



**Control Design, Inc.**

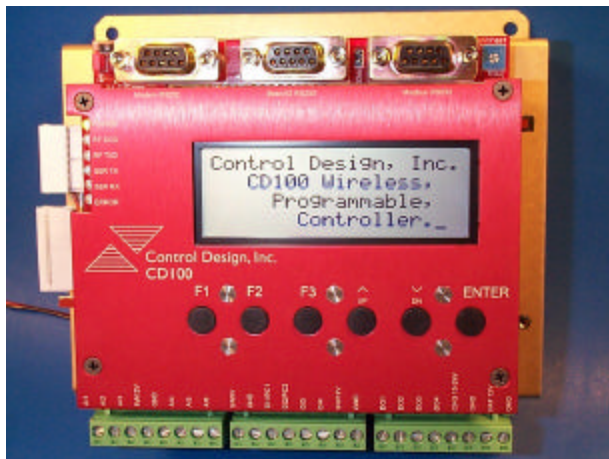
Telemetry and Control Products

Office: 505-867-0398

## Product Information Guide

July 2011A

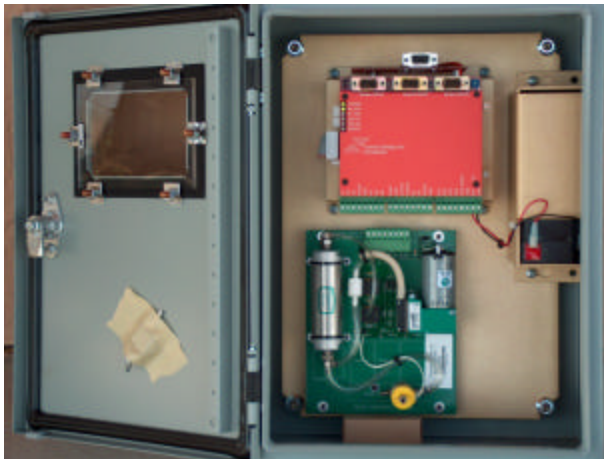
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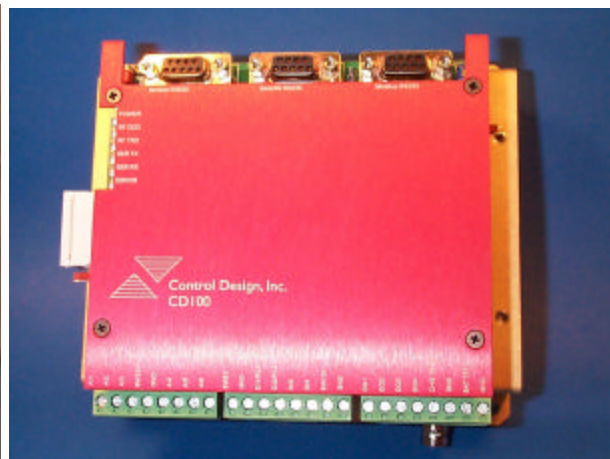
CD100 w/Built-In LCD and Keypad  
CD100-B-KDI



CD100 On-Site w/Solar, Antenna, Steel Box  
and Bubbler Sensor



CD100 in 16x12 Steel Enclosure and Bubbler  
Sensor- CD100-B-E16126S, CD103-2



Basic CD100, No LCD/Keypad Options  
CD100-B

Specifications and pricing subject to change without notice.

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## CD50, CD100, CD110, CD200 Wireless Controller Product Information

Control Design's latest Product line, first introduced in 1996 as the C18 and C44, is a highly integrated, programmable, wireless automation controller. It supports many customer-requested and field tested features for use in the Remote Control and Automation markets.

The primary features are as follow:

