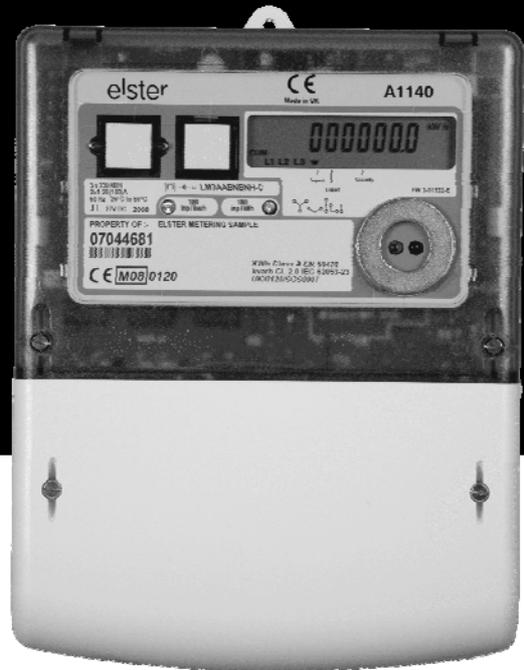# A1120/40 Programmable Electronic Polyphase Meter

Users Manual

Options

- CT or Direct Connected
- Serial Communications
- Load Profiling
- Read Without Power
- SO Pulse Output
- English or OBIS Display Descriptors

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Leading the World
in Metering Technology

A1120/40 Programmable Electronic Polyphase Meter

Chapter 1 - Introduction

Minor Change Record

Date	Modification
7.5.2009	Format change

Introduction

Structure of the Manual

The A1120/40 meter Users Manual consists of a number of Chapters containing information on Meter Hardware, Communications and Software Support. Each Chapter is self contained so that for specific information, only that part of the manual needs to be referred to. Each Chapter can therefore be distributed as a document in its own right.

Manual Numbering System

The manual numbering system is defined as follows:

M181 - (A1120/40) 001 - (Manual variation) - 1 (Chapter number) - A (Issue)

Sections and their Contents

The contents of the manual are divided into the following Chapters:

Chapter 1 - Introduction   (M181 001 1)

Chapter 1 contains a general description of the manual itself.

Chapter 2 - Operating & Maintenance Instructions   (M181 001 2)

Chapter 2 contains general information on the A1120/40 meter including configuration and installation.

Chapter 3 - Software Support   (M181 001 3)

This Chapter contains full documentation for Power Master Unit Software Support.
This includes Reading, Programming and Configuring the A1120/40 meter.

Chapter 4 - Communications (M181 001 4)

Operating and Installation Instructions for all types of communications including, RS232, RS485 and GSM modems. General information and configuration data for setting up ASL, GSM modems are also included.

A1120/40 Programmable Polyphase Meter

Chapter 2 - Operating & Maintenance Instructions

1   FOREWORD

⚠ **HEALTH AND SAFETY**

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 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 that 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 that 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.

2   WARNINGS

⚠ **WARNINGS**

Internal Electronic Circuits

Parts of the internal electronic circuits of these meters are, due to technical necessity, connected to PHASE VOLTAGES.

Dangerous voltages are present

A Terminal Cover Plate must always be fitted to the A1120/40 meter to protect the main meter terminals. If the Terminal Cover Plate is **not** fitted to the A1120/40 meter, all supplies to the meter **must** be isolated before a module, module peripheral equipment or external battery module is installed or removed.

Failure to do so may result in electric shock.

Caution

Installation of a faulty module or module peripheral equipment may affect the main meter functionality.

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

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.

Batteries

The meter contains an internal Lithium manganese dioxide primary cell. 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.

An optional External Battery Module supports the display and optical communications during power outages. A non-rechargeable "alkaline" (alkaline zinc manganese dioxide) PP3 (IEC 6LR61) battery is used.

This battery is completely safe under normal conditions. It must not be recharged, disassembled, short-circuited, overheated or incinerated. It contains corrosive materials.

Used batteries should be disposed of in compliance with local legislation requirements.

3 COMPLIANCE WITH STANDARDS AND EUROPEAN DIRECTIVES

Meters are marked with the European CE mark, in accordance with the Marking Directive 93/68/EEC, to indicate compliance with the requirements of the EMC Directive 89/336/EEC.

Safety requirements for meters are addressed in specific metering standards outlined below.

The CE Mark does not denote compliance with the European Low Voltage Directive 73/23/EEC, which specifically excludes electricity meters.

The A1120/40 meter measures active energy, according to the requirements of - EN 62053-21/22:2003 for indoor kWh meters of Protective Class II and Accuracy Class 0.5s, 1 or 2 (MID) - Annex MI-003, kWh Class A, B or C.

The meter measures reactive energy in accordance with EN 62053-23:2003, Class 2 or Class 3.

Meters displaying OBIS Identification Codes meet the requirements of IEC 62056-61.

The degree of ingress protection is to IP53, IEC 60529:1989.

The meter complies with DIN 43857 Part 2 and Part 4 - dimensional requirements (except for the top fixing centres).

The meter complies with the essential requirements of the EC Directive 2004/22/EC on Measuring Instruments (MID).

The meter complies with the general requirements and particular requirements of EN 50470 Parts 1 & 3, and complies with Class M2 Mechanical environment and Class E2 Electromagnetic Environment.

Devices for metering and billing electrical energy described in this manual are supplied for use in a 'Fixed Installation' only. Devices described are a 'component of a system only' and therefore outside the scope of European Directives 2002/95/EC RoHS (Restriction of the Use of Certain Hazardous Substances in Electrical Equipment) and 2002/96/EC WEEE (Waste Electrical and Electronic Equipment).

4 APPROVALS

kWh/kvarh energy meters are approved by the Office of Gas and Electricity Markets (OFGEM) in compliance with European and British metering legislation.

5   INTRODUCTION

The A1120/40 has been designed to meet the changing needs of the Electricity Supply Industry.

The meter offers a 'modular' solution for remote communications, allowing the meter to be integrated into an AMR system at any time. Flexibility in communications provides the Utility with the means to employ the most cost effective communications method. The RJ11 connector provides power for a modem removing any requirement for external connections.
The modem fits neatly under the terminal cover providing a high degree of protection against fraud or tampering.

Communications are provided via the optical (IEC 62056-21) port and are supported by data stream mode, allowing fast reading of meter data. The A1140 permits up to 90 days of load profile data to be collected in less than 30 seconds. The RJ11 socket provides optional RS232 communications allowing remote access to the same data as the optical port. This port can be multi-dropped, allowing access to up to 10 meters in a single installation. A further option allows a pulsed output to be transmitted via the meter's auxiliary terminals.

The meter is available in a number of variants that measure combinations of active energy, four quadrant reactive energy and kVAh. Two customer defined registers can be used to summate energy from any like unit registers. Instrumentation quantities to aid installation can be included in the display sequence.

Firmware Version C allows 12 External Registers to display data from an external source such as a gas or water meter. The registers are written to by an intelligent source via the RS232 port.

The meter offers extensive security data which includes a programming log with user ID.
Further security can be provided as an option with terminal cover and main cover removal detection. As an alternative option, the latter detection switch can instead be used to allow the CT ratio to be changed.

The Liquid Crystal Display (9.8mm) has large characters that can be viewed from a wide angle. The display sequence is programmable and can be auto-cycle, step or utility. Displayed information can have English language identifiers or OBIS (Object Identification System) codes. The OBIS codes can be changed via the Power Master Unit.

Power Master Unit software provides a user-friendly Windows^{TM} graphical interface for programming the meter and reading meter data.

The meters are approved to:

EN 62053-21/22 for kWh accuracy - Class 0.5s, 1 or 2
EC Directive 2004/22/EC (MID) - Class A, B or C
EN 62053-23 for kvarh accuracy - Class 2 or Class 3

The meter has an ingress protection rating of IP53 to IEC 60529:1989.

The following main variants of the meter (configured at manufacture) are available:

Import kWh

Import kWh, Q1 and Q4 kvarh

Import kWh, Q1, Q2, Q3, Q4 kvarh, kVAh 1

Import/Export kWh

Import/Export kWh, Q1, Q2, Q3, Q4 kvarh

Import/Export kWh, kVAh 1-2

Import/Export kWh, Q1, Q2, Q3, Q4 kvarh, kVAh 1-2

The main available manufacturing options of the meter are tabulated below:

	A1120	A1140
Pulse Output	Optional	Optional
Load Profile	Not available	Standard
RS232 Port	Optional	Optional
Accuracy EN 62053 - 21/22(kWh) 2004/22/EC (MID)	Class 0.5s, 1 or 2 Class A, B or C	Class 0.5s, 1 or 2 Class A, B or C

Features

- Accuracy   kWh Class 0.5s, 1 or 2 (EN 62053 -21/22)
                       kWh Class A, B or C (EC Directive 2004/22/EC [MID])
                       kvarh Class 2 or Class 3
- Comprehensive tariff structure
- Twelve external registers (Firmware Version C only)
- Large digit (9.8 mm register digits) Liquid Crystal Display
- IEC 62056-21 (formerly IEC 61107) optical communications port
- Internal clock and calendar with battery back-up
- 15 years product life
- Comprehensive security data
- Display of external register information
- Compact design
- DIN (BS) double insulated, glass filled polycarbonate case
- IP53 in accordance with IEC 60529 : 1989

Options

- RS 232 serial communications
- Load profiling (A1140)
- Module/battery carrier
- SO (EN 62053-31) or relay pulsed output
- Terminal cover removal detection switch
- Main cover removal detection or CT ratio programming switch
- Terminal cover with cut-out
- Read without power option (battery support)
- Optional (Extended) terminal cover and main cover with voltage disconnect protection (See Figure 5)

Tariff Structure

- 8 time-of-use (TOU) registers
- 4 maximum demand registers
- 48 switching times
- 12 seasons
- 24 change of season dates
- 32 exclusion dates
- 13 end of billing date

Independent day control
Daylight saving
Deferred tariff
Tariff scheme CRC

6   GENERAL DESCRIPTION

6.1   Basic Meter Types

LM… DIN/BS Termination

6.2   Current and Voltage Ratings

Unless otherwise indicated on the nameplate, the following meter ratings are available:

Voltage	Current	Frequency
3 Element Meters	20 - 100A (Direct connected)	50 or 60Hz
*220 - 240V L-N	10 - 100A (Direct connected)	
105 - 127V L-N	5 - 100A (Direct connected)	
2 Element Meters	1 - 2A (CT operated)	
220 - 240V L-L	*5 - 10A (CT operated)	
105 - 127V L-L	1 - 10A (CT operated)	

* Ratings available for Class 0.5s, CT operated variant

Note - 105 - 127V meters and 60Hz meters are not OFGEM or MID approved.

6.3   System Connections

Meters can be supplied for direct connected or CT, 3 element (3 phase, 4 wire) or 2 element (3 phase 3 wire) applications and have the following connection capability:

Number of Elements	Connection capability
3	* 3 phase, 4 wire
	2 phases of 3 phase, 4 wire
	2 phase, 3 wire
	1 phase, 3 wire
	1 phase, 2 wire
2	* 3 phase, 3 wire

* Connections available for Class 0.5s, CT operated variant

6.4   Terminal Arrangements

Current Terminals	8.2mm diameter bore, 2 x M6 Combi pinch screws
	9.0mm diameter bore, 2 x M6 Combi pinch screws
	9.5mm diameter bore, 2 x M6 Combi pinch screws
Auxiliary Terminals	3.2mm diameter bore, M3 Combi pinch screws

Meter nameplates (see Figure 3 for example) are marked with the rated current, reference voltage, frequency and the relevant meter constant (pulses/kWh, pulses/kvarh).

Connection diagrams (See Figure 5A for examples) are shown underneath the terminal cover.

A Terminal Cover Plate must be fitted to protect the meter Main Terminals.

6.5 Meter Accuracy

The A1120/40 meter measures active energy, in accordance with the requirements of -
EN 62053-21/22 for indoor kWh meters of protective Class II and accuracy Class 0.5s, 1 or 2,
EC Directive 2004/22/EC (MID) - Class A, B or C

The design of the meter ensures life long stability. There are no on-site adjustments.

The meter measures reactive energy in accordance of the requirements of EN 62053-23 for kvarh
meters for reactive energy Class 2 or Class 3.

Typical accuracy curves are shown in Figure 4.

6.6 Meter Case

The case is double insulated to protective Class II.

The case provides an ingress protection rating of IP53 in accordance with IEC 60529:1989.

The base is light beige coloured polycarbonate.

A separate phenolic terminal block conforms to DIN 43857 Part 2 and 4.

