



WORLD
PRECISION
INSTRUMENTS

INSTRUCTION MANUAL

A310

Accupulser™ Pulse Generator

Serial No. _____

www.wpiinc.com

111723

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ABOUT THIS MANUAL

The following symbols are used in this guide:



This symbol indicates a CAUTION. Cautions warn against actions that can cause damage to equipment. Please read these carefully.



This symbol indicates a WARNING. Warnings alert you to actions that can cause personal injury or pose a physical threat. Please read these carefully.

NOTES and TIPS contain helpful information.

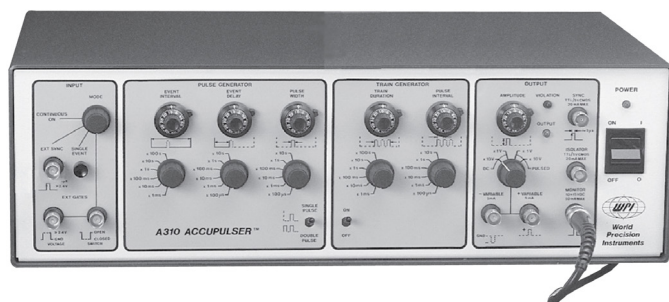
INTRODUCTION

The Model A310 Accupulser™ is a second generation pulse generator/stimulator that combines the reproducibility and accuracy of digital electronics with the fine resolution and continuous adjustment characteristics of analog circuitry. All of the A310's timing parameters are entered via ten-turn readable controls and six-position range switches. Combining the accuracy of ten-turn dials with the A310's highly linear circuitry allows the outputs to be accurate to within 1% of the set value, over a range of seven orders of magnitude.

The A310 can produce single or double pulses in either continuous run, single-shot or train/burst modes. The duration of the train/burst is easily controlled by using the onboard envelope generator or by externally provided potential or dry-contact gating inputs.

Five separate outputs are available from the A310. The ISOLATOR output is designed to drive a WPI stimulus isolator and is also compatible with TTL and 5-volt CMOS circuits. The MONITOR output provides 10-15 volt (up to 50 milliampere) signals for viewing the output on an oscilloscope/recorder or for controlling other devices. A pair of low noise, VARIABLE outputs are amplitude variable from zero to +10 volts and -10 volts, in two ranges, with a resolution of one millivolt. The TTL and 5 volt CMOS compatible, SYNC output provides short duration pulses which are synchronized with the beginning of each output interval.

Panel lights indicate when the user set parameters result in logical timing violations and when the outputs are active.



SAFETY

Do Not Use With Humans



CAUTION: *This instrument is for investigational use only in animals or other tests that do not involve human subjects.*

Power Source

This instrument is intended to operate from a power source that will not apply more than 250 volts rms between the supply (mains) conductors or between either supply conductor and ground. A protective (safety) ground connection by way of the grounding conductor (green with yellow stripe) in the power cord is essential for safe operation.

Grounding the Instrument

This instrument is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting to the instrument input and output terminals. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.



WARNING: *YOU MUST NOT REMOVE OR IN ANY WAY BYPASS THE GROUNDING PIN OF THE POWER CORD.*

Use the Proper Power Cord

Use only the power cord specified for your instrument and locale. Use only a power cord that is in good condition.

Use the Proper Fuse

To avoid a fire hazard, use only the fuse specified for your instrument. Replacement fuses shall be identical in type, voltage rating, and current rating. Line fuses must match the selected voltage source of AC power and must be changed when the nominal voltage range is changed.

Do Not Operate in Explosive Atmospheres

To avoid explosion, do not operate this instrument in an atmosphere of explosive gases.

Do Not Remove Covers or Panels

To avoid personal injury, do not remove covers or panels from this instrument. Do not operate the instrument without properly installed covers or panels.

PREPARATION FOR USE

This section describes the initial preparations required when the A310 Accupulser™ is first placed into operation. Review the Safety guidelines on pages 4-5 before proceeding.

