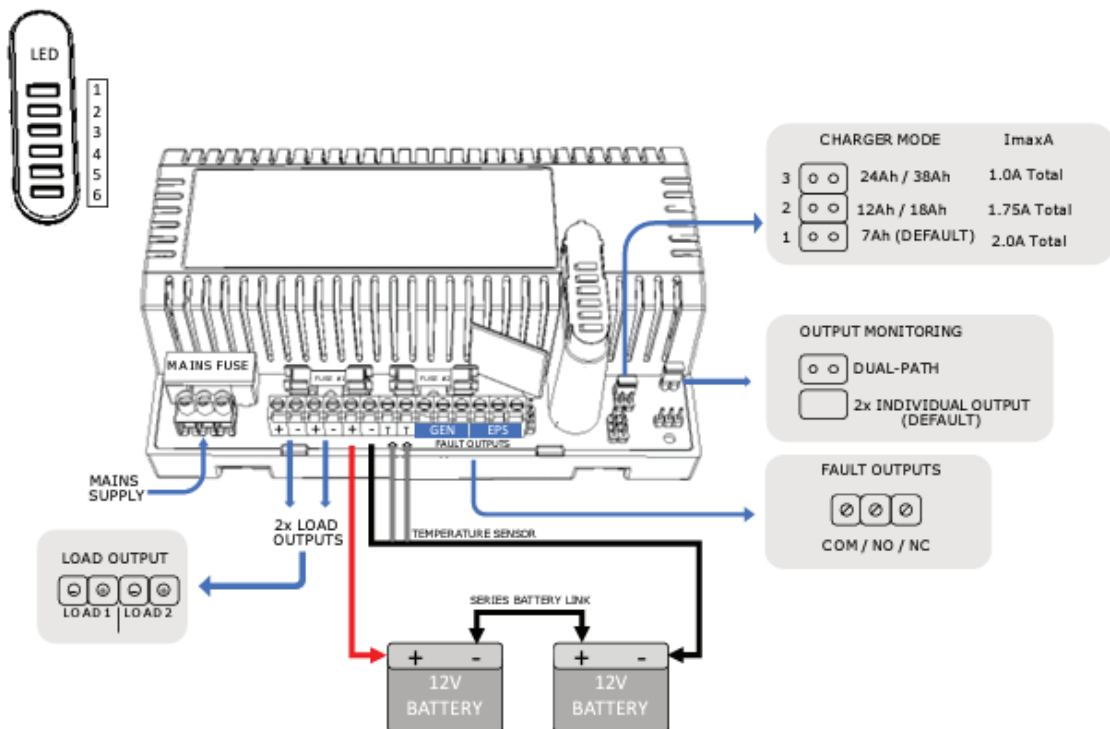


HYUNDAI
SECURITY DEVICE

**Control and indicating equipment
power supply, 24V, 2.4A
HYU-FA-PS001-2.4A**

User Manual





Mains Input

Rated Voltage / Power (Operational voltage)	230V ac / 60W @ $I_n = 2.5A$ nominal output current $U_n = 24V$ nominal output voltage (195V ac – 265V ac)
Frequency Input Switching frequency range	50 Hz nominal 20kHz – 125kHz approximately, dependent on load.
Input current	< 1.0 Amps at full load
Inrush current	25A Max at 25 °C 230V ac for 10ms
Fuse	T2.0 A 20mm, 250V ac HRC (IEC 60127-2 type)
Earth / neutral system	TN & TT

PSU Output

Voltage on Mains power (at full load)	21.6V dc (U_{min})* – 28.8V dc (U_{max})* / ** $U_n^* = 24.0 V$ dc +/-3% at 25°C
Voltage on Battery standby (at full load)	21.6V dc – 26.0V dc
Continuous Output Current No charging ($I_{max B}$) With Charging EN54-4 ($I_{max A}$)	2.5A Varies – see Section 20
Ripple	<100 mV pk – pk max @ Rated Voltage (HF)
Current Limitation Short circuit protection	From I_n^* to $I_n+15\%$ for an output voltage < 50% U_n^*
Fuse Load (OP1 and OP2)	F2.0 A (IEC 60127-2 type)
Battery Charging	Constant current (bulk) charging to 80% capacity within 24 hours Float charging to 100% within 48 hours with monitored ECO charging
Battery Voltage Low battery threshold voltage Deep discharge protection	23.2 V (measured at the battery) 21.6 V (minimum, measured at PSU output)
Quiescent current At no load At battery cut off	< 60 mA < 180 μA

