Wireless Communications Module
Stand-Alone HE200WCM910
and
SmartStack HE800WCM900 / HE-WCM900*

* HE- denotes plastic case.

This datasheet also covers products starting with IC300 instead of HE800 or HE-.

Additional technical information is found in the following supplements: HE**200**WCM**910** (MAN0782) and HE**800**WCM**900** (MAN0789).   See the *Technical Support* section in this document to obtain manual updates.

1   DESCRIPTION

a.   Wireless Communications Modems (WCM)

The Wireless Communications Modems (HE**200**WCM**910** and HE**800**WCM**900)** have outstanding sensitivity and are two of the longest-range, low-cost radio modems available. The WCM provides wireless serial communication links in a large variety of applications. The WCM takes serial data from the OCS/RCS RS-232 port and sends out frequency hopping spread spectrum data to a receiving WCM.

This datasheet covers two kinds of Wireless Communication Modems (WCM):

Note: The stand-alone WCM910 and the SmartStack WCM900 are <u>not</u> **compatible – they can** <u>not</u> **be used together.**

- The HE**200**WCM**910 (**WCM**910)** is a *stand-alone* **WCM.** It comes with a *non-articulating* antenna, which **is** suitable for indoor or outdoor use.

- The HE**800**WCM**900 (**WCM**900)** is a *SmartStack module* that is connected to a controller as part of its I/O stack. It comes with an *articulating* antenna, which is suitable for indoor use but **not** suitable for outdoor mounting.

   Note: Unlike most SmartStack modules, the WCM900 must be connected to the OCS/RCS RS-232 port using an external cable. The data is <u>not</u> accessed through the backplane of the OCS/RCS.
   Note: When used with OCS250, a Revision B or later of a WCM900 is required.

b.   Antenna Kits

Horner APG offers antenna kits, which *include* a bulkhead-mounted **antenna** (suitable for indoor/outdoor use) *and* an **extension cable** to extend the RPSMA RF connections to the outside of the panel. **In general, the shorter the RF cable, the better.** Two antenna kits are available:
- HE200ANT**906** comes with a **1-foot long** extension cable
- HE200ANT**908** comes with a **4-foot long** extension cable.

<u>Two Instances When You Need To Consider Getting An Antenna Kit:</u>
If you do <u>not</u> want to connect the antenna directly to the WCM, an antenna kit allows you to remotely mount the antenna away from the WCM.
- If you are using an HE800WCM900 and need to mount it outdoors, an antenna kit is required. (The antenna that comes standard with the WCM900 is <u>not</u> suitable for outdoor mounting.)
Note: The included antenna *as well as* **the optional antenna kits do** <u>not</u> **satisfy the antenna requirements for** *all* **applications.** Please contact *Technical Support* for antenna/cable selection assistance and/or optional services (e.g., site surveys, etc.).   ).   See the *Technical Support* section in this document for contact information.

2   SPECIFICATIONS

2.1   WCM900 SmartStack Specifications

Table 1 – WCM900 Specifications		
Performance	@ 9600 bps Throughput Data Rate	
Transmit Power Output	100mW	
Indoor/Urban Range	1,500 Feet (457 m)	
Outdoor RF line-of-sight Range	Up to 7 miles (11 km) w/ dipole antenna Up to 20 miles (32 km) w/ high-gain antenna	
Interface Data Rate (selectable using BD Command)	10 - 57600 bps	
RF Data Rate	10000 bps	
Receiver Sensitivity	-110 dBm	
Power Requirements		
Required Power (Power from OCS)	During Transmit 0.8W (33mA @ 24VDC) During Receive 0.3W (13mA @ 24VDC) During Power Down 50µW (2µA @ 24VDC)	
General		
Frequency	902-928 MHz ISM Band	
Spread Spectrum	Frequency Hopping	
Modulation	Wide Band FM	
Supported Network Topologies	Peer-to-Peer, Point-to-Point, Point-to-Multipoint & Multidrop	
Channel Capacity	7 hop sequences share 25 frequencies	
Physical Properties		
Weight	7.1 oz. (200 g)	
Operating Temperature	0 to 60º C	
Antenna		
Connector	RPSMA (Reverse-polarity SMA)	
Type	½ wave dipole whip, 6.75″ (17.1 cm), 2.1 dBi Gain	
Impedance	50 ohms unbalanced	
Certifications		
FCC Part 15.247	OUR-9XSTREAM	
Industry Canada (IC)	4214A-9XSTREAM	
CE UL	See Compliance Table at http://www.heapg.com/Support/compliance.htm	