Shipping Information

The A310 Accupulser™ is packaged and shipped in a foam-packed container. This manual and any options will be included with the instrument. Upon receipt of the instrument, make a thorough inspection for proper contents and possible shipping damage. If reshipment is necessary, use the original container. If the original container is not available, use any suitable substitute that is rigid and of adequate size. Wrap the instrument in paper and surround with at least 100 mm (four inches) of shock absorbing material.

Installation

Input Power



CAUTION: The A310 Accupulser™ may be damaged if the Line Voltage Selector switch is not set to match the applied AC power source or the wrong line fuse is installed.

This instrument operates from either a 120V or 230V nominal AC power source. The rear panel is marked at the factory with the user's expected mains power. Before connecting the power cord, verify that, in fact, the correct mains power setting was provided and the appropriate line fuse is installed. If any doubt remains, the internal Line Voltage Selector switch may be adjusted.



WARNING: BEFORE REMOVING THE COVER, DISCONNECT THE INSTRUMENT FROM THE AC POWER SOURCE.

The switch is located inside the instrument. To verify the voltage setting:

1. Remove the four screws (two on each side) on the side panels of the top cover.
2. Remove the instrument cover by sliding it straight upward.
3. Find the power supply printed wiring board next to the right side of the instrument.
4. Locate the slide switch on the board and slide to the appropriate voltage setting. The actuator is marked and the visible marking is the actual voltage setting, i.e. 115V or 230V.
5. Reassemble the instrument by reversing the order of the above steps.

Line Fuse



WARNING: BEFORE ATTEMPTING FUSE REPLACEMENT, DISCONNECT THE INSTRUMENT FROM THE AC POWER SOURCE.

The instrument contains one fuse, located in the fuse holder on the back panel. If necessary, replace the fuse with the type and rating specified on the back panel. Verify that the fuse contained in the fuse holder matches the desired line voltage. A spare fuse is provided in the fuse housing (Fig. 1).

1. Turn the main power switch off (I).
2. Unplug the power cord from the power cord socket on the back of the unit (Fig. 1).

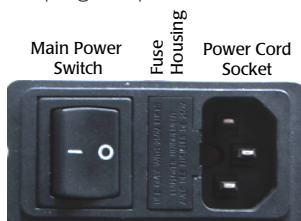


Fig. 1—Unplug the power cord to access the fuse housing release.

3. Insert a small flat blade screwdriver under the lip on the right side of the fuse housing cover (Fig. 2).



Fig. 2—Insert the screw driver under the fuse housing lip and pry the housing open.

4. Pull the fuse housing out as far as it will go and rotate it to the right. There is a catch to keep the housing from coming completely out (Fig. 3).



Fig. 3—Open the fuse housing and rotate it right to remove the fuse.

5. Remove the bad fuse. It is the one on the top. A spare fuse is stored in the bottom slot of the fuse housing.
6. Use the spare fuse provided to replace the bad fuse. Slide it into the top slot of the fuse housing.
7. Rotate the fuse housing and slide it back into position.
8. Reinstall the power cord.
9. Turn the power switch on to verify that the unit has power again.

Tilt Bail

The instrument is provided with a tilt bail. If use is desired, lift the front edge of the instrument, swing the bail down and forward, and snap into place.

Rack Mounting

The instrument may be provided with a rack mounting kit for a standard 19 inch rack. Each mounting ear is assembled with two screws.