* U_{min} / U_{max} / U_n = maximum / minimum

** U_{max} elevated by approximately +1% of U_n when connecting the battery. $U_{max} = 28.8V$ at all other times.

Environmental

Temperature – Operating	-10 to +40°C (operating) 75% RH non-condensing
Temperature - Storage	-20 to +80°C (storage)
Enclosure rating	IP30

INSTALLATION

This product is designed for the use in automatic fire detection and fire alarm systems. If the PSE is used as a power supply for Control and Indicating Equipment (CIE), the PSE shall be installed no further than 10cm from the CIE, and close coupled by conduit. Where this is not possible, see 'DUAL PATH' section 41 for EN54-4 compatible equipment.

Mains Feed

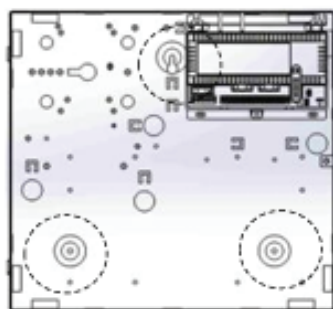
1. This unit must be fed from a mains power source via a separate (approved) disconnect device and fitted with a fuse or other over-current protection device rated at 5A maximum.
Ensure that the disconnect device used has appropriate earth fault protection to the applicable standard.
2. Where the PSE is used to provide power to a fire alarm circuit, the mains isolation and disconnect device should be provided solely for this purpose and be suitably marked "FIRE ALARM – DO NOT TURN OFF". All cabling should meet national and local fire system installation regulations, e.g. FP200 type cable for high integrity installations.
3. Where the PSE is used for other applications, it should be installed according to all relevant safety regulations applicable to that application.

Cable Sizing

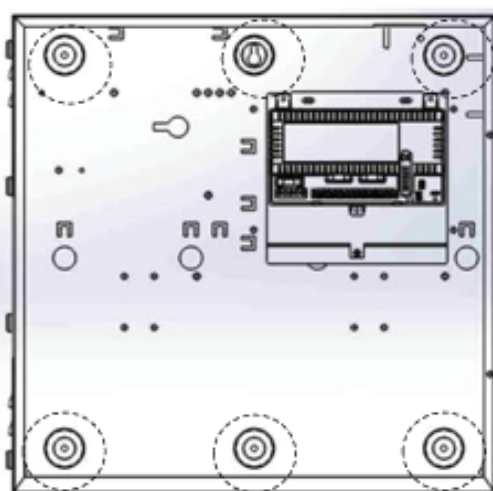
4. Mains input cable must be to the applicable standard with a 5A, or greater, current capacity, i.e. 0.75 mm² nominal conductor area, having a minimum operating voltage of 300/500V ac.
5. The low voltage output cable must be sized to carry the rated load current to the devices connected to the PSE.
6. Mains input and low voltage output cables should be routed to use different entry / exit holes in the case. Cable glands should be used to protect cable sheaths from chafing. Ensure that the glands are correctly sized (i.e. close fitting with respect to cable sizing). Note that the glands should meet a minimum flammability specification of UL94 HB.
7. All cabling should be securely fastened in position using a cable tie linked to the fixing points provided.

Mounting PSE enclosures

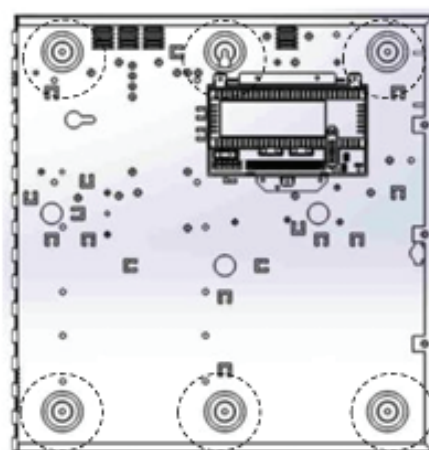
8. Using the appropriate fixing points, fix enclosure to a suitable surface, ensuring that wall fixings are appropriate to support its fully loaded weight.
9. Knock-outs are provided in the case for mating with external trunking or conduit
10. Ensure that all unused holes (on the rear of the case) are sealed to prevent the ingress of dust and moisture



