CATH-TECH

CORROSION CONTROL EQUIPMENT

Operation Manual for CI-100 / CI-200

GPS Synchronized Current Interrupter

CI-100

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Limited Warranty

All Cathodic Technology Limited (Cath-Tech) instruments and equipment are warranted against defects in materials, design or workmanship for a period of two years from date of sale. This warranty excludes damage due to misuse, abuse, tampering or acts of God such as fires, floods, wind damage, lightning etc.

We will repair or replace at our option any defective component, after examination in our manufacturing facility, if the fault is due to defective materials or labour, within two years of the purchase date. For warranty repair, a Returned Goods Authorization (RGA) must be obtained from Cathodic Technology Ltd prior to shipping the defective unit pre-paid to our location.

Note: ***There is no warranty expressed or implied on batteries.***

Cath-Tech Policy

- Cath-Tech extends a two-year in use warranty on all units, which have been designed and/or manufactured by Cath-Tech staff.
- Cath-Tech reserves the right to make any changes in design or specification which it deems an improvement, with no liability to make the same changes on existing equipment.
- This warranty is in lieu of all other warranties or guaranties, expressed or implied, which might otherwise exist. The purchaser is relying only upon this guarantee and not upon any representations not herein expressed.
- Any material or equipment being returned to the factory must first have a Returned Goods Authorization (RGA) from Cath-Tech.

Safety

Do not operate the CI-100 / CI-200 GPS synchronized current interrupter during electrical storms. Damage to both the CI-100 / CI-200 GPS synchronized current interrupter and the rectifier could occur.

The installation of the CI-100 / CI-200 GPS synchronized current interrupter requires electrical connections in the rectifier. Only personnel who are trained in electrical safety should undertake this. The CI-100 / CI-200 can interrupt either DC or AC current. Turn the AC supply to the rectifier OFF and verify with a volt meter before making any connections to the rectifier.

Alligator clips are only provided for the 100 Amp model, not the 200 Amp. Field test have found that a direct lug connection at higher amperages is more secure and less likely to overheat. Alligator clips are not recommended when interrupting more than 100 amps.

Welcome

Thank you for selecting the CI-100 / CI-200 GPS synchronized current interrupter. Cath-Tech is the world leader in electronic equipment for corrosion control.

The CI-100 / CI-200 GPS synchronized current interrupter is equipped with a GPS engine to ensure accurate synchronization with other interrupters no matter how far apart.

Your CI-100 / CI-200 GPS synchronized current interrupter is a precision instrument. It is designed to interrupt the current flow from your cathodic protection rectifier or sacrificial anode system on a cyclic basis.

Open and inspect your CI-100 / CI-200 GPS synchronized current interrupter on receipt. If any damage occurred during shipping, file a claim with the carrier immediately.

Rating Info

The CI-100 is rated for a maximum of 100 Amps. As the voltage increases, the maximum amperage decreases as per the table below:

AC Voltage	**Max Amps**	**DC Voltage**	**Max Amps**
240 V AC	100 Amp	48 V DC	100 Amp
480 V AC	80 Amp	125 V DC	50 Amp
600 V AC	70 Amp	250 V DC	30 Amp

The CI-200 is rated for a maximum of 200 Amps. As the voltage increases, the maximum amperage decreases as per the table below:

AC Voltage	**Max Amps**	**DC Voltage**	**Max Amps**
240 V AC	200 Amp	48 V DC	200 Amp
480 V AC	160 Amp	125 V DC	100 Amp
600 V AC	140 Amp	250 V DC	60 Amp

Features

Quick Start Guide

Storage Compartment

AC Power Mains Cable

Lockable Hasp

GPS Antenna

Interruption Cables – Alligator clips only available for 100 Amp model

Interrupt Indicator

12V DC Aux. Input

GPS Antenna

Power Indicator

Negative (black) Cable

AC Mains Power

Positive (red) Cable

Charging

Before connecting the CI-100 / CI-200 to the rectifier, charge the battery overnight with the supplied battery charger. The CI-100 / CI-200 will run from mains power and/or the internal rechargeable gel cell lead acid battery. It is recommended that the battery be fully charged before installing the interrupter in a rectifier.

When the mains power cord is plugged into an active power outlet, the red light on the side should illuminate indicating that power is being provided to the unit and the battery is charging. The unit accepts 110 – 240 V AC at 50 or 60 Hz.