CONTROLS, INDICATORS AND CONNECTORS

Front Panel

Input

MODE	A four position rotary switch selects the source of the operation control signal.
CONTINUOUS ON	provides a continuously running internal time base established by the setting of the EVENT INTERVAL controls.
EXT SYNC	replaces the EVENT INTERVAL time base by an external, user-provided signal.
SINGLE EVENT	replaces the EVENT INTERVAL time base by a one-time signal provided by the user pressing the push button.
EXT GATES	is the same as the CONTINUOUS ON mode, except that the internal time base is only on when the appropriate signal is applied to either of the two EXT GATES connectors.
EXT SYNC	BNC connector input for an external signal to replace the internal EVENT INTERVAL time base. Connector is only active when selected by the MODE switch. The signal should be positive on the center pin, referenced to the shell.
SINGLE EVENT	A momentary push-button switch provides a single pulse or sequence of pulses each time the switch is pressed. The switch is only active when selected by the MODE switch.
EXT GATES	Two BNC connectors provide external signal input, which switches the internal EVENT INTERVAL time base on and off. The connectors are only active when selected by the MODE switch. The VOLTAGE signal should be positive on the center pin, referenced to the shell. The SWITCH signal is a short-circuit between the center pin and the shell.

Pulse Generator

EVENT INTERVAL	A ten-turn dial with an associated six-position rotary switch are used to control the internal time base of the instrument. The number set on the dial is multiplied by the position of the Range switch. For example, 1.28 on the dial and x1ms on the switch, represent an event interval of 1.28 ms.
EVENT DELAY	A ten-turn dial with an associated six-position rotary switch are used to control the delay between the internal or external pulse starting the event interval and the beginning of the first pulse in the event.

PULSE WIDTH	A ten-turn dial with an associated six-position rotary switch are used to control the duration of the pulse(s) within the event interval.
SINGLE/DOUBLE	A two-position switch used to select a “twin” pulse. In the SINGLE PULSE mode, the first pulse in an event appears after the elapse of the event delay. In the DOUBLE mode, in addition of the normal pulse(s) of the event interval, a pulse is generated coincident with the beginning of the event interval and of the same duration as the other pulse(s) of the event interval. This feature is functional in both the pulse and the train generation modes.

Train Generator

ON/OFF	A two-position switch used to enable and disable the train generator function of the instrument.
TRAIN DURATION	A ten-turn dial with an associated six-position rotary switch are used to control the duration of the train of pulses. The length of the train may be longer than the value set on the dial because the last pulse of the train is, by design, of the same duration as the earlier pulses.
PULSE INTERVAL	A ten-turn dial with an associated six-position rotary switch are used to control the time interval between the beginnings of the pulses within a train.

Output

AMPLITUDE	<p>A ten-turn dial with an associated four-position rotary switch are used to control the amplitude of the signal through the -VARIABLE and the +VARIABLE output connectors. The number set on the dial is the actual value of the output voltage, depending on the full scale value selected by the position of the AMPLITUDE switch. For example, 10.00 on the dial and DC x1V on the switch, represent a constant -1.0V on the -VARIABLE and +1.0V on the +VARIABLE outputs.</p> <p>The DC positions represent a non-switching DC output voltage even when the other outputs are providing pulses. The PULSED positions provide switched outputs, synchronous with the other outputs. DC outputs with the least amount of “noise” are obtained by switching the INPUT MODE out of CONTINUOUS ON and not providing an external input.</p>
-VARIABLE	A BNC connector used to provide a variable output signal. Signal polarity on the center pin is negative relative to the connector shell.
+VARIABLE	A BNC connector used to provide a variable output signal. Signal polarity on the center pin is positive relative to the connector shell.
VIOLATION	<p>A red light, which is illuminated for approximately one second, whenever the instrument is operating with timing parameters that are in conflict with each other. Violations are defined as follows:</p> <p>EVENT DELAY is greater than EVENT INTERVAL.</p> <p>PULSE WIDTH extends into the next EVENT INTERVAL.</p> <p>TRAIN DURATION extends into the next EVENT INTERVAL.</p>

