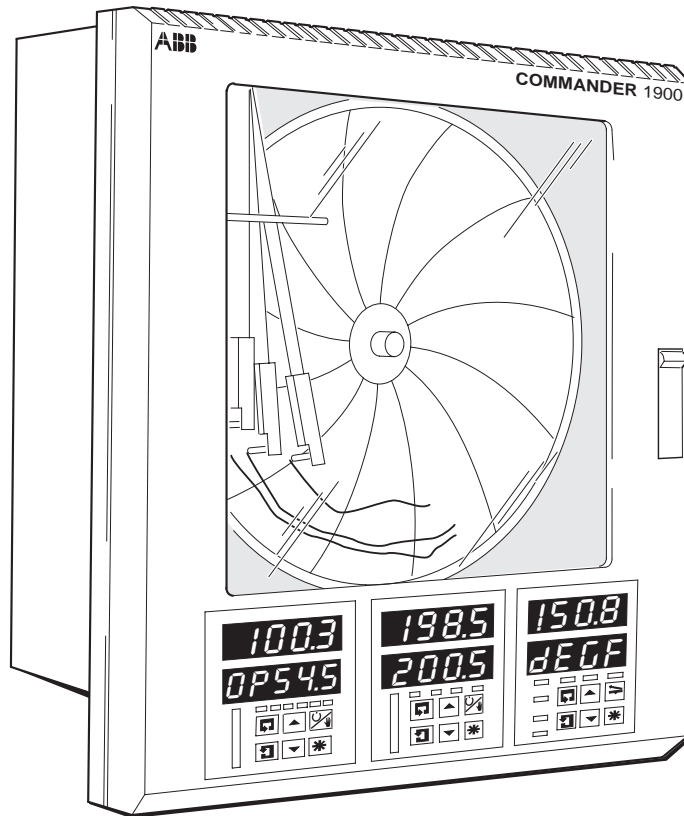


Commander 1900 Series  
Circular Chart Recorder

**Operating Instructions**

Dairy Farm Supplement



## The Company

We are an established world force in the design and manufacture of instrumentation for industrial process control, flow measurement, gas and liquid analysis and environmental applications.

As a part of ABB, a world leader in process automation technology, we offer customers application expertise, service and support worldwide.

We are committed to teamwork, high quality manufacturing, advanced technology and unrivalled service and support.

The quality, accuracy and performance of the Company's products result from over 100 years experience, combined with a continuous program of innovative design and development to incorporate the latest technology.

The NAMAS Calibration Laboratory No. 0255 is just one of the ten flow calibration plants operated by the Company, and is indicative of our dedication to quality and accuracy.

BS EN ISO 9001



St Neots, U.K.

EN 29001 (ISO 9001)



Lenno, Italy – Cert. No. 9/90A



Stonehouse, U.K.

## Use of Instructions



### Warning.

An instruction that draws attention to the risk of injury or death.



### Caution.

An instruction that draws attention to the risk of damage to the product, process or surroundings.



### Note.

Clarification of an instruction or additional information.



### Information.

Further reference for more detailed information or technical details.

Although **Warning** hazards are related to personal injury, and **Caution** hazards are associated with equipment or property damage, it must be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process system performance leading to personal injury or death. Therefore, comply fully with all **Warning** and **Caution** notices.

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 Marketing Communications Department.

### Health and Safety

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

1. The relevant sections of these instructions must be read carefully before proceeding.
2. Warning labels on containers and packages must be observed.
3. Installation, operation, maintenance and servicing must be carried out only by suitably trained personnel and in accordance with the information given.
4. Normal safety precautions must be taken to avoid the possibility of an accident occurring when operating in conditions of high pressure and/or temperature.
5. Chemicals must be stored away from heat, protected from temperature extremes and powders kept dry. Normal safe handling procedures must be used.
6. 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.

---

# CONTENTS

---

<b>1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	About this Manual .....	1
1.2	Application Overview .....	2
<b>2</b>	<b>ELECTRICAL INSTALLATION .....</b>	<b>4</b>
2.1	Electrical Connections .....	4
<b>3</b>	<b>SETTING UP .....</b>	<b>6</b>
3.1	Fitting the Chart .....	6
3.2	Fitting the Pen Capsule(s) .....	6
<b>4</b>	<b>ALARMS .....</b>	<b>7</b>
4.1	Delayed High/Low Process Alarm .....	7
<b>5</b>	<b>CONFIGURATION .....</b>	<b>8</b>
5.1	Default Configuration .....	8

---

# 1 INTRODUCTION

---

## 1.1 About this Manual

This Supplementary Manual provides an overview of the use of the C1900 Circular Chart Recorder on a Dairy Farm and describes the electrical connections and special alarm feature designed for this application, together with chart and pen replacement.

