CHAPTER 7

A1700
Programmable Polyphase Meter

Installation

The company’s policy is one of continuous product improvement and the right is reserved to modify the specification contained herein without notice.
Contents

1. SCOPE........................................................................................................................................ 3
2. FOREWORD.................................................................................................................................. 4
3. SAFETY ISSUES .......................................................................................................................... 5
4. CE MARK ..................................................................................................................................... 7
5. INSTALLATION ........................................................................................................................... 8
   5.1 RECEIVING THE EQUIPMENT ................................................................................................. 8
   5.2 HANDLING ............................................................................................................................... 8
   5.3 STORAGE ................................................................................................................................ 8
   5.4 INSTALLATION SITE ................................................................................................................ 8
   5.5 INSTALLING THE METER ........................................................................................................ 8
      5.5.1 Mechanical ......................................................................................................................... 8
      5.5.2 Electromagnetic Compatibility (EMC) .............................................................................. 9
6. TERMINAL ARRANGEMENTS ...................................................................................................... 9
7. COMMISSIONING ......................................................................................................................... 10
   7.1 INITIAL CHECKS .................................................................................................................... 10
   7.2 POWER ON .............................................................................................................................. 10
   7.3 SYSTEM TEST ....................................................................................................................... 10
8. FAULT FINDING GUIDE ............................................................................................................... 11
9. HAZARDOUS SUBSTANCES ...................................................................................................... 11
   9.1 BATTERY ............................................................................................................................... 11
   9.2 LIQUID CRYSTAL DISPLAY ................................................................................................. 11

FIGURES
FIGURE 1: TERMINAL ARRANGEMENTS ......................................................................................... 12
FIGURE 2 : RELAY CONTACT OUTPUT CIRCUIT ......................................................................... 13
FIGURE 3: OUTLINE DIAGRAM AND FIXING CENTRES (STANDARD TERMINAL COVER) ........... 14
FIGURE 3A: OUTLINE DIAGRAM AND FIXING CENTRES (SHORT TERMINAL COVERS) ........... 15
FIGURE 4: BEZEL AND BRACKET WITH CUT-OUT FOR FLUSH MOUNTED METERS ................. 16
FIGURE 5A: FAULT FINDING CHART ............................................................................................. 17
FIGURE 5B: 3 PHASE 4 WIRE CT OPERATED METERS ................................................................. 18
FIGURE 5C: 3 PHASE 3 WIRE CT OPERATED METERS ................................................................. 19
Installation Instructions

1 SCOPE

This Chapter covers the installation of all versions of A1700 meters. For information on installing modules, refer to Chapters M120 001 4 (Communications) and M120 001 5 (Input/output).

Before installing an A1700 meter, please read Section 2 (Health and Safety) and Section 3 (Warnings) of this Chapter.
FOREWORD

HEALTH AND SAFETY WARNING

Compliance with Instructions in this Manual
The instructions and information in this manual are provided in compliance with Section 6 of the UK Health and Safety at Work Act, as amended by Schedule 3 of the Consumer Protection Act 1987.

The purchaser is responsible for making sure that everyone, whether in his employment or not, who will be associated with the products supplied by Elster Metering Systems, and to which these instructions and information apply, are made familiar with the contents of this manual.

This applies to all persons who may be involved in activities such as unpacking, inspecting, testing, setting, cleaning, installing, commissioning, operating, maintaining, decommissioning or disposing of the products.

Safety of Persons using Electrical Products
Employers are reminded that they have a duty to ensure, as far as is reasonably practicable, the Health, Safety and Welfare at work of all their Employees. Employers must therefore ensure that employees are informed, trained and supervised and use proper working procedures to ensure the safety of themselves and others. The information provided in this manual is intended to ensure that products are properly installed and otherwise handled in order to maintain them in a safe condition.

In the UK, employers have duties under the Health and Safety at Work Act 1974 and the various regulations stemming therefrom.

In countries outside the UK, employers should ensure proper compliance with the Health and Safety Legislation which is applicable to them.

Putting into Service
Products supplied by Elster Metering Systems have been designed and manufactured, in accordance with appropriate standards, to operate under specified conditions, when properly installed.

The purchaser or delegated contractor is responsible for the "Putting into Service" of any Elster Metering Systems products which have been supplied as "Non-connected". All related activities must therefore be carried out with due regard to any applicable legislation, standards and good practice.
3 SAFETY ISSUES

WARNINGS

Live parts
The A1700 meter is provided with a 'terminal cover plate' that should always be fitted on installation. The terminal cover plate provides protection for the main terminals whilst, for example, modules are being installed. Only if the terminal cover plate is in place should any attempt be made to remove the meter terminal cover unless all supplies have been isolated. Failure to follow this instruction may result in electrical shock.