	PULSE WIDTH is greater than PULSE INTERVAL.
OUTPUT	A green light, which is illuminated during the length of the PULSE WIDTH and the TRAIN DURATION. The light may not be visible when short pulses are generated with large intervals between pulses. The light will appear to be continuously on when pulses are generated with very short intervals between pulses.
SYNC	A BNC connector used to provide a narrow pulse at the beginning of each EVENT INTERVAL. The signal on the center pin is positive relative to the connector shell.
ISOLATOR	A BNC connector used to provide output pulses in accordance with the preset timing parameters. The signal on the center pin is positive relative to the connector shell. This output is compatible with WPI Stimulus Isolators.
MONITOR	A BNC connector used to provide output pulses in accordance with the preset timing parameters. The signal on the center pin is positive relative to the connector shell.

Power

POWER Light	A green light, which is illuminated whenever mains power is connected to the instrument and the POWER switch is ON.
POWER Switch	A two-position switch used to apply mains power to the instrument.

Rear Panel

Connector	Polarized, 3-conductor, IEC320/CEE-22 connector is used for line (mains) power input to the instrument. A removable cordset, terminated with a NEMA 5-15P connector, is standard. An alternate cordset may be supplied when local circumstances dictate different mains voltages and connections.
Fuse holder	Used for protective fuse in series with the high side (brown or black wire) of the mains. The holder in older models accepts 1/4 by 1-1/4 inch (6.35mm by 31.8mm) fuses of the type indicated on the rear panel. New models require a 5 mm diameter x 20 mm long fuse.

OPERATING DIRECTIONS

The Model **A310** Accupulser™ is designed to make the operation of the instrument as self-explanatory as possible. Extensive graphics are provided on the front panel to guide the user with the function of each of the controls and connectors. Before using the following instructions, it is recommended that the user should read about each panel component in the Controls, Indicators and Connectors section of this manual. The following operating directions are provided as typical instrument setups, that would result in valid operating modes.

Pulse

In the pulse mode, the instrument provides single or double pulses of user set widths. The train generator is disabled by the user. In the single pulse mode, the pulse is delayed after the start of the event interval. In the double pulse mode, a second pulse is provided, starting at the same time as the event interval.

In the CONTINUOUS ON input mode, the time parameters for the event interval, the event delay and the pulse width are set on the panel controls by the user. In the EXT SYNC input mode, the internal clock is disabled and the event interval starts whenever an input sync pulse is applied. In the SINGLE EVENT mode, one event interval occurs for each push on the switch. In the EXT GATES input mode, the panel set event interval time is active as long as either of the gate signals is active. The EXT GATES feature allows the generation of a train of train pulses. At the OUTPUT SYNC connector, a narrow pulse is provided every time an event interval starts.

The output signal from the instrument is available at four different connectors. The time parameters at each of the connectors are identical. The differences among the outputs are due to the amplitude of the signal and the source/sink current capability of each circuit. These differences are described in the Specification section of this manual.

It is possible to set the panel controls so that conflicting timing parameters are provided. In order to assist the user, the VIOLATION light is illuminated for one second, whenever one time interval improperly overlaps another. As a further aid, the OUTPUT light is illuminated for the duration of every output pulse and train duration.

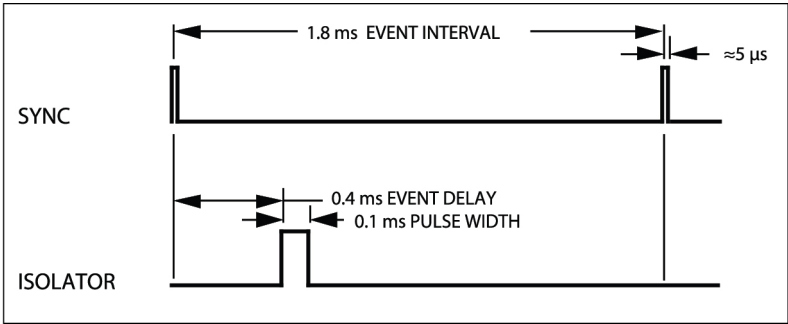


Fig. 4—Pulse mode

The pulse mode may be demonstrated with the panel controls set as follows. The instrument should provide the waveform shown on Fig. 4, at the SYNC and the ISOLATOR OUTPUT connectors.

