![HORNER APG]

Horner APG's CAN Network Repeater Module

User Manual for the
HE200CGM100

DATA

CAN
PORT A

Controller Area Network (CAN)
Isolated Gateway/Repeater

RX TX

RS-232
PORT

CAN
PORT B

DATA

-
+

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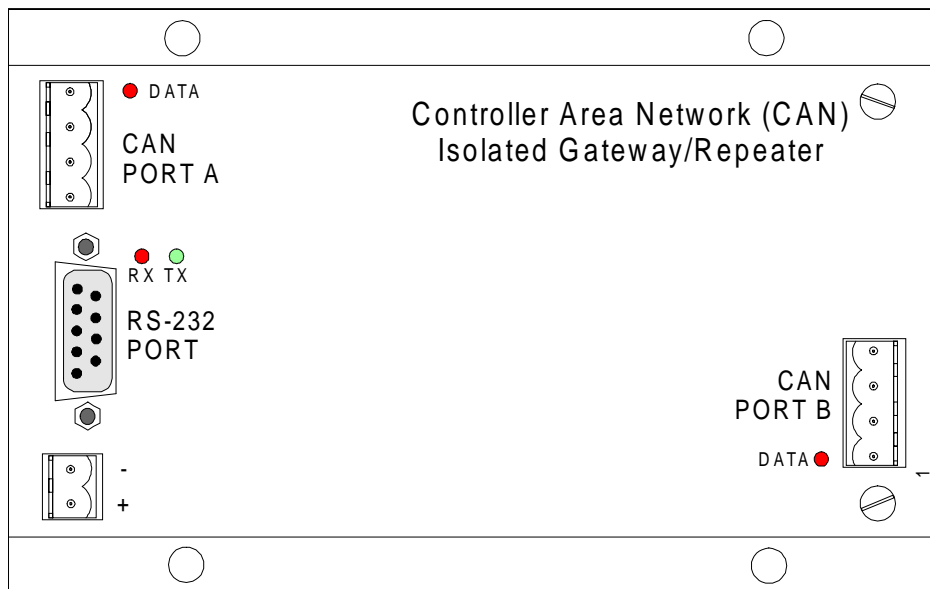
PREFACE

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This manual explains how to use the Horner APG CAN Network Repeater Module for use in Controller Area Networks.

SDS is a trademark of Honeywell, Inc.

DeviceNet is a trademark of Allen Bradley.

LIMITED WARRANTY AND LIMITATION OF LIABILITY

Horner APG, LLC. Inc. ("HE-APG") warrants to the original purchaser that the HE200CGM100 manufactured by HE-APG is free from defects in material and workmanship under normal use and service. The obligation of HE-APG under this warranty shall be limited to the repair or exchange of any part or parts which may prove defective under normal use and service within two (2) years from the date of manufacture or eighteen (18) months from the date of installation by the original purchaser whichever occurs first, such defect to be disclosed to the satisfaction of HE-APG after examination by HE-APG of the allegedly defective part or parts. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE AND OF ALL OTHER OBLIGATIONS OR LIABILITIES AND HE-APG NEITHER ASSUMES, NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR HE-APG, ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF THIS HE200CGM100. THIS WARRANTY SHALL NOT APPLY TO THIS PC CPU OR ANY PART THEREOF WHICH HAS BEEN SUBJECT TO ACCIDENT, NEGLIGENCE, ALTERATION, ABUSE, OR MISUSE. HE-APG MAKES NO WARRANTY WHATSOEVER IN RESPECT TO ACCESSORIES OR PARTS NOT SUPPLIED BY HE-APG. THE TERM "ORIGINAL PURCHASER", AS USED IN THIS WARRANTY, SHALL BE DEEMED TO MEAN THAT PERSON FOR WHOM THE HE200CGM100 IS ORIGINALLY INSTALLED. THIS WARRANTY SHALL APPLY ONLY WITHIN THE BOUNDARIES OF THE CONTINENTAL UNITED STATES.

In no event, whether as a result of breach of contract, warranty, tort (including negligence) or otherwise, shall HE-APG or its suppliers be liable of any special, consequential, incidental or penal damages including, but not limited to, loss of profit or revenues, loss of use of the products or any associated equipment, damage to associated equipment, cost of capital, cost of substitute products, facilities, services or replacement power, down time costs, or claims of original purchaser's customers for such damages.

To obtain warranty service, return the product to your distributor with a description of the problem, proof of purchase, post paid, insured and in a suitable package.