Live parts will be exposed when the terminal cover plate or the main cover is removed.

Removal of the main cover invalidates the certification of certified meters.

Direct connected meters have electrical connections between the measured voltage terminals and measured current terminals.

CT connected meters have electrical connections between the measured voltage terminals.

Warning Labels
One warning label is fixed to the meter, on the top of the terminal cover plate. The label contains an exclamation mark in a black triangle, to indicate that reference should be made to the manual.

The label also contains the words "live parts exposed when this cover is removed".

Battery Warning
The meter contains a Lithium manganese dioxide battery. This battery is completely safe under normal conditions. However, it must never be recharged, disassembled, heated above 100°C, incinerated, or have the contents exposed to water.

Fire, explosion or severe burns may result if these instructions are disregarded.

In the interests of safety, environmental protection and possible legislation, Lithium batteries require careful disposal.

Before arranging for the disposal of these cells, users should satisfy themselves that the proposed means of disposal is both safe and compliant with local legislation requirements.

Elster Metering Systems would like to draw the user's attention to the International Standard for Lithium Batteries - IEC 60084-4. - which gives further information about the handling, storage, transport and disposal of lithium cells.

Elster Metering Systems should be contacted by the user should difficulties arise in arranging proper disposal. They will, if practical, help the user identify safe disposal means.

Liquid Crystal Display
Liquid crystals are toxic. If a display is damaged, avoid contact with the liquid. If the liquid makes contact with the skin it must be washed off immediately with water. Seek medical advice.
WARNINGS

Modules

Only modules of the appropriate type and supplied by Elster Metering Systems should be inserted into the two A1700 meter module apertures. Inappropriate use of these apertures could result in contact with hazardous voltage. See Chapters M120 001 4 and M120 001 5.

Operation on Different Power Systems

The A1700 allows for 3 manufacturing configurations for use on the following power systems:

<table>
<thead>
<tr>
<th>Configuration 1 - 3 elements</th>
<th>Configuration 2 - 3 elements</th>
<th>Configuration - 2 elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>3ph 4w</td>
<td>3ph 4w</td>
<td>3ph 3w</td>
</tr>
<tr>
<td>2ph of 3ph 4w (Note 1)</td>
<td>3ph 3w (Note 1)</td>
<td></td>
</tr>
<tr>
<td>2ph 3w (Note 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1ph 3w (Note 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1ph 2w (Note 1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The pulse value of the test indicator is that marked on the nameplate regardless of the power system to which the meter is connected. This means that the pulse rate of the test indicator at Imax will be less for systems not using all elements.

UNUSED TERMINALS

Note 1 (see configuration table above).

Meters installed with these configurations will have unused main terminals. To avoid accidental or fraudulent contact with these unused terminals, it is strongly recommended that either:

1. Full terminal covers without cut-out's are used
2. If terminal covers with cut-out's or short terminal covers are used, then suitable insulated blanking plugs are fitted into used terminals
4 CE Mark

A1700 meters and their internal modules delivered to customers for use in European Economic Area (EU & EFTA) countries are CE marked to indicate compliance with the requirements of the Electromagnetic Compatibility Directive.

This compliance has been demonstrated by subjecting representative samples of the product, installed in accordance with the instructions and guidelines given in this document, to the tests prescribed in the following standards:


- **EN50082-1 : 1992**, *Electromagnetic compatibility generic immunity standard - part 1 : Residential, Commercial and Light Industry.*

- **EN60687 : 1996**, *Alternating current static watt-hour meters for active energy – (class 0.2s and 0.5s).*

- **EN 61036 : 1996**, *Alternating current static watt-hour meters for active energy (class 1 and 2).*

- **EN 61268 :1996**, *Alternating current static var-hour meters for reactive energy (class 2 and 3).*

The user can therefore be confident that, provided the guidelines and instructions are properly followed, all units installed will satisfy the requirements for residential, commercial and light industrial premises.

Elster Metering Systems holds on record the appropriate Declaration of Conformity, and supporting documentation, against which the CE mark is affixed.
5 INSTALLATION

5.1 Receiving the Equipment

Remove the equipment from its container and inspect for damage.

If damage has been sustained in transit a claim should be made immediately to the transport company and a report sent to the Elster Metering Systems or their branch office or agent.

5.2 Handling

In its container the equipment is very robust and no special handling precautions are required. Some care should be taken when the equipment is unpacked to avoid marking or scratching it.

5.3 Storage

If the equipment is not required for a prolonged period, the meter should be returned to the packing case and wrapped and stored in a dry place.

5.4 Installation Site

The site should be free from excessive vibration and preferably have a clean, dry atmosphere.

For optimum viewing of the display the meter should be mounted at eye level and within ±30° of the vertical.

Avoid mounting the meter in direct sunlight.