The extended terminal cover is moulded in light beige coloured polycarbonate.
An option with a cut-out is available.

The main cover is moulded in tinted, clear polycarbonate.

Figure 6 illustrates the outline and fixing dimensions.

The main cover is secured by two sealable screws. Two separate sealable screws secure the terminal
cover.

The terminal cover plate protects the meter main terminals.

An optional main cover prevents access to the voltage disconnect links (See Figure 5)

A holder for a module/battery that attaches to the base under the terminal cover is available as an
option.

7 OVER VOLTAGE OPERATION

The meter has been designed to withstand a phase - neutral voltage of $\sqrt{3}$ x 1.1 Uref (i.e. 440V
for 230V meters) for an indefinite period. When tested over a 12 hour duration the change in
meter error was less than 0.4%.

8 IMPORT ACTIVE REGISTRATION

Import Active registration can be configured at manufacture to one of the following:

Import Active Units Only – Import Active Units measures the sum of all phases, when the total
system flow is positive.

Positive (kWh [L_1] + kWh [L_2] + kWh [L_3])

Power Flow Insensitive Mode - Power Flow Insensitive Mode allows the meter to increment its
main kWh register regardless of whether the system energy flow is import or export.

$\left| (kWh [L_1] + kWh [L_2] + kWh [L_3]) \right|$

The Reverse Energy Event Alarm, Reverse Energy Count and Reverse kWh Register respond only to reverse power flow and continue to function as in normal operation.

Theft Resistant Measurement - Theft Resistant Measurement mode measures the sum of the modulus of each phase ($|$ kWh [L_1]$|$ + $|$ kWh [L_2]$|$ + $|$ kWh [L_3]$|$)

The Reverse Energy Event Alarm, Reverse Energy Count and Reverse kWh Register respond only to reverse power flow and continue to function as in normal operation.

Note 1: Power Flow Insensitive Mode and Theft Resistant Measurement may not be allowed in certain countries due to local regulations.

Note 2: Theft resistant measurement is not appropriate for meters connected to 3 phase 3 wire systems.

9   TEST INDICATORS & ANTI-CREEP

Test Indicators

Two red test output LEDs (for kWh and kvarh) are provided which pulse in accordance to the following configurations:

Import only meter - The LED pulses for forward system energy only

Import meter with Power Flow Insensitive enabled - The LED pulses for forward and reverse system energy

Import meter with Theft Resistant measurement enabled – The pulsing LED reflects theft resistant measurement.

Import/export meter - The LED pulses for import and export energy

See Section 25 (Technical Data) for LED specification.

Anti-creep

The Wh and varh anti-creep threshold is set at manufacture to a value appropriate to the meter rating and accuracy class. For a 4 wire meter connected with less than 3 elements energised, the value adjusts to maintain an appropriate current threshold level. Each Test Indicator LED is continuously illuminated when the meter's anti-creep lock is operating for kWh and kvarh respectively.

10   FEATURES OF THE A1120/40 METER

The meter contains numerous features, combinations of which can be selected to provide the required metering function. Main variants are selected at manufacture (See Section 5). Programmable features are selected using Power Master Unit Software that runs on an IBM or compatible PC.

This software is available from Elster Metering Systems and is described in M181 001 3.

Note: The features available will depend on the meter variant (See Section 5).

10.1   Registration of Quantities

10.1.1   kWh

kWh total import (active energy)

kWh total export (active energy)

Total import and total export quantities are registered separately. The measurement discrimination is such that, as the power factor of any load from 0.05Ib to Imax is varied over 360°, the import and export registers will never advance together. The resolution of registration is 1mWh.
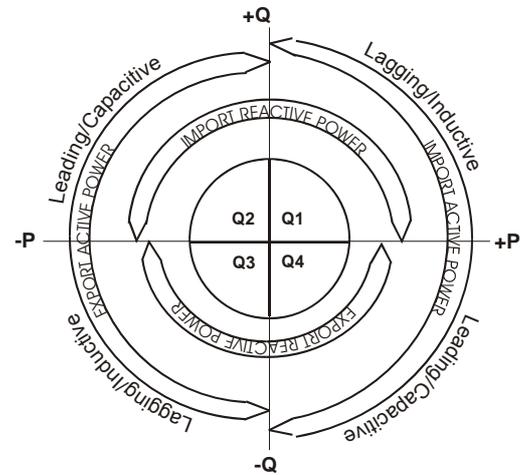
10.1.2   kvarh

Q1   kvarh Inductive Import

Q2   kvarh Capacitive Import

Q3   kvarh Inductive Export

Q4   kvarh Capacitive Export

All four quadrants are registered separately. The resolution of registration is 1mvarh.

kvarh is derived using the phase shift method.

Note: The diagram shows a representation of the quadrants. The active quadrant can be shown on the display.

10.1.3   kVAh

kVAh is derived from the measured kWh and kvarh values

The calculation uses the formula: $kVAh = \sqrt{[kWh]^2 + [kvarh]^2}$

There are two kVAh registers. These can each be configured to accept pulses from any combination of quadrants e.g.

	Q1	Q2	Q3	Q4	
kWh	*			*	kVAh - to match 2 electromechanical meters
kvarh	*	*			

Note: Real and reactive energy for each phase is respectively summated prior to kVAh calculation.

10.1.4   Customer Defined Registers

Two **C**ustomer **D**efined (CD) Registers are provided. These are cumulative registers which can be used throughout the tariff scheme and load profile data and are programmable to accept consumption from any two of the following like-unit registers:

kWh import

kWh export

Q1 kvarh

Q2 kvarh

Q3 kvarh

Q4 kvarh

kVAh 1

kVAh 2

Examples of their use are:

CD Register 1 | Total kWh | kWh import + kWh export = Total kWh

CD Register 2 | Total Import kvarh | Q1 + Q2 = Total Import kvarh

The contents of the Customer Defined Registers can be viewed on the display.

11   TARIFF STRUCTURE

The tariff structure repeats year on year and comprises the following features:

```
 8 Time-of-use (TOU) registers
 4 Maximum demand registers
48 Switching times
12 Seasons
24 Change of season dates
32 Exclusion dates
13 End of billing dates
```

```
Daylight savings
Independent day control
Deferred tariff
Tariff scheme CRC
```

At least one Season must be programmed into the meter for TOU registers to be available.

11.1   Time-of-use Registers

A total of 8 Time-of-use (TOU) registers are provided. Each TOU register has a single source that can be selected from one of the following:

Import kWh

Export kWh

Q1 kvarh

Q2 kvarh

Q3 kvarh

Q4 kvarh

kVAh 1

kVAh 2

Customer Defined Register 1

Customer Defined Register 2

Each TOU Register is independently time controlled so that registration can take place over a restricted time period.

The contents of each TOU Register can be viewed on the display along with the active rate(s).

11.2   Demand Registers

The A1120/40 provides the rising demand value associated with each of the 10 registered quantities specified in Section 11.1. The demand integration period can be 1, 2, 3, 4, 5, 6, 10, 15, 20, 30 or 60 minutes.

In A1140 meters the integration period used for the demand registers is the same as the load profile integration period.

During any period, the rising demand value is calculated by measuring the energy consumed to a point in a period, then scaling the measured value by a factor equal to the ratio of the demand period to a total hour interval.

$$\text{Rising Demand} = \text{Energy recorded in current period} \times \frac{60}{\text{minutes in demand period}}$$

The contents of each Rising Demand Register can be viewed on the display.

11.2.1   TOU Maximum Demand Registers

The meter has 4 maximum demand registers, each with an independent source selectable from one of the 10 rising demands.

The meter records the three highest maximum demand values (along with time and date stamp) that can be sampled on a continuous basis (24-hour period) or over a restricted time period.
At the end of each billing period, the greatest of the three demands is added to a corresponding cumulative maximum demand register.
The maximum demand registers are then set to zero.

11.3   Switching Times

Up to 48 switching times can be set, each allocated to a specified season.
Each switching event can be enabled for any combination of days of the week.
These are the transition times when one or more TOU registers become active or inactive.

Each switching time is defined in hours and minutes. A 24-hour clock is used.
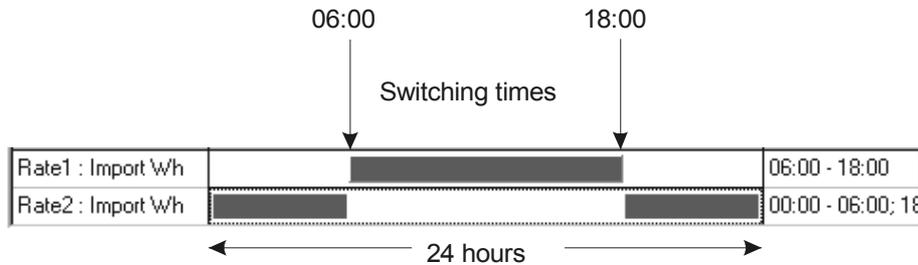
The above diagram shows the tariff for TOU1 and TOU2. TOU1 is active from 06:00 to 18:00. TOU2 is active from 18:00 to 06:00. It is possible for none or multiple TOU registers to be programmed to be active at any particular time period.

11.4   Seasons and Change of Season Dates

Up to 12 Seasons may be specified and at least one Season must be programmed for the TOU registers to be available. Each Season is activated by one or more Change of Season Dates.

Up to 24 Change of Season Dates are available, each date specifying the start of a new Season. These may refer to a different Season, or the same Season may be used more than once in a year.

The old Season ends at the instant the new Season starts.
A new Season starts at 00.00 of the specified day.
Start dates are specified as absolute (dd.mm) dates.

The diagram shows three Seasons. Season 1 is in operation from October to February, Season 2 from March to May and Season 3 from June to September.
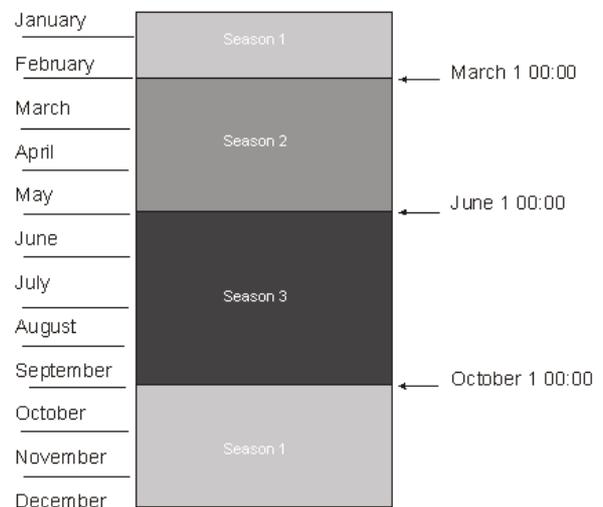
11.5   Exclusion Dates

There may be special days in the year when the tariff does not follow the normal pattern, e.g. public holidays. These can be taken care of by invoking Exclusion Dates.

Up to 32 Exclusion Dates can be programmed.

These dates will fall into one of three categories:

1 Dates which are fixed for every year e.g. December 25th - programmed by absolute dd.mm

2 Dates which fall on the same day of the month every year e.g. the first Monday in May

3 Dates which vary from year to year e.g. Easter Monday - defined using dd.mm.yy

For each Exclusion Date the meter may be programmed to:

- Use the switching times for a different weekday of the current season

- Use the switching times for the same weekday but a different season

- Use the switching times for a different weekday of a different season

11.6   End of Billing (EOB)

Time and Date Stamps for the last three EOB records

End of Billing Reset

Programmed EOB
Automatically on programmed dates (13) or every midnight when auto reset is enabled
At a change of season date (24)
When the deferred tariff becomes active
Daily reset

Instantaneous EOB
When the Billing Reset pushbutton is pressed
On command via the optical port
On command via the serial port (where fitted)
When a CT ratio programming event occurs
When the internal battery has failed at power up

When a snapshot of meter data is required to allow a bill to be prepared reflecting consumption to a specified date, the End of Billing feature should be used.

See Section 13.3 for a description of the data captured.

A programmed Automatic End of Billing occurs at midnight.

More than one End of Billing request may occur at the same time (for example, a deferred tariff introduced at the start of a new season), but only a single End of Billing event will take place. The cause of each of the End of Billing events is recorded but the End of Billing Counter is only incremented by one.

If an automatic End of Billing event should have occurred during a power down, then a billing event will take place immediately following the next power up. If several requests were missed then a single billing event is created, the cause reflecting all billing events that were missed.

If an End of Billing reset is required when the current tariff is manually overwritten by a new current tariff, it should be manually requested as part of the communications session.