2.2   WCM910 Stand-Alone Specifications

Table 2 – WCM910 Specifications		
Performance	**@ 9600 bps Throughput Data Rate**	**@ 115200 bps Throughput Data Rate**
Transmit Power Output	1 mW - 1 W (software selectable)	1 mW - 1 W (software selectable)
Indoor/Urban Range	Up to 3000′ (900 m)	Up to 1500′ (450 m)
Outdoor RF line-of-sight Range	Up to 14 miles (22 km) w/ dipole antenna Up to 40 miles (64 km) w/ high-gain antenna	Up to 7 miles (11 km) w/ dipole antenna Up to 20 miles (32 km) w/ high-gain antenna
Interface Data Rate (selectable using BD Command)	1200 - 230400 bps	1200 - 230400 bps
RF Data Rate	10000 bps	125000 bps
Receiver Sensitivity	-110 dBm	-100 dBm
Power Requirements (Refer also to **Transmit Power Output** specifications in this table.**)**		
Receive Current	110 mA	110 mA
Idle Currents — 16 sec cyclic sleep (SM=8)	20 mA	19 mA
Idle Currents — 8 sec cyclic sleep (SM=7)	21 mA	19 mA
Idle Currents — 4 sec cyclic sleep (SM=6)	24 mA	20 mA
Idle Currents — 2 sec cyclic sleep (SM=5)	30 mA	22 mA
Idle Currents — 1 sec cyclic sleep (SM=4)	39 mA	25 mA
Pin Sleep Power Down	17 mA	17 mA
Serial Port Sleep Power Down	45 mA	45 mA
General		
Power Supply Voltage	7 – 28 VDC	
Frequency	902-928 MHz ISM Band	
Spread Spectrum	FHSS (Frequency Hopping Spread Spectrum)	
Modulation	FSK (Frequency Shift Keying)	
Supported Network Topologies	Peer-to-Peer, Point-to-Point, Point-to-Multipoint & Multidrop	
Channel Capacity	10 hop sequences share 50 frequencies	
Physical Properties		
Size	2.75″ x 5.50″ x 1.124″ (7.90 cm x 13.90 cm x3.80 cm)	
Weight	7.1 oz. (200 g)	
Serial Connector	DB-9	
Operating Temperature	-40 to 85º C (industrial)	
Antenna		
Connector	RPSMA (Reverse-polarity SMA)	
Type	½ wave dipole, 1.75″, 2dBi (or greater) gain	
Impedance	50 ohms unbalanced	
Certifications		
FCC Part 15.247	OUR-9XTEND	
Industry Canada (IC)	4214A-9XTEND	
CE	See Compliance Table at http://www.heapg.com/Support/compliance.htm	
UL		

Transmit Power Output	1 mW	10 mW	100 mW	500 mW	1 W

Table 2 – WCM910 Specifications					
(TX Currents Relative To Each TX Power Output Option)					
Transmit Current @9600 baud (9 VDC supply voltage, typical)	110 mA	145 mA	250 mA	510 mA	900 mA
Transmit Current @115K baud (9 VDC supply voltage, typical)	110 mA	140 mA	245 mA	500 mA	800 mA

3   DIMENSIONS

3.1   WCM900 Dimensions

a.   WCM900 Dimensions (Shown as part of SmartStack I/O in OCS Controller)

The WCM can be used with any model of OCS. The example below uses an OCS1xx and shows four SmartStack modules attached – one of which can be a WCM.

Note: Figures 1 and 2 do not show dimensions for the WCM antenna. Refer to Figure 3 for antenna dimensions. *WCM antenna dimensions need to be considered for panel box dimensions.*
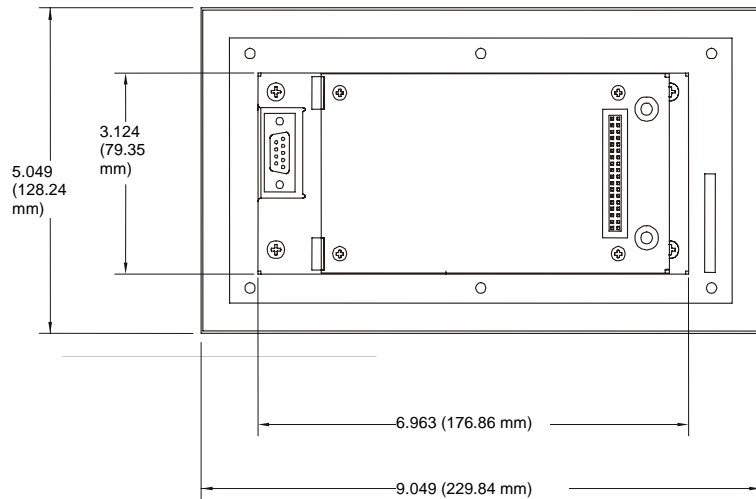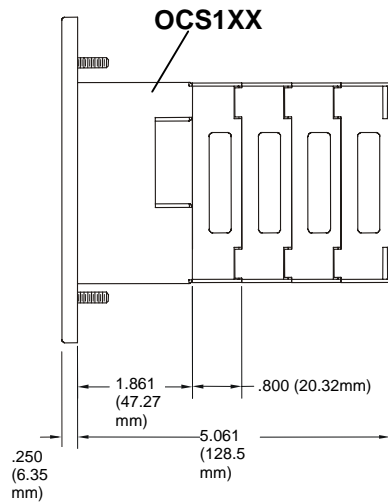