C and K enclosure



H enclosure

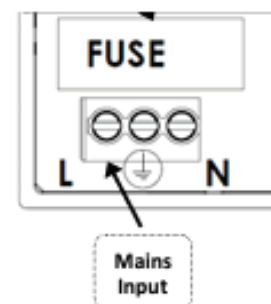


E enclosure

COMMISSIONING

Connecting the mains supply

- With no external connections made to the PSE, connect the mains input wires to the terminal block, **ensuring that the mains isolator (disconnect device) is open**. Fasten wiring in place with cable tie to the fixing points provided.
Note: This equipment MUST be earthed.



- Apply mains input. Confirm that all LED indicators flash on briefly proving integrity of indicators. After the power-on LED sequence confirm that the following conditions are met:

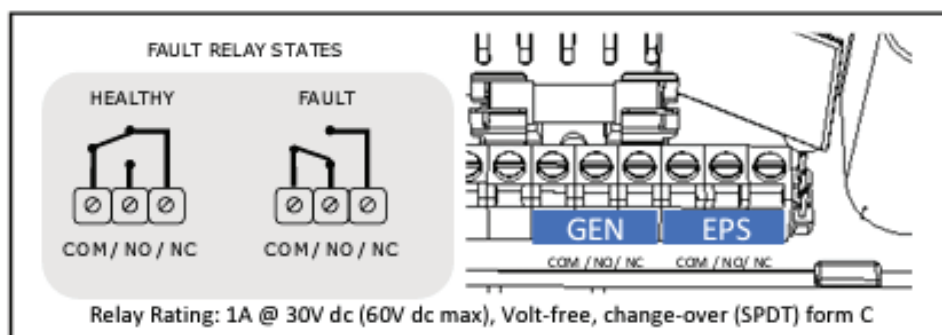
LED #	Symbol	LED Colour	Function
1	Mains	Constant Green	Indication: Mains supply = OK
2	Batt	Constant Yellow	Indication: Battery Fault = missing battery indicated
3	Fault	Yellow FLASH x1 (repeating)	Indication: Fault with PSU = due to missing battery
4	Diagnostic	Red FLASH x2 (repeating)	Indication: Fault = missing battery indicated
5	OP1*	Constant Green	Indication: Output 1 = OK
6	OP2*	Constant Green	Indication: Output 2 = OK

(See also 'Status and Fault-Diagnostic LED Indication' table for full details of LED indications.)

- Disconnect the mains power using the disconnect device.

Connecting the Remote Signalling

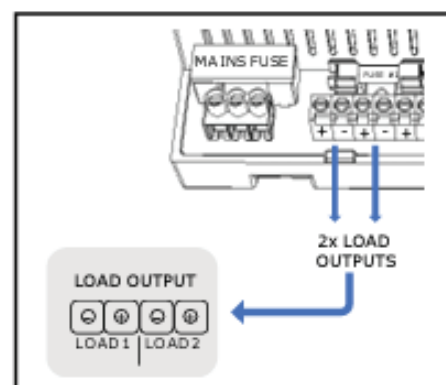
- Connect the EPS and GEN PSU Fault outputs to the appropriate inputs of CIE



EPS Fault	GEN Fault	Condition	Possible Cause	Action
(COM TO N/C) CLOSED	(COM TO N/C) CLOSED	Normal operation.	Mains present. Battery healthy.	None.
(COM TO N/C) OPEN	(COM TO N/C) CLOSED	Standby Mode.	Mains lost (> 8 seconds) Battery driving load.	Investigate loss of mains.
(COM TO N/C) CLOSED	(COM TO N/C) OPEN	Fault Present.	Blown fuses. Battery fault Internal fault.	Investigate fault source using diagnostic LED #4. Rectify fault where possible.
(COM TO N/C) OPEN	(COM TO N/C) OPEN	PSU Shutdown.	Mains lost (> 8 seconds) Standby battery exhausted.	Restore mains as soon as possible.