TABLE OF CONTENTS

HE200CGM100 FEATURES

- Microprocessor controlled re-clocking repeater
- Bi-directional CAN message FIFO (first in first out)
- Programmable CAN Baud rate up to 1 MHz
- Integral RS-232 port for configuration and monitoring
- 1000V isolation
- Wide range DC voltage input power

HE200CGM100 OVERVIEW

The HE200CGM100 is an intelligent CAN network isolating repeater.

CAN (Controller Area Network) is the basis for networking protocols used in automotive, and more recently, industrial control applications. Published application protocols which use CAN include SDS (MicroSwitch) and DeviceNet (Allen Bradley).

In a typical CAN network, each device is assigned a unique CAN node address (ID) to arbitrate network communication.

Depending on the application protocol used, these IDs are assigned in the range of 0 to 253. Therefore, up to 254 devices may be logically attached to a CAN network.

However, the use of standard CAN transceiver chips limits the number of **physically attached devices** to 64.   Thus, to reach the logical limit of 254 devices, up to three smart CAN repeaters are used to connect groups of devices together.

A CAN network (without repeaters) should be limited to a **maximum cable length of 1500 feet** (assuming a Baud rate of 125 kHz). With repeaters, this limit may be extended to 6000 ft.

In conclusion, the HE200CGM100 CAN repeater's 1000V isolation virtually eliminates problems associated with ground potential differences that are inherent in long cable drops on many local area networks.

HE200CGM100 SPECIFICATIONS

I/O SPECIFICATIONS			
PARAMETER	MINIMUM	MAXIMUM	UNITS
Can Baud Rates	125	1000	kHz
CAN Port A to B Isolation	1000	N/A	VDC
POWER LOAD SPECIFICATIONS			
PARAMETER	MINIMUM	MAXIMUM	UNITS
Input Voltage	8	32	VDC
Typical Power Consumption	N/A	2.88 @ 24VDC	Watts
ENVIRONMENTAL SPECIFICATIONS			
PARAMETER	MINIMUM	MAXIMUM	UNITS
Operating Temperature	0	+60	Deg C
Storage Temperature	-40	+85	Deg C
Humidity (Non-condensing)	5	95	% RH

HE200CGM100 LED INDICATORS

- There are four LED indicators on the HE200CGM100. Below is a description of each of them.

Indicator	Color	Description
CAN Port A **DATA**	Red	ON when CAN Port A is active
CAN Port B **DATA**	Red	ON when CAN Port B is active
RS232 Port **RX**	Red	ON when RS232 Port receives data
RS232 Port **TX**	Green	ON when RS232 Port transmits data

HE200CGM100 CONNECTOR PINOUTS

- The V-, GND and AV- signals are common to each other. The CAN Port B connector signals are isolated from all other signals.

POWER CONNECTOR

Pin	Signal	Description
1	V-	Input power supply ground
2	V+	Input power supply voltage

RS-232 PORT CONNECTOR

Pin	Signal	Description	Direction
1	DCD	Always high	Out
2	TXD	Transmitted Data	Out
3	RXD	Received Data	In
4	DTR	Ignored	In
5	GND	Ground	-
6	DSR	Always high	Out
7	CTS	Clear to Send	In
8	RTS	Request to Send	Out
9	RI	Always high	Out

CAN PORT A CONNECTOR

Pin	Signal	Description
1	AV-	CAN Port A return for pins 2 and 3
2	AD+	CAN Port A Data +
3	AD-	CAN Port A Data –
4	ASHLD	CAN Port A Cable Shield

CAN PORT B CONNECTOR

| Pin	Signal	Description
1	BV-	CAN Port B return for pins 2 and 3
2	BD+	CAN Port B Data +
3	BD-	CAN Port B Data –
4	BSHLD	CAN Port B Cable Shield