OCS1XX

1.861 (47.27 mm)
.800 (20.32mm)
5.061 (128.5 mm)
.250 (6.35 mm)

3.124 (79.35 mm)
5.049 (128.24 mm)
6.963 (176.86 mm)
9.049 (229.84 mm)

Figure 1 –Side View of OCS1XX   **Figure 2 - Back View of OCS1XX**

Note: OCS1xx Shown with Four SmartStack Modules-one which can be a WCM.

b.   ***WCM900 Antenna Dimensions***

Table 3 – WCM900 Antenna Dimensions		
	A	**B**
WCM900		
Folded	6" (152.4mm)	1.5" (38.1mm) Folded
Straight	6.75" (171.45mm)	

Figure 3 shows the antenna that is included with WCM900. The *articulating* antenna included with the WCM**900** is **not** suitable for outdoor mounting.

For remote mounting of the antenna or if an antenna is required that is suitable for outdoor mounting, refer to antenna kits on page 1.
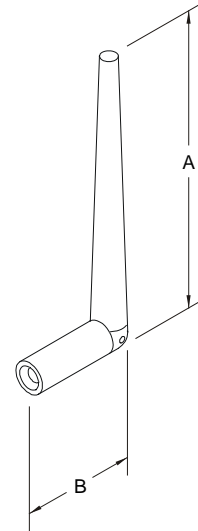

Figure 3 –WCM 900 Antenna Dimensions (Shown Folded)

3.2   WCM910 Dimensions

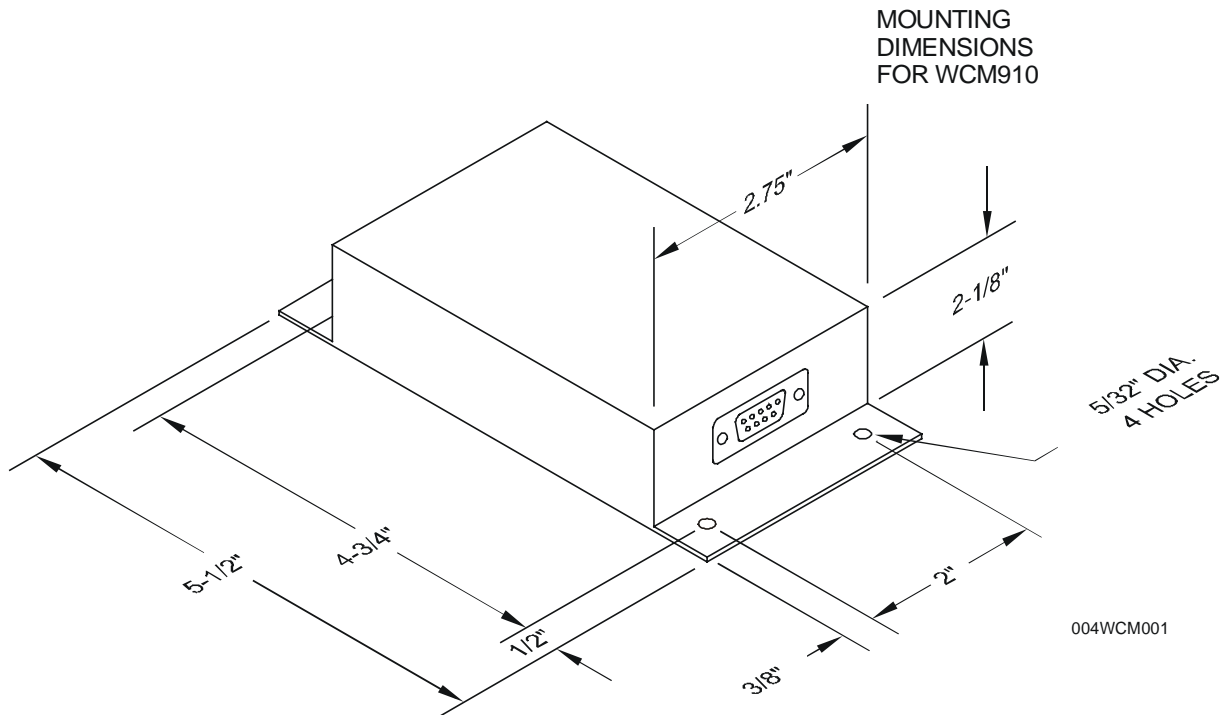*a.*   ***WCM910 Dimensions Stand-Alone***

Figure 4 – Dimensions of WCM910 (Does not include Antenna Dimensions)
Note: WCM antenna dimensions need to be considered for panel box dimensions.

b.   WCM910 Antenna Dimensions

Figure 5 shows the antenna that is included with WCM910.

