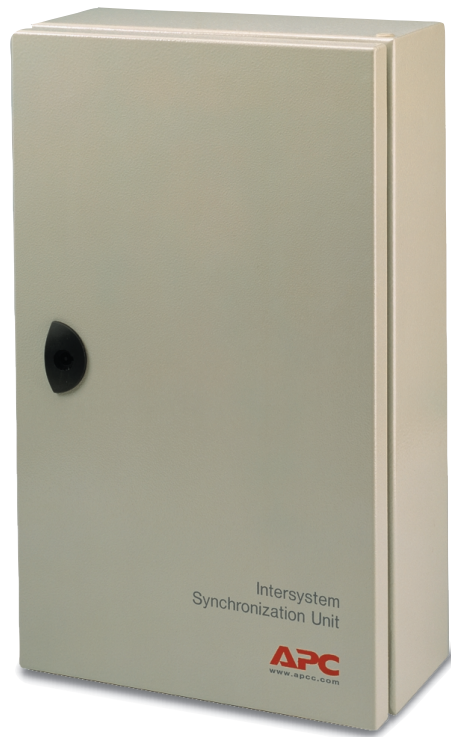


APC Intersystem Synchronization Unit User's Manual



APC
www.apcc.com

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Thank You

Thank you for investing in the APC Intersystem Synchronization Unit (ISU). Please read this User's Manual thoroughly prior to installing the system. It provides important information on safe and efficient installation and use.

The installation and use of this product must comply with national, federal, state, municipal and local codes.

Safety Symbols used in this manual



WARNING! Indicates a hazard which, if not avoided, could result in injury or death.



CAUTION! Indicates a hazard which, if not avoided, could result in damage to the product or other property.



NOTICE! Read and pay attention to this important information.

Indicates the primary safety ground.



WARNING!

The Intersystem Synchronization Unit (ISU) contains hazardous AC voltages. Only qualified electricians should install the ISU.

Before installing, maintaining or servicing the ISU, shut off the ISU and disconnect all sources of AC power.

To reduce the risk of fire or electric shocks, install the ISU in a temperature and humidity controlled indoor area, free of conductive contaminants.



CAUTION!

This unit contains components sensitive to electrostatic discharge (ESD). If you do not follow the ESD procedures, you may cause severe damage to electronic components.



PLEASE RECYCLE

The shipping materials for the APC Intersystem Synchronization Unit are recyclable. Please save them for later use or dispose of them appropriately.

Definitions

1.0 Definitions

Definitions used in this User's Manual:

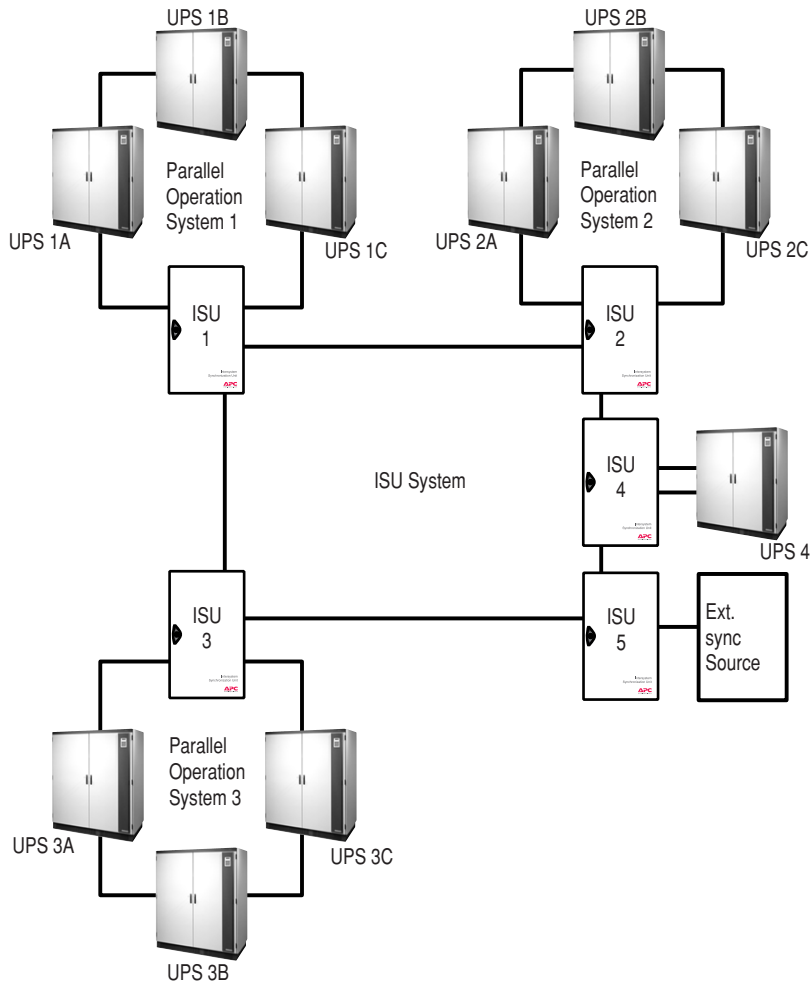
Intersystem Synchronization Unit System (ISU System)