For all other installation, operating and programming information, refer to the appropriate manual:

IM/C1900-INS	Installation Guide
IM/C1900-OGR	Operating Guide (Recorder)
IM/C1900-OGC	Operating Guide (Controller)
IM/C1900-PGR	Programming Guide (Recorder)
IM/C1900-PGC	Programming Guide (Controller)

---

## ...1 INTRODUCTION

---

### 1.2 Application Overview – Fig. 1.1

In a dairy application, the C1900 Circular Chart Recorder monitors the milking system cooling and washing cycles for possible failures that could compromise milk quality and, most importantly, provides a permanent record of these parameters for traceability purposes.

During the milking process, the milk is extracted from the cows by a vacuum milking system and passed into a bulk storage tank where it is stored for a maximum of 48 hours prior to collection by the Dairy. Whilst in the tank, the milk is cooled and maintained at a temperature of  $3^{\circ}\text{C} \pm 1^{\circ}\text{C}$ .

Cleaning of the vacuum milking and bulk storage systems is done using soap or acid and hot water. The vacuum milking system is cleaned after every milking; the bulk storage tank is cleaned every time it is emptied, normally every 48 hours.

Two temperature sensors are used in the system. The first is located in the milk storage tank and monitors the temperature of the contents of the tank during the milk cooling cycle and the system washing cycle. The second sensor is located in the return pipeline from the barn to the vacuum milking system and monitors the temperature of any product flowing in the pipeline such as milk or cleaning solution.

A white indicator light located in the barn shows when the refrigeration system is operating. A red warning light, also located in the barn, is illuminated if milk temperature and/or time limits are exceeded. An additional set of indicator and warning lights can be mounted in a more convenient location if required.

Under normal conditions the storage tank is empty and at ambient temperature when the milking system is started. Once there is sufficient milk in the storage tank (normally within 20 minutes), the refrigeration system is started and the temperature begins to fall.

If the refrigeration system has not been started 20 minutes after the start of the milking system **and** the milk temperature remains above  $12^{\circ}\text{C}$ , the red warning light is illuminated.

If the milk temperature has not been cooled to less than  $10^{\circ}\text{C}$  within 120 minutes of the refrigeration system being started, the red warning light is illuminated.