The **non-articulating** antenna included with the WCM**910 IS** suitable for outdoor use. For remote mounting of the antenna refer to antenna kits on page 1.
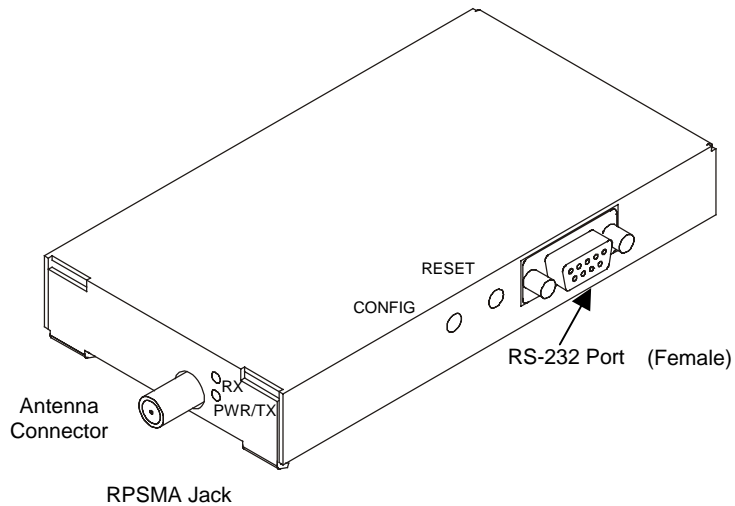
0.28"

0.38"

1.77"

0.11"

0.30"

0.65"
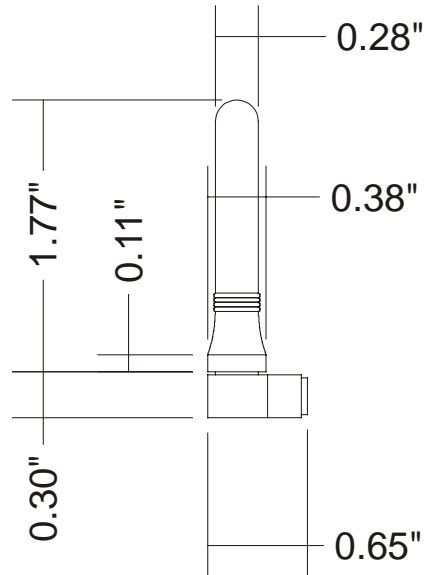
004WCM003

Figure 5 –WCM 910 Antenna Dimensions

4   CONNECTORS, ANTENNA, AND RF CABLING

4.1   WCM900 Connectors

RESET

CONFIG

RS-232 Port   (Female)

RX

PWR/TX

Antenna
Connector
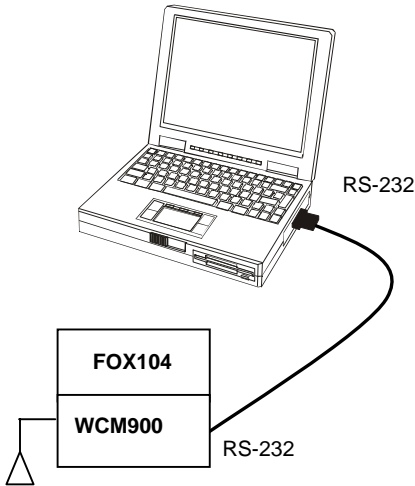
RPSMA Jack

Note: RP = Reversed Polarity. The center of the
conductor of the **jack** on the **modem** is **Male**.

Figure 6 – WCM900 Connectors

Figure 7 shows cables between the WCM900 and the OCS/RCS and also between the antenna and the WCM900. Follow the numbered explanations in order as shown.

1. When connecting a **WCM900** to a **PC**, power is provided by mounting the WCM900 to a FOX104 base. **The FOX104 base functions strictly as a power supply / mounting platform for the WCM900**.

In this example, serial data is sent to the WCM900 RS-232 port via a standard RS-232 cable from the PC's RS-232 port. The WCM900 sends out frequency hopping data directly to the antenna or via an external cable connected between the WCM900 and the antenna.

RS-232

FOX104

WCM900   RS-232

OCS / RCS
(Shown with 2 SmartStack modules attached including WCM900.)

RS-232
(Female)

2. The antenna is directly connected to the WCM900 SmartStack Module or can be connected via an external cable to the WCM900.