The ISU system consists of inter-connected ISUs. One ISU system may consist of up to 5 ISUs, regardless of ISU configuration. The ISU system synchronizes the voltage of parallel operation systems running in battery operation.

The ISU system may also include one or more external synchronization sources, e.g. a genset or a non-APC Silcon UPS system.

Synchronization accuracy of the ISU is better than 2°.

Schematic overview of ISU system (example):



Definitions

Intersystem Synchronization Unit (ISU)

The ISU is an active part of an ISU system, serving as the interface to the sources and the ISU system.

The ISU can be connected to a parallel UPS configuration, using the standard parallel communication controller in the parallel operation system.

Parallel Operation System

APC Silcon UPS systems paralleled by standard parallel operation controllers of the APC Silcon Series.

When installing an ISU in a parallel operation system, the ISU is not regarded as a UPS unit and does not take up a “station address”.

Uninterruptible Power Supply (UPS)

Any APC Silcon Series UPS, unless otherwise specified.

Installation

2.0 Installation

2.1 Introduction

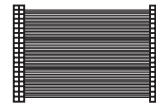
With the ISU system it is possible to synchronize up to 5 APC Silcon parallel operation systems in battery operation. The ISU system also enables synchronization of APC Silcon UPS systems in battery operation to an external synchronization source.

The Delta conversion on-line technology of the APC Silcon Series provides a system output with the same voltage phase angle and frequency as the input voltage. Therefore, different APC Silcon UPS systems will have synchronized outputs, provided the input mains/utility are synchronous. There will be a need for an external synchronization source only if a UPS system is running in battery operation and therefore APC has purpose-developed the Intersystem Synchronization Unit.

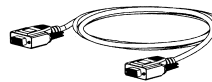
2.2 Unpacking / Identification of Equipment

Unpack the ISU and identify the following equipment:

- APC Intersystem Synchronization Unit
 - Dimensions H x W x D mm/inch.: 500/19.69 x 300/11.80 x 150/5.90
 - Weight kg/lbs: 12.5/27.5
- APC Intersystem Synchronization Unit User's Manual
- Multicore cable (used only with an ISU in a Single APC Silcon UPS configuration)



- 14-pole cable with 2 15-pin sub-D male connectors



A type label (on the inside of the ISU door) contains details on: part number, type, serial number, and weight of the ISU.

