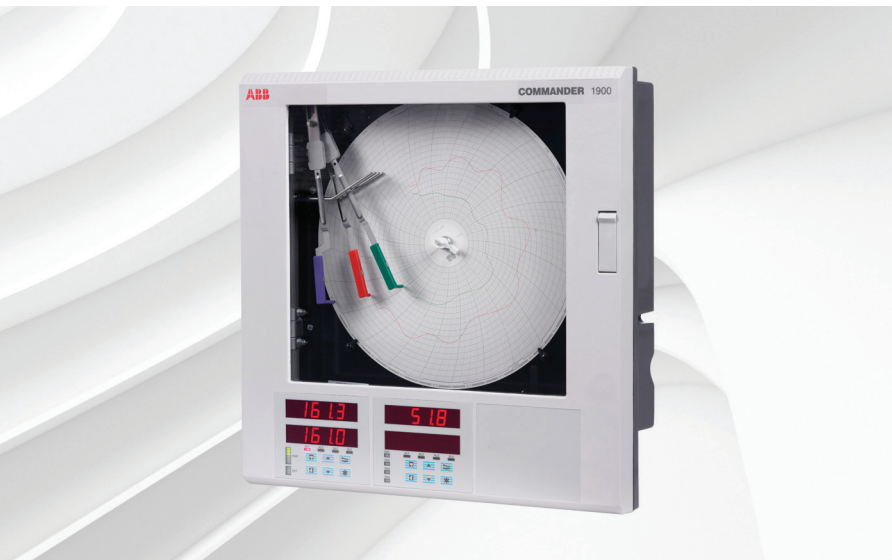


C1950

Pasteurizer recorder and recorder/controller



Electrical noise protection supplement

Measurement made easy

—
C1950
pasteurizer recorder
and recorder controller

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




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Electrical safety

This equipment complies with the requirements of CEI/IEC 61010-1:2001-2 'Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use'. If the equipment is used in a manner NOT specified by the Company, the protection provided by the equipment may be impaired.

Symbols

One or more of the following symbols may appear on the equipment labelling:

	Warning – refer to the manual for instructions
	Caution – risk of electric shock
	Protective earth (ground) terminal
	Earth (ground) terminal
	Direct current supply only
	Alternating current supply only
	Both direct and alternating current supply
	The equipment is protected through double insulation

Information in this manual is intended only to assist our customers in the efficient operation of our equipment. Use of this manual for any other purpose is specifically prohibited and its contents are not to be reproduced in full or part without prior approval of the Technical Publications Department.

Health and safety

To ensure that our products are safe and without risk to health, the following points must be noted:

- The relevant sections of these instructions must be read carefully before proceeding.
- Warning labels on containers and packages must be observed.
- Installation, operation, maintenance and servicing must only be carried out by suitably trained personnel and in accordance with the information given.
- Normal safety precautions must be taken to avoid the possibility of an accident occurring when operating in conditions of high pressure and/or temperature.
- Chemicals must be stored away from heat, protected from temperature extremes and powders kept dry. Normal safe handling procedures must be used.
- When disposing of chemicals ensure that no two chemicals are mixed.

Safety advice concerning the use of the equipment described in this manual or any relevant hazard data sheets (where applicable) may be obtained from the Company address on the back cover, together with servicing and spares information.

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1 Introduction

The series of C1950 instruction manuals is shown in Figure 1. The standard manuals, including the specification sheet, are supplied with all instruments. The supplementary manuals supplied depend on the specification of the instrument.

This installation supplement for the C1950 series recorders contains information and procedures to be implemented at installation to avoid potential problems caused by electrical noise, particularly Electro Magnetic Interference (EMI), or Radio Frequency Interference (RFI). The best method of controlling and limiting the effects of EMI and RFI is a comprehensive program including all of the recommendations contained in this supplement such as shielding, grounding and radio transmission exclusion zones.

Each of these practices should be considered routine in assuring and safeguarding public health and safety, and in maintaining the integrity of electrical instrumentation.