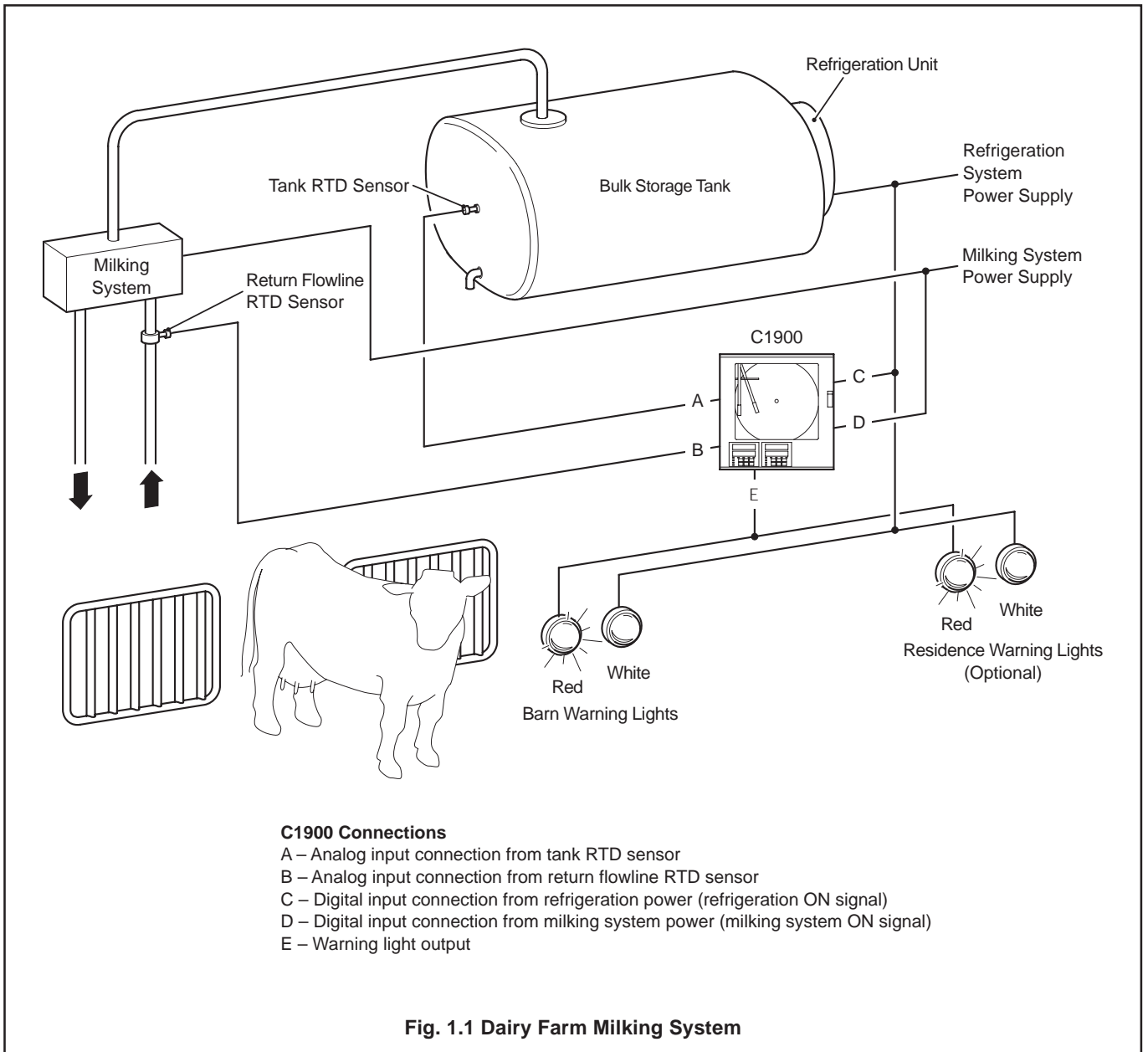
The refrigeration system remains operational whilst there is milk in the tank and the red warning light is illuminated if the milk temperature subsequently rises above  $10^{\circ}\text{C}$ . It is important that the milk is cooled quickly and maintained at a low temperature in order to meet legal requirements.

If the temperature of the milk in the tank rises above  $10^{\circ}\text{C}$  for more than 2 minutes during subsequent milkings (when there is already milk in the tank and the refrigeration system is on), the red warning light is again illuminated.



**Note.** Additional alarms can be configured and adjustments to time and trip points can be made in the field as required to meet individual needs.

Compliance with local regulations must be maintained at all times.



## 2 ELECTRICAL INSTALLATION

### 2.1 Electrical Connections – Figs. 2.1 to 2.3



**Warning.** Before making any connections, ensure that the power supply, any high voltage-operated control circuits and high common mode voltages are switched off.