In this example, the antenna receives frequency- hopping data from another WCM900, which is then sent via cable to the receiving WCM900.
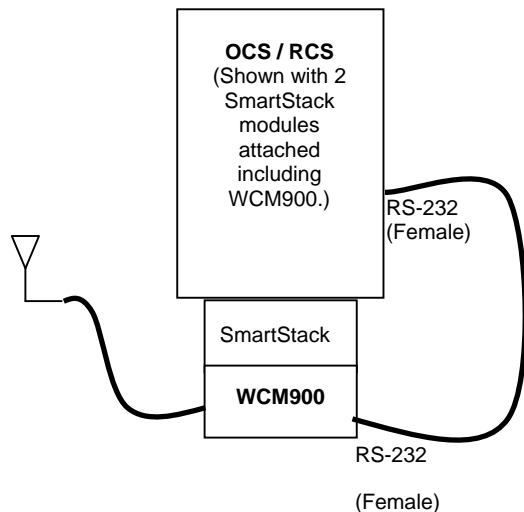
3. Serial data is sent to the OCS/RCS RS-232 port via an external null-modem cable connected to the WCM RS-232 port.

Note:Serial data is not accessed through the backplane of the OCS/RCS that contains the WCM900 in its stack.

SmartStack

WCM900

RS-232

(Female)

Figure 7 – SmartStack WCM900 Overview

4.2   WCM910 Dipswitches / Connectors

a. Dipswitches

Dipswitches on the WCM910 are set by default to use an RS-232 port. If other settings are desired, see the detailed supplement for the WCM910 (MAN0782). Refer to the *Technical Support* section in this document for contact information.
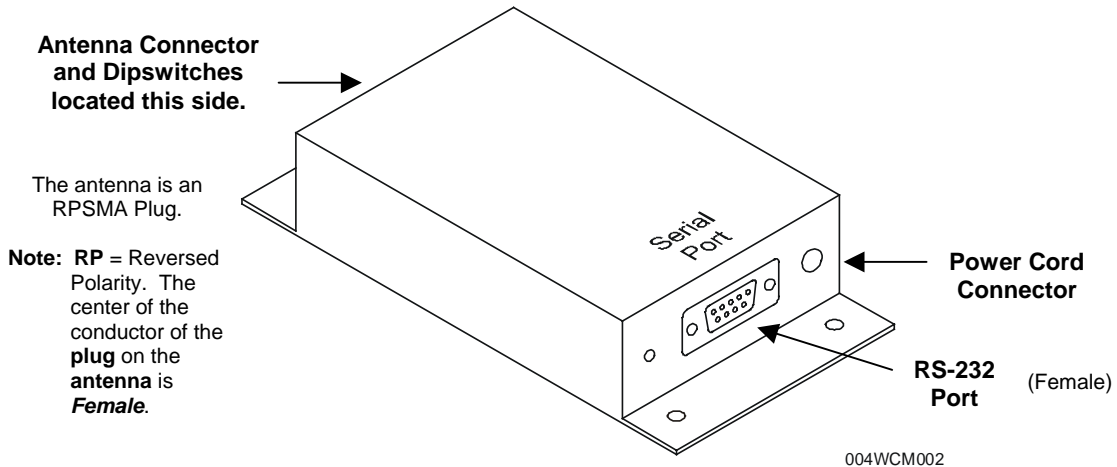
b. Connectors

Antenna Connector and Dipswitches located this side.

The antenna is an RPSMA Plug.

Note: RP = Reversed Polarity. The center of the conductor of the **plug** on the **antenna** is *Female*.

Serial Port

Power Cord Connector

RS-232 Port   (Female)

004WCM002

Figure 8 – WCM910 Connectors

V+   Ground

Table 4 - WCM Power Cord	
Black / White Wire	V+
Black Wire	Ground

Figure 9 - WCM910 Power Cord

RS-232   RS-232

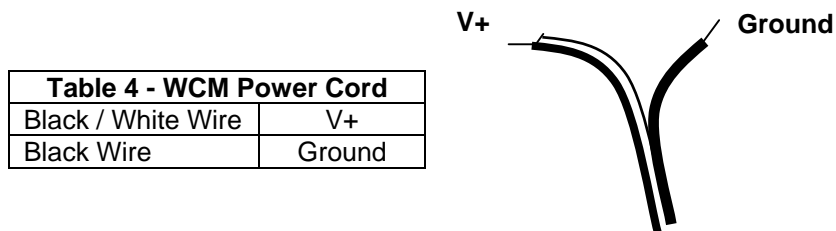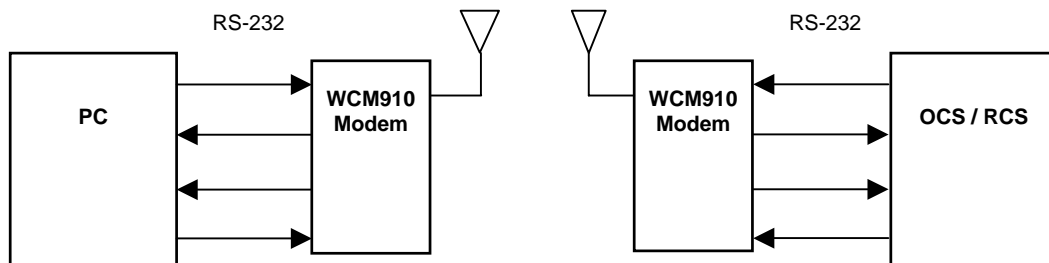PC   → **WCM910 Modem**   **WCM910 Modem** → **OCS / RCS**