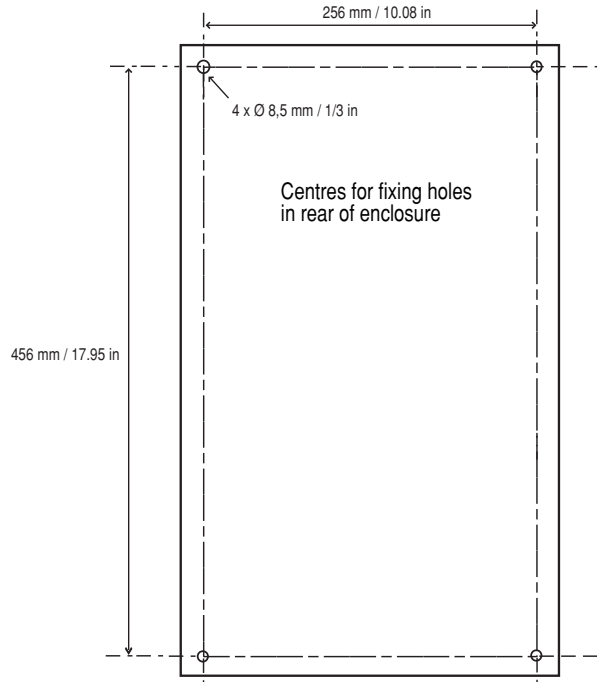
 www.apcc.com			
P.No.	:		
TYPE	:		
S.No.	:		
WEIGHT	:		KG



Installation

2.3 Installation Site

The ISU is designed for wall mounting as illustrated below:




Installation

2.4 Connections

2.4.1 ISU Terminals

Each ISU has a series of terminals; the use of the individual terminal is described in Table 1 below:

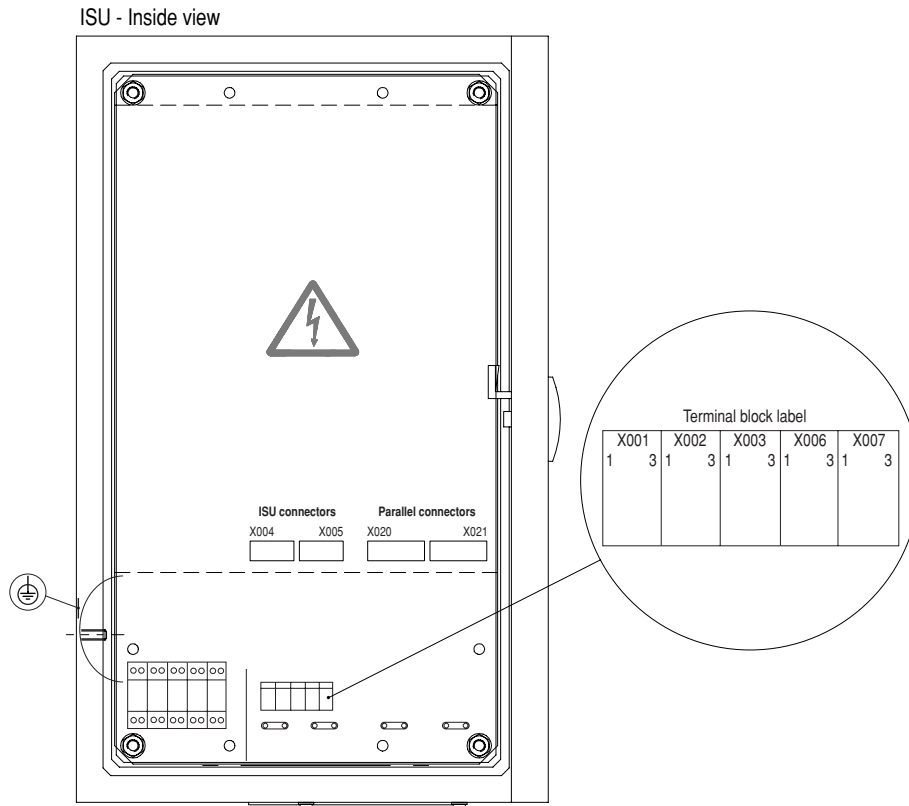
Table 1: ISU Terminals

Terminal	In-Out	Function	Electrical Data
Ground			
X001:1 X001:3	Input	Primary supply: Supplying ISU electronics ^a	208V -10% to 480V +10%
X002:1 X002:3	Input	Reserve supply: Supplying ISU electronics ^b	208V-10% to 480V +10%
X003:1 (L1) X003:3 (L2)	Input	External synchronization source	480V \pm 20% / 400V \pm 20% / 208V \pm 20% 50Hz \pm 8% / 60Hz \pm 8%
X004:1-9 X005:1-9	Input/ Output Input/ Output	Communication to ISU system Communication to ISU system	See section 2.6 for Construction of ISU Connection Cables
X006:1 X006:3 X007:1 X007:3	Input/ Output Output	Relay output for indication of ISU Master Status. See section 3.5 on Alarms & Messages Relay contact output fail-safe. Relays to be used must be con- nected to the same phase to comply with dielectric strength standards. Relay contact output for indica- tion of system ok / system error. (Common fault)	Max. 250VAC/8A Min. 20mA 0.3-2000VA
X020:1-15 X021:1-15	Input/ Output Input/ Output	Communication to parallel oper- ation system Communication to parallel oper- ation system	Use existing cables for parallel operation

- a. For an ISU with a local parallel operation system it is recommended to use two phases of the system's output as the primary supply. If the ISU is working with an external synchronization source it is recommended to use two phases of the external source's output as primary supply.
- b. It is recommended to use either the same source as the primary supply (but do not use the same two phases) or to use the output of another parallel operation system or external source in the same ISU system

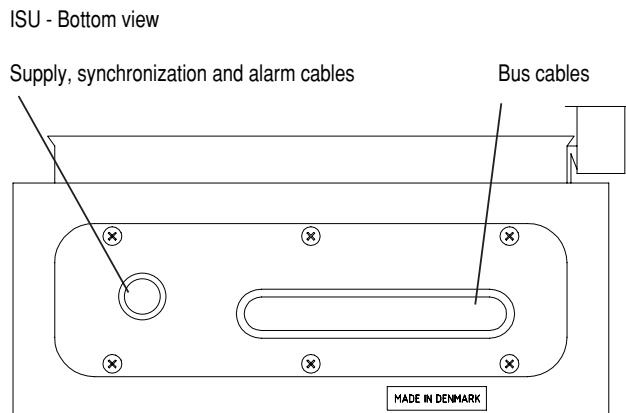
Installation

Terminal positions illustrated below.



2.4.2 ISU Cables

All ISU cables are connected to the unit via the gland plate in the bottom of the ISU as illustrated below.



Installation

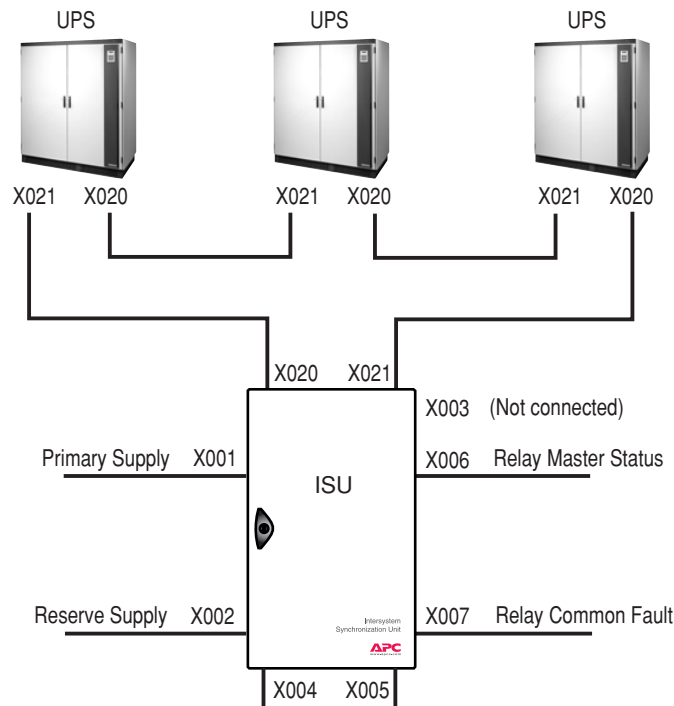
2.5 ISU Configurations

The ISU will typically be installed in one of the following three example configurations:

- ISU as part of a parallel system
- ISU and single APC Silcon UPS
- ISU connected to an external synchronization source

For configuration examples, refer to the appropriate paragraphs below:

2.5.1 ISU in Parallel System



X020 and X021: Cable Connection to UPS

Multicore cable: APC specified 14-core cable.
Total cable length in systems: up to 100 m / 330 ft.

X004 and X005: Cable Connection to ISU system

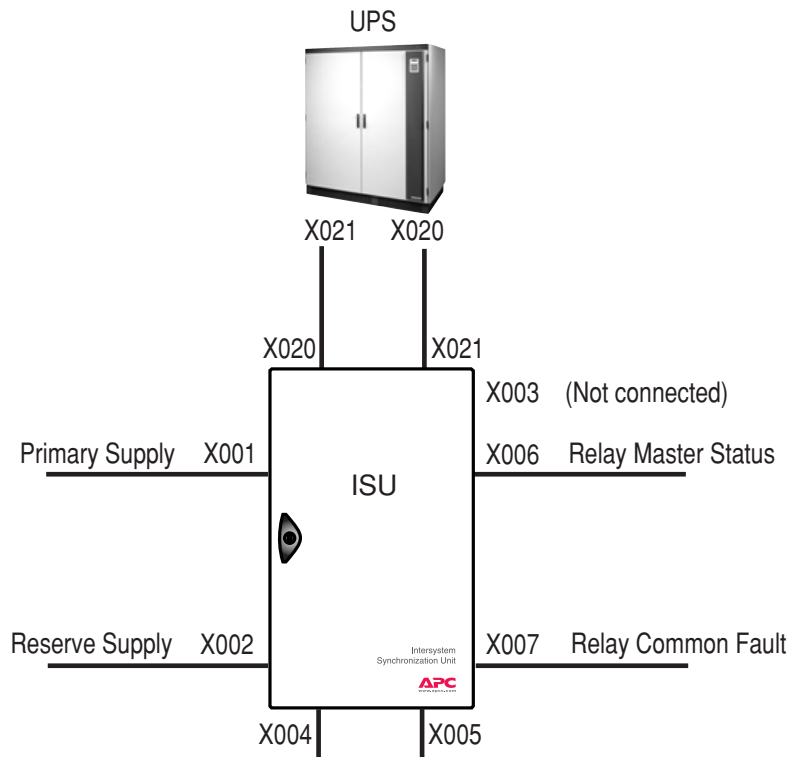
Multicore cable: APC specified 6-core cable.
Total cable length in systems: up to 500 m / 1640 ft.

X001, X002, X006 and X007: Cable Connection to primary and reserve power, and relay output

Copper wire: 22-12 AWG required in US installations. Tightening torque: 4.5 Lb In / 0.51 Nm

Installation

2.5.2 ISU and Single APC Silicon UPS



CAUTION!

If the ISU is controlling a single UPS through the parallel operation controller, replace the multicore cable between main controller and parallel controller with the one supplied.

X020 and X021: Cable Connection to UPS

Multicore cable: APC specified 14-core cable.

Total cable length in systems: up to 100 m / 330 ft.

X004 and X005: Cable Connection to ISU system

Multicore cable: APC specified 6-core cable.