- **Fully Programmable**, using a built-in Basic 52 operating system, allow almost unlimited possibilities for use in Data Logging, Gate Controls, Water or Gas Flow Measurement and Calculation, etc. for on-site system management. A simple and relatively easy to use, built-in, Intel designed, Basic Interpreter coupled, uniquely by CDI, with industry standard Modbus give many end-users the ability to self-maintain their own programs and systems.
- **Industrial grade**, Modbus compatible, TVSS Protected Analog Inputs, Optically Isolated Digital Inputs/Pulse Counters and Solid State Digital Outputs provide for remote control and monitoring of many sensor types at sites as part of the unit on all products.
- Internal and External/Remote **Display/Keypad options** allow on-site readings and adjustments without requiring a laptop or other interface.
- **Modbus RTU** Protocol used throughout the product line for Industry standard acceptance into many off-the-shelf Software HMI packages. Integration into existing systems that use Modbus is also made easier.
- An optional **built-in, long-range**, reliable wireless **Radio-Modem** that allows use in remote (1 to over 120 air mile distances in use) applications using a unique radio-modem technology which allows data recovery down to -113dbm receive sensitivity. Typical "over-the-air" data recovery @ -112 dbm is better than 90%, @ -115dbm, better than 50%.
- The Radio-Modem **Store and Forward** feature ("SnF"), standard in every unit, permits even greater distances by allowing routing over and around terrain obstacles. Intelligent routing, using the Modbus Protocol, allows a unique path for each slave. Standard Routing allows any protocol to be forwarded. No Routing allows direct communication as with any other radio-modem. Setup and use of this feature has been designed for the easiest possible user interface via the CDI Toolbox (free software).
- Easily interfaced to external Data Loggers, PLCs, Sensors, Etc. with intelligent capability to enable use with CDI Radio-Modem and Modbus compatibility.

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## CD50, CD100/110/200 Technical Features Overview

- **9 Analog Inputs**, 6 available to the user via Terminals, 3 internally dedicated for Charge, Battery and RSSI (Radio Signal Strength Indicator) monitor.
  - **Analog Temperature Monitor.**
- **4 Digital Inputs**, (8 on CD200) Optically Isolated, Positive (8-27vdc) Voltage Active.
- **2 Pulse Counters**, Digital Inputs 1 and 2 also double as **Pulse** (to 3Khz) counters.
- **Digital Outputs**, (2 on CD50, 4 on CD100/110, 8 on CD200) Solid State, 30 VDC, 1 Amp (Pull to Ground when On).
- **LCD and Keypad (optional on all units)**,
  - CD50- 2 row by 16 character LCD (Backlit optional), no Keypad available
  - CD100/110- 4 row by 20 character LCD, Backlit standard, 6 button built-in keypad
  - CD110/200- External Serial LCD with 4x4 Keypad, Weatherproof optional.
- **Basic52 Programmability** for programming features such as:
  - Complicated 32 bit math functions to process data from I/O ports,
  - Master polling for local data gathering and transfer,
  - PID loop controllers for Gate and Valve controls,
  - Data logging and Totalizer for water or other materials flow measurement.
  - Runs multiple programs to allow operation as Data Logger, Sensor Management, Gate Controller, Etc. simultaneously.
- **Modbus RTU Protocol** includes 500 standard integer (16bit) registers and 16000+ floating-point (32bit) registers (7800+ floats on CD50). All Registers are non-volatile.
- **64K, Non-Volatile FRAM\*** (32K on CD50) for Data Logging and other data storage, contains all Integer and Floating Point Modbus Registers.
- **64K of Non-Volatile Flash Memory** (128K on CD110/200). 32K used by Basic52 system. 32K available for Basic52 programs.
- **High Accuracy Real Time Clock (CD100/110/200 only)** with Battery backup. Maintains +/- 2 minutes per YEAR (+/- 10 seconds/month) accuracy. 5-Year minimum battery backup.
- **Charge Controller** built-in for Solar or other DC power sources up to 30 VDC input and programmable for 13.6v standby or 14.4v intermittent (Solar) battery charging. Allows up to 30 watts of Solar Panel or ~1.2 Amp of current.
- **Low Power Operation** ~60ma maximum operating current, ~40ma normal operating current with a low power mode for ~10ma operation to extend battery life.
- **Radio-Modem (VHF 150-174Mhz or UHF 450-470Mhz)** built-in, full 1 to 5 watt transmit power with exclusive Control Design long-range Modem and Store & Forward technology for remote monitoring and control over long distances in rugged terrain and noisy environments.