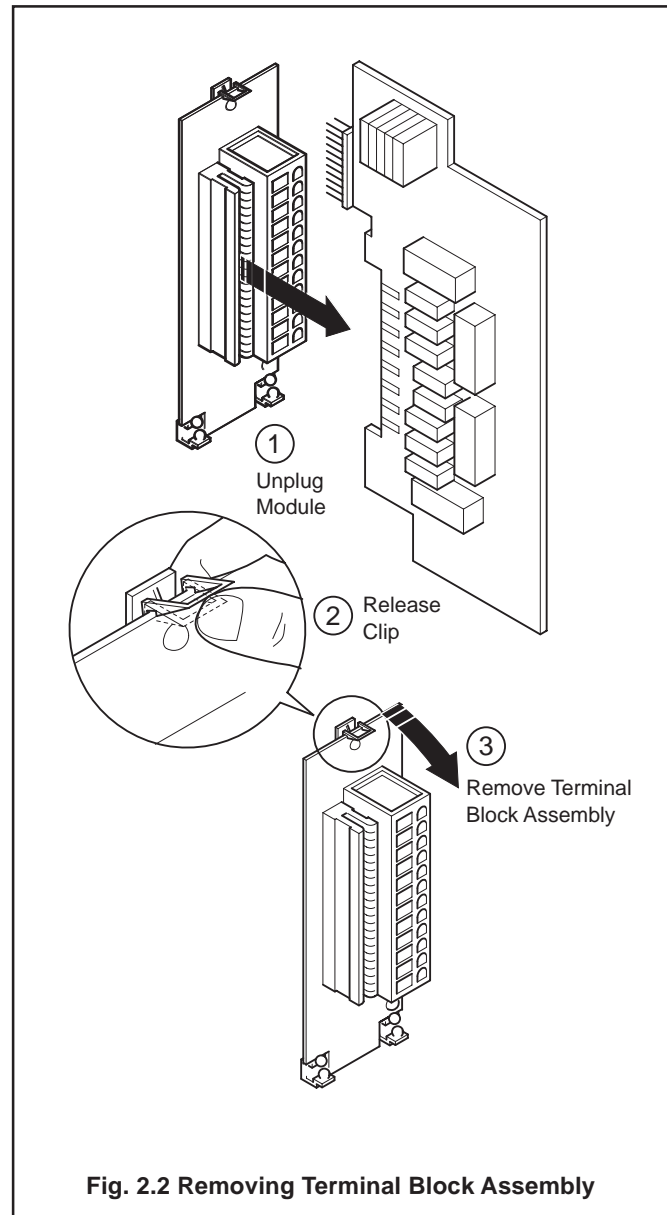
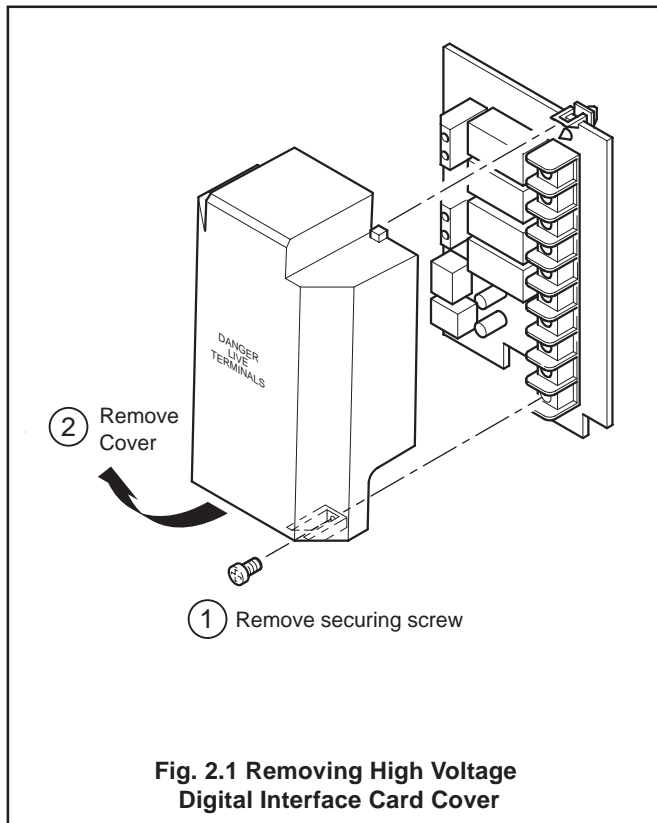


#### Note.

- Use flexible conduit for cable routing (signal and power).
- Always route signal leads and power cables separately, preferably in earthed metal conduit.
- Screened cable must be used for signal inputs and relay connections. Connect the screen to the ground stud.
- The terminal blocks can be removed from the main p.c.b. when making connections. Before removing any module note its position – see Fig. 2.1.



**Information.** Use cable appropriate for the load currents. The terminals accept cables up to 12AWG for power supply connections and 14AWG for all other connections.