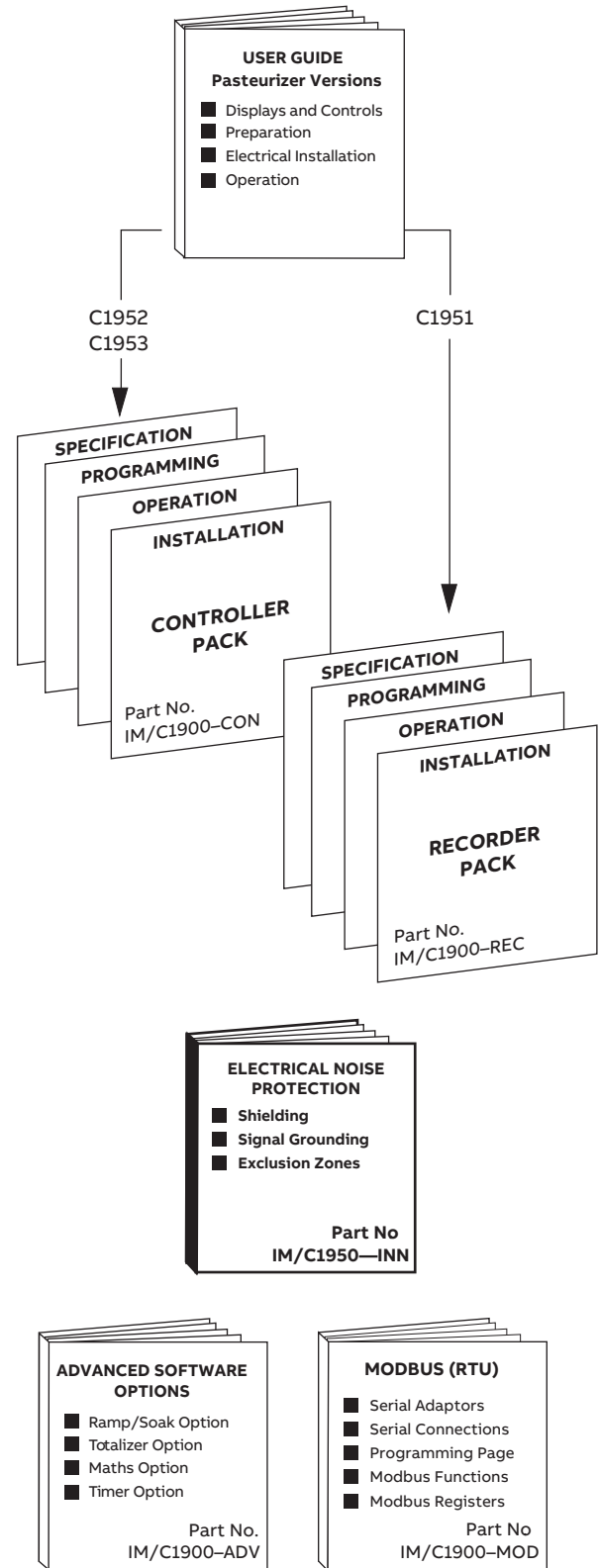


Figure 1 C1900 documentation

2 Electrical noise

Any unwanted extraneous electrical signal in an electronic system is known as noise. Noise can be caused by EMI or RFI. Electrical noise-producing equipment, such as rotating machinery, relays, power lines, and handheld two-way radios are examples of sources of both EMI and RFI.

The effects of high field strength EMI and RFI, such as from two-way radios, are unpredictable and depend on many factors including field strength, separation distance, frequency, direction, installation-related factors and the uncontrolled use of radio transmission devices. All of these factors can disrupt the correct operation of any electrical equipment's performance and reliability.

The C1900 range is designed to meet international standard requirements for Electro Magnetic Compatibility (EMC), however, any system can be subjected to levels of EMI above the prescribed limits, especially under uncontrolled conditions. In order to ensure correct operation in industrial environments, it is essential that correct installation methods are followed. Handheld radios operated in close proximity to any electronic equipment can produce high and unpredictable field strengths beyond the normal reasonable levels. In such circumstances the use of a radio transmission exclusion zone must be considered

3 Shielding

The importance of shielding and grounding on electrical control and instrumentation equipment and wiring cannot be over-emphasized, because it determines to a large degree how the electrical control systems will behave in the presence of EMI/RFI emissions.