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- **Multiple Communication Ports:**
  - **3 on CD50/100-**
    - Modem RS232 port for direct communications with external PLCs, Data Loggers, Etc.
    - Com0/Basic52 RS232 port for Basic52 programming and ASCII communications to external devices, IE- Displays, PLCs, Data Loggers, Etc.
    - Com1/ASCII or Modbus RS232 (and RS485 on CD50 only) port for communications with External PLCs, Radio Modem, Etc, using Modbus protocol. Also used for internal communications to built-in IO unit.
  - **5 on CD110/200 (3 above plus):**
    - Com2/ASCII Serial LCD-Keypad port (on CD110 and CD200) for communications with external LCD and Keypad or other serial and Ascii devices.
    - Com3/Auxiliary ASCII or Modbus port (on CD110 and CD200) for communications with secondary radio system, other Modbus or ASCII devices.
  - An SDI-12 port can also be provided on the CD200 product only.
- **Switched Voltages** (5V/12V/24V) with Ground next to each Switched V+, available on the Terminals for use in providing power to external sensors or other devices requiring intermittent or constant battery power.
- **Switched Precision** 5 volt power on all units (4.95 to 5.05v).
- **Switched Battery** 12 volt power on all units.
- **Switched 24 Volts** (on CD200 unit only).
- **LED Indicators** for Power and Modem functions to aid in instant troubleshooting or assessment of critical system functions. Can be turned off for additional power saving.
- **Industrial Grade** components for more reliable field operation and -30 Deg C (-22 Deg F) to +50 Deg C (122 Deg F) operation for Radio, -40 Deg C (-40 Deg F) to +85 Deg C (185 Deg F) for all other components.

\*NOTE: The FRAM used in all CDI products is a technology that replaces SRAM and EEPROM. The FRAM:

- does not require battery backup like Static RAM
- does not wear out like EEPROM
- reads and writes at Static RAM speeds



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## Product Guide

### Controller/Loggers -

#### CD50-B >>>

- 64K Flash Memory, 2K RAM, 11Mhz Crystal, Modem Port, Com0/Basic52, Com1/Modbus. (Internal 2x16 LCD Option Only)
- includes 12 I/O Programmable Controller with Faceplate on Metal Bracket

#### CD100-B >>> (**NOTE- The CD100 will be discontinued as of 12-31-11. The replacement for the CD100 is the CD110 listed below**)

- 64K Flash Memory, 2K RAM, 11Mhz Crystal, Modem RS232 Port, Com0/Basic52, Com1/Modbus. (Internal 4x20 LCD, 6 Button Keypad Options Only)
- includes 14 I/O Programmable Controller with Faceplate on Metal Bracket

#### CD110-B >>>

- 96K Flash Memory, 8K RAM, 22Mhz Crystal, Modem Port, Com0/Basic52, Com1/ASCII or Modbus, Com2/LCD-Keypad, Com3/ASCII or Modbus

#### CD200-B >>>

- In addition to all CD110 upgrades, includes 4 additional Digital Inputs, 4 additional Digital Outputs for a total of 22 IO Ports and a 12 to 24 Volt Inverter.

### Mobile Terminal Unit-

#### CD110-MTU >>>

- includes 22mhz, 128K Flash, 8K Ram, Programmable Controller with Radio-Modem in a handheld, durable Plastic Box with 6 Button Tactile Keypad, 4x20, water and dust protected, Backlit Display, Cigarette Lighter Power Cable.

^ **Antenna Kit** for above MTU sold Separate (see \*\* **G8BI-KIT** on Page 9).

### NEMA4 Sealed RTU-

#### CD110-PBX >>>

- includes 22mhz, 128K Flash, 8K Ram, Programmable Controller with Radio-Modem in a handheld, NEMA4 rated, 6" x 6" x 2.4" Plastic Box. Weather tight wire entry grommet, D9 connector for Com and BNC antenna connector are installed on bottom edge of box or as requested.

^ **Sealed Display** unit for use with above NEMA4 RTU (see \*\* **LCDSCE** on Pg. 11)



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## Options for Controller/Loggers -

- DI >>> for CD110 only (backlit standard)
  - add Built-In 4 Line x 20 Character Display
    - for CD50 (non-backlit),
    - for CD50 (backlit)
  - add Built-In 2 Line by 16 Character Display
  
- KDI >>> for CD110 only
  - add Built-In 4 Line x 20 Character, Backlit Display and 6 Button, Tactile built-in Keypad.
  
- KDES >>> for CD110, CD200 only (standard keypad, non-weather tight)
  - add External, Serial, 4 Line x 20 Character, Backlit Display and 16 Button, **Standard** (0-9, \*, #, A, B, C, D), Non-Sealed **Keypad**.
  
- KDEC >>> for CD110, CD200 only (custom keypad, weather tight)
  - add External, Serial, 4 Line x 20 Character, Backlit, Weather Tight Display and 16 Button, **Custom** Character (0-9,.,,Enter,Esc,Up,Down), **Sealed Keypad**.