INPUT MODE

EVENT INTERVAL dial
EVENT INTERVAL switch
EVENT DELAY dial
EVENT DELAY switch

CONTINUOUS ON

1.80
x1 ms (i.e. event interval is 1.8 ms)
4.00
x100 μs (i.e. event delay is 0.4 ms)

PULSE WIDTH dial	1.00
PULSE WIDTH switch	$\times 100 \mu\text{s}$ (i.e. pulse width is 0.1 ms)
SINGLE/DOUBLE PULSE	SINGLE
TRAIN GENERATOR	OFF
AMPLITUDE dial	5.00
AMPLITUDE switch	PULSED $\times 10\text{V}$ (i.e. $\pm 5\text{V}$ DC amplitude)
POWER	ON

Vary the three PULSE GENERATOR dials and notice how the waveform timing follows the dial values. Note that the OUTPUT light is dimly lit, reflecting the fact that the pulse width is 1/18 of the event interval duration. Try to extend the pulse into the next event interval. This may be accomplished by increasing the delay or increasing the pulse width or decreasing the event interval. As soon as the pulse width overlaps the beginning of the next interval, the VIOLATION light should illuminate.

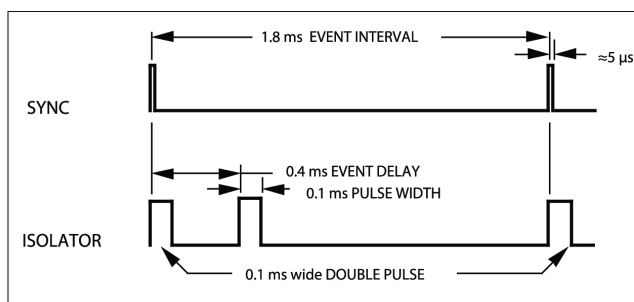


Fig. 5—Double Pulse

Switch SINGLE/DOUBLE PULSE to DOUBLE and note that a second pulse appears as shown on Fig. 5.

Change the output connection to the MONITOR connector. Note that the waveform timing does not change, but that the pulse amplitude more than doubles.

Change the output connection to the +VARIABLE connector. Again note, that the timing remains the same, but the amplitude drops to the previously set +5 volts. Vary the AMPLITUDE dial and notice how the amplitude follows the value on the dial. Switch the AMPLITUDE to PULSED $\times 1\text{V}$ and the signal amplitude drops to 1/10 of the previously observed value. Switch the AMPLITUDE to DC $\times 1\text{V}$ and the output changes to a steady voltage, which can still be varied with the AMPLITUDE dial. Switch AMPLITUDE to DC $\times 10\text{V}$ and the output voltage increases ten-fold.

Change the output connection to the -VARIABLE connector. Repeat the steps of the previous paragraph and note that all the output conditions remain the same except that all the output voltages are negative.

Switch the INPUT MODE to EXT SYNC, then to SINGLE EVENT. In both modes the output signal goes to zero volts. Press the SINGLE EVENT button and note that a single event interval is generated from the output. Switch to EXT GATES. The output should still be zero.

Short circuit the EXT GATES SWITCH connector and note that as long as the connection is held, the output produces waveforms. As soon as the connection is broken, the output returns to zero. The EXT SYNC and the EXT GATES VOLTAGE input modes can be verified by applying the appropriate signal to the connectors. For each EXT SYNC pulse, one event interval is generated. As long as the EXT GATES VOLTAGE is applied, the output will produce waveforms.

Train

In the train mode, the instrument provides all the functions of the pulse mode. In addition, the single pulse can be expanded to a train of pulses. The double pulse at the beginning of the event interval, remains as one pulse. The violation function is expanded to include overlapping train timing parameters.