Note that the meter is constructed to BS EN 61010-1 Safety Class II (All Insulated) and that no Safety Earth is required.

5.5 Installing the Meter

5.5.1 Mechanical

1. The meter must be securely fixed to the wall using all three fixing positions. (see Figure 3). The top fixing can be used in three positions

2. The current terminals will accept a cable size of 35 sq. mm maximum. The screws are M6 pinch screws and should be tightened to a torque of 2.2 N m (minimum), 3 N m (maximum)

3. The voltage terminals (for VT connected meters) will accept a cable size of 5 sq. mm maximum. The screws are M3 pinch screws, which should not be tightened more than 0.45 N m

4. The auxiliary terminals will accept a cable size of 1.5 sq. mm maximum. The screws are M2.5 pinch screws, which should not be tightened more than 0.34 N m. In order not to stress the retainer inside the terminal the cable size must not be less than 0.4 sq. mm minimum. Single strand wire is recommended but if multi strand wire is used, it must not be folded prior to insertion into the terminal

5. An appropriate fuse must protect any auxiliary output circuits that are connected to an a.c. supply

6. For direct connected meters, ensure that the voltage connection links are correctly positioned

7. Check that all screws are tight

8. Fit the terminal cover plate and terminal cover, See Figure 3 (standard terminal cover), Figure 3A (short terminal cover and DIN standard accessories terminal cover)

9. Figure 4 illustrates the method of flush mounting an A1700 meter on a switchboard or meter panel, using an additional bezel and bracket
5.5.2 Electromagnetic Compatibility (EMC)

The A1700 meter has been designed and tested for compliance with the EMC Directive.

It is, however, the responsibility of the installer for ensuring that a system conforms to the Directive.

In order to assist the installer the following guidelines are given: -

1. Keep a.c. circuits and d.c. circuits separated by a minimum of 50mm where possible
2. Where a.c. and d.c. circuits must cross, do so at right angles to each other
3. The cables for each circuits must be bunched together to minimise the loop area enclosed
4. The cables for the relay outputs and auxiliary inputs must use a twisted pair
5. Where the environment is electrically hostile screened, twisted pair cable may be required. The screen must be connected to earth at one point only
6. Ancillary equipment must also be CE marked
7. If interposing relays are used (a.c. or d.c.) then these must be correctly and adequately suppressed

**WARNINGS**

Cables for the auxiliary terminals should be routed straight down or routed outside the case, using the two knock-outs in the terminal cover. They should not cross the centre line.

Cables at potential greater than 40V should remain segregated from those at lower voltages.

The Installer is responsible for ensuring that all connected cables are adequately rated for the application and all voltage and signal circuits are adequately protected by fuses.

It is recommended that direct connected meters are protected by fuses equal to the meter rating i.e. 100A fuse for a 100A meter. Failure to do so may result in damage or fire.

6 TERMINAL ARRANGEMENTS

Figure 1 shows the general terminal arrangements of the meter.

The terminal functions are as follows: -

a. Terminal 1, 2 & 3  
   Phase A
b. Terminal 4, 5 & 6  
   Phase B
c. Terminal 7, 8 & 9  
   Phase C
d. Terminal 10 &11  
   Neutral

NOTE 1: These are the phase current and voltage terminals.

NOTE 2: Meter connections must always be made as detailed on the diagram supplied with the meter.
7 COMMISSIONING

7.1 Initial Checks
Check that the supply rating on the nameplate and the meter configuration agree with the system supply being used.
Check that the connections shown on the connection diagram agree with terminal block arrangement.
Check that the wiring connections are correct and that there is no danger of the low voltage signal circuit coming into contact with high voltages.

7.2 Power on

WARNINGS
Live terminals will be exposed if the terminal cover and terminal cover plate are removed.
The circuit board under the main cover may be at line potential. Contact with this circuit board may result in electrical shock.

Observe all Safety issues in Section 3.
Check that the terminal cover plate and terminal cover are fitted.
Switch on the a.c. supply.

7.3 System Test
The liquid crystal display on the meter should immediately show data. The meter may then start to autocycle through any register data programmed for the autocycle mode.
Two indicators, in the form of pulsing LED’s are provided. The right indicator monitors real energy and left indicator monitors reactive energy.
The LED's will be continually 'ON' if the connected active/reactive load is below the anti-creep threshold, but will pulse at a rate proportional to load if above that level.
8 FAULT FINDING GUIDE

Because of the integrated nature of the design of the A1700 meter, it is not possible to fault find without specialised equipment.

It is therefore recommended that fault finding is limited to deciding whether the fault is inside or outside the meter. If the meter is not functioning correctly, the fault finding guide in Figure 4 should be followed.

If the meter is not registering correctly, the fault finding guide in Figure 4a or 4b should be followed.