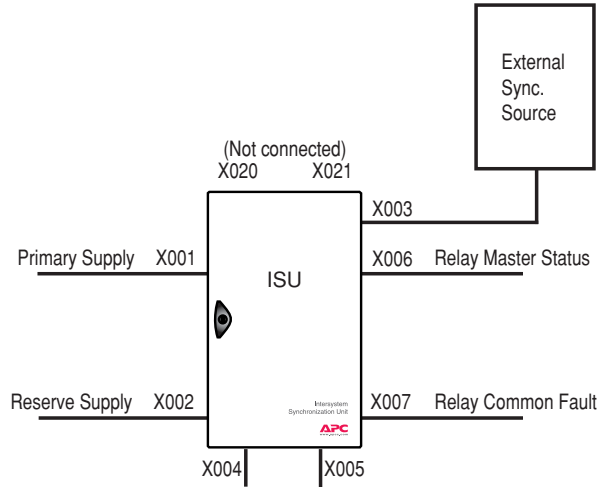
Total cable length in systems: up to 500 m / 1640 ft.

X001, X002, X006 and X007: Cable Connection to primary and reserve power, and relay output

Copper wire: 22-12 AWG required in US installations. Tightening torque: 4.5 Lb In / 0.51 Nm

Installation

2.5.3 ISU Connected to an External Source



X004 and X005: Cable Connection to ISU system

Multicore cable: APC specified 6-core cable.
Total cable length in systems: 500m / 1640 ft.

X001, X002, X003, X006 and X007: Cable Connection to primary and reserve power, external synchronization source, and relay output

Copper wire: 22-12 AWG required in US installations. Tightening torque: 4.5 Lb In / 0.51 Nm

2.6 Construction of ISU Connection Cables

Use a shielded LIYCY cable 8 x 2 x 0.14mm UL Style 2464 300V 80°C VW-1 with 2 9-pole sub-D male connectors

Table 2: Pin Connections for ISU Cables

Twisted Pair	Wire	Connector 1	Connector 2
First pair of twisted wires	1a 1b	Pin 1 Pin 6	Pin 1 Pin 6
Second pair of twisted wires	2a 2b	Pin 3 Pin 7	Pin 3 Pin 7
Third pair of twisted wires	3a 3b	Pin 5 Pin 9	Pin 5 Pin 9

Both ends of the shield must be connected to the base of the connector.



CAUTION!

Cut off any extra pairs of twisted wire and **DO NOT** connect such extra wires.