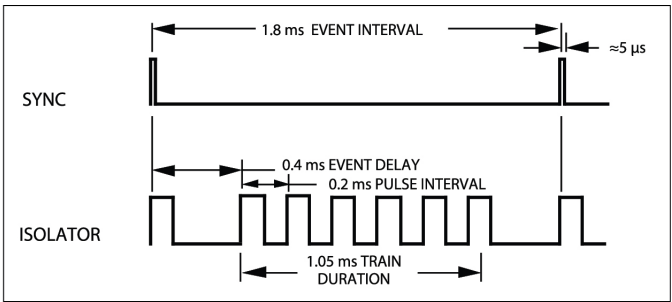


Fig. 6—Train mode

The train mode may be demonstrated with the panel controls set as follows. The instrument should provide the waveform shown on Fig. 6, at the ISOLATOR OUTPUT connector. The other outputs behave in the same manner as in the above described pulse mode example.

INPUT MODE

EVENT INTERVAL dial
EVENT INTERVAL switch
EVENT DELAY dial
EVENT DELAY switch
PULSE WIDTH dial
PULSE WIDTH switch
SINGLE/DOUBLE PULSE
TRAIN GENERATOR
TRAIN DURATION dial
TRAIN DURATION switch
PULSE INTERVAL dial
PULSE INTERVAL switch
POWER

CONTINUOUS ON

1.80
x1 ms (i.e. event interval is 1.8 ms)
4.00
x100 μs (i.e. event delay is 0.4 ms)
1.00
x100 μs (i.e. pulse width is 0.1 ms)
DOUBLE
ON
1.05
x1 ms (i.e. train duration is 1.05 ms)
2.00
x100 μs (i.e. pulse interval is 0.2 ms)
ON

Vary the two TRAIN GENERATOR dials and notice how the waveform timing follows the dial values. Note that the OUTPUT light is now brighter than in the pulse mode example. This


is due to the fact that the train duration plus the double pulse are 11.5/18 of the event interval duration.

Try to extend the train duration into the next event interval. This may be accomplished by increasing the delay or increasing the train duration or decreasing the event interval. As soon as the train duration overlaps the beginning of the next interval, the VIOLATION light should illuminate. Increasing the pulse width to equal the pulse interval will also result in a violation.

With the above train timing parameters, five pulses fit into the train duration. Decrease the train duration and at some point, the number of pulses suddenly drops to four. The sudden change is due to the requirement that only full-width pulses are to be generated. Thus, it is normal that the preset train duration is shorter than the actual length.

MAINTENANCE

Cleaning

 **CAUTION:** *Do not use alcohol, aromatic hydrocarbons or chlorinated solvents for cleaning. They may adversely react with plastic materials used to manufacture the instrument.*

The exterior of this instrument may be cleaned periodically to remove dust, grease and other contamination. There is no need to clean the inside. Use a soft cloth dampened with a mild solution of detergent and water. Do not use abrasive cleaners.

Test

The Model A310 Accupulser™ can be tested by following the steps in the Operating Directions section of this manual. A different and more specific test is described below. To perform all the tests, a voltmeter and an oscilloscope will be required.

- 1. Set the front panel controls as follows:

INPUT MODE	CONTINUOUS ON
EVENT INTERVAL	10 s
EVENT DELAY	550 μs
PULSE WIDTH	100 s
SINGLE/DOUBLE PULSE	SINGLE PULSE
TRAIN GENERATOR	OFF
AMPLITUDE dial	10.00
AMPLITUDE switch	PULSED x10V
- 2. Switch POWER to ON. Verify during the waveform “on” cycle, with the voltmeter, that the given voltages exist at each connector.