Connecting the Load (with OUTPUT MONITOR jumper fitted)

- When monitoring the PSU outputs, the STV can either consider the outputs as 2 individual, unrelated loads or will monitor the two outputs as a single dual-power transmission path
With the OUTPUT MONITOR jumper fitted, the outputs are considered as two individual loads.



16. Connect the load (output) wiring as shown here. Cable tie to fixing point provided (adjacent to exit hole).
17. If only one load is connected, the PSU will continue to monitor both outputs
Warning: do not overload the PSU, the I_{maxA} and I_{maxB} value is shared between both outputs
18. Re-apply mains. Verify the following

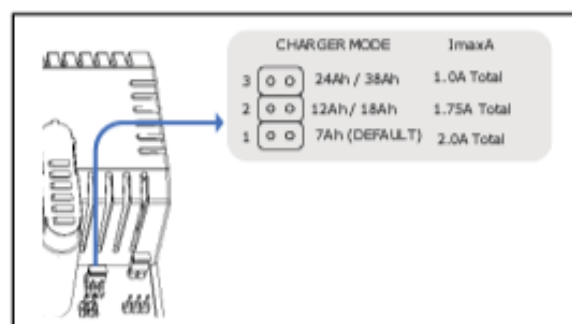
LED #	Symbol	LED Colour	Function
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2	Batt	Constant Yellow	Indication: Battery Fault = missing battery indicated
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5	OP1*	Constant Green	Indication: Output 1 = OK
6	OP2*	Constant Green	Indication: Output 2 = OK

19. If connected, verify that the EPS Fault monitor shows a (com to n/c) *CLOSED* contact and the GEN PSU Fault monitor shows an (com to n/c) *OPEN* contact.
20. Perform a full functional test of the connected system (load) including full alarm condition, then disconnect the mains supply.

Battery Charger Setting

21. Set the correct charger mode by fitting the jumper to the appropriate charger mode header. Use the table below to select the appropriate charger mode

Battery mode selected		Mode 1 (DEFAULT)	Mode 2		Mode 3	
Battery Capacity (2x 12V)		7 Ah	12 Ah	17/18 Ah	24 Ah	38 Ah
EN54-4 Continuous Output Current No charging (Imax B) With Charging (Imax A))		2.5 A 2.0 A	2.5 A (b) 1.75 A		2.5 A (c)1.0 A	
Constant current charge		0.35 A	0.75 A		1.50 A	
EN12101-10 (ImaxB) For 180s at end of standby period		2.5A				
EN12101-10 Max Standby current (Imax Standby)	4hr standby	1.10 A	1.90 A	2.50 A	2.50 A	2.50 A
	24hr standby	0.25 A	0.43 A	0.60 A	0.83A	1.30 A
	72hr standby	0.10 A	0.171 A	0.25 A	0.33 A	0.52 A



Battery Location

22. Mount two 12V batteries in lower part of enclosure, see below for correct orientation.
23. Note position of 'H' box brackets for each battery option.
24. Ensure all battery terminals are sufficiently insulated to prevent accidental shorting to each other or the enclosure metalwork.

25. Where a dual box solution (PSE and CIE in separate enclosures) is used all cabling between the two boxes should be routed to use separate case entry/exit holes from other cabling using suitable cable glands to protect the cables.
26. Connect the two 12 V standby batteries in series using the single link cable provided. Connect the *negative* of one battery to the *positive* of the other battery.

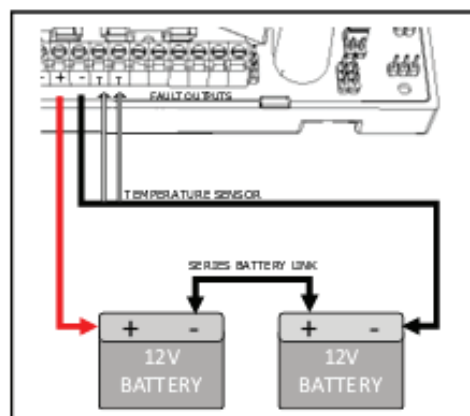
CAUTION – DO NOT CONNECT the two remaining (free) battery terminals to each other

27. Using the battery lead provided, connect the two white wires to the “Temp” terminals on the PSU (polarity is not important) and the RED lead to “Bat+” and the BLACK lead to “Bat-”.