DIAGRAM OF PORT LOCATIONS
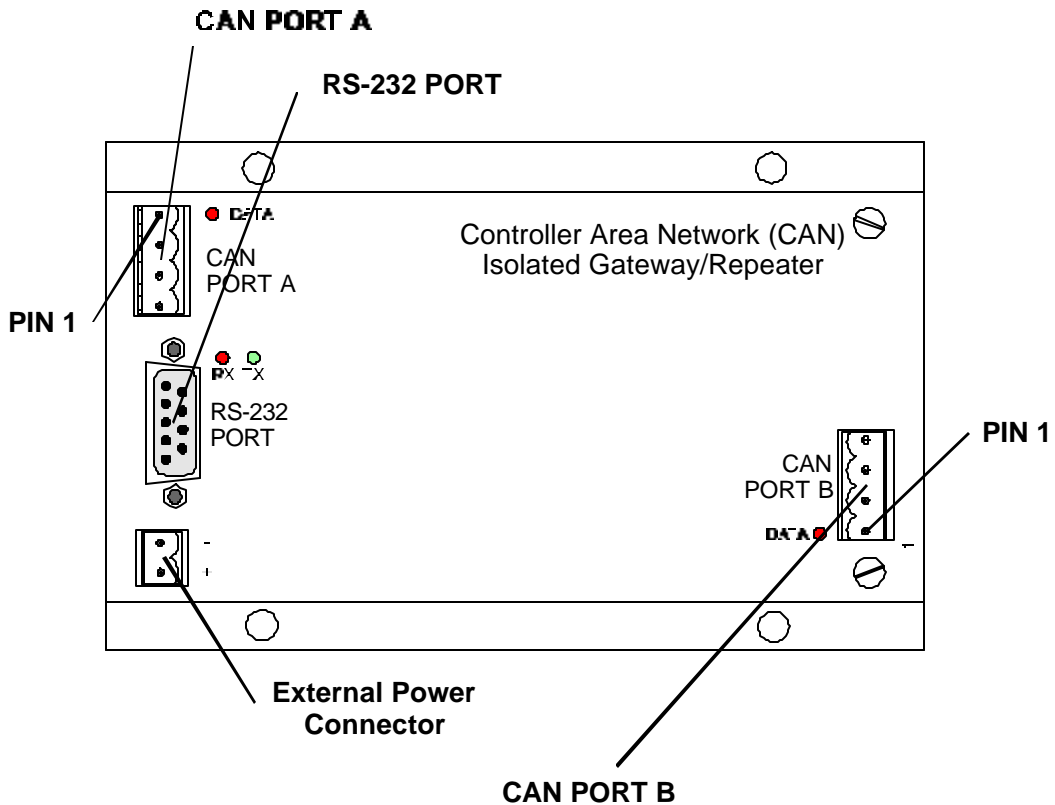
HE200CGM100 INSTALLATION

Power Connection

The CAN Network Repeater Module is powered by 8-32VDC and requires approximately 2.8 Watts @ 24VDC.   The power supplied to the repeater must be isolated from **ALL** other system power supplies. For example, the repeater **SHOULD NOT** be powered from the 33VDC power terminals on the HE200PLC084 conveyer controller. A simple solution is to use an Archer 273-1652 AC Adapter available from Radio Shack. This device provides 12VDC at 500mA.

CAN Connection

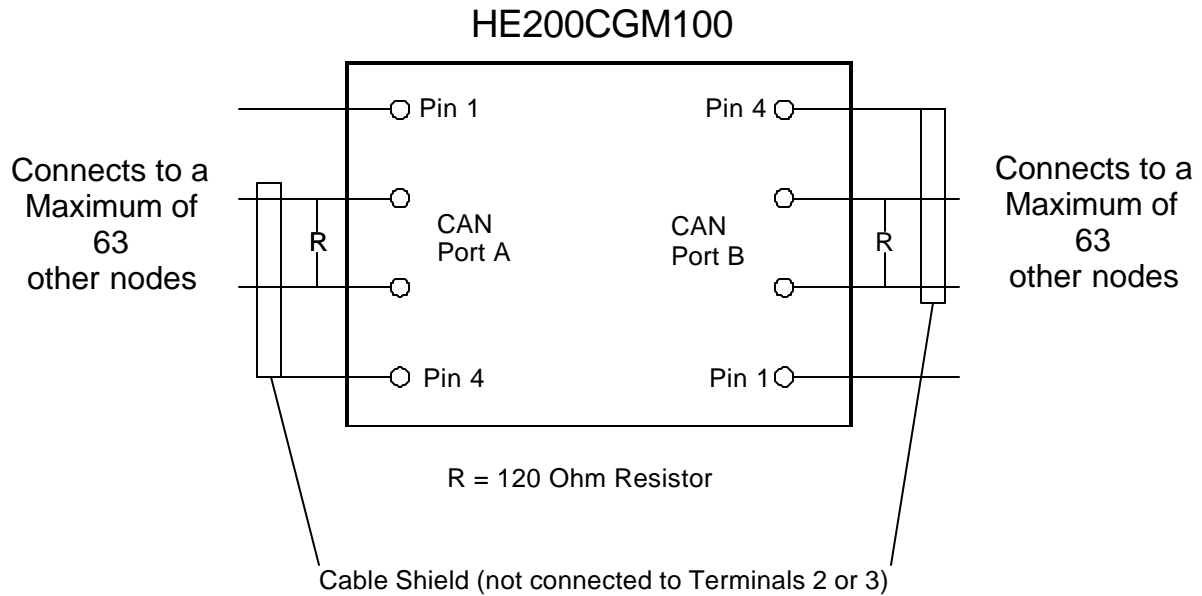The following diagram shows how to properly wire multiple nodes together on the CAN network:

Cable Shield (not connected to Terminals 2 or 3)
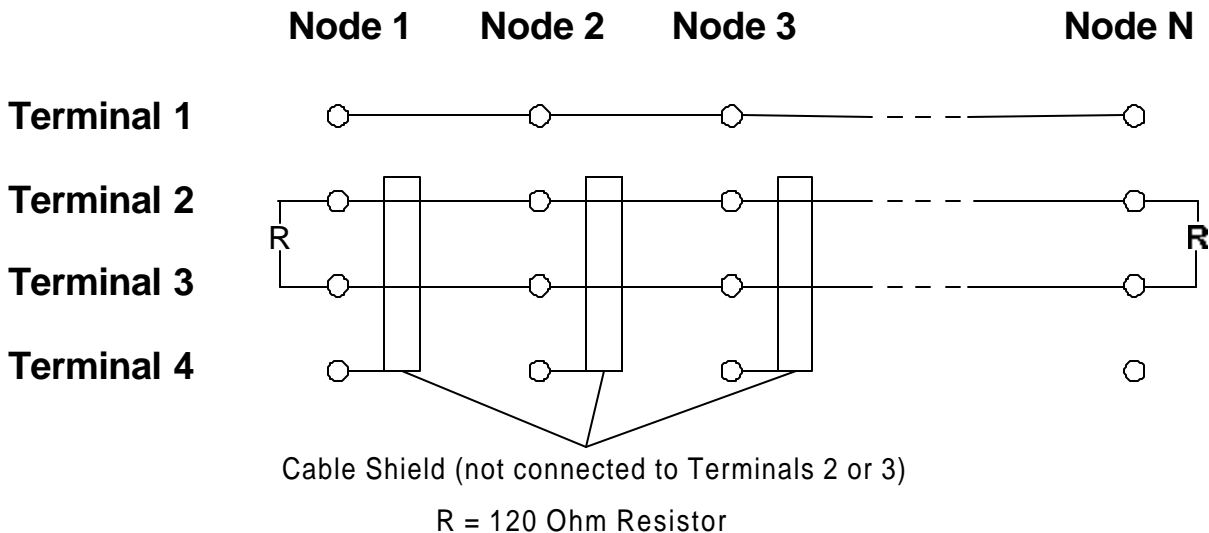
R = 120 Ohm Resistor

CAN Wiring Rules

1) A CAN network should be wired in a daisy-chained fashion, such that there are exactly two physical endpoints on the network.
2) The two nodes at the physical endpoints should have 120 ohm terminating resistors connected across terminals 2 and 3.
3) The data conductors (terminals 2 and 3) should be a 24 AWG shielded twisted pair, with 120-ohm characteristic impedance.
4) Notice that for a section of cable between two nodes, the cable shield is connected to terminal 4 at one end of the cable only.
5) A CAN network (without repeaters) should be limited to 64 nodes with a maximum cable length of 1500 ft.
6) Up to four CAN network segments, which adhere to the above five rules, may be connected together using three CAN repeaters (HE200CGM100). In this manner, a CAN network may be extended to 253 nodes with a total cable distance of 6000 ft.
7) Each HE200PLC084 unit is assigned a unique Network ID (Local PLC number) by the HEPLC programming software, via the RS485 port. Repeaters **DO NOT** have Network Addresses.

CAN Repeater Wiring:

For wiring purposes, a repeater can be thought of as two CAN nodes, each of which is part of a different network segment (as shown in the diagram below).

HE200CGM100

Connects to a
Maximum of
63
other nodes

Pin 1

CAN
Port A

R

Pin 4

Pin 4

CAN
Port B

R

Pin 1

Connects to a
Maximum of
63
other nodes

R = 120 Ohm Resistor

Cable Shield (not connected to Terminals 2 or 3)

MECHANICAL INSTALLATION

- See attached "CANBUS REPEATER BASE" drawing (on the next page) for mechanical mounting considerations. **For best results, mount to a metal backplate that is electrically connected to earth ground.**