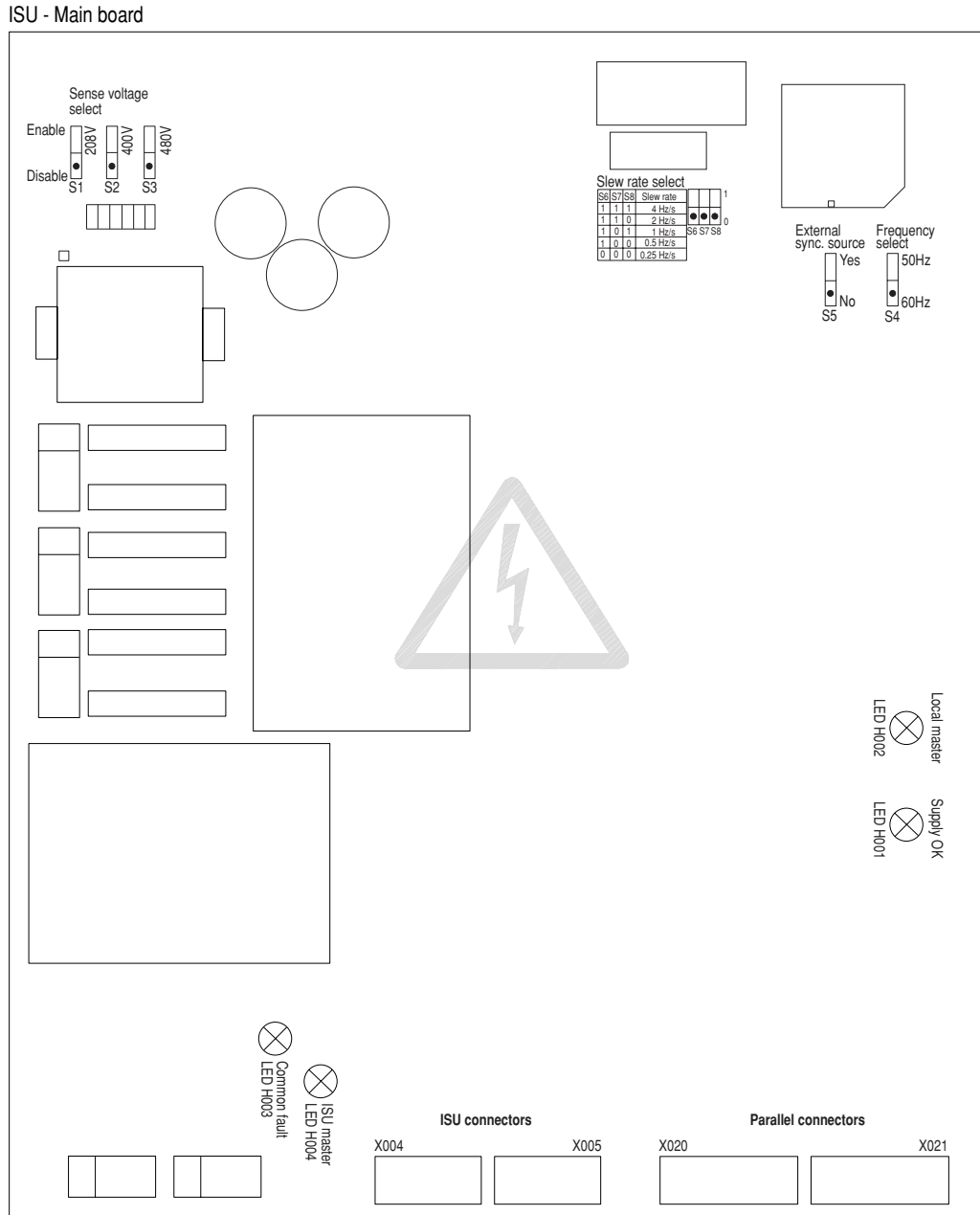
The ISU cables are used for connection of two or more ISUs in a loop connection as follows: X005 in ISU1 to X004 in ISU2, X005 in ISU2 to X004 in ISU-N, and X005 in ISU-N to X004 in ISU1.

Operation

3.0 Operation

3.1 ISU Main Board Layout

Schematic drawing of the ISU main board illustrating location of switches and LED indicators:



Marks default settings

Operation

3.2 Programming

The following parameters must be set on the ISU main board.

- Voltage
- Frequency
- Slew-rate

For instructions on parameter settings refer to the appropriate paragraphs in this section.

3.2.1 Voltage and Frequency

The possible voltage and frequency settings are listed in Table 3 and Table 4 below:

Table 3: Voltage Settings

Voltage
208V \pm 20%
400V \pm 20%
480V \pm 20%

Table 4: Frequency Settings

Frequency
50Hz \pm 8%
60Hz \pm 8%

Set voltage and frequency parameters according to Table 5 below:

Table 5: How to Set Voltage and Frequency

Switch	Function	Condition	IMPORTANT!
S001 S002 S003	Operating voltage	Set => 208V Set => 400V Set => 480V	Select ONLY one voltage Default: None set
S004	Frequency option	Choose 50Hz or 60Hz (default)	
S005	External synchronization source	Yes: External synchronization source connected to this ISU No: No external synchronization source connected to this ISU (default)	If YES, DO NOT connect a parallel operation system

Operation

3.2.2 Slew-rate

NOTICE!

All frequency and slew-rate ISU settings must be identical and the ISU slew-rate must be lower than or equal to the slew-rate of the parallel operating systems in the ISU system.