CAUTION: Connect battery leads to PSU terminals FIRST - THEN connect to the battery LAST.

28. Connect the red battery lead to the free positive battery terminal and the black battery lead to the free negative battery terminal.

CAUTION – significant energy can be released from an SLA battery. When connecting the last battery lead, take extreme care to attach the cable ONLY to the correct terminal. Avoid shorting it to any other terminal or conducting surface.

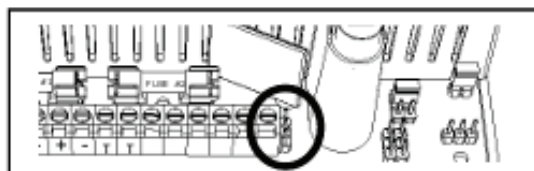


CAUTION – the supplied battery lead contains a temperature sensor – DO NOT attempt to modify this lead in any way and do not use an alternative method of connecting the batteries.

29. Reconnect the mains supply and verify that Fault LED #3 is off and Battery LED #2 indicates flashing or constant Green.

Note: Batteries as low as 19V may be connected, but this is NOT ADVISED as this could indicate damaged batteries. To connect batteries as low as 19V, carefully disconnect one white temperature sensor wire from the “TEMP” terminal block). This will induce a thermistor fault. Then wire the batteries to the terminals (follow steps 27-28). Once the batteries are charging, clear the thermistor fault by reconnecting the thermistor wire.

30. Verify GEN Fault relay n/c contact is closed, (com to n/c terminals = short circuit)
31. Disconnect the mains power. Verify that the green Mains LED #1 extinguishes, and the Yellow Fault LED #3 starts to flash (indicating that the PSE is running from its standby batteries).
32. If connected, verify that the EPS Fault output shows an open contact (com and n/c terminals = open circuit) and the GEN PSU Fault output shows a closed contact (com and n/c terminals = short circuit).
33. Verify that the standby batteries are now supporting the system load. Perform a full functional test of system including full alarm condition Note: ensure batteries have sufficient charge to support the system under full load.
34. To prevent battery fault indication when no battery is required, fit the “No Battery” link ().



Final Commission

35. Reconnect the mains. Verify that

LED #	Symbol	LED Colour	Function
1	Mains	Constant Green	Indication: Mains supply = OK
2	Batt	Green flash x1 (repeating)	Indication: Battery Charging (bulk phase)
3	Fault	OFF	Indication: No Fault
4	Diagnostic	OFF	Indication: No Fault
5	OP1	Constant Green	Indication: Output 1 = OK
6	OP2	Constant Green	Indication: Output 2 = OK

36. If connected, verify that EPS Fault output shows a (com to n/c) *closed* contact and the GEN PSU Fault output also shows a (com to n/c) *closed* contact.
37. Disconnect one of the battery leads, ensuring that no exposed section of conductor or connector is allowed to contact exposed metal-work, other PSE terminals, or other battery terminals.
38. Verify that, in less than 1 minute the following conditions are met:

LED #	Symbol	Green ON	Function
1	Batt	Constant Yellow	Indication: Battery Fault = missing battery indicated
2	Fault	Yellow flash x1 (repeating)	Indication: Fault with PSU = due to missing battery
3	Diagnostic	Red flash x2 (repeating)	Indication: Fault = missing battery indicated
4	OP1	Constant Green	Indication: Output 1 = OK
5	OP2	Constant Green	Indication: Output 2 = OK
6	Batt	Constant Yellow	Indication: Battery Fault = missing battery indicated

(See also 'Status and Fault-Diagnostic LED Indication' table for full details of LED indications.)

39. Reconnect the battery lead and, after approximately 3s, verify that that the Fault LED #3 does not flash. (Audible click can be heard as the battery relay closes, then a second click while the charger is tested.)
Note: If it is necessary to obtain confirmation of charging current; between steps 28 and 29, an ammeter can be placed in series with the battery leads. Continue to observe caution with all exposed conductors when inserting or removing the meter and when restoring normal battery wiring
40. Close cover and secure using fastening screws provided.