The CI-100 / CI-200 can also be charged and powered by an external DC power source of 12-14 V DC. Leads from the power source are plugged into the 2 banana jacks on the side of the unit.

If the CI-100 / CI-200 is turned on with a low battery, it is possible that the processor will stall. Allow the CI-100 / CI-200 to charge for a few minutes then toggle the power switch off then on to reset the processor.

Setup

Prior to turning on the unit, it is best to attach the GPS antenna if you will be using GPS synchronization. To turn the unit on move the power toggle to the ON position then press the * key on the keypad. As the unit activates, the following message will appear on the screen:

```
CATHODIC TECHNOLOGY

2 VIII 2006 V127mH
```

The second line indicates the version of firmware currently installed. After a short delay, the main menu will be displayed.

Main Menu

The main menu allows the user to program the unit to operate. If there is no user input after 20 seconds, the unit will go into operation and run whatever programs it currently has stored. The options on the main menu are as follows;

```
CATHODIC TECHNOLOGY
E-program I-off
0-RS232
C-GPS-power  GPS ON
```

E-program	This allows the user to see and change the programs currently in the current interrupter's memory.
C-GPS-power	This option turns the GPS power on and off. For GPS synchronized surveys, GPS power must be on.
0-RS232	No longer used

I-off	This option turns the unit off. It is recommended that the user only use the toggle switch, not the keypad to turn the unit off.

At any time, the user may return to the main menu by toggling the power switch or press both yellow keys simultaneously.

E-program

Prior to using your current interrupter, the unit must be programmed with your desired current interruption cycle. From the main menu screen, press E to access the programming mode.

OFF Time

The first input will be the length of time OFF.

```
0200 ms off

C-change N-ok
```

To change this value press C and enter a 4 digit off time in ms. 1 second = 1000 ms.

If you only enter 3 digits, the program interprets that as having an extra 0 on the end. For example, entering the number 200, the program will make your off time 2000 ms. Instead, type in 0200.

After you are satisfied with the off time, press N to move on.

Cycle Time

The next screen asks for the cycle time to be set. The cycle time is the total time of the interruption cycle including the OFF and ON time. Some standard cycles are:

Off Time	**Cycle Time**	
200 ms	1 sec	This results in 800 ms on
400 ms	2 sec	This results in 1.6 seconds on
1 sec	4 sec	This results in 3 seconds on

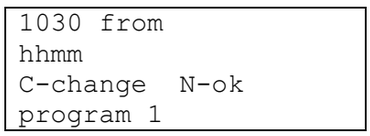
The current interrupter has pre programmed cycles ranging from ¼ second to 6 minutes. Press C to cycle through the options. The available cycles are:

¼, ½, 1, 2, 3, 4, 5, 6, 10, 12, 15, 20 and 30 seconds, 1, 2, 3, 4, 5 and 6 minutes

The cycle time should always be greater than the OFF time. When the correct cycle time is displayed, press N to accept and move on.

Start Time

The next screen asks for the starting time of the cycle. The value is entered in a 24 hour clock format. i.e. 2pm = 1400 hours.

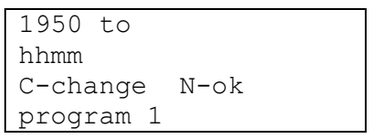


All times in the current interrupter are in Coordinated Universal Time (UTC). You must calculate your start and stop times by adding or subtracting your local time as appropriate.

Press C to change the starting time and enter your new time in hours and minutes. Press N once you are satisfied to move on.

Stop Time

The next screen asks for the ending time of the cycle. The value is entered in a 24 hour clock format. i.e. 2pm = 1400 hours.

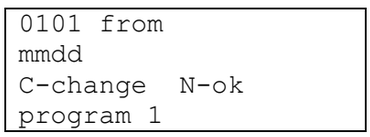


All times in the current interrupter are in Coordinated Universal Time (UTC). You must calculate your start and stop times by adding or subtracting your local time as appropriate.

Press C to change the starting time and enter your new time in hours and minutes. Press N once you are satisfied to move on.

Start Date

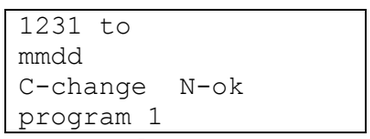
The next screen asks for the starting date of the cycle. The value is entered in 4 digits representing the month and day.



Press C to change the starting time and enter your new date in month and day. Press N once you are satisfied to move on.