## **Radio-Modem options -**

- add one of the following, to the above Logger/Controller part numbers, to have the radio-modem installed:
  - 1S for VHF 148-174Mhz, Licensed Public channels, 5 watt Radio
  - 2S for VHF 151-154Mhz, **License Free channels**, 2 watt Radio
  - 2U for VHF 218-222Mhz Licensed channels, 2 to 5 watt Radio
  - 3S for UHF 402-430Mhz, Licensed Govt. channels, 5 watt Radio
  - 4S for UHF 450-470Mhz, Licensed Public channels, 5 watt Radio

NOTE: when ordering the VHF or UHF radios above, you may specify radio frequencies to be programmed in radio (up to 8- No Extra Charge).

**Spread Spectrum Radio option-** add to the base part number to add SS radio only OR add as a separate line item on the order in addition to ordering the unit with the above radio-modem:

-SSR for 1 Watt Spread Spectrum (902-928Mhz) radio

## **ORDER EXAMPLE:**

Example to order a CD100 with built-in LCD/Keypad and UHF 450-470Mhz radio-modem:

Part Number = **CD110-B-KDI-4S**

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## Sensor and Gate Control Options:

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Order as a separate line item.

### CD103 Pneumatic Bubbler Sensor

Single Sensor    Dual Sensor

CD103-1-p	Single Output Pneumatic Sensor
CD103-2-p	Dual Output Pneumatic Sensor
CD103-3-p	Triple Output Pneumatic Sensor

- **-p** = specify 1 PSIG (2.31ft H<sub>2</sub>O), 5 PSIG (11.55ft H<sub>2</sub>O) or 15 PSIG (34.65ft H<sub>2</sub>O) by adding -1, -5 or -15 to above part number.
- To specify a second sensor on the unit, add a second -p with the pressure desired.

Example: **CD103-2-1-5** to order a 2 output with a 1 PSIG and a 5 PSIG sensor.

- To install a PSIA sensor (instead of PSIG), add **A** to the pressure range. Example above for a PSIA sensor would be- **CD103-2-15A** for a 15 PSIA sensor only.
- NOTE: Only 1 PSIA sensor can be installed. 1 PSIG can also be installed with a PSIA. Added cost for a PSIA is + \$25 to either Single or Dual price.

### CD103 Description:

The CD103 Bubbler Sensor unit is designed to take measurements in low flow water and situations where more than one measurement is needed from the same sensor. Provides greater accuracy and no contact with the water for long-term reliability and accuracy.

### CD104 Gate Relay Controller

CD104-0	Gate Relay Unit, No Relays
CD104-2	Gate Relay Unit, 2 Relays (1 Gate)
CD104-4	Gate Relay Unit, 4 Relays (2 Gates)

NOTE: above relay boards come with terminals for external, user-supplied switches.

### CD104 Description:

The CD104 Gate Relay Controller is designed to operate 2 DC motors, requiring up to 15 amps and can be operated manually or automatically using any controller. The user, via plug-on terminals on the board, adds auto-Manual and Up/Down switches.

The CD104-0 has 4 sockets for 4 each KUP-14D15-12 (10 amp) or KUMP-14D18-12 (15 amp) relays. The board is designed to switch polarity of the DC being fed to the motors. The board is also wired so that both relays to one motor cannot be switched on simultaneously.

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## Serial LCD/Keypads

<a href="#">KDES</a>	Standard, Non-Sealed Keypad with Serial LCD
<a href="#">KDEC</a>	Custom, Sealed Keypad with Serial LCD
<a href="#">KDEW</a>	Weather tight Serial LCD/Keypad, Toggle Holes
<a href="#">KDEWT</a>	Weather tight Serial LCD/Keypad, Toggle Switches

- NOTE: The above KDEW and KDEWT include a weathertight faceplate designed to be mounted into a user enclosure. The Keypad and LCD are sealed. The KDEWT includes weather tight, rubber covered Toggle Switches installed.

## Enclosure Options:

Call CDI to discuss your specific needs for an enclosure. CDI will quote and custom-manufacture the enclosure to suit your application. Some pricing examples:

<a href="#">E864F</a>	8" Tall x 6" Wide x 4" Deep Fiberglass NEMA 4X Enclosure	*
<a href="#">E1086F</a>	10" Tall x 8" Wide x 6" Deep Fiberglass NEMA 4X Enclosure	*
<a href="#">E16126WS</a>	16" Tall x 12" Wide x 6" Deep Steel NEMA 4 Enclosure	*
^ includes display window, locking handle, mounting feet, battery, ext. antenna connector.		
<a href="#">E16126S</a>	16" Tall x 12" Wide x 6" Deep Steel NEMA 4 Enclosure	*
^ delete display window from WS above.		