...2.1 Electrical Connections – Figs. 2.1 to 2.3

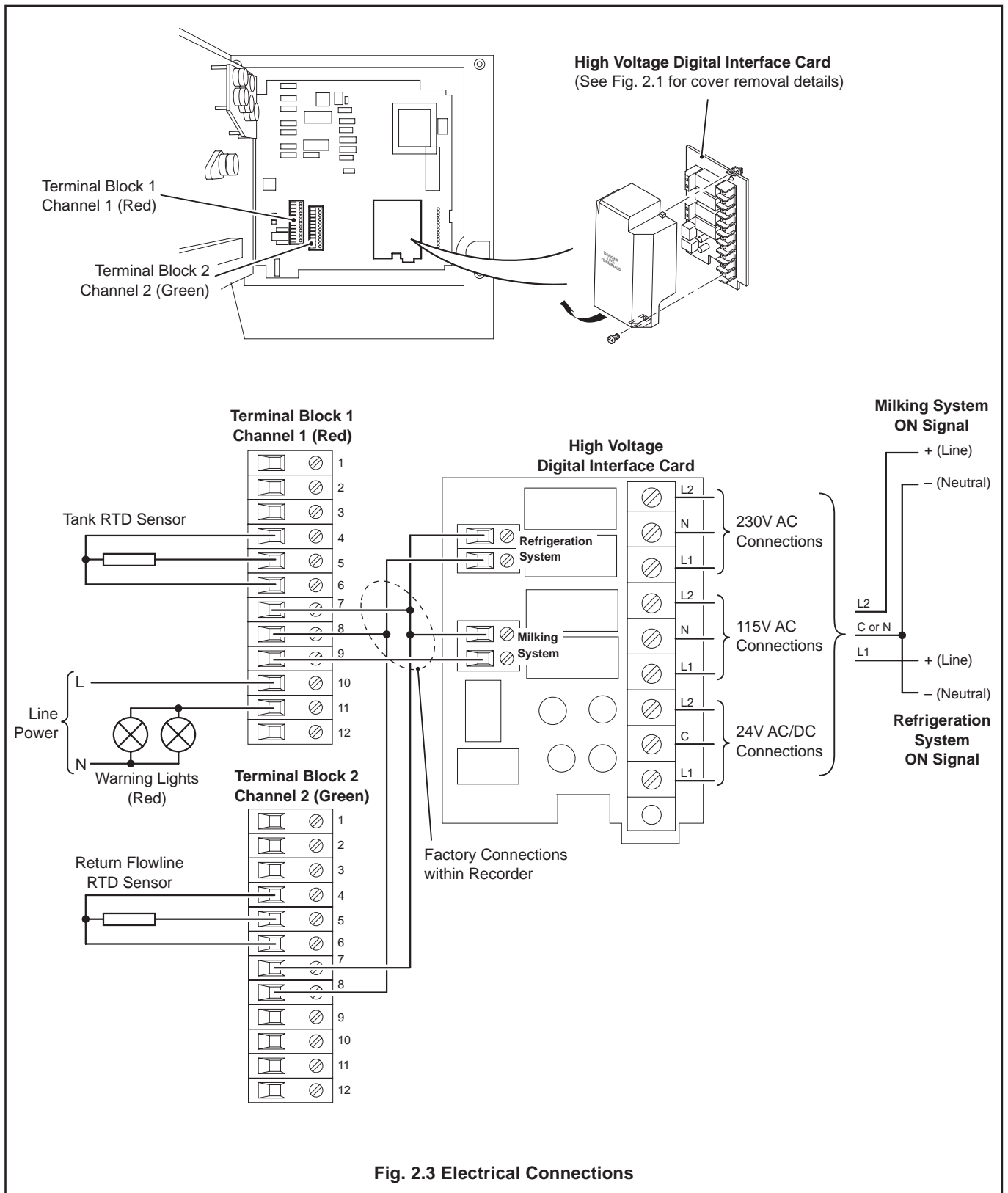
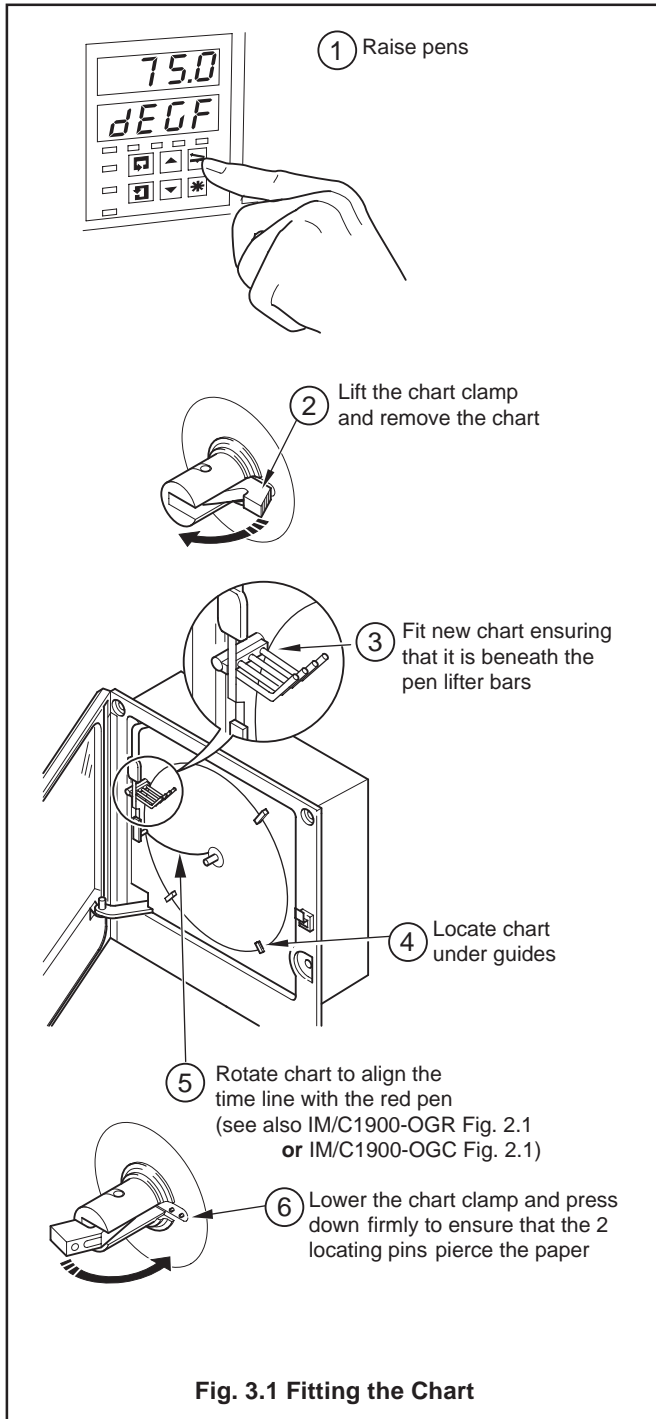