End Date

The next screen asks for the ending date of the cycle. The value is entered in 4 digits representing the month and day.



Press C to change the starting time and enter your new date in month and day. Press N once you are satisfied to move on.

Additional Programs

Once the first program is complete, the unit asks if there are any additional programs to be entered.

```
more programs? N F-Y
```

For example, you can program the unit to work Monday to Friday, 7am to 7pm. Then program 2 will have the unit work Monday to Friday the following week.

Press F to enter another program or press N to exit the programming mode and return to the main menu.

C-GPS-power

On the main menu the GPS function can be turned on or off by pressing C. GPS must be on to be synchronized with other interrupters and survey equipment.

When the GPS is turned off, a slightly different main menu is shown.

```
CATHODIC TECHNOLOGY
E-program I-off
0-RS232   N-time
C-GPS-power  GPS OFF
```

The extra option is to set the date and time on the unit so it can go through the programs. This is only in GPS off mode.

```
yymmddhhmmss
```

The date and time is entered as one long numerical string with two digits for the year, month, day, hour, minute and second. Once programmed, the internal clock will keep track. After the date and time have been successfully programmed, it will be shown on the main menu.

```
13:07:52    25/12/10
E-program I-off
0-RS232   N-time
C-GPS-power  GPS OFF
```

0-RS232

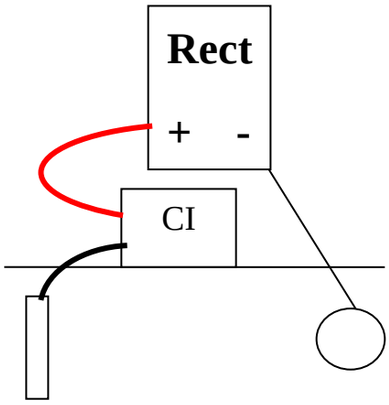
This feature is no longer used.

Connection

Rectifier

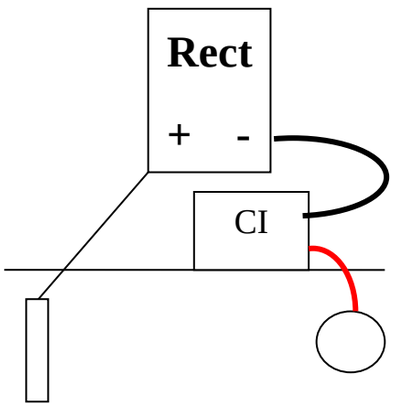
Before connecting the CI-100 / CI-200 to the rectifier, turn the CI-100 / CI-200 ON and program the CI-100 / CI-200. Always turn the rectifier OFF and check with a meter before performing any work inside the rectifier case. Follow your company procedures for rectifier access.

Anode Circuit:



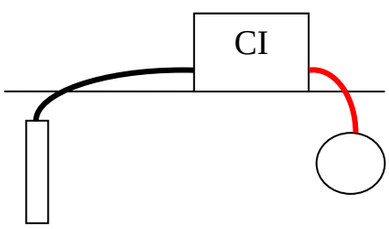
To connect to the anode or positive side of a rectifier, first turn OFF the rectifier and the CI-100 / CI-200. Then connect the CI-100 / CI-200 (Red Terminal) to the + terminal of the rectifier and the (Black Terminal) to the anode lead. Switch the CI-100 / CI-200 ON, then the rectifier.

Pipe or Structure Circuit:



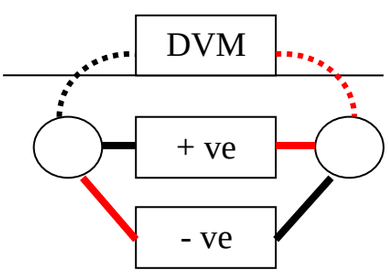
To connect to the structure or negative side of a rectifier, first turn OFF the rectifier and the CI-100 / CI-200. Then connect the CI-100 / CI-200 (Red Terminal) to the Pipe Lead and the (Black Terminal) to the Negative (-) terminal of the rectifier. Switch the CI-100 / CI-200 ON, then the rectifier.

Sacrificial Anode Bed



To connect to a sacrificial anode bed, turn the CI-100 / CI-200 off and disconnect the anode bed from the structure. Connect the Positive (+) (Red Terminal) of the interrupter to the structure and the Negative (-) (Black Terminal) of the interrupter to the sacrificial anode bed. Switch the CI-100 / CI-200 ON.