NOTE: All above enclosures **include** internally mounted battery appropriate for internal equipment and custom metal to mount and/or enclose all RTU and Battery equipment in enclosure.

\*Any optional equipment included as part of order, such as CD104 Relay controller or CD103 Bubbler sensor, will be mounted and pre-wired as part of enclosure price (for enclosures in which options will fit inside).

**Please call to discuss these and any other options with which we can assist**



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## Antenna Kits:

AKA/NN/15	3 Element 7.1db gain Yagi Kit	UHF	VHF
AKB/NN/15	5 element 9.2db gain Yagi Kit	UHF	VHF
AKC/NN/15	6 element 10db gain Yagi Kit	UHF	VHF
AKD/NN/15	3db gain Omni-Directional Antenna Kit	UHF	VHF

/G added to any above antenna kits will add the Gold, Anodized, Welded option

NOTE: Above Antenna Kits include Coax w/connectors installed, Pole Mount hardware.

G8BI	Magnetic Mount Roof top antenna mount w/BNC, 12ft Coax
LP450NMOW	Low profile 3"x 1" tall on-unit antenna for MAB8BI2 cable
TRA4503	Phantom Antenna for above mount, 3" Tall
** G8BI-KIT	G8BI and TRA4503 both required for complete antenna kit
JP18	18" BNC Male to N Female Bulkhead cable

^ >NOTE: Change 18 to 06 thru 36 for any length needed from 6" to 36"

## Lightning Protection:

AKL	Polyphaser Lightning arrestor (N Female connectors)
JM18	18" BNC Male to N Male jumper (RTU to Polyphaser)

## ANTENNA MOUNTS, COAX, CONNECTORS

MABTO	NMO mount for RG58, 3/8" Hole size, No Coax	
MAB8U	NMO mount with 17ft RG58, 3/8" Hole size	
MAB8BI2	NMO mount with 2 ft RG58, 3/8" hole, BNC Conn	
LMR240	RG8X Type Coax Cable	per foot
LMR200	RG58 Type Coax Cable	per foot
CBNC8X	BNC Male Connector for RG8X/LMR240 Coax	
CN8X	N-Male Connector for RG8X/LMR240 Coax	
CBNC58	BNC Male Connector for RG58U Coax	
CN58	N-Male Connector for RG58U Coax	

NOTE: for BNC Male connector, substitute "B" for "N" above on either end.

## Antenna Kit NOTES:

1. /NN above indicates connector choice for each end of coax: N=N Male, B=BNC Male.
2. /15 above indicates coax length choices: to change coax length, replace 15 with a value from 1 to 25. If longer than 25 feet is required, call for details and pricing.
3. Coax cable used is RG8X low loss (0.242" OD.). Similar in size to RG58/U (0.195" OD.)
4. UHF or VHF antenna and pricing is assumed based on radio specified with RTU order.

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## Power Options:

<a href="#">BC</a>	120VAC to 15VDC, 1amp wall mount charger
<a href="#">SPA</a>	20 Watt Solar Panel with Side of pole bracket Kit
<a href="#">SPB</a>	10/12 Watt Solar Panel w/Side of pole bracket Kit
<a href="#">PS-1228</a>	12 volt, 2.8 amp hour battery (CD20/50)
<a href="#">PS-1270</a>	12 volt, 7 amp hour battery (CD100/110)
<a href="#">PS-12120</a>	12 volt, 12 amp hour battery

## **ORDER EXAMPLE:**

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To order a CD100 on a bracket ([CD100-B](#)) with an Internal 4x20 Display ([-DI](#)) and then add a VHF License Free Radio-Modem ([-2S](#))

Add a Gate Relay Controller unit with 2 Relays installed ([CD104-2](#))

To order a 3 element Yagi Antenna Kit ([AKA](#)), with N-Male to BNC-Male ([/NB](#)) connectors and 10 feet of RG8X low loss coax ([/10](#)), then add Gold Welded version ([/G](#)),

And last, add a 10/12 Watt Solar Panel with bracket kit ([SPB](#)) to the order.