Figure 10 – Stand-Alone WCM910 (Overview)

4.3   Serial Connections

Table 5 shows the serial connection between the WCM and PC.

WCM900/910 Modem DB-9	Direction	RS-232 Signal Name	PC COM	
			DB-25	**DB-9**
		PG	**1**	
1	From MODEM to PC	RLSD/CD	**8**	**1**
2	From MODEM to PC	RD	**3**	**2**
3	From PC to MODEM	TD	**2**	**3**
4	From PC to MODEM	DTR	**20**	**4**
5	-	SG	**7**	**5**
6	From MODEM to PC	DSR	**6**	**6**
7	From PC to MODEM	RTS	**4**	**7**
8	From MODEM to PC	CTS	**5**	**8**
9	From MODEM to PC	RI		**9**

Table title: Table 5 – WCM900/910 Serial Cable Connections and PC COM RS-232 Serial Port

Pin 1   Pin 9
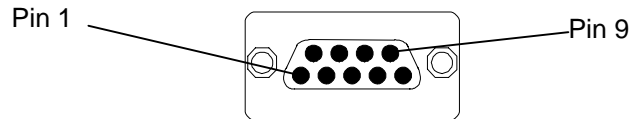
Figure 11 - RS-232 Port on OCS/RCS

SHIELDED MULTI CONDUCTOR

WCM   9-PIN PC COM

DB9
MALE

15.24 METERS MAX
(50 FEET MAX)

DB9
FEMALE
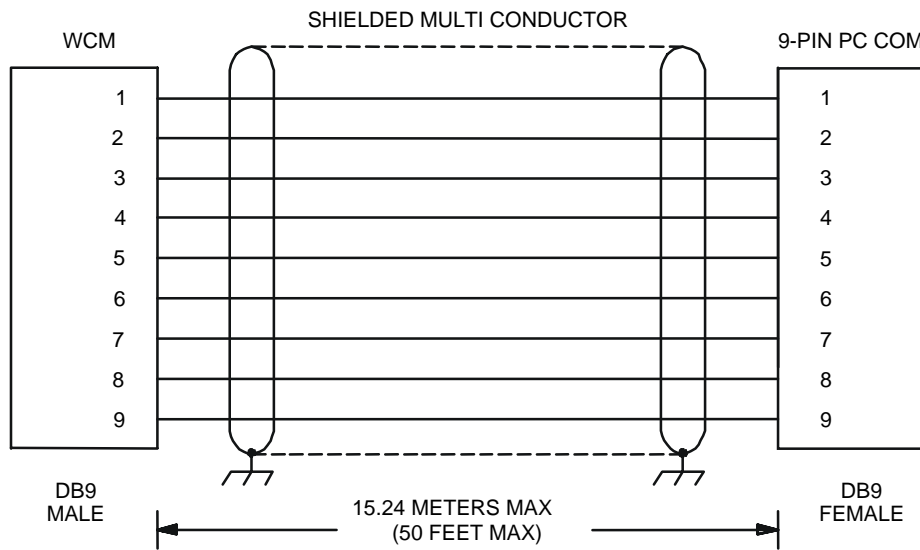
Figure 12 – WCM900 (or WCM910) RS-232 to PC Wiring Diagram (9-pin)
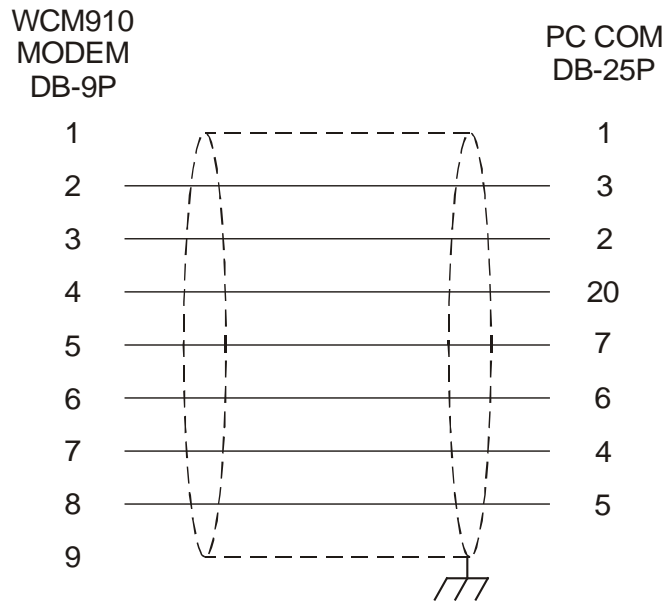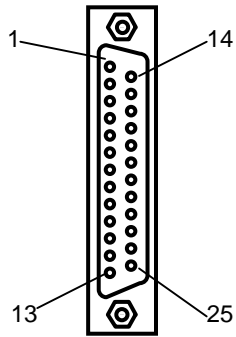
WCM910
MODEM
DB-9P