Bonds Between Pipelines



To interrupt a bond, determine which way the current is flowing. Using a volt meter, measure the voltage across the resistor in the bond. If the meter voltage is positive, then the pipe on the + side of the meter is more positive and should be connected to the red side of the interrupter. If the meter voltage is negative, then the pipe on the + side of the meter is more negative and should be connected to the black side of the interrupter.

AC Input

The CI-100 / CI-200 is capable of interrupting the AC input to the rectifier. This should only be done by trained personnel following the company's safety policies. The CI-100 / CI-200 can only interrupt one line of AC input. Disconnect one AC supply wire and hook up the CI-100 / CI-200 in series in the supply. Ensure that the interrupter is turned on, then turn on the rectifier.

GPS (Global Positioning System)

The GPS antenna is equipped with a magnet base to allow the antenna to be placed on top of the rectifier. The GPS antenna must be placed in a location where it has a clear view of the sky. In the Northern Hemisphere the GPS antenna should have a clear view of the southern sky and in the Southern Hemisphere the GPS antenna should have a clear view of the northern sky. GPS Antenna extension cables are available from Cathodic Technology Limited in 30 metre lengths.

If the CI-100 / CI-200 has been moved more than 50 Km. it may take a few minutes for the GPS engine to re-establish its almanac and obtain a lock on the Global Positioning Satellites. When the GPS engine has acquired the minimum number of satellites and it has calculated its position the UTC time and location will be shown on the screen.

Physical Orientation

To properly interrupt, the CI-100 / CI-200 must be standing on its end with the carry handle at the top. It will not interrupt properly in any other position.

Operation

After turning the unit on, the main menu is displayed. If there is no user input then the unit will switch to run mode after 20 seconds. The menu is obscured briefly by a series of boxes as the unit switches to run mode.

```
▓▓▓▓▓▓▓▓C TECHNOLOGY
E-program I-off
0-RS232
C-GPS-power  GPS ON
```

Once in run mode, the unit looks for the GPS lock. At first the screen will look like below:

```
00:00:00UTC 00/00/00
GPS NOT LOCKED

program 1
```

After the unit receives the GPS lock, it will display the GPS information.

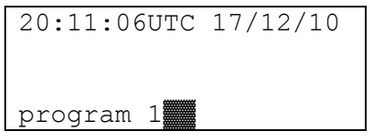
```
20:11:06UTC 17/12/10
GPS     LOCKED
4351.642N 07942.900W
program 1▓▓
```

The unit must have a GPS lock for the program to run and the unit to interrupt. A minimum of 4 satellites are required for the lock. Beside the program number that is currently running there will be two boxes; the first indicates that the program is activated and the second flashes with the interruption cycle.

If only one block appears, check the programming, your interruption cycle time may not be active at the moment. If the blocks do not appear (or the program number keeps changing) then a valid program hasn't been entered. See the Programming section and enter a valid program.

When the program is not interrupting the rectifier, the output is held ON to minimize depolarization of the cathodic protection levels.

When the GPS is turned off, the operations screen is slightly different.



If the time and date show all zero's and don't change, then return to the main menu and re-enter the date and time.

An amber LED on the outside of the box above the power input will flash in time with the interruption cycle.

Maintenance

There are very few user serviceable parts on the CI-100 / CI-200. It is good practice to store the CI-100 / CI-200 in a cool, dry place when not in use. For best battery life, the battery should be fully charged once every 2 months.

If the unit does not interrupt;

- Ensure the battery is charged. Use a volt meter to check the voltage across the 12 V external power plugs, it should read above 12V.
- Check the program, it may not be programmed to interrupt that day.

For other problems, please contact Cathodic Technology at ++1-905-857-1050 or ctl@cath-tech.com .

Spare Parts

Below is a list of spare or replacement parts available for the CI-100 / CI-200 from Cathodic Technology. Most parts are in stock and can ship in 2 business days.

CTL-220

CI-100 interrupt cables

CTL-221

CI-200 interrupt cables

CTL-230

Power cable CI-100 200

CTL-233

12VDC aux power cable

CTL-311

GPS 18X, long lead

CTL-533

12V battery for CI-100 & 200

CTL-541

Keypad for CI

CTL-542

LCD display for CI

CTL-553

Mechanical relay for CI-100 & 200

CTL-603

Internal Battery Charger

CTL-609

Main Control Card

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