-VARIABLE	-10VDC
+VARIABLE	+10VDC
MONITOR	+10 to +15VDC
ISOLATOR	+3.5 to +5.1VDC

Also verify that,

POWER light is on

VIOLATION light is flashing 1s on and 9s off

OUTPUT light is on when any output is on

3. Vary the AMPLITUDE dial and verify with the voltmeter that both the -VARIABLE and the +VARIABLE outputs follow the value on the dial.
4. Switch the AMPLITUDE to PULSED x1V and again verify with the voltmeter that both the -VARIABLE and the +VARIABLE outputs follow the value on the dial.
5. Reset the front panel controls as follows:

EVENT INTERVAL	1 ms	
EVENT DELAY	550 μ s	
PULSE WIDTH	100 μ s	
TRAIN GENERATOR		ON
TRAIN DURATION	450 μ s	
PULSE INTERVAL	200 μ s	
6. Connect the oscilloscope. If a two channel instrument is available, it is recommended that the SYNC output is connected to channel one and the alternate output to channel two. The oscilloscope trigger should be taken from channel one. Verify that the above set waveforms are provided from each of the following connectors:
 - VARIABLE
 - +VARIABLE
 - MONITOR
 - ISOLATOR

Also verify that,

-The OUTPUT SYNC connector provides approximately 5 μ s wide pulses

-POWER light is on

-VIOLATION light is continuously on

7. Reduce the TRAIN DURATION to 300 μ s and note, that while passing 400 μ s, the VIOLATION light goes off and the third pulse disappears.
8. Switch from SINGLE PULSE to DOUBLE PULSE and note that an extra pulse appears at the same time as the beginning of the SYNC pulse.
9. Switch INPUT MODE to SINGLE EVENT and note on the oscilloscope that the output goes to zero.
10. Press the SINGLE EVENT button and note that one and only one waveform is generated from the outputs.

SPECIFICATIONS

Timing Parameters	accuracy better than 1% of set value, each parameter is continuously variable, through two orders of magnitude, in six ranges
EVENT INTERVAL	100 μ s to 1000 s
EVENT DELAY	10 μ s to 100 s
PULSE WIDTH	10 μ s to 100 s
TRAIN DURATION	100 μ s to 1000 s
PULSE INTERVAL	20 μ s to 100 s (50 KHz max pulse frequency)
Inputs	
EXT SYNC	accepts 1 μ s minimum pulses TTL, CMOS, RS232C compatible
EXT GATES VOLTAGE	accepts 1 μ s to ∞ pulses TTL, CMOS, RS232C compatible
EXT GATES SWITCH	any switch closure, 5 mA max source
Outputs	
SYNC	\approx 5 μ s, TTL & 5V CMOS compatible, 20 mA max sink and source
ISOLATOR	TTL & 5V CMOS compatible, 20 mA max sink and source
MONITOR	10-15 VDC, 50 mA max sink and source
+VARIABLE/-VARIABLE	0 to \pm 1 V low range, 1 mV resolution 0 to \pm 10 V high range, 10 mV resolution 5 mA max sink and source <500 μ V PULSED noise @ 100 kHz band width <500 μ V DC noise, wide band <1 ohm output impedance
Signal Ground	connected to chassis ground, removable
Power	95-130 VAC or 190-260 VAC, switch selectable single phase, 50/60 Hz, 20 VA
Fuse (Older models)	120 V: 0.25 A, fast, 0.25 x 1.25" USA 230 V: 0.13 A, fast, 0.25 x 1.25" USA
Fuse (2019 models)	120 V: 0.25 A, fast, 5 x 20 mm metric 230 V: 0.13 A, fast, 5 x 20 mm metric
Temperature	10° C (50° F) to 40° C (104° F)
Dimensions	Height: 134 mm (5.25 in.) plus 16 mm (0.6 in.), removable bail Width: 432 mm (17.0 in.) Depth: 242 mm (9.5 in.) Mountable in standard ANSI/EIA RS310C 19 in. rack
Weight	4.1 kg (9 lb), 5.5 kg (12 lb) shipping