Line Item 1> 1 each [CD110-B-DI-2S](#)  
Line Item 2> 1 each [CD104-2](#)  
Line Item 3> 1 each [AKA/NB/10/G](#)  
Line Item 4> 1 each [SPB](#)



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## Replacement Parts for CDI Products

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Order these part numbers separate from Logger/Controller orders:

### LCD and KEYPAD COMPONENTS:

<b>LCD420B</b>	4x20 Backlit LCD with pins installed (for CD100, CD110)
<b>LCD216</b>	2x16 Non-Backlit LCD with pins installed (for CD20, CD50)
<b>LCD216B</b>	2x16 Backlit LCD with pins installed (for CD20, CD50)
<b>LCDS</b>	4x20 LCD with serial adaptor board, no cable, no enclosure
<b>LCDSC</b>	4x20 LCD with serial adaptor board & cable, no enclosure
** <b>LCDSCE</b>	4x20 LCD with serial adaptor board, cable, NEMA enclosure
<b>KP6</b>	6 Button, Tactile plug-in keypad for CD100, CD110
<b>KP16</b>	16 Button, Sealed keypad for serial display/keypad unit
<b>KP16C</b>	16 Button, Sealed keypad with custom lettering

### RADIO MODULES:

- CD100, CD110, CD200 current and previous products:
  - DTX-445-15** 450-470Mhz 5W Radio w/D15 Female
  - DTX-145-15** 148-174Mhz 5W Radio w/D15 Female
- C44, C44P, CD20, CD50 current and older products:
  - DTX-445-10** 450-470Mhz 5W Radio w/10 pin adaptor
  - DTX-145-10** 148-174Mhz 5W Radio w/10 pin adaptor

NOTE: The DTX-442 Radio was discontinued by Ritron as of 9-1-2011

**RPK1** Radio Program Kit w/Software and cables for all radios  
**SSC** cable kit for Spread Spectrum radio connection to RTU  
**DTC** cable kit for standard radio modules to CDI modem

### REPLACEMENT CIRCUIT BOARDS:

<b>CD50-IO-PCB</b>	Replacement IO circuit board
<b>CD50-MDM-PCB</b>	Replacement Modem circuit board (4L)
<b>CD100-IO-PCB</b>	Replacement IO circuit board
<b>CD100-MDM-PCB</b>	Replacement Modem circuit board (2L)
* <b>CD110-IO-PCB</b>	Replacement IO circuit board
* <b>CD200-IO-PCB</b>	Replacement IO circuit board

\* **NOTE:** The CD100 Modem board fits the CD110 and CD200.

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## **Control Design, Inc. (CDI) Warranty Statement**

All components manufactured by CDI are warranted for 24 months to be free from manufactured defects, firmware bugs and from failure due to design.

This warranty includes all parts and labor for 6 months from the date of delivery to customer. All parts continue to be covered for 18 months beyond the first 6 months. Labor to repair or service the unit will be billed to the customer during the last 18 months of warranty.

### **First 30 Days Immediate Exchange Program:**

For the first 30 days of the warranty period, CDI will exchange the complete unit, at no charge to the customer, if it is found to be defective.

The defective unit should be delivered to CDI for replacement. CDI will ship a replacement unit immediately, by overnight express if appropriate, to the customer and will allow the customer up to 30 days to return the defective unit. If the defective unit is not returned within 30 days, to CDI, CDI will bill the customer for the replacement unit.

If the defective unit is found to be non-defective or is defective but not due to CDI's fault, the customer will be charged for any repairs or replacement of the unit not covered by warranty.

### **After 30 Day Exchange Program:**

All components suspected of being defective must be returned to CDI either by the customer, the customer's representative, distributors for CDI or CDI's employees for repair or replacement. Customer will be charged for any repairs or replacement not covered by the warranty.

CDI reserves the right to determine whether the product is defective due to CDI's fault or causes beyond CDI's control. Lightning, Floods and other damaging acts of nature, Vandalism, Improper installation, Improper technical repairs are some items NOT covered by this warranty.

### **Third party manufactured devices are covered as follows :**

- **RADIOS** supplied by CDI as part of a complete product will be covered according to the manufacturers warranty and will be handled by CDI as a representative of the radio manufacturer.
- **BATTERIES** supplied by CDI will be warranted fully and replaced, if defective, for the first 6 months. Beyond 6 months up to 24 months CDI will prorate the battery for replacement. Battery prorating will be based on the list price of the battery divided by 18 months times the number of months beyond the first 6.
- **ANTENNAS** and **CABLE KITS** supplied by CDI will be warranted for 30 days.
- **ALL OTHER** components, supplied by CDI with it's products, will be warranted according to the manufacturers warranty. Handling and Labor charges may be applied depending on the manufacturers warranty and support to CDI.

Defective products, made by CDI, will be repaired or replaced and returned to customer within 15 working days of receipt of the defective product(s) if parts delays are not incurred.

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