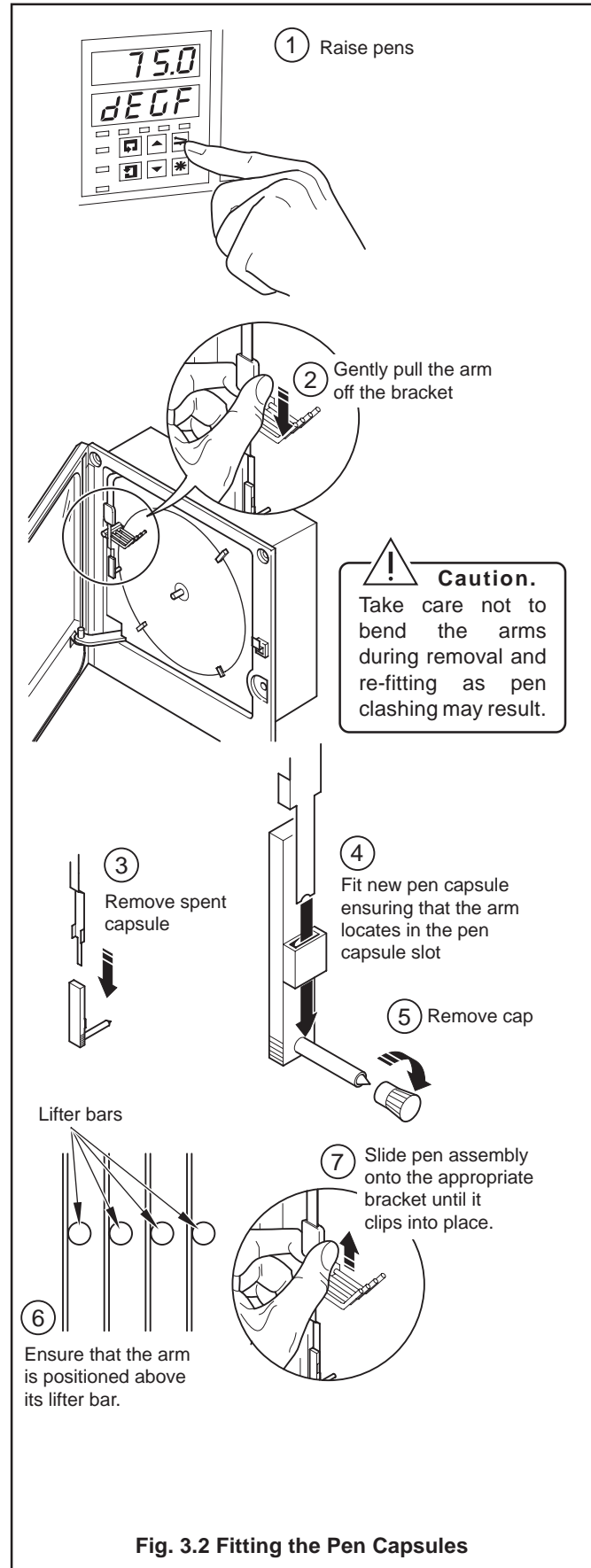
Fig. 2.3 Electrical Connections

### 3 SETTING UP

#### 3.1 Fitting the Chart – Fig. 3.1



#### 3.2 Fitting the Pen Capsule(s) – Fig. 3.2



## 4 ALARMS

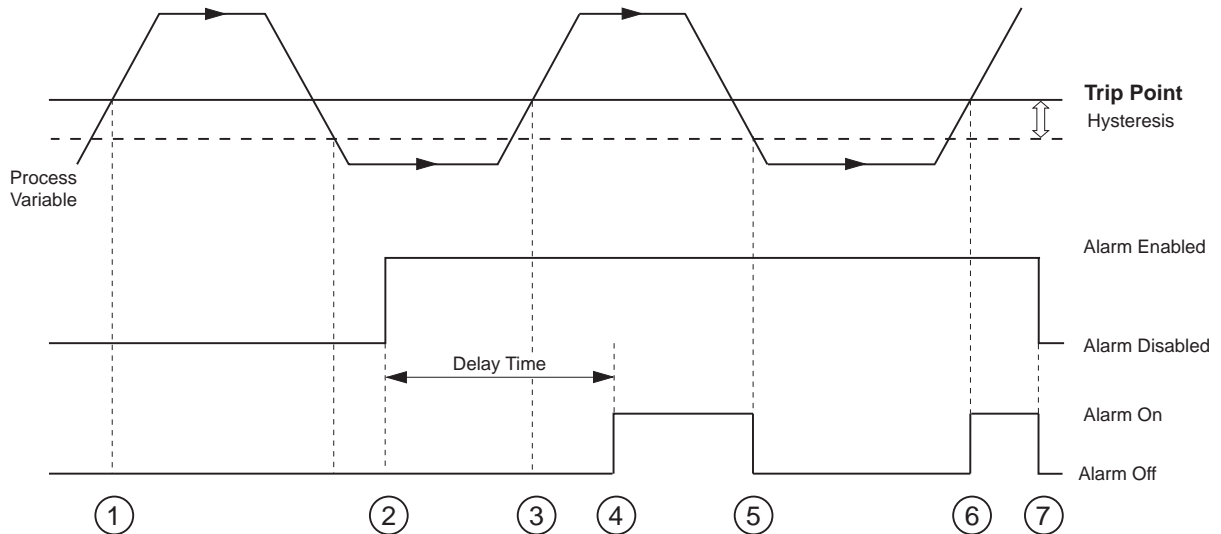


**Note.** Refer to Programming Guide (IM/C1900–PGR or IM/C1900–PGC) Section 3.4 for alarm configuration procedures.

### 4.1 Delayed High/Low Process Alarm – Fig. 4.1

The operation of a Delayed High/Low Process Alarm is identical to that of the Standard High/Low Process Alarm but the alarm can be enabled/disabled by use of a digital signal.

The alarm state is held off whilst the enable signal is off and continues to be held off for a pre-configured period of time after the enable signal is switched ON (irrespective of the process variable value). Once the pre-configured alarm delay time has expired, the alarm operates in the same manner as a standard high/low process alarm.



- ① Process variable goes above trip point but alarm is not activated because enable signal is low (Alarm Disable).
- ② Alarm Enable signal is switched ON by activation of milking system. Alarm delay timer started.