DECLARATION OF CONFORMITY



WORLD PRECISION INSTRUMENTS, LLC.
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e-mail wpi@wpiinc.com

DECLARATION OF CONFORMITY CE

We: World Precision Instruments, Inc.
175 Sarasota Center Boulevard
Sarasota, FL 34240-9258, USA

as the manufacturer/distributor of the apparatus listed, declare under sole responsibility that the product(s):

A310

To which this declaration relates is/are in conformity with the following standards or other normative documents:

Low Voltage Directive (Safety) 2014/35/EU:

- EN 61010-1:2010+A1:2019

EMC Directive 2014/30/EU:

- EN IEC 61326-1:2021
- EN IEC 61326-2-3:2021
- EN IEC 61000-3-2:2019+A1:2021
- EN IEC 61000-3-3:2013+A2:2021


Cory Boyes, Director of Design and
Development

Issued On: December 12, 2022

Europe Representative
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Managing Director
World Precision Instruments Germany GmbH,
Pfungstweide 16, 61169 Friedberg, Germany

F-QC-006 Rev D

WARRANTY

WPI (World Precision Instruments, Inc.) warrants to the original purchaser that this equipment, including its components and parts, shall be free from defects in material and workmanship for a period of one year* from the date of receipt. WPI's obligation under this warranty shall be limited to repair or replacement, at WPI's option, of the equipment or defective components or parts upon receipt thereof f.o.b. WPI, Sarasota, Florida U.S.A. Return of a repaired instrument shall be f.o.b. Sarasota.

The above warranty is contingent upon normal usage and does not cover products which have been modified without WPI's approval or which have been subjected to unusual physical or electrical stress or on which the original identification marks have been removed or altered. The above warranty will not apply if adjustment, repair or parts replacement is required because of accident, neglect, misuse, failure of electric power, air conditioning, humidity control, or causes other than normal and ordinary usage.

To the extent that any of its equipment is furnished by a manufacturer other than WPI, the foregoing warranty shall be applicable only to the extent of the warranty furnished by such other manufacturer. This warranty will not apply to appearance terms, such as knobs, handles, dials or the like.

WPI makes no warranty of any kind, express or implied or statutory, including without limitation any warranties of merchantability and/or fitness for a particular purpose. WPI shall not be liable for any damages, whether direct, indirect, special or consequential arising from a failure of this product to operate in the manner desired by the user. WPI shall not be liable for any damage to data or property that may be caused directly or indirectly by use of this product.

Claims and Returns

Inspect all shipments upon receipt. Missing cartons or obvious damage to cartons should be noted on the delivery receipt before signing. Concealed loss or damage should be reported at once to the carrier and an inspection requested. All claims for shortage or damage must be made within ten (10) days after receipt of shipment. Claims for lost shipments must be made within thirty (30) days of receipt of invoice or other notification of shipment. Please save damaged or pilfered cartons until claim is settled. In some instances, photographic documentation may be required. Some items are time-sensitive; WPI assumes no extended warranty or any liability for use beyond the date specified on the container.

Do not return any goods to us without obtaining prior approval and instructions from our Returns Department. Goods returned (unauthorized) by collect freight may be refused. Goods accepted for restocking will be exchanged or credited to your WPI account. Goods returned which were ordered by customers in error are subject to a 25% restocking charge. Equipment which was built as a special order cannot be returned.

Repairs

Contact our Customer Service Department for assistance in the repair of apparatus. Do not return goods until instructions have been received. Returned items must be securely packed to prevent further damage in transit. The Customer is responsible for paying shipping expenses, including adequate insurance on all items returned for repairs. Identification of the item(s) by model number, name, as well as complete description of the difficulties experienced should be written on the repair purchase order and on a tag attached to the item.

** Electrodes, batteries and other consumable parts are warranted for 30 days only from the date on which the customer receives these items.*

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