Auto Reset initiates a Billing Reset every midnight. When Auto Reset is enabled there is an option to inhibit the reset of the Maximum Demand Registers.

A message that a Billing Reset has been initiated is displayed with a code showing the cause of the reset (See Figure 8, Display Table).

At each Billing Reset the oldest of the fifteen historical data records is overwritten. Time and date stamps, together with causes are stored for the last three End of Billing events.

End of Billing Lock-out

A further End of Billing can be inhibited via the Power Master Unit for either:

- Up to 255 minutes

- Until the next midnight boundary

Note: This only inhibits instantaneous end of billing requests, either via the pushbutton or communications setting, not programmed End of billing events.

11.7   Daylight Savings

The meter provides 2 Daylight Savings dates whereby the clock can be advanced by one or two hours at the start of the summer and can be retarded by one or two hours at the end of the summer.

The day on which a Daylight Saving occurs is programmable, with the choice of the first, second, third, fourth or last specified weekday in a specified month.

The algorithm used will identify the correct calendar dates for the next 50 years.

All of the following will reflect Daylight Savings:

Automatic End of Billing

Switching times within the tariff definition

Time and date stamps (For firmware Version C meters, daylight savings time and date stamps can be referenced to base time or daylight savings time)[7].

Optionally load profile (A1140 only)

11.8   Independent Day Control

The meter has the facility to have a different switching program consisting of several switching times running on different days of the week. An example of a switching program is below.

11.9   Deferred Tariff and Deferred Tariff Changeover Date

A second tariff can be programmed in the meter that will take effect from a programmed date.

An option to perform an End of Billing on the Deferred Tariff Changeover Date is available as part of the deferred tariff structure.

11.10   Tariff/Display Scheme Verification

The meter generates a checksum (CRC-16) of the tariff/display scheme currently residing in the meter. The checksum can be included as part of the display sequence, and also compared with a tariff checksum generated by the Power Master Unit. This allows quick verification, either locally or remotely, that the correct tariff/display scheme resides within the meter.

12   EXTERNAL REGISTERS (FIRMWARE VERSION C ONLY)

Firmware Version C of the A1120/40 has 12 External Registers that can be used to display data from an external source such as a gas or water meter. The registers are accessed via an intelligent source (such as a modem) and can be viewed on the A1120/40 meter display.

The registers are configured as three sets, External set 1, External set 2 and External set 3.

Each register set has four associated registers and has its own formatting options that can be configured using the Power Master Unit (Number of digits, Number of decimal places and display scale).

The Display shows Register 2 of External Set 1

Each register has 16 digits. The user is able to select English text or create an OBIS code for each of the twelve external registers.
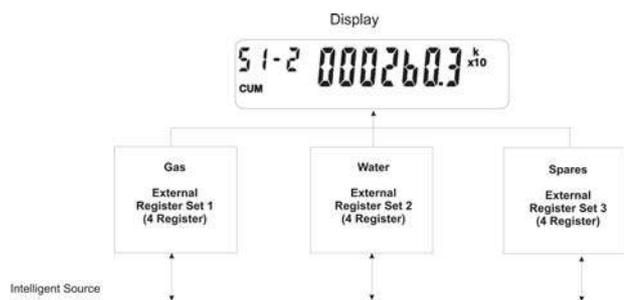
13   SECURITY FEATURES

Password Protection

The A1120/40 meter uses a Password as part of the security algorithm. The passwords must be entered in upper case. Password protection can be disabled at manufacture if required.
Four levels of access are available.

Entering the correct password for levels 0, 1, 2 and 3 allows the functions in Figure 9 to be performed, higher levels giving access to the lower levels. Passwords may also be set to defaults using the Power Master Unit.

It is important to note that the integrity of the A1120/40 meter passwords should always be protected. This can be achieved by ensuring the ability to change passwords is controlled and only made available to Administrative Personnel.
The level 3 password should be changed at regular intervals. It may be appropriate for no more than 100 meters to be protected by the same level 3 password.

Calibration values, zeroing of registers etc. are protected by a security link that is removed at the factory before the meter is sealed.

13.1   Data Retention

All cumulative register and time of use data is saved to non-volatile memory every time the power to the meter fails and also every 2 hours. The data is recovered when power is restored to the meter.

All data is retained for the nominal life of the meter.

13.2   Recordable Security Features

The following security features are available and can be included in the display sequence:

13.2.1   Phase Present/Phase Fail Indication

The meter detects and stores the number of phase fail events to a maximum of 65535.
The register will then roll over to 0. A time and date stamp of the three most recent events is recorded. The phase fail threshold can be set between 0 and 250 V.

Phase indication on the display (L1, L2, L3) has the following options:

Indicator 'on' when phase present

Indicator 'on' when phase failed

Where a meter is to be used on a supply with less than 4 wires, it is possible to disable the monitoring and display of phases L2 and L3.

13.2.2   Reverse Energy Flow

Reverse run event count

The meter detects and stores the number of reverse running events to a maximum of 65535. The register will then roll over to 0.

A time and date stamp of the three most recent events is recorded.

The count and time and date stamps can be included in the display sequence.
An event is detected if the meter runs in reverse for a period greater than 5 seconds.

Reverse energy reading

Irrespective of whether the meter is set to import only power flow insensitive mode, reverse kWh power flow will be independently recorded.

Theft Resistant Measurement

Theft Resistant Measurement mode measures the sum of the modulus of each phase

$(|\text{kWh [L}_1]| + |\text{kWh [L}_2]| + |\text{kWh [L}_3]|)$

The Reverse Energy Event Alarm, Reverse Energy Count and Reverse kWh Register respond only to reverse power flow and continue to function as in normal operation.

Reverse energy Alarm (Import only meter)

The reverse run indication, which responds to the total system power flow, can be inhibited if required.

Per Phase Reverse Run Indication

Any phase in reverse run can be indicated on the Liquid Crystal Display by flashing the L_1, L_2 or L_3 phase indicators.

13.2.3 Power Fail

A count of the cumulative number of power downs to a maximum of 65,535 is recorded.
The register will then roll over to 0.

A time and date stamp of the three most recent events is recorded. The count and time and date stamps can be included in the display sequence.

13.2.4 End of Billing Event

A count of the number of end of billing events to a maximum of 65,535 is recorded.
The register will then roll over to 0. Time and date stamps together with the source of the billing reset for the three most recent events is recorded. The count and time and date stamps can be included in the display sequence.
The message 'Reset' is displayed each time an End of Billing event takes place.

13.2.5 Programming Event Log

A count of the number of programming events to a maximum of 65,535 is recorded. A time and date stamp of the three most recent events together with the source (optical or RS232 data port) is recorded. The identity of the programming user is also stored. The count and time and date stamps can be included in the display sequence.

Note: Programming events are communications sessions where the meter configuration or data has been changed. Reading data only does not count as a programming event.

13.2.6   CT Ratio Programming

The CT ratio can be displayed as a ratio or as a scalar quantity. A count of the number of CT Ratio reprogramming events to a maximum of 65,535 is recorded together with source (Optical or RS232 port) and time and date stamps for the three most recent events. The identity of the programming user is also stored. The count and time and date stamp can be included in the display sequence.

Note: CT Ratio Reprogramming Events are communications sessions where the primary or secondary value of the CT has been changed.

An End of Billing Reset can be requested with a CT ratio change.

A CT Programming switch can be fitted as a manufacturing option. The switch must be activated in order to change the CT ratio. The switch is under the terminal cover and may be protected by a paper seal.

13.2.7   Watchdog (Transient Reset)

A count of the number of watchdog resets to a maximum of 65,535 is recorded together with time and date stamps for the three most recent events. The count and time and date stamps can be included in the display sequence.

13.2.8   In Service Hours

The elapsed time counter records the cumulative time (to a resolution of 1 hour) the meter has been powered up. The count can be included in the display sequence.

The amount of storage is in excess of 25 years.

13.2.9   Meter Errors

An alarm can be displayed if an error occurs. The alarm and error message (See Figure 8, Display table) can be disabled via the Power Master Unit.

Access to the data is via the optical port, the RS232 data port or on the LCD.
A time and date stamp of the three most recent non-fatal error events is recorded where possible.

In the unlikely event that any of the above meter errors occur, a catastrophic failure has been detected and the meter should be returned to Elster Metering for failure investigation.

13.2.10   Cover Removal Detection

Main Cover
As a manufacturing option the main cover can be fitted with a tamper switch to detect removal. The number of times the cover has been removed to a maximum of 65,535 is recorded together with the time and date stamps of the last three occurrences. The count and time and date stamps can be included in the display sequence.

Note: The main cover removal option is not available when the meter is configured for CT Ratio Programming Switch.

Terminal Cover

As a manufacturing option the meter can be fitted with a tamper switch to detect removal of the terminal cover. The number of times the cover has been removed to a maximum of 65,535 is recorded together with the time and date stamps of the last 3 occurrences.

The count and time and date stamps can be included in the display sequence.

13.2.11 Remaining Internal Battery Life

The A1120/40 provides a count of the number of hours of life left in the internal battery.
The count can be included in the display sequence.

The count is calculated by subtracting the amount of time the meter has been supported during power outages from the initial battery life estimate.

13.3   Historical Data

At each End of Billing the following data is stored to historical registers:

Meter Data

- Cumulative Registers
- TOU Registers
- TOU MD Registers

There are 15 sets of historical registers

Event Data

- Reverse running count, last 3 time and date stamps
- Billing events count, last 3 time and date stamps
- Power failures count, last 3 time and date stamps
- Meter errors, last 3 time and date stamps of non fatal errors
- Watchdog resets count, last 3 time and date stamps
- Programming events count, last 3 time and date stamps
- Phase failures (L_1, L_2 or L_3) count, last 3 time and date stamps
- CT ratio programming events count, last 3 time and date stamps
- External battery failures count, last 3 time and date stamps
- Number of times the terminal cover has been removed, last 3 time and date stamps
- Number of times the main cover has been removed, last 3 time and date stamps
- In-service hours
- Internal battery life

Note that for Version C meters the Time and Date Stamps can be in Base Time or daylight Savings Time.

14   METER DISPLAY

14.1   Introduction

The A1120/40 meter is fitted with a high contrast liquid crystal display that can be viewed from a wide angle. The main display characters are 9.8mm high.

The display can be configured using the Power Master Unit to display data with English descriptors or OBIS (**Ob**ject **I**dentification **S**ystem**)** format.

The Test Display with a description of the displayed legend (English or OBIS) is shown below.
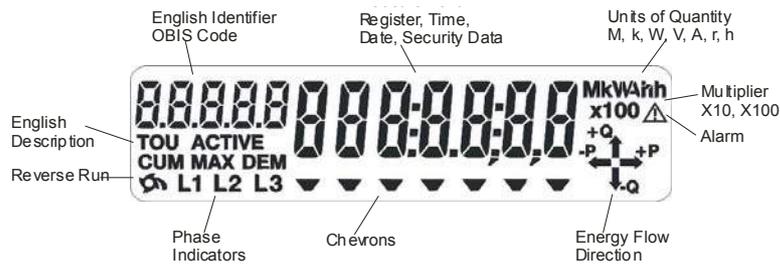
14.2   General

Display Resolution

The resolution of the display can be set at manufacture to 7, 6 or 5 digits.
The decimal point indicator can be configured to be a point or a comma and set to 0, 1 or 2 places.

```
                                       kWh        Wh        mWh
                                        |          |          |
Internal storage is :-  1 2 3 4 5 6 7 8 9 0  1  2  3.  4  5  6
```

The display is a window of this. e.g.   1 2 3 4 ⌐5 6 7 8 9 0⌐ 1 2 3. 4 5 6

Seven Digits	Six Digits	Five Digits
4 5 6 7 8 9 0	5 6 7 8 9 0	6 7 8 9 0
5 6 7 8 9 0.1	6 7 9 9 0.1	7 8 9 0.1
6 7 8 9 0.1 2	7 8 9 0.1 2	8 9 0.1 2

Units of Quantity and Multiplier

The Units of Quantity (Wh, kWh, MWh) and multiplier (x10, x100) displayed are selectable by the Power Master Unit and displayed in the top right corner of the display.

The display opposite shows kWh, x10.

14.3   Display Modes

The display has two modes of operation, Default Mode and Utility Mode. Up to 40 displays can be made available for each mode of operation.

14.3.1   Default Mode

The Default Mode can operate in two ways, Auto-cycle or single step.

Auto-cycle

At power up the segment test pattern is shown. This will remain displayed for a period of 3 seconds.

The display will then sequence through the programmed displays, remaining on each display item for one step duration time, called the Auto-cycle step duration
(2-30 seconds).