PC COM
DB-25P

Figure 13 – WCM RS-232 to PC Wiring Diagram (25-pin) (Also Applies to WCM900)

Table 6 shows the serial connection between the WCM and the OCS.

Table 6 – OCS/RCS RS-232 Serial Port and WCM900/910 Serial Cable Connections				
Color OCS DB-25P	OCS/ RCS DB-9P	RS-232 Signal Name	Direction	WCM900/910 Modem DB-9P
1		PG		
		RLSD/CD	From MODEM to OCS	1
3	3	RD	From MODEM to OCS	2
2	2	TD	From OCS to MODEM	3
	6	DTR	From OCS to MODEM	4
7	5	SG	-	5
	4	DSR	From MODEM to OCS	6
4	8	RTS	From OCS to MODEM	7
5	7	CTS	From MODEM to OCS	8
		RI	From MODEM to OCS	9

Figure– 14 RS-232 / RS-485 Connector

```
OCS                                    WCM910
DB-9P                                  MODEM
                                       DB-9P

   1                                      1
   2  ———————\        /——————————         2
   3  ———————— \      / ————————————       3
              \  \  /  /
   4  ———————— \  \/  / ————————————       4
   5  ——————————  /\  ——————————————       5
              /  /  \  \
   6  ———————/  /    \  \———————————        6
   7  ———————— /      \ ————————————       7
   8  ———————/        \——————————         8
   9                                      9
```
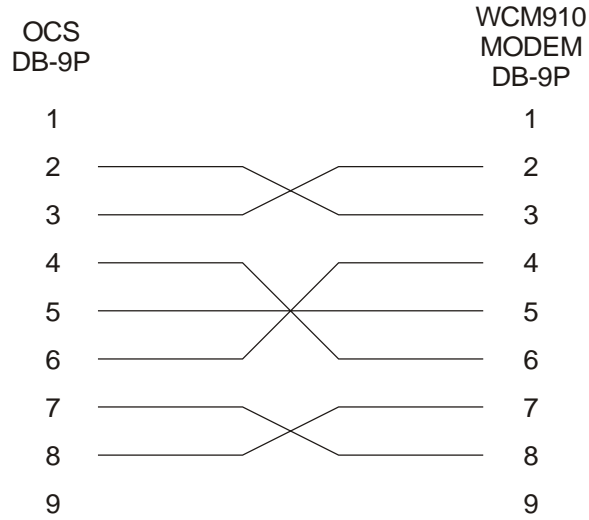
Figure 15 - OCS to WCM RS-232 to Wiring (9-pin) (Also Applies to WCM900)

```
OCS                                    WCM910
DB-25P                                 MODEM
                                       DB-9P

   1                                      1
   2  ———————\        /——————————         2
   3  ———————— \      / ————————————       3

   4  ——————————\                          4
   5  ——————————  \      /——————————       5

                                          6

   7  ——————————  /      \——————————       7
                                          8

                                          9
```
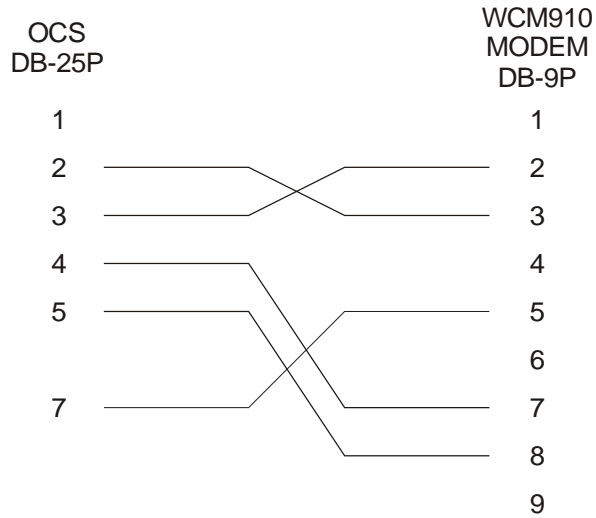
Figure 16 - PC to WCM RS-232 to Wiring (25-pin) (Also Applies to WCM900)

5   CONFIGURATION

Note: The stand-alone WCM910 and the SmartStack WCM900 are <u>not</u> compatible – they can <u>not</u> be used to communicate with one another.

