is Manual.

IV. Terminals:**a) Power Terminals:**

- Four Power terminal Contacts for each sources.
- Four Power terminal Contact for load.
- Power terminal contacts shall have suit a cross section area 16mm^2 .

b) Control and Alarm Terminals

- Control and alarm terminals cross-section area 4mm^2 , blade screwdriver.
- 1) Suitable terminals for Gen-sets' batteries (Positive / Negative).
 - 2) Suitable terminals for automatic battery charger (L-N).
 - 3) Free contact terminals for alarms to be transmitted according to Switch_2 position that indicates the type of source:

- **Mains + Gen Position:** Three alarms shall be transmitted

- 1) Mains disconnect
- 2) Gen-set run
- 3) Gen-set fail.

- **Gen1+ Gen2 Position:** Four alarms shall be transmitted

Alarm Terminal for Gen-Set -1		Alarm Terminal for Gen-Set -2	
1	Gen-Set_1 Run	3	Gen-Set_2 Run
2	Gen-Set_1 Failure	4	Gen-set_2 Failure

V. Automatic Battery charger:

- Automatic Battery charger to suit the PLC and Gen-set batteries 220V AC, 12V DC, 5A, and it shall be adjustable charge current and voltage.
- **In addition**, the battery charger shall provide individual indication and common alarm at Charger failure and output voltage drops abnormally.

VI. ATS Display Unit (Digital Card)

The Automatic transfer Switch shall incorporate multi-function digital card to display the following.

- AC (line – line / line – neutral) voltage values, AC current per phase values, frequency, and total kW display for the load.

VII. Current transformers:

- Three current transformers connected with mentioned module and fixed on Omega roll, DIN rail.
- The ratio of CT 60/5 to suit the digital module parameters.

VIII. Indicators Lamp , Alarms and Lights for:

For Source -1			For Source -2		
1	Source_1 Available	Yellow LEDS	4	Source_2 Available	Yellow LEDS
2	Source_1 On Load	Green LEDS	5	Source_2 On Load	Green LEDS
3	Source_1 Failure	Red LEDS	6	Source_2 Failure	Red LEDS

IX. Protections Devices

a) Surge Protection Device:

- 4-pole incomings mains surge protection device level-1 or level-2 at least shall be supplied.

b) Load Circuit Breaker:

- Four- pole MCB load circuit breaker 25A, breaking capacity current at least 16kA.

c) Suitable MCBs protection for all input and output (AC /DC) circuits.

d) Incoming Mains, source_1 only, shall be provided with programmable protection relay to include the following functions:

- U/O voltage protection (Preferable to work in 3 Phases or single Phase)
- Phase sequence and phase missing protection.
- U/O frequency protection.

e) Another relays that are needed for control panel ATS.

2.4 ATS Operation Mechanism

The System shall be designed to fulfill the following Operation sequence:

- When switch_1 is in the position of Auto mode and switch_2 is in the position of (Mains+ Gen-set) that means the system is mains electricity with a Gen-set, so that when the mains electricity is available it will be automatically loaded after adjustable timer. If Mains is disconnected, the PLC timer will give a signal to the Gen-set to start running and after adjustable timer the Gen-set will be loaded. If the Gen-set still cut off, the Gen-set must still running for an adjustable timer, 6 hours as an example, and stop for an adjustable timer as well, 2 hours as an example, then restart again and so on until the Mains gets back to be available.
- When switch_1 is in the position of (Auto) mode and switch_2 is in the position of (Gen-set_1+ Gen-set_2) and switch_3 is in the position of (Gen-set_1) that means the system is two generators and the priority is for Gen-set_1, it is expected that the PLC timer will give signal to Gen-set_1 to start running and after an adjustable timer the Gen-set_1 will be loaded for an adjustable timer, after that the PLC timer will give signal to Gen-set_2 to start running and after an adjustable timer the Gen-set_2 also will be loaded for an adjustable timer. All mentioned sequences above shall continue functioned smoothly as long as no one of the Gen-sets out of work due to any reasons otherwise the other Gen-set will be working alone for an adjustable timer then rested for an adjustable timer frequently.
- When switch_1 is in manual mode that means both sources will be loaded manually by the switch_4 after one of them is available whatever the type of source is.

The operation Manual mode shall be working directly without PLC timer.

All timers shall be adjustable and implemented in software; no external hardware timer will be accepted. The following timers shall be existed:

- 1) Mains failure timer
- 2) Mains restoration timer
- 3) Gen-sets and mains loading timers
- 4) Gen-sets cooling-off timer.

In case the mains fail for more than six hours, controller shall operate each Gen-set for adjustable set hours and also adjustable rest hours frequently.

SECTION-3: DOCUMENTS AND DRAWINGS

1. Description (operating) manual.
2. Control manual.
3. Fault-finding manual.
4. Arrangement and layout drawings of the board enclosures indicating equipment and its arrangement and dimensions including areas of permissible cable entries shall be provided.
5. Component lists – indicating country of origin, make, model, and rating etc. shall accompany the layout drawings.
6. Catalog data and instruction manuals on all electrical devices and components mounted on or within the board.
7. List of spare parts for all devices with prices, indicating make, model, and rating etc.
8. The tenderer shall introduce clearly drawing for ATS and put it inside enclosures of ATS.
9. One original Software program for control panel and three soft copies.
10. Software cable link (three).