3 seconds

Next display 2-30 seconds
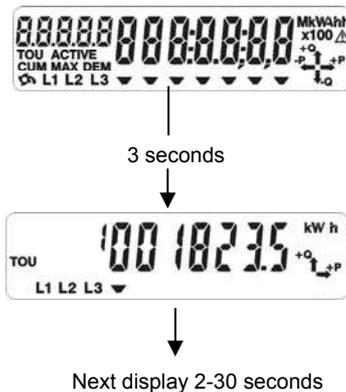
Step

Step mode is entered by a single press of the Display Pushbutton. The first display in the autocycle sequence is displayed. Further presses of the pushbutton allow the consumer to step through the autocycle display items, and then through the single step display items.

The display will default to autocycle mode at a programmed time after the last press of the display pushbutton.

Display pushbutton press

Next display
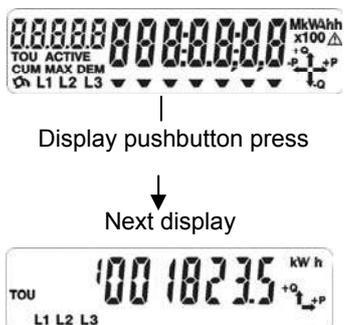
14.3.2   Utility Mode

It is necessary to break the seal on the Reset Pushbutton to enter 'Utility' mode.
The mode is entered by pressing the Reset Pushbutton. 'Utility' appears on the display.
Single presses of the Display pushbutton will then step through the utility displays.
The display will default to autocycle mode at a programmed time after the last press of the
Display Pushbutton, or if the Reset Pushbutton is again pressed.

Short press Reset Pushbutton

Press Display Pushbutton

Next display
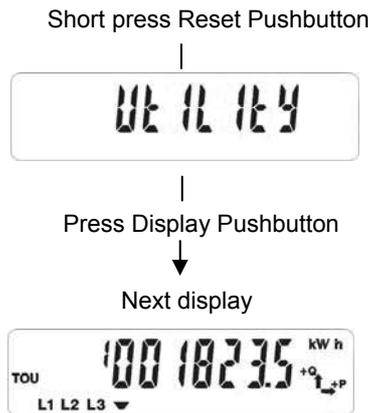
14.3.3   English Display

Chevrons & Identifiers

The chevrons on the display have the following meaning:

Chevron/Description	
1	Import
2	Export
3	-
4	Security
5	-
6	-
7	-
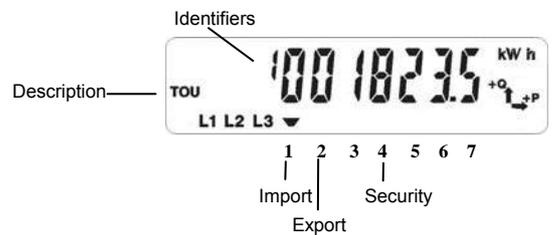
The display identifiers give a description of the main register displayed.

Examples of the display are shown in Figures 7.

A full list of displays is given in Figure 8.

14.3.4   OBIS Display

The OBIS code gives a description of the main register displayed.

Chevron 7 indicates the register is active.

Examples of displays and a full list of displays are given in Figures 7
and 8 respectively.

14.4 Displayable Data

A full list of displayable data items is given in Figure 8. Items available will depend on the meter variant.

Segment Test Pattern

Cumulative Registers

Customer Defined Registers

Rising Demand Registers

TOU Maximum Demand

TOU Registers

Historical Registers

Security

Instrumentation

Phase Failure

CT Ratio

Tariff CRC

Meter Errors

Dial Test

For dial testing, the cumulative kWh and kvarh displays can be set to a higher resolution by using the Power Master Unit.

The resolution of the display can be configured to 0, 1, 2, 3 or 4 decimal places

Note: If the display is configured for Wh with no multiplier set, the maximum resolution of the display is 3 decimal places.

The meter will cease using dial test resolution when instructed by the Power Master Unit, or after a programmable number of power cycles.

Display Indicators

System Reverse Run Indicator

Phase Failure Indication

Per Phase Reverse Run Indication

Error/Alarm

Energy Direction Indicators

Communications Indication

When communications are taking place the following indicators are displayed in the top left corner of the display.

o Optical communication

r RS232 Communication

Figure 7 shows examples of the display. The indicators can be disabled via the Power Master Unit.

15   USING THE PUSHBUTTONS

Two pushbuttons can be provided as an option. Their use is as follows:

Default Display Mode
A short press of the display (right pushbutton) enters consumer display mode at the first display in the autocycle display sequence. Single presses of the display pushbutton allow the user to step through the consumer display sequence. The display will default to auto cycle mode at a programmed time after the last press of the consumer display pushbutton.

Utility Display Mode

A short press of the Reset (left pushbutton) enters the utility display mode at the first display in the utility sequence. Single presses of the display (right pushbutton) allow the user to step through the utility display sequence. The display will default to auto cycle mode at a programmed time after the last press of the display pushbutton, or if the Reset pushbutton is presses again.

Billing Reset

A Billing Reset can be initiated by holding both of the pushbuttons pressed for approximately 3 seconds. The billing reset pushbutton can be disabled by using the Power Master Unit.

As a further option, a message that a billing 'reset' has been initiated can be displayed.

External Battery Support (Optional)

Pressing either pushbutton allows the displays to be read and optical communications to be established during power outages (See Appendix D).

16   COMMUNICATIONS

Communications with an A1120/40 can be established via the IEC 62056-21(formerly 1107) port or via the optional RS232 Port. A symbol can be displayed in the top left corner of the display which gives an indication of the type of communications currently taking place.

16.1   Optical Communications Port

A bi-directional infra red communications port is provided to allow reading of all stored data (measurement, diagnostic and current personality) and programming of "personality" data. Data Stream Mode (See Section 16.3) allows a fast method of retrieving all data from the meter.

The port is accessible through the front of the main cover and interfaces to a hand held unit or computer. In normal operation the port only operates when the meter is powered from the a.c. supply.

An optional battery (See Section 20) supports the port during power outages. This facility is limited to reading data only.

The port can operate at baud rates of up to 9600.

16.2   Optional RS232 Port

An RJ11 connector provides RS232 communications. The port allows access to the same data as the optical port, using the same protocol. The port operates at speeds of up to 9600 baud. Data Stream Mode (See Section 16.3) allows a fast method of retrieving all data.

The RS232 port supports multi drop mode, allowing up to 10 meters (RS232) or 32 meters (RS485) to be accessed from a PC (See Appendix B).

16.2.1   Modem Power Supply

The RS232 port allows different modules to be added that can support different means of communications (PSTN, Ethernet, GSM etc).

An isolated internal d.c. supply to power the modem is provided via the RJ11 socket

Nominal Voltage: ≥+6V with mean load ≤500mA

The power is sufficient to support a GSM modem

16.2.2   Resetting the Power Supply

If a modem is installed which draws too much power from the meter, a transient reset occurs and the modem power supply is disabled to prevent continuous resetting of the meter. On early versions of A1120/40 meter only, the RS232 port may also be disabled. The power supply (and RS232 port on early versions of the meter) can be re-enabled using the PMU via the IEC 1107 port or by using the following sequence:

Step to the 'GSM signal strength' display in the Utility Display section of the meter

Press the display and utility pushbuttons together for several seconds until 'PSU On' is displayed

If the meter generates another reset, an alternative modem should be fitted and the power supply re-enabled as above.

16.3   Data Stream Mode

Data stream mode allows fast reading of all metering data (90 days of 30 minute, one channel data in 30 seconds). To achieve this, the meter and modem device must be configured to 8 bits, no parity, 1 stop bit (Selectable via the Power Master Unit).

17   PROGRAMMING THE METER

The meter can be programmed via the optical port or via the RS232 port. The optical port can be connected either directly to a PC (IBM compatible) or to a Hand Held Unit. In both cases an IEC 62056-21 (formerly 1107) Probe is required.

Information for the meter is first prepared on forms within the Power Master Unit Software (Refer to Master Unit Software M181 001 3).

The meter does not check to ensure that reprogramming has been completed, therefore at the end of a reprogramming session all data should be read back to confirm the meter is programmed correctly.

If communications fail during programming a failure message is displayed.

Each time the meter is reprogrammed, the programming counter is incremented and the time and date of the event is recorded. The user who created the scheme in the PMU is recorded.

Note: The programming counter does not increment when a 'Set time' or 'Time and date adjustment' only is programmed to the meter.

18   REAL TIME CLOCK AND CALENDAR

The clock uses the notation 00:00 to 23:59. The calendar automatically caters for leap years.

Note: - For time stamps 00:00 indicates the start of the day and 24:00 the end of the day.

The time base for the clock is a programmable option. It can be derived from either the a.c. supply frequency or from a crystal controlled oscillator.

When the clock is synchronised to the mains frequency, it maintains synchronisation for variations of up to +/- 5% of nominal mains frequency. Outside these limits the meter switches to the crystal oscillator and then switches back to mains when the frequency is back within limits.

Crystal calibration achieves an internal accuracy of better than 0.5 of a second per day at reference temperature. In the event of a supply failure a backup battery supports the crystal oscillator, which maintains timekeeping.

There are two methods of adjusting the meter clock:

1.   The time and date of the clock may be set via the IEC 62056-21 optical port or RS232 communications port (if fitted) provided the correct (level 2 or higher) password is used.

2.   If a request for a small adjustment (-7.5 minutes to +7.5 minutes) to the current setting is made (with appropriate password), this adjustment will be applied by shortening or lengthening subsequent demand periods by 5 seconds until the whole of the adjustment has been achieved.

19   BATTERY BACK-UP

The A1120/40 has an internal battery that supports the clock and calendar.

An optional external battery that supports the reading of meter data and display facilities during power outages can be provided.

19.1   Internal Battery

In the event of an a.c. failure, an internal battery (a Lithium 'coin' cell) supports the real time clock.

The battery is soldered onto the printed circuit board.

The meter can be programmed to initiate one of the following courses of action should the supply fail and the battery become exhausted. When the supply returns: -

a.   Freeze the TOU registers and increment the total cumulative registers only
b.   Assume the last known time and continue to use the TOU registers

See Section 29 for battery disposal.

19.1.1   Internal Battery Monitoring

The battery provides support for the life of the meter. The following functions are provided on the Battery Monitor: -

Elapsed Time - The total amount of battery support time is monitored. The elapsed time counter decrements to represent the use/shelf life of the battery.

Remaining Time - The remaining battery life is calculated by subtracting the elapsed time from the expected time. The remaining life may be read via the optical or RS232 communications port and its value optionally included in the display sequence.

If the remaining time falls to zero, a 'flag' is set which can be read by via the optical port or RS232 port.

Failed Battery - The occurrence of total battery fail is monitored each time the meter is energised. A flag is set and the time and date recorded when the meter last powered down.

20   MODULE/BATTERY CARRIER

A Special housing can be supplied as an option for a Module or External Battery.   Molex Connector

20.1   Communications Module

Simple installation

Snap in position

Sealable (under the terminal cover)

Connects to the meter via a 'RJ11' connector

Refer to Chapter 3 (M181 001 3) Communications Modules

20.2   External Battery Module

Simple installation

Snap in position

Sealable (under the terminal cover)

Connects to the meter via a 'Molex' connector

Refer to Appendix D, External Battery Module

RJ11 Connector
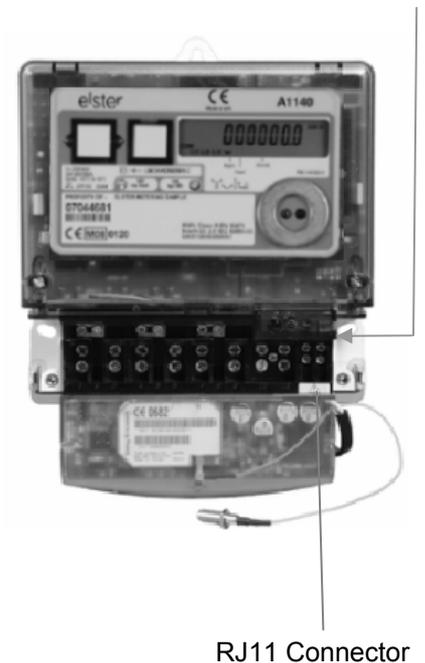
21   OUTPUT

An optional output can be provided. This output can be set at manufacture to one of the following options:

SO output, floating, customer configurable pulse duration/value

SO output, floating, replicating the kWh LED

SO output, floating, replicating the kvarh LED

100mA relay output, floating, customer configurable pulse duration/value

100mA relay output, floating, replicating the kWh LED

100mA relay output, floating, replicating the kvarh LED

300mA relay output, floating, customer configurable pulse duration/value

The outputs have the following characteristics:

	SO Output		100 mA Relay Output		300mA Relay Output
Maximum voltage (Umax)	27V d.c.		230V a.c or d.c		230V a.c
Maximum current in On-state	27 mA		100mA		300mA
Minimum current in On-state	10 mA				
Maximum current in Off-state	2 mA				

The output is connected using two 3.2mm diameter terminals (See Figure 5).