HE*800*WCM*900* and HE*200*WCM*910*

Configuration Using RadioSet Software

RadioSet software is included with both WCM900 (SmartStack) and WCM910 (Stand-Alone) units to set communication parameters.

- **Default settings for both WCMs:**
  Baud Rate is set at 9600 and 8 Data Bit, No Parity, and 1 STOP Bit for serial connection.

- **Selection of the Modem Model Number** from a pull-down menu is required as part of the RadioSet configuration:

If This Modem Is Being Configured…	This is the Modem Model Number
HE**200**WCM**910**	XT09
HE**800**WCM**900**	X09-009

- For **application-specific configurations**, refer to the following supplements containing **AT Commands:** HE**200**WCM**910** (MAN0782) and HE**800**WCM**900** (MAN0789). See the *Technical Support* section in this document for contact information to obtain manual updates and other assistance.

Additional Configuration for HE800WCM900 (SmartStack) Using Cscape Software

Configuration using Cscape software is required for the WCM900 to reside in the OCS/RCS/FOX I/O stack.

Note: The WCM900 occupies one of the available four slots.

- Preliminary configuration procedures that apply to all SmartStack™ Modules are contained in the hardware manual of the controller you are using. Refer to the **Additional References** section in this data sheet for a listing of hardware manuals and other useful references. Also, refer to the Cscape Help File.

6   INSTALLATION / SAFETY

When found on the product, the following symbols specify:

⚠ | **Warning:** Consult user documentation.   ⚡ | **Warning:** Electrical Shock Hazard.

WARNING: To avoid the risk of electric shock or burns, always connect the safety (or earth) ground before making any other connections.

WARNING: To reduce the risk of fire, electrical shock, or physical injury it is strongly recommended to fuse the voltage measurement inputs. Be sure to locate fuses as close to the source as possible.

WARNING: Replace fuse with the same type and rating to provide protection against risk of fire and shock hazards.

WARNING: In the event of repeated failure, do not replace the fuse again as a repeated failure indicates a defective condition that will not clear by replacing the fuse.

WARNING: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, or service this equipment. Read and understand this manual and other applicable manuals in their entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

For detailed installation and a handy checklist that covers panel box layout requirements and minimum clearances, refer to the hardware manual of the controller you are using. (See the **Additional References** section in this document.)

- All applicable codes and standards need to be followed in the installation of this product.
- For I/O wiring (discrete), use the following wire type or equivalent: Belden 9918, 18 AWG or larger.

Adhere to the following safety precautions whenever any type of connection is made to the module.

- Connect the green safety (earth) ground first before making any other connections.
- When connecting to electric circuits or pulse-initiating equipment, open their related breakers. Do not make connections to live power lines.
- Make connections to the module first; then connect to the circuit to be monitored.
- Route power wires in a safe manner in accordance with good practice and local codes.
- Wear proper personal protective equipment including safety glasses and insulated gloves when making connections to power circuits.
- Ensure hands, shoes, and floor are dry before making any connection to a power line.
- Make sure the unit is turned OFF before making connection to terminals. Make sure all circuits are de-energized before making connections.
- Before each use, inspect all cables for breaks or cracks in the insulation. Replace immediately if defective.

7   ADDITIONAL REFERENCES

For detailed installation, configuration and other information, refer to the hardware manual of the controller you are using.   See the **Technical Support** section in this document for the web site address to download references and to obtain revised editions.

Additional References	
Controller	**Manual Number**
OCS NX Series Hardware e.g. HE-NX220, HE-NX221, HE-NX250, HE-NX251	MAN0781
Operator Control Station Hardware (OCS, OCX) e.g., OCS1XX / 2XX; Graphic OCS250	MAN0227
Remote Control Station Hardware (RCS [except RCS116], RCX) e.g., RCS210, RCS250	
Color Touch OCS Hardware e.g., OCS300, OCS301,OCS350, OCS351 e.g., OCS451, OCS551, OCS651	MAN0465
OCS LX Series Hardware e.g., LX280 / LX300; RCS116	MAN0755
MiniOCS / MiniRCS / MiniOCX / MiniRCX Hardware e.g., HE500OCSxxx	MAN0305
Other Useful References	
Cscape Programming and Reference	MAN0313
DeviceNet™ Implementation	SUP0326
Wiring Accessories and Spare Parts Manual	MAN0347

8   TECHNICAL SUPPORT

For assistance and manual up-dates, contact Technical Support at the following locations:

North America: **Europe:**
(317) 916-4274   (+) 353-21-4321-266
www.heapg.com   www.horner-apg.com

NOTES