A shield is a metal construction of aluminium foil, aluminium conductors, mylar, or copper conductors surrounding the interior of a wire or cable. The shield helps to prevent interference or noise from entering the wire, and helps to prevent signals from leaving the wire and interfering with adjacent wires and signals. Foil shields, while less flexible than braided shields, offer the best protection by providing 100 percent wire coverage.

If strong magnetic induced noise is present, a double-shielded wire or cable may be used, as shown in Figure 2.

Shielded twisted-pair wire, which will reduce the effects of electromagnetic and electrostatic noise coupling, should be used for analog signal connections, as shown in Figure 3.

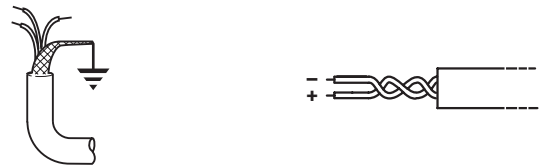


Figure 2 Double-shielded cable

Figure 3 Twisted pair cable

A twisted-pair comprises two wires, each insulated and twisted around each other. Any induced interference in each wire (from outside magnetic fields around the two wires), tends to be equal and in opposite directions, causing the interference to cancel.

Cable trays and conduit are useful for both cable separation and shielding. All trays and conduit should be metal and solidly grounded. The cables and wires should be grouped according to their signal level, keeping power and relay switching lines in a separate conduit away from signal input or communication lines. When trays or conduits of unlike signals must cross, they should cross at 90-degree angles. If trays or conduits are non-metallic or open, a grounded steel barrier should be placed between the two at the crossover point.

4 Signal grounding

To effectively ground a shield of a wire or cable carrying signals, the shield must be intentionally connected to earth, or to some conducting body serving in place of earth, through a low impedance ground connection.

Wire or cable shields must be grounded at one end only to eliminate circulating currents and resultant noise by eliminating differences in potential between the two ends.

Shield drain wires must be as short as possible and insulated from each other and other conducting objects, except at the point of connection. When connecting a shielded, twisted-pair input to the C1900 terminal block (see Figure 4) ensure that the extension of the shield from the cable jacket is as short as possible (preferably 25 mm [1.0 in] or less) and maintain the twisted-pair configuration of the two wires up to the point of termination.

If a double-shielded wire is used, ground the inner shield at one end and ground the outer shield at the other end.

Note. Thermocouples should always have their shields grounded at the process end only, to avoid charging currents.

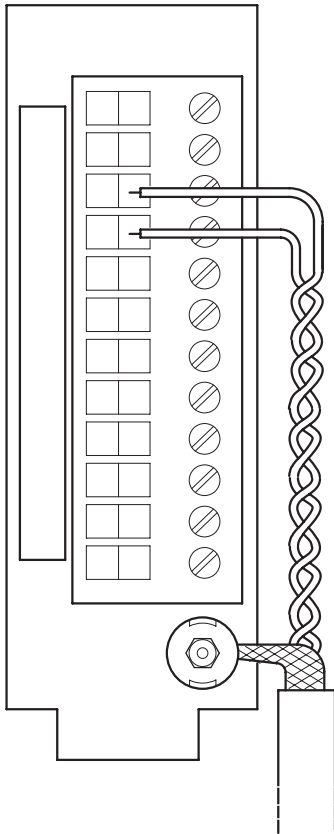


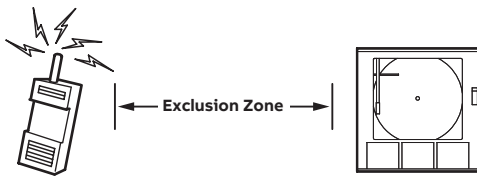
Figure 4 C1900 terminal block

5 Exclusion zones

An exclusion zone is defined as the minimum distance permitted between instrumentation devices and the point where EMI/RFI emitters may be activated. Within an exclusion zone, the activation of EMI/RFI emitters (for example, handheld two-way radios) is prohibited.