The pulse output meets the requirements of IEC 62053-31.

> **⚠ WARNING**
>
> See Warning in Section 26.6 regarding additional protection for circuits connected to the auxiliary terminals.

21.1   Customer Configurable Auxiliary Output (SO and Relay)

Retransmit

The customer configurable auxiliary output can be sourced (using the Power Master Unit) to transmit pulses from one of the following registers:

- Cumulative registers (Import or export Wh - Q1, Q2, Q3 or Q4 - VAh 1 or VAh 2)

- Customer defined registers (Register 1 or Register 2)

The pulse value and width can be configured as follows:

Pulse value	1, 2, 4, 5, 10, 20, 40, 50, 100, 200, 250
Pulse width (ms)	10, 20, 30, 40, 50, 60, 80, 100, 120, 160, 200, 250
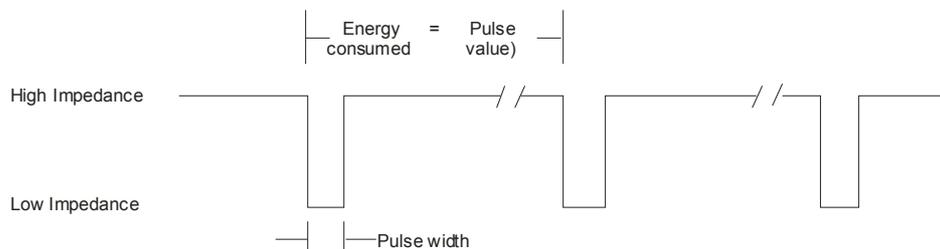
> **Caution**
>
> Care should be taken in selecting the combination of pulse width and pulses/unit.
> Avoid combinations that may give insufficient spacing between pulses at maximum load.
>
> To ensure correct operation a maximum of 10 pulses/sec should not be exceeded.

When the meter is in anti-creep mode the output does not pulse.

Rate Indication

The output can be sourced (using the Power Master Unit) to provide indication of an active rate.

The output becomes low impedance if any one of a selected combination of TOU or MD TOU tariffs is activate.

21.2   Test Indication (Manufacturing option)

The output can be configured at manufacture to generate pulses that replicate the kWh LED or the kvarh LED.

This option is desirable if meter accuracy verification must be performed without using optical pickups. When configured in this way the auxiliary output pulse width and LED pulse width are the same (approximately 6 ms).

22   ADDITIONAL VOLTAGE TERMINALS

As an option the A1120/40 can be supplied with additional terminals that allow external equipment to be powered from the meter (See Figure 5).

> ⚠️ **WARNING**
>
> Connections made to these terminals will only be protected by the installation's main fuse cut-out.
>
> The installer must ensure that additional local protection is provided for any circuits connected to these terminals.

23   LOAD PROFILE RECORDING (A1140)
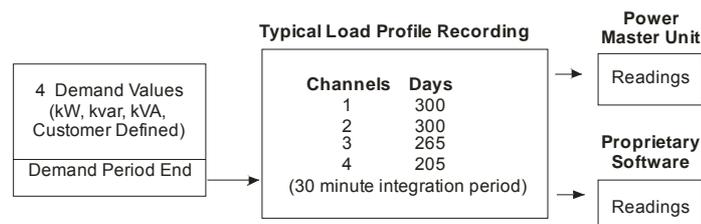
The A1140 can be programmed to record up to four values from any of the rising demand registers at the end of each integration period. Up to 300 days of 30 minute data can be stored for a single channel. The number of day's storage is reduced if Instrumentation Profiling is configured, the Number of Channels stored is increased or the Integration Period is reduced.

Integration period - 1, 2, 3, 4, 5, 6, 10, 15, 20, 30, 60 minutes. Common with the demand period.

Load profile data is stored with reference to either base time or daylight saving time.
- Base Time - Daylight savings have no effect on the demand period and 48 periods are stored (assuming 30 minute integration period).

- Daylight savings time - When the clock advances, 46 periods will be stored. When the clock retards, 50 periods will be stored (assuming 30 minute integration period).

Status information is also stored with each integration:

- Load profile event indication with time and date stamps – Power up, Power down, Time change, Configuration change, New day, Daylight savings, Forced end of demand.

- Load profile status indication per period – Transient reset, Time synchronisation, Data change, CT ratio change, Internal battery failure, Reverse run, Phase failure (one or more phases).

When storage is full, new data overwrites the oldest stored data.

Using Data Stream Mode (9600 baud rate), 90 days of single channel, 30 minute demand period data can be read in less than 30 seconds.

Two methods of reading load profile data are provided:

- Number of day's data up to and including the current day
- From day x up to and including day y.

Load profiles can be transferred to the Power Master Unit and viewed in Readings.

24   INSTRUMENTATION

The A1120/40 calculates the following instrumentation values:

Volts	(Phase A, B, C)
Current	(Phase A, B, C)
Watts	(Phase A, B, C, System)
Phase Angle	(Phase A, B, C)
Phase Rotation	(Phase A, B, C)
Power Factor	(Phase A, B, C, System)
Frequency	(Phase A, B, C)

Instrumentation values can be included in the display sequence.

25   TECHNICAL DATA

Current: Standard Range (direct connected)	20 - 100A, 10 - 100A
Extended Range (direct connected)	5 - 100A
Standard Range (CT operated)	1 - 2A, 5 - 10A
Extended Range (CT operated)	1 - 10A
Frequency	50 or 60Hz
Reference Voltage	220V - 240V (L – N)
	220V - 240V (L – L)
	105V - 127V (L – N)
	105V - 127V (L – L)
Voltage Operating range	±20%
System Connection - 2 element meter	3 phase 3 wire
- 3 element meter	3 phase 4 wire
	2 phases of 3 phase 4 wire
	2 phase 3 wire
	1 phase 3 wire
	1 phase 2 wire
Short Circuit Current	30 Imax
Burden of Voltage Circuits 230V	0.8W, 1.3VA
Burden of Current Circuits (10 – 100A meter)	4VA @ 100A/phase [max]
Burden of CT Operated Meters	0.22VA per phase
Insulation	4kV RMS
Impulse Withstand	12kV 1.2/50μs 40 ohm source
Display	9.8mm characters, high contrast, wide viewing angle
Meter Constant (pulsing LED output)	1,000 p/kWh (kvarh) Direct connected
	10,000p/kWh (kvarh) CT Operated
	Approximately 6ms Pulse width
Pulse Output Specification	
SO Output (12 kV isolation)	27V d.c. 27 mA, IEC 62053-31 (Transistor Output)
100mA Relay Output (12 kV isolation)	230V a.c or d.c, 100mA
300mA Relay Output (12 kV isolation)	230V a.c 300mA
Product Life	15 years
Certified Life	10 years
Temperature	Operational range: -25° C to +65° C
	Storage Range: -25° C to +85° C
Humidity	Condensing (See note below)
	Annual Mean 75% (95% for 30 days spread over one year)
Maximum Dimensions	233mm (High) x 174 mm (Wide) x 50mm (Deep)
Weight	904 grams
Accuracy Class kWh	EN 62053-21/22 - Class 0.5s, 1 or 2
kWh	EC Directive 2004/22/EC (MID) - Class A, B or C
kvar	EN 62053-23 - Class 2 or Class 3
Case	DIN 43857 Part 2 and Part 4 (except for top fixing centre)
	IP53 to IEC 60529:1989
	EMC Directive 89/336/EEC
Terminals Main	8.2mm bores, M6 Terminal Screws – max torque 2.8 N m
	9.0mm bores, M6 Terminal Screws – max torque 2.8 N m
Auxiliary	9.5mm bores, M6 Terminal Screws – max torque 2.8 N m
	3.2 mm bores, M3 Terminal Screws – max torque 0.45 N

Note: Sample meters have successfully passed the "Damp heat cyclic" test given in section 6.3.4 of EN50470-1. However, for maximum operational life, it is recommended that installation sites are chosen where condensation is unlikely to occur.

26   INSTALLATION

26.1   Unpacking

Remove the meter from its packaging and inspect for damage.

Check that there is no movement or loose parts within the meter enclosure.

If damage has been sustained in transit, an immediate claim should be made to the Transport Company, and a report sent to the Elster Metering Systems branch office or agent.

> ⚠️ **WARNING**
>
> Removal of the main cover seals will invalidate certification.
>
> The meter type and rating must be correct for the intended application.

26.2   Handling

Once removed from the packaging, meters must be treated with care and not subjected to excessive shock or mechanical vibration.

Care should be taken to avoid marking or scratching the meter case and polycarbonate cover.

26.3   Storage

If the meter is not required for immediate use, it should be returned to the original packing (including plastic bag) and stored in a clean, dry environment.

Storage temperature: -25° C to +85° C

26.4   Installation Site

The installation site should be a dry indoor environment and, as far as is practicable, away from direct sunlight and free from mechanical shock and vibration.

26.5   Electromagnetic Compatibility (EMC)

The A1120/40 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 circuit must be bunched together to minimise the loop
4. area enclosed
5. The cables for the pulsing output must use a twisted pair. 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

26.6   Fixing and Connection

> ⚠ **WARNING**
>
> Installation must always be carried out by appropriately trained and qualified personnel in accordance with normal metering custom and practice.
>
> The installer is responsible for the choice of connecting cables which must be appropriate for the voltage and current rating of the meter and for ensuring that the supply is properly fused. For direct current meters, $25mm^2$ cables are recommended. Meters must be 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.
>
> Connections to the auxiliary voltage terminals will only be protected by the installation's main fuse cut-out. The installer must ensure that additional local protection is provided for any circuits connected to these terminals.
>
> Refer to the connection diagrams inside the terminal cover, paying particular attention to the auxiliary terminal configuration.
>
> Isolate all circuits before carrying out the installation.
>
> Refer to the nameplate to ensure that the correct meter is being installed.
> Failure to comply with these instructions may result in damage, fire and/or electric shock.

To mount the meter on the meter board

Remove the meter terminal cover.

Fix a 5mm dia. x 13mm long round headed wood screw into the meter board to accommodate the keyhole fixing aperture at the back of the meter. Note that a choice of two fixing points is available for the upper fixing screw (see figure 6). Leave the shank of the screw projecting from the board by 4.5 mm.

Hang the meter on the screw and align it to be vertical.

Secure the lower end of the meter to the board using two 5mm dia. x 13mm long round head screws through the lower mounting holes in the area of the terminal chamber.

Tighten screws just sufficiently to prevent movement of the meter.

> ⚠ **WARNING**
>
> **Do not** over-tighten the screws or the meter base may be damaged.

For connecting to the large diameter terminals, strip back the cable insulation by 26mm.

Fully insert cables into the terminals so that the insulation butts up into the counter-sunk recesses in the bottom face of the terminal block.

Using a Number 2 Phillips or flat blade screwdriver, tighten the M6 terminal screws to a torque of between 2.2N m (minimum), 2.8N m (maximum).

Auxiliary terminal connections should be completed with appropriately sized cable.
The M3 terminal screws should be tightened using a Number 1 Phillips or flat blade screwdriver to a maximum torque of 0.45N m.

Where connections are taken from the auxiliary voltage terminals, appropriate fuses should be incorporated to protect these circuits.

If a battery (for read without power) is installed in the module housing, the battery must be connected before mains supplies are energised.

It is also recommended that connections to the meter's RJ11 connector are made with the meter supplies isolated.

27   COMMISSIONING

> ⚠ **WARNING**
>
> Commissioning must only be carried out by appropriately trained and qualified personnel.
>
> Check that the supply rating on the meter nameplate corresponds to the system rating.
>
> Removal of the meter cover seals will invalidate certification.

With the system de-energised, check the cable connections are secure and correct to the wiring diagram fitted under the terminal cover

Refit and seal the terminal cover. Energise and load the system

At power-up, ensure all segments of the LCD show in the test pattern

Check that the display is cycling through the display sequence

Check that the LED test indicators are illuminated or flashing

Check the operation of the pulse output (if fitted)

Check operation of the RS232 port (if fitted)

Carry out load checks as necessary

28   MAINTENANCE

No maintenance is necessary during the meter's normal working life.