- ③ Process variable goes above trip point but alarm is not activated because alarm delay time has not expired.
- ④ Alarm delay timer expires, alarm is now enabled. Alarm is activated because process variable is above trip point.
- ⑤ Process variable goes below trip (hysteresis) point therefore alarm is de-activated.
- ⑥ Process variable goes above trip point, alarm is activated (alarm is enabled and delay time has expired).
- ⑦ Alarm Enable signal is switched OFF by activation of refrigeration system. Alarm is disabled immediately. Alarm de-activates.

**Fig. 4.1 Delayed High/Low Process Alarm**

---

## 5 CONFIGURATION

---

### 5.1 Default Configuration

#### Inputs

	Channel 1 (PV1)	Channel 2 (PV2)
Input Type	RTD	RTD
Linearizer Type	RTD	RTD
Linearizer Units	deg C	deg C
Engineering High	90.0	90.0
Engineering Low	-10.0	-10.0
Broken Sensor Protection Drive	Upscale	Upscale
Fault Detection Level	10%	10%
Filter	0 sec	0 sec

#### Pen Range

	Pen 1	Pen 2
Pen High	-10.0	-10.0
Pen Low	90.0	90.0

Pen range is reversed so that -10.0 is recorded at the outside of the chart and 90.0 is recorded at the centre of the chart.