As a general rule, transmitting devices must always be operated at least 'an arms length' away from any instrumentation.

Administrative controls should be used to establish exclusion zones in specified areas where instrumentation and control systems have been installed and are operational.



The size of the exclusion zone(s) should be site-specific and dependent upon the effective radiated power of the portable EMI/RFI emitter type(s) likely to be used.

Some examples of exclusion zone distances recognized by European Industry standards (for CE marking), and by the U.S. Nuclear Regulatory Commission (NRC) are shown in Figure 5 below.

Table 1 shows some examples of relationships between radiated power, distance and EMI field strength, derived from the graphs in Figure 5.

Radiated power output (watts)	10 V/m distance (feet)	4 V/m distance (feet)
5	4.0	10.0
2	2.5	6.4
1	1.8	4.5
0.5	1.3	3.2

Table 1 Radiated power, distance and EMI field strength relationships

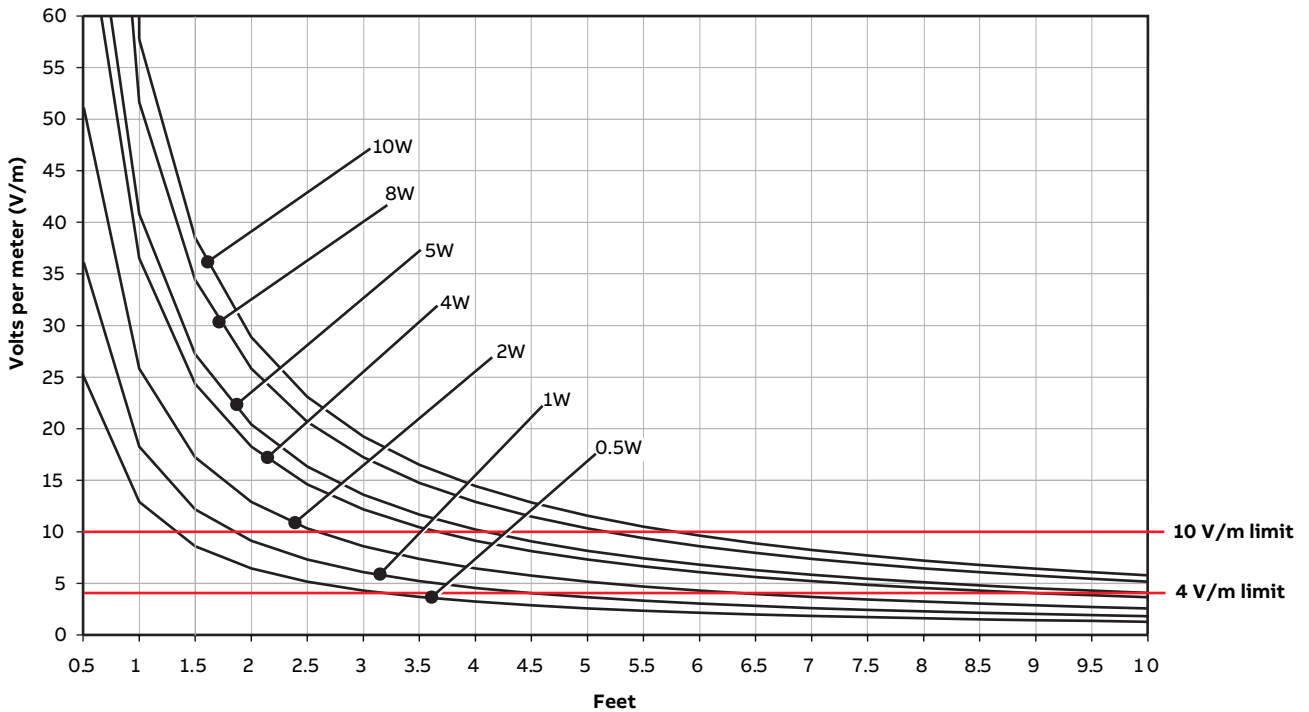


Figure 5 EMI field strength (in Volts per meter) versus distance (in feet) versus radiated power (in feet)

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