29   DISPOSAL AND RECYCLING

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.

Recycling Materials

The following meter materials are recyclable: polycarbonates, metals and printed circuit board (see Safety Warning in Section 2).

Major plastic parts are marked with recycling information. On the disposal of a meter, every endeavour should be made to comply with local environmental legislation regarding recovering materials and waste disposal.

Batteries

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 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.

An optional battery may be housed in a module housing attached to the meter.
The battery is a non re-chargeable, alkaline zinc manganese dioxide, PP3 size. Where local legislation places restraint on the disposal of this type of battery, the requirements of that legislation should be obeyed.

POLYPHASE (A1120/A1140) MODEL CODE

V$_{ref}$		I$_b$	I$_{max}$
L-L	L-N		

MODEL

TYPE (nameplate)

example: L | M | 3 | A | A | B | N | N | B | B | B | N | N | B | - | A | N

PRODUCT/TERMINATION

	Code
Polyphase, BS/DIN termination	L M

SERVICE TYPE

	Code
3Ph 4W for use on:	3
3Ph 3W	2

CURRENT RANGE

	Code
Direct Connected 20A – * (* is any multiple of Ib up to 100A maximum)	A
Direct Connected 10A – * (* is any multiple of Ib up to 100A maximum)	B
Direct Connected 5A – * (* is any multiple of Ib up to 100A maximum)	C
CT Operated 1A – 2A	L
CT Operated 5A – 10A	M
CT Operated 1A – 10A	N
Direct Connected (10A - 100A) -40˚ to 70˚C operation	P

VOLTAGE

	Code
220 - 240V (L - N) (See note 2 for Ref voltage ranges)	A
220 - 240V (L - L) (See note 2 for Ref voltage ranges) (LM2****** variants only)	B
105 - 127V (L - N) (See note 2 for Ref voltage ranges) Not OFGEM Approved	C
105 - 127V (L - L) (See note 2 for Ref voltage ranges) (LM2****** variants only) Not OFGEM Approved	D

ACCURACY CLASS

	Code
50 Hz Cl.1 kWh, Cl.2 kvarh (IEC 62053-21, 23 see note 1)	B
50 Hz Cl.2 kWh, Cl.3 kvarh (IEC 62053-21, 23 see note 1)	C
60 Hz Cl.1 kWh, Cl.2 kvarh (IEC 62053-21, 23 see note 1) Not OFGEM Approved	E
60 Hz Cl.2 kWh, Cl.3 kvarh (IEC 62053-21, 23 see note 1) Not OFGEM Approved	F

HARDWARE - SWITCHES

	Code
No tamper detect switches	N
Two tamper detect switches	B
Terminal cover tamper detect switch and CT ratio programming protection switch	C

HARDWARE - BUTTONS

	Code
No buttons	N
Two buttons	B
Backlit LCD with no buttons	C
Backlit LCD with twom buttons	D

HARDWARE - BATTERY

	Code
No external battery connection	N
External Battery connection. Note! External battery module cannot be fitted when an RS232 comms module is fitted	B
Supercapacitor/External battery/RS485 module connection	C

OPERATIONAL MODES

	Code
Import kWh only	B
Import kWh, Q1 and Q4 kvarh	C
Import kWh, Q1, Q2, Q3, Q4 kvarh and Imp kVAh	D
Imp/Exp kWh	E
Imp/Exp kWh, Q1, Q2, Q3, and Q4 kvarh	F
Imp/Exp kWh and Imp/Exp kVAh	G
Imp/Exp kWh, Q1, Q2, Q3, Q4 kvarh and Imp/Exp kVAh	H
Import kWh only (Power Flow Insensitive)	J
Import kWh, Q1 and Q4 kvarh (Power Flow Insensitive)	K
Import kWh, Q1, Q2, Q3, Q4 kvarh and Imp kVAh (Power Flow Insensitive)	L
Import kWh only (Theft Resistant Measurement)	R
Import kWh, Q1 and Q4 kvarh (Theft Resistant Measurement)	S
Import kWh, Q1, Q2, Q3, Q4 kvarh and Imp kVAh (Theft Resistant Measurement)	T

TARIFFS

	Code
A1120 Multi Rate	B
A1140 Multi Rate (with load profile)	C
A1120 Multi Rate with password protected register zeroing and zero level time shift	D
A1140 (with load profile) Multi Rate with password protected register zeroing and zero level time shift	E

AUXILIARY OUTPUT

	Code
No Output	N
SO output, floating, 2 aux terminals. 12 kV isolation (Configurable pulse duration/value) 27V DA only	P
SO output, floating, 2 aux terminals. 12 kV isolation, replicating centre LED (kWh) 27V DA only	A
SO output, floating, 2 aux terminals. 12 kV isolation, replicating left hand LED (kvarh) 27V DA only	R
Relay output, floating, 2 aux terminals. 12 kV isolation (Configurable pulse duration/value) 230V AC, DC	S
Relay output, floating, 2 aux terminals. 12 kV isolation, replicating centre LED (kWh) 230V AC, DC	D
Relay output, floating, 2 aux terminals. 12 kV isolation, replicating left hand LED (kvarh) 230V AC, DC	U
300mA Relay output, floating, 2 aux terminals, 12kV isolation, indicating tariff/MD state, 230V a.c only	T

COMMUNICATIONS

	Code
No Serial Comms	N
RS232 serial Comms Note! RS232 Comms module cannot be fitted when an external battery module is fitted	R

OTHER OPTIONS

	Code
Standard (Extended) Terminal cover	B
Standard (Extended) Terminal cover with cut-out	C
Standard (Extended) Terminal plus 9.0mm main terminal bores	D
Short Terminal Cover	E
Standard (Extended) Terminal cover with additional voltage terminals	F
Standard (Extended) Terminal cover with cut-out and additional voltage terminals	G
Standard (Extended) Terminal cover plus 9.0 mm mail terminal bores and additional voltage terminals	H
Standard (Extended) Terminal cover plus 9.5 mm main terminal bores	J
Standard (Extended) Terminal cover and main cover with voltage disconnect protection	K
Standard (Extended) Terminal cover with slotted head screws	L
Standard (Extended) Terminal cover with cut-out and slotted head screws	M
Short terminal cover with slotted head screws	P

Figure 1 - Model Code

VERSION			
8 TOU Registers, 4 MD Registers, 15 Historical Registers, DSM - see Note 4	-	A	
8 TOU Registers, 4 MD Registers, 15 Historical Registers, DSM, DLS time stamps and 12 external registers - Note! All new customers from November 2007 - see Note 4	-	C	
8 TOU Registers, 4 TOU Registers, 15 Historical Registers, DSM, DLS Time stamps, 12 External Registers and Daily Billing		F	
8 TOU Registers, 4 TOU Registers, 15 Historical Registers, DSM, DLS Time stamps, 12 External Registers - Note! Register zeroing by use of "Register Zeroing Tool" is NOT available in this option		G	
Revision Suffix			
Firmware 2-01178-Q (Version A only). Enhanced GPRS and COP 10			Q
Firmware 2-01322-K (Version C) Enhanced GPRS and COP 10			K
Firmware 2-01340-B (Version F) Daily Billing			B
Firmware 2-01345-A (Version G) Enhanced GPRS & COP 10. No register zeroing			Z
SPECIAL ADDITIONS FIRMWARE			
None			N
Additional Firmware Function for ESCOM only (Phase angle definition as A1700)			A
SPECIAL ADDITIONS HARDWARE			
NONE			N

Notes

Note 1: CURRENT RATINGS

IEC/EN 62052-11 defines **only** Basic, Reference and Maximum currents as follows:

Basic Current (Ib) **Direct Connected**	Standard values: 5, 10, 15, 20, 30, 40, 50A Exceptional values: 80A.
Reference Current (In) **CT Operated**	Standard values: 1, 2, 5A Exceptional values: 1.5, 2.5A

Direct Connected Maximum current (Imax) shall preferably be an integral multiple of Ib.

Direct Connected A1120/A1140 meters may have Imax values *up to a maximum of 100A*

CT Operated shall have maximum currents of 1.2 In, 1.5 In and 2 In

CT Operated A1120/A1140 meters may be:

1 - 2A (suitable for use as 1 - 1.2A, 1 - 1.5A, or 1 - 2A)
5 - 10A (suitable for use as 5 - 6A, 5 - 7.5A, or 5 - 10A)
1 - 10A (suitable for use with any of the above 6 ratings)

EN 50470-1 (MID) defines basic values or Itr from which Imin, Iref and Imax can be derived

Basic values of Itr	Direct Connected	0.5, 1, 1.5, 2A
Basic values of Itr	CT Operated	0.05, 0.1, 0.25

Imin, Iref and Imax have been chosen so that the following relationships are met

Direct Connected, Class A	$Imin \leq 0.5 \times Itr$	$Iref = 10 \times Itr$	$Imax \geq 50 \times Itr$
CT Operated, Class A	$Imin \leq 0.4 \times Itr$	$In = 20 \times Itr$	$Imax \geq 1.2 \times In$
Direct Connected, Class B	$Imin \leq 0.5 \times Itr$	$Iref = 10 \times Itr$	$Imax \geq 50 \times Itr$
CT Operated, Class B	$Imin \leq 0.2 \times Itr$	$In = 20 \times Itr$	$Imax \geq 1.2 \times In$

Note 2: VOLTAGE RATINGS

Of the values IEC/EN 62052-11 defines for reference voltages, the following may be accepted

Ref Voltages for meters not connected through current transformers

Std values	120, 230, 400V
Exceptional values	100, 127, 200, 220, 240, 380, 415V

EN 50470- 1 (MID) defines for reference voltages, the following standards and exceptional values

Ref Voltages for **Direct Connected**

Std values	230/400V
Exceptional values	220/380V, 240/415V

Meters with marked currents and voltages other than the above values CANNOT be provided when the nameplate shows the IEC/EN Standard Number.

If a valid requirement exists for meters with marked values within the acceptable ranges, but not listed above, specific arrangements to provide nameplates not showing the IEC/EN standard must be made.

Note 3: TEST INDICATOR OUTPUT VALUES

The following values are to be used for the Test Indicator LED outputs:

Direct Connected: 1,000 p/kWh (kvarh)   CT Operated: 10,000 p/kWh (kvarh)

Note 4: SCHEME COMPATIBILITY

Schemes generated for VERSION 'A' meters are not compatible with VERSION 'C' meters

Note 5: SPECIAL ADDITIONS

Early issues of this code used the final (16th) digit for SPECIAL ADDITIONS and an 'A' in this position indicates "with additional voltage terminals".

Figure 1 - Model Code (Continued)