OPERATING INSTRUCTIONS

In the event of loss of mains, a battery fault or a GEN fault, the corresponding Fault relay (signal) contacts will open, and the LED indicators will display the fault condition and overall status of PSE.

If the output of the PSE fails, the cause of the failure should be investigated, also by referring to the '**Status and Fault-Diagnostic LED Indication**' table, e.g. short circuit on load terminals or connection of a deeply discharged battery. The fault should be rectified before restoring power to the PSE.

If any of the fuses require replacing, ensure the correct fuse rating and type is used – see page 2

MAINTENANCE

This unit is intended for use by Service Personnel only. There are NO USER SERVICEABLE parts inside.

There is no regular maintenance required of the PSE other than periodic testing, and replacement of the standby battery. ***Reference should be made to the battery manufacturer's documentation to determine typical/expected battery life with a view to periodic replacement of the battery.***

TROUBLE SHOOTING

Front Panel Legend



#	Indicator	Functional states
1	Mains status	Fault / Standby (support) operation / OK
2	Battery status	Battery Fault / Bulk Charging / Battery OK (charged)
3	Fault status	No Fault(s) / GEN (PSU) Fault
4	Diagnostic status	See 'Status and Fault-Diagnostic LED (Indication' table, below)
5	OP1 status	Fault / OK
6	OP2 status	Fault / OK

The PSU will identify a fault the PSU (LED3)

Further information can be obtained by observing the flash sequence of LED 4 and using the tables below

LED KEY	ON	OFF	FLASHING ON/OFF	FLASHING GREEN/YELLOW

Mains LED #1	Condition	Possible Cause	Action
 GREEN		Mains OK	
 YELLOW	Mains lost (Battery supporting load)	Mains lost / Battery supporting load.	Investigate loss of mains.
 OFF	PSU off – No power (Battery depleted)	Mains lost / Battery not supporting load.	Restore mains, confirm batteries are in working condition

Batt LED #2	Condition	Possible Cause	Action
 GREEN/YELLOW Fast Flash	Battery in process of connecting	Battery connecting	No action – Wait for battery connection to complete
 GREEN Flash x1	Normal operation (Battery connected)	Battery in bulk charge	No action – Battery charging normally
 GREEN	Normal operation (Battery connected)	Battery healthy.	No action – System healthy. (Battery in good state of charge)
 YELLOW	Battery fault	Battery disconnected Low Battery Volts High impedance in battery connection. Ri max 500mΩ Battery internal fault (detected during load test).	Note LED #4 Flash sequence and refer to table

Fault LED #3	Condition	Possible Cause	Action
 OFF	Normal Conditions	No faults	No action
 YELLOW Flash x1	PSU Fault	See LED #4 Flash sequence table	Note LED #4 Flash sequence and refer to table

Diagnostic LED #4	Condition	Possible Cause	Action
 RED Flash x1	No Output	Output fuse fail Output overload or short circuit.	Check and replace output fuse. Disconnect and test output load.
 RED Flash x2	No Battery Low Battery Volts.	Battery disconnected Battery heavily discharged Low Battery Volts.	Check battery connections Check battery fuse. Check battery condition / replace battery.
 RED Flash x3	Battery Fault.	High impedance in battery connection. Ri max 500mΩ Battery internal fault (detected during load test).	Check battery connections for corrosion. Replace battery if aged.
 RED Flash x4	Charger Fault.	Internal failure of battery charger.	Return to manufacturer.
 RED Flash x5	Battery Temperature Probe Fault.	Battery temperature monitor disconnected or damaged. PSU running in Safe Mode.	Check temperature sensor connections and condition of sensor. Replace if suspect
 RED Flash x6	Dual Path Fault.	Fault in output connections to the load (DUAL-PATH mode active only).	Check all cables between PSU and load.

OP1 & OP2 LEDs #5 or #6	Condition	Possible Cause	Action
 GREEN	Normal operation	No faults.	No action
 YELLOW	No Output	Output fuse fail Output overload or short circuit.	Check and replace output fuse. Disconnect and test output load.

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