Faulty meters should be returned to Elster Metering Systems for examination and repair.

9 HAZARDOUS SUBSTANCES

9.1 Battery

If the main cover is removed from the meter then a Lithium manganese dioxide battery will be exposed.

This battery is completely safe under normal conditions. However, it must never be recharged except in accordance with Manufactures instructions, disassembled, heated above 100°C, incinerated, nor have the contents exposed to water.

Fire, explosion or severe burns may result if these instructions are disregarded.

In the interests of safety, environmental protection and possible legislation, Lithium batteries require careful disposal.

Before arranging for the disposal of these cells, users should satisfy themselves that the proposed means of disposal is both safe and compliant with local legislation requirements.

Elster Metering Systems would like to draw the user's attention to the International Standard for Lithium Batteries - IEC 60084-4. - which gives further information about the handling, storage, transport and disposal of lithium cells.

The user should contact Elster Metering Systems should difficulties arise in arranging proper disposal. They will, if practical, help the user identify safe disposal means.

9.2 Liquid Crystal Display

Liquid crystals are toxic. If a display is damaged, avoid contact with the liquid.

If the liquid makes contact with the skin it must be washed off immediately with water.
Terminal 1, 2 & 3  Phase A
Terminal 4, 5 & 6  Phase B
Terminal 7, 8 & 9  Phase C
Terminal 10 & 11 Neutral

Figure 1: Terminal Arrangements
Terminal Pair

<table>
<thead>
<tr>
<th>Relay</th>
<th>a (Com)</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay 1</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>Relay 2</td>
<td>21</td>
<td>20</td>
</tr>
<tr>
<td>Relay 3</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Relay 4</td>
<td>21</td>
<td>22</td>
</tr>
</tbody>
</table>

**Figure 2:** Relay Contact Output Circuit
Figure 3: Outline Diagram and Fixing Centres (Standard Terminal Cover)
Short Terminal Cover

Short Terminal Cover for DIN Standard Accessories

Figure 3a: Outline Diagram and Fixing Centres (Short Terminal Covers)
Figure 4: Bezel and Bracket with Cut-out for Flush Mounted Meters

Note: Countersink holes to suit screws
Check metering load greater than the anti-creep threshold

For meter models with relays fitted. Ensure meter is mounted upright

Figure 5a: Fault Finding Chart
3 Phase, 4 Wire CT Operated kWh Meters
Fault Finding Chart

Table 1

<table>
<thead>
<tr>
<th>Voltage Connection</th>
<th>Current Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>A B C</td>
<td>A C B</td>
</tr>
<tr>
<td>A B C</td>
<td>B A C</td>
</tr>
<tr>
<td>A B C</td>
<td>C B A</td>
</tr>
<tr>
<td>A C B</td>
<td>A B C</td>
</tr>
<tr>
<td>B A C</td>
<td>A B C</td>
</tr>
<tr>
<td>C B A</td>
<td>A B C</td>
</tr>
</tbody>
</table>

Table 2

<table>
<thead>
<tr>
<th>Voltage Connection</th>
<th>Current Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>A B C</td>
<td>B C A</td>
</tr>
<tr>
<td>A B C</td>
<td>C A B</td>
</tr>
<tr>
<td>B C A</td>
<td>A B C</td>
</tr>
<tr>
<td>C A B</td>
<td>A B C</td>
</tr>
</tbody>
</table>

- Represents Wrong Connection
- Standard Connections
  - Voltage: A B C
  - Current: A B C

Figure 5b: 3 Phase 4 Wire CT Operated Meters
3 Phase, 3 Wire CT Operated kWh Meters Fault Finding Chart

LED Not Pulsing
- No Current Applied to Meter
- Any of the Two Phases of Voltage or Current are Interchanged or Reversed

LED Pulses at \( \frac{1}{2} \) Rate
- B Phase Connection Loose or Missing

Meter Registers Reverse Energy
- Both the CT Connections are Reversed

Register Reading is Low
- Check Meter Voltage Fuses
- Check Programming of Register Cat.
  VT Ratio
  CT Ratio
  CT Error

<table>
<thead>
<tr>
<th>Voltage Connection</th>
<th>Current Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>A B C</td>
<td>C A</td>
</tr>
<tr>
<td>A B C</td>
<td>A C</td>
</tr>
<tr>
<td>A B C</td>
<td>A C</td>
</tr>
<tr>
<td>A C B</td>
<td>A C</td>
</tr>
<tr>
<td>B A C</td>
<td>A C</td>
</tr>
<tr>
<td>C B A</td>
<td>A C</td>
</tr>
</tbody>
</table>

- Represents Wrong Connection
- Represents Reversed Connection

Figure 5c: 3 Phase 3 Wire CT Operated Meters