© Elster Metering Limited - M181 001 2G - 5/2010
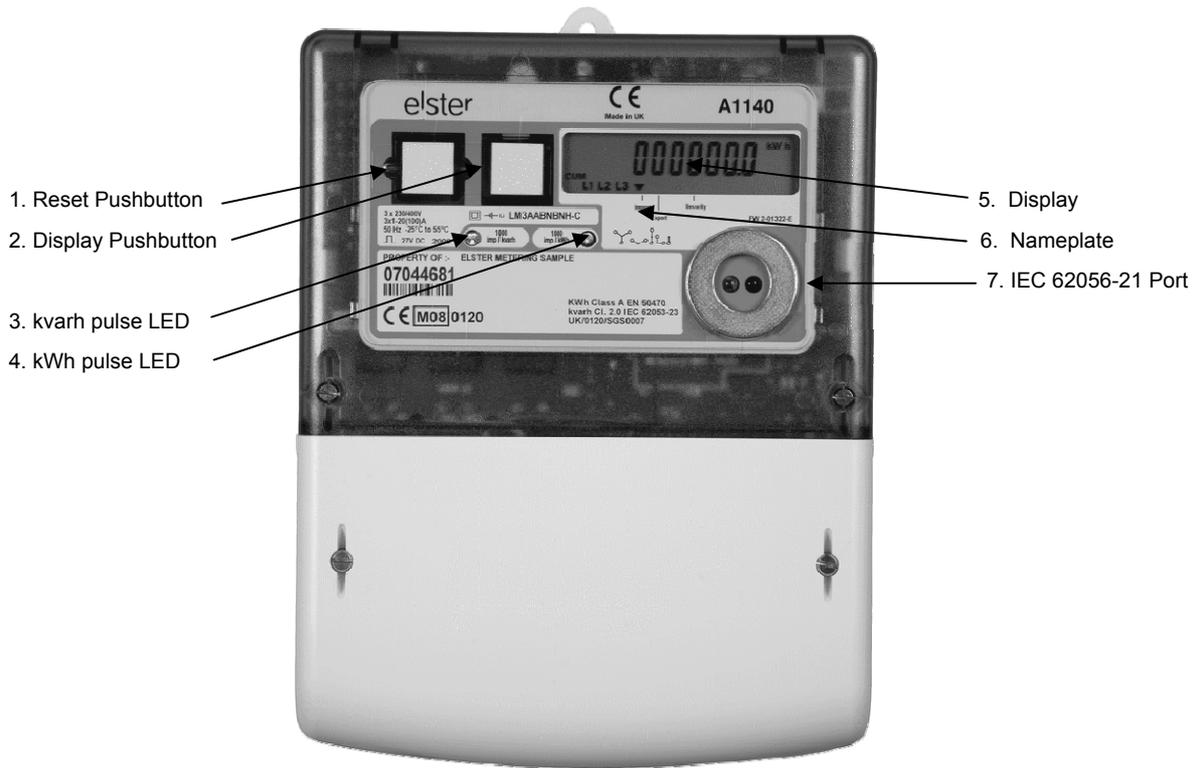
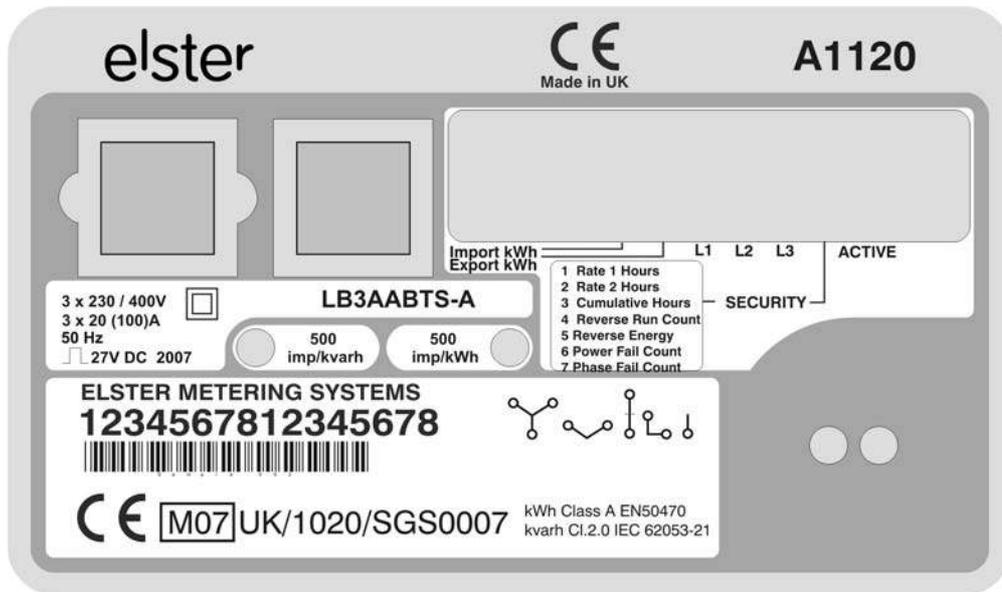| 1 | Reset Pushbutton (See Section 15) |
2	Display Pushbutton (See Section 15)
3	kvarh Pulse Indicator (See Section 9)
4	kWh Pulse Indicator (See Section 9)
5	Display (See Section 14)
6	Nameplate (See Figure 3)
7	IEC 62056-21 Port (See Section 16)

Module Carrier (Fits under the terminal cover)

Figure 2 – A1120/40 Meter

Figure 3 - Typical Nameplate

kWh Balanced Loads

kvarh Balanced Loads
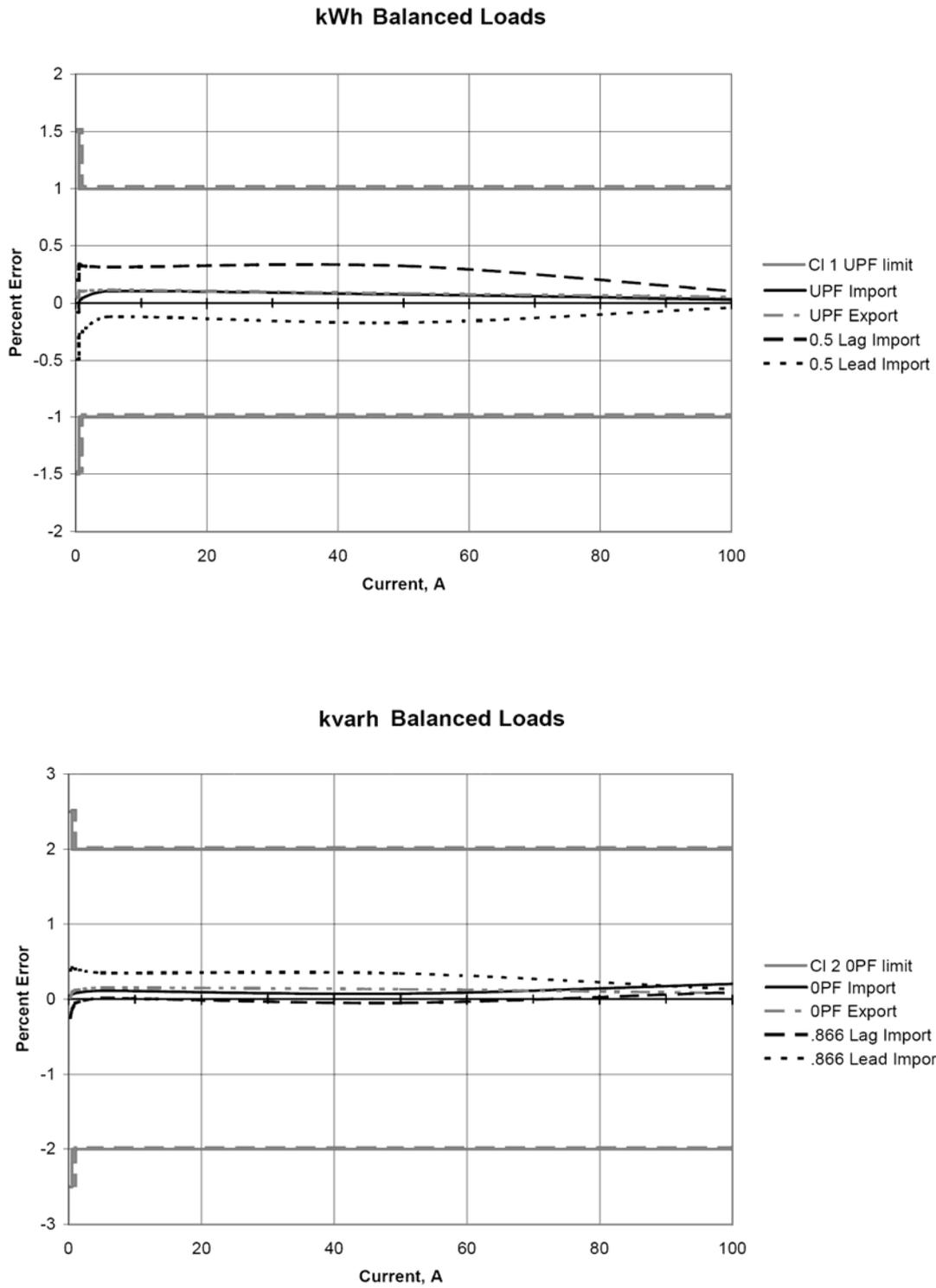
Figure 4 - Load Curves

Terminal Block (3 phase 4 wire shown)

Voltage connections
on a CT Meter.
Optional additional
⚠ Voltage terminal on
   whole current meter

Voltage Links shown in open position
(whole current meters only)

Main cover removal or CT ratio programming switch
Terminal cover removal switch

Molex connector
to connect external
battery

1 2 3 4 5 6 7 8 9 10 12 20 21
Element 1 Element 2 Element 3 Neutral Auxiliary   RJ 11
                                          Terminals

RJ 11 and Auxiliary Terminals

27V DC
MAX
+ (20) (21) −

Auxiliary Terminals

RJ11 Socket

6 5 4 3 2 1
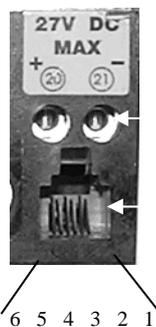
Main cover with voltage disconnect protection.
Note that this cover cannot be used if voltage terminals are fitted.

Terminal & RJ11 Numbering

Terminal	
1	Element 1 - Line in
2	- Voltage terminal
3	- Line out
4	Element 2 - Line In
5	- Voltage Terminal
6	- Line Out
7	Element 3 - Line In
8	- Voltage Terminal
9	- Line Out
10	Neutral In
12	Neutral Out
Auxiliary	20 positive
	21 negative

RJ11	
1	Rx (Input)
2	Tx (Output)
3	Rx (Input)
4	No Connection
5	Zero Volts
6	Modem Power Supply (+) Output

> ⚠ See Warning in Section 22 regarding protection for additional voltage terminals.

Figure 5 - Terminal Arrangements

LM3 ***

		A/A$_1$		B		C/A$_2$		N	
A ⅄ C B	3ø 4W	2		5		8		11	
		1	3	4	6	7	9	10/12	
A ⅄ C	2ø of 3ø 4W	2				8		11	
		1	3			7	9	10/12	
A$_1$ ⅄ A$_2$	2ø 3W	2				8		11	
		1	3			7	9	10/12	
A$_1$ ⅄ A$_2$	1ø 3W	2				8		11	
		1	3			7	9	10/12	
A ⅂	1ø 2W	2						11	
		1	3					10/12	

JL 3013 312B

TO LOAD — Rx Tx 0V +V
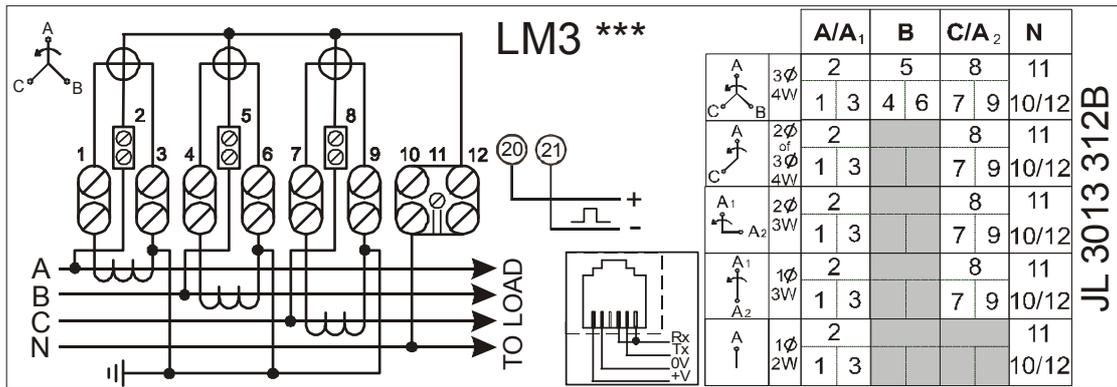
3 phase 4 wire, CT operated

LM3 ***

		A/A$_1$		B		C/A$_2$		N	
A ⅄ C B	3ø 4W	1	3	4	6	7	9	10/12	
A ⅄ C	2ø of 3ø 4W	1	3			7	9	10/12	
A$_1$ ⅄ A$_2$	2ø 3W	1	3			7	9	10/12	
A$_1$ ⅄ A$_2$	1ø 3W	1	3			7	9	10/12	
A ⅂	1ø 2W	1	3					10/12	

JL 3013 311B

TO LOAD — Rx Tx 0V +V
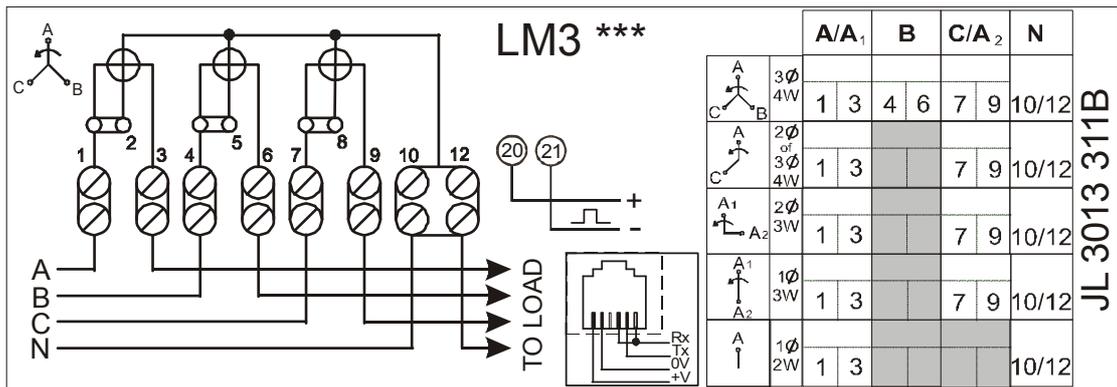
3 phase 4 wire, Direct connected

Note: These diagrams are examples only.