Set slew-rate parameters according to Table 6 below:

Table 6: How to Set Slew-rate

S006	S007	S008	Slew-rate
1	1	1	4Hz/s
1	1	0	2 Hz/s
1	0	1	1 Hz/s
1	0	0	0.5 Hz/s
0	0	0	0.25 Hz/s (default)

3.3 Starting Up

Connect the ISU as described under Connections (section 2.4), and check the LED indicators listed in the section below.

3.4 LED Indicators

The ISU LEDs (H001-H004) provide information concerning operation of the unit. Refer to Table 7 below for a description of the conditions indicated by the LEDs:

Table 7: How to Read LED Signals

LED	LED Function	IF the LED lights	THEN
H001	SUPPLY OK	GREEN	All DC operation voltages are OK: +5V (VCC) > +4.50V +12V (VDD) > +9V -12V (VSS) < -8V
H002	Synchronization / local bus	GREEN	ISU supplies synchronization to local parallel operation system
H003	COMMON FAULT	RED	A fault is preventing synchronization
H004	ISU Master	GREEN	ISU supplies synchronization pulses to ISU system

Operation

3.5 Alarms & Messages

For use in advanced systems the ISU has two relay outputs, operating with H003 and H004

The relay outputs are defined as:

Common Fault (X007)

The common fault alarm message will be initiated by an error resulting in faulty ISU operation. Check the following sources of error:

- Supply fault
- No local parallel bus communication
- Global synchronization corrupt
- No ISU bus communication

In a fault situation the red LED indicator H003 on the main board lights up (except when ISU-power is completely down), the relay is de-energized and the potential-free relay contact is closed (X007: 1-3)

Master Status (X006)

Indicating if ISU is the master and thus supplying synchronization signals to the ISU system.

In a Master Status situation the green LED indicator H004 on the main board lights up, the relay is energized and the potential-free contact is closed (X006: 1-3).

Warranty

4.0 Warranty

4.1 APC Intersystem Synchronization Unit Limited Factory Warranty

APC warrants that the unit, when properly installed and commissioned by APC or APC authorized service personnel, shall be free from defects in materials and workmanship for a period of (1) year from the date of installation or maximum 18 months after manufacturing. In the event that the unit fails to meet the foregoing warranty, APC shall for a period of one (1) year repair or replace any defective parts, without charge for on-site labor and travel if trained & authorized APC personnel has conducted start-up of the unit.

An APC Start-Up Service must be performed/completed by APC or APC authorized service personnel or the on-site factory warranty will be voided and replacement of defective parts only will be covered. APC shall have no liability and no obligation to repair the installed unit if non-authorized APC personnel performed the start-up and such start-up caused the unit to be defective.

APC SHALL NOT BE LIABLE UNDER THE WARRANTY IF ITS TESTING AND EXAMINATION DISCLOSE THAT THE ALLEGED DEFECT IN THE PRODUCT DOES NOT EXIST OR WAS CAUSED BY PURCHASER'S OR ANY THIRD PERSON'S MISUSE, NEGLIGENCE, IMPROPER INSTALLATION OR TESTING, UNAUTHORIZED ATTEMPTS TO REPAIR OR MODIFY, OR ANY OTHER CAUSE BEYOND THE RANGE OF THE INTENDED USE, OR BY ACCIDENT, FIRE, LIGHTNING OR OTHER HAZARD.

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How to Contact APC

5.0 How to Contact APC



APC Corporate
132 Fairgrounds Road
West Kingston, RI 02892
USA

Telephone: 401 789-5735
Fax: 401 789-3710

PowerFax™: 800 347-FAXX

Pre-sales Technical Support
877-474-5266 (1-877-4Silcon)

Post-sales Technical Support
877-287-7835 (1-877-2UPS-TEK)

Web: www.apcc.com/support/contact/contact_support.cfm

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