#### Chart

Duration	48 hours
Chart Stop Source	None
Auto Drop	Yes
Pen Lift Enable	Enabled

#### Alarms

Acknowledgement Type	None
Global Ack. Source	None

	Alarm A1	Alarm B1	All Other Alarms
Alarm Type	Delayed High Process	Delayed High Process	Off
Trip Level	10.0	12.0	—
Hysteresis	0.5	0.5	—
Time Hysteresis	120 sec.	120 sec.	—
Alarm Delay	120 min.	20 min.	—
Enable Source	Digital Input 1.1	Digital Input 1.2	—

#### Relays

	Relay 1.1	Relay 2.1
Relay Source	Logic Equation 1	None
Relay Polarity	Positive	—

#### Digital Inputs

	Module Position 1	Module Position 2
Polarity	Negative	Positive

#### Logic Equations

Logic Equation 1	Alarm B1 <b>AND</b> Digital I/P 2.1 <b>OR</b> Alarm A1
All other logic equations	Off

# PRODUCTS & CUSTOMER SUPPORT

## Products

### Automation Systems

- *for the following industries:*
  - Chemical & Pharmaceutical
  - Food & Beverage
  - Manufacturing
  - Metals and Minerals
  - Oil, Gas & Petrochemical
  - Pulp and Paper

### Drives and Motors

- *AC and DC Drives, AC and DC Machines, AC motors to 1kV*
- *Drive systems*
- *Force Measurement*
- *Servo Drives*

### Controllers & Recorders

- *Single and Multi-loop Controllers*
- *Circular Chart, Strip Chart and Paperless Recorders*
- *Paperless Recorders*
- *Process Indicators*

### Flexible Automation

- *Industrial Robots and Robot Systems*

### Flow Measurement

- *Electromagnetic Magnetic Flowmeters*
- *Mass Flow Meters*
- *Turbine Flowmeters*
- *Wedge Flow Elements*

### Marine Systems & Turbochargers

- *Electrical Systems*
- *Marine Equipment*
- *Offshore Retrofit and Referredishment*

### Process Analytics

- *Process Gas Analysis*
- *Systems Integration*

### Transmitters

- *Pressure*
- *Temperature*
- *Level*
- *Interface Modules*

### Valves, Actuators and Positioners

- *Control Valves*
- *Actuators*
- *Positioners*

### Water, Gas & Industrial Analytics Instrumentation

- *pH, conductivity, and dissolved oxygen transmitters and sensors*
- *ammonia, nitrate, phosphate, silica, sodium, chloride, fluoride, dissolved oxygen and hydrazine analyzers.*
- *Zirconia oxygen analyzers, katharometers, hydrogen purity and purge-gas monitors, thermal conductivity.*

## Customer Support

We provide a comprehensive after sales service via a Worldwide Service Organization. Contact one of the following offices for details on your nearest Service and Repair Centre.

### United Kingdom

ABB Ltd.  
Tel: +44 (0)1480 475321  
Fax: +44 (0)1480 470787

### United States of America

ABB Inc.  
Tel: +1 215 674 6000  
Fax: +1 215 674 7183

#### Client Warranty

Prior to installation, the equipment referred to in this manual must be stored in a clean, dry environment, in accordance with the Company's published specification. Periodic checks must be made on the equipment's condition.

In the event of a failure under warranty, the following documentation must be provided as substantiation:

1. A listing evidencing process operation and alarm logs at time of failure.
2. Copies of operating and maintenance records relating to the alleged faulty unit.

---

ABB has Sales & Customer Support  
expertise in over 100 countries worldwide

[www.abb.com](http://www.abb.com)

The Company's policy is one of continuous product  
improvement and the right is reserved to modify the  
information contained herein without notice.

Printed in UK (03.02)

© ABB 2002



**ABB Ltd.**  
Howard Road, St. Neots  
Cambridgeshire, PE19 8EU  
UK  
Tel: +44 (0)1480 475 321  
Fax: +44 (0)1480 217 948

**ABB Inc.**  
125 E. County Line Road  
Warminster, PA 18974  
USA  
Tel: +1 215 674 6000  
Fax: +1 215 674 7183