⚠ WARNING

Meters must be connected according to the diagram fitted under the meter terminal cover.

Figure 5A – Terminal Configurations

Back View

171.5mm

139mm

121mm

233mm

150mm

Side View

49mm

Terminal Cover with Cut-out

22mm

110mm

Short Terminal Cover

171.5mm

41.5mm
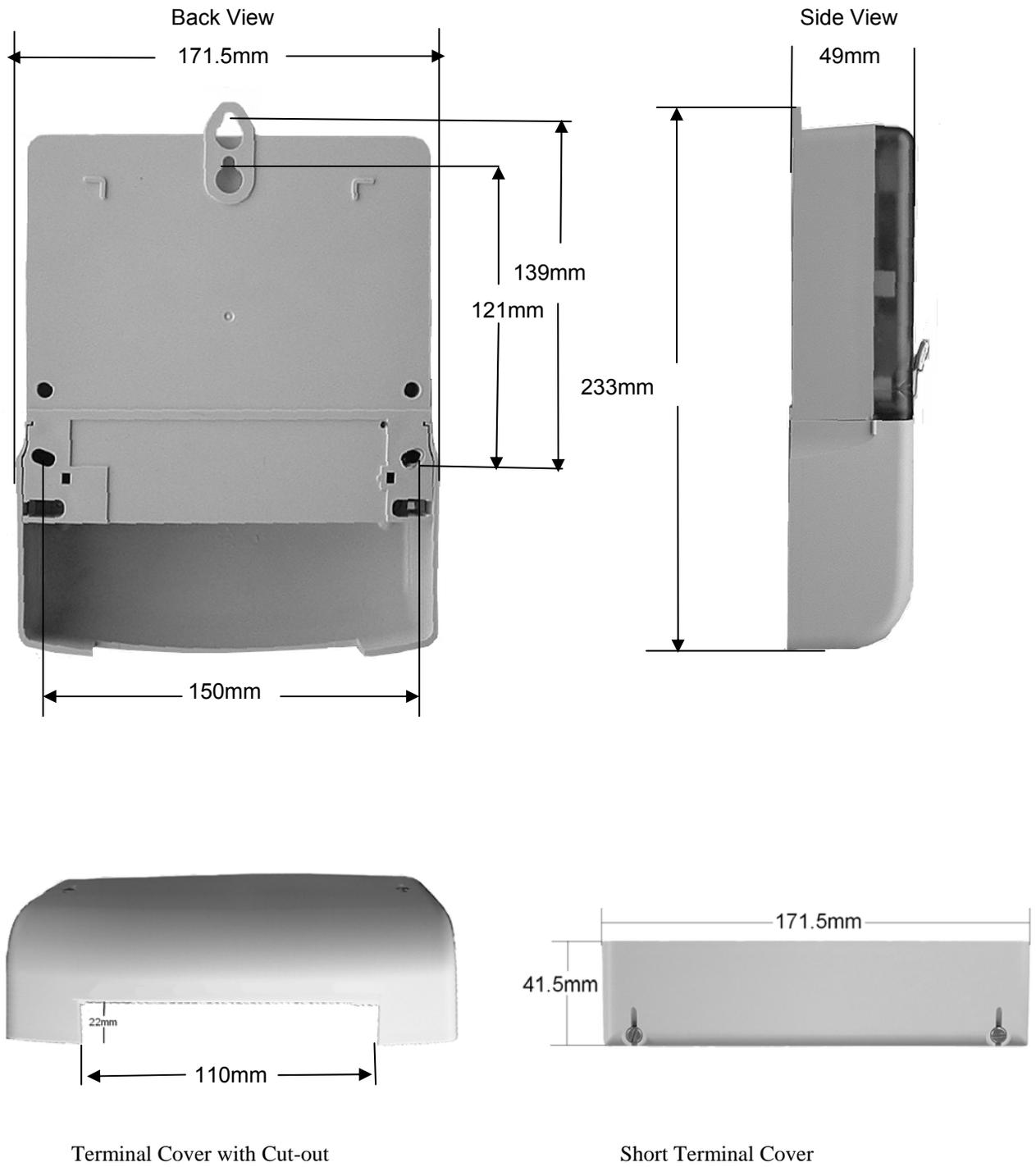
Figure 6 – Dimensions, Fixing Centres

English Displays   **OBIS Displays**

Segment Test
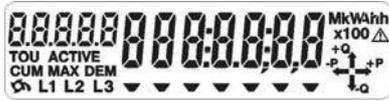
Cumulative

Customer Defined (1-2)

Rising Demand (Export)

Maximum Demand (1-4)

Maximum Demand (1-4) Date   Time

Cumulative Maximum Demand (1-4)
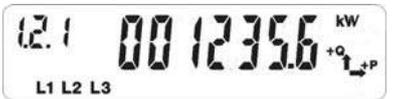
Time of Use (1-8)

Figure 7 - A1120/40 Displays

English Displays	**OBIS Displays**

Historical

Security (Reverse Run Event Count)

Instrumentation (Phase A Voltage)

Dial Test
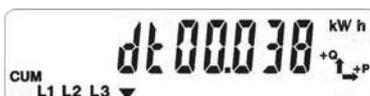
Communications Indicators
Optical

Remote RS232

End of Billing (Change of Season)

End of Billing (Internal Battery Fail)

Error (Power Fail Data)

Error (Internal Battery Fail)

CT (Scalar)

CT (Ratio)

External Registers

Figure 7 - A1120/40 Displays (continued)

Description	Units		OBIS Display Code		English Display		
	Note 1 *				Identifier	Chevron	Index
Segment Test	-		-		-	-	-
Current Time	-		0.9.1		-	-	-
Current Date	-		0.9.2		-	-	-
Cumulative							
Total Import kWh	kWh		1.8.0		CUM	1	-
Total Export kWh	kWh		2.8.0		CUM	2	-
Q1 kvarh	kvarh		5.8.0		CUM	-	↳ 1
Q2 kvarh	kvarh		6.8.0		CUM	-	↵ 2
Q3 kvarh	kvarh		7.8.0		CUM	-	⌐ 3
Q4 kvarh	kvarh		8.8.0		CUM	-	⇁ 4
kVAh 1	kVAh		D.8.0		CUM	-	-
kVAh 2	kVAh		E.8.0		CUM	-	-
Customer Defined 1	*		A.8.0		CUM	-	Cd 1
Customer Defined 2	*		B.8.0		CUM	-	Cd 2
Rising Demand							
Total Import kW	kW		1.4.0		DEM	1	-
Total Export kW	kW		2.4.0		DEM	2	-
Q1 kvar	kvar		5.4.0		DEM	-	↳ 1
Q2 kvar	kvar		6.4.0		DEM	-	↵ 2
Q3 kvar	kvar		7.4.0		DEM	-	⌐ 3
Q4 kvar	kvar		8.4.0		DEM	-	⇁ 4
kVA 1	kVA		D.4.0		DEM	-	-
kVA 2	kVA		E.4.0		DEM	-	-
CD 1	*		A.4.0		DEM	-	Cd 1
CD 2	*		B.4.0		DEM	-	Cd 2
Cumulative MD (1-4)							
Total Import kW	kW		1.2.(1 - 4)		CUM MAX DEM	-	1 - 4
Total Export kW	kW		2.2.(1 - 4)		CUM MAX DEM	-	1 - 4
Q1 kvar	kvar		5.2.(1 - 4)		CUM MAX DEM	-	1 - 4
Q2 kvar	kvar		6.2.(1 - 4)		CUM MAX DEM	-	1 - 4
Q3 kvar	kvar		7.2.(1 - 4)		CUM MAX DEM	-	1 - 4
Q4 kvar	kvar		8.2.(1 - 4)		CUM MAX DEM	-	1 - 4
kVA 1	kVA		D.2.(1 - 4)		CUM MAX DEM	-	1 - 4
kVA 2	kVA		E.2.(1 - 4		CUM MAX DEM	-	1 - 4
1 - 4 CD 1	*		A.2.(1 - 4)		CUM MAX DEM	-	1 - 4
1 - 4 CD 2	*		B.2.(1 - 4)		CUM MAX DEM	-	1 - 4
Maximum Demand (1-4)							
1 - 4 Import kW	kW		1.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 Import Time	-		1.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 Import Date	-		1.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 Export kW	kW		2.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 Export Time	-		2.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 Export Date	-		2.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 Q1 kvar	kvar		5.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 Q1 Time	-		5.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 Q1 Date	-		5.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 Q2 kvar	kvar		6.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 Q2 Time	-		6.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 Q2 Date	-		6.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 Q3 kvar	kvar		7.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 Q 3 Time	-		7.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 Q3 Date	-		7.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 Q4 kvar	kvar		8.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 Q4 Time	-		8.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 Q4 Date	-		8.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 kVA 1	kVA		D.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 kVA 1 Time	-		D.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 kVA 1 Date	-		D.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 kVA 2	kVA		E.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 kVA 2 Time	-		E.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 kVA 2 Date	-		E.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 CD 1	*		A.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 CD 1 Time	*		A.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 CD 1 1 Date	*		A.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 CD 2	*		B.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 CD 2 Time	*		B.6.(1 - 4)		MAX DEM	-	1 - 4
1 - 4 CD 2 Date	*		B.6.(1 - 4)		MAX DEM	-	1 - 4

Figure 8 - Display Table

Description	Units		OBIS Display Code		English Display		
			Note 1		Identifier	Chevron	Index
TOU (1-8)							
1 - 8 Import kWh	kWh		1.8.(1 - 8)		TOU	-	1 - 8
1 - 8 Export kWh	kWh		2.8.(1 - 8)		TOU	-	1 - 8
1 - 8 Q1 kvarh	kvarh		5.8.(1 - 8)		TOU	-	1 - 8
1 - 8 Q2 kvarh	kvarh		6.8.(1 - 8)		TOU	-	1 - 8
1 - 8 Q3 kvarh	kvarh		7.8.(1 - 8)		TOU	-	1 - 8
1 - 8 Q4 kvarh	kvarh		8.8.(1 - 8)		TOU	-	1 - 8
1 - 8 kVAh 1	kVAh		D.8.(1 - 8)		TOU	-	1 - 8
1 - 8 kVAh 2	kVAh		E.8.(1 - 8)		TOU	-	1 - 8
1 - 8 CD 1	*		A.8.(1 - 8)		TOU	-	1 - 8
1 - 8 CD 2	*		B.8.(1 - 8)		TOU	-	1 - 8
External Registers							
Register Set 1 (1-4)	-		User selectable		Cum	-	S1 - (1 - 4)
Register Set 2 (1-4)	-		User selectable		Cum	-	S2 - (1 - 4)
Register Set 3 (1-4)	-		User selectable		Cum	-	S3 - (1 - 4)
Security							
Program Event Count	-		C.2.0		-	4	1
Program Event Time	-		C.2.0		-	4	1
Program Event Date	-		C.2.0		-	4	1
CT Ratio Change Count	-		C.72.0		-	4	2
CT Ratio Change Time	-		C.72.0		-	4	2
CT Ratio Change Date	-		C.72.0		-	4	2
Phase Fail Event Count	-		C.54.0		-	4	3
Phase Fail Event Time	-		C.54.0		-	4	3
Phase Fail Event Date	-		C.54.0		-	4	3
Power Fail Event Count	-		C.7.0		-	4	4
Power Fail Event Time	-		C.7.0		-	4	4
Power Fail Event Date	-		C.7.0		-	4	4
Rev Run Event Count	-		C.53.0		-	4	5
Rev Run Event Time	-		C.53.0		-	4	5
Rev Run Event Date	-		C.53.0		-	4	5
End Billing Count	-		0.1.0		-	4	7
End Billing Time	-		0.9.6		-	4	7
End Billing Date	-		0.9.7		-	4	7
Main Cov RemCount	-		C.70.0		-	4	8
Main Cov Remove Time	-		C.70.0		-	4	8
Main Cov Remove Date	-		C.70.0		-	4	8
Term Cov Rem Count	-		C.71.0		-	4	9
Term Cov Remove Time	-		C.71.0		-	4	9
Term Cov Remove Date	-		C.71.0		-	4	9
Est Battery Life Remain	-		C.6.0		-	4	10
In Service Hours	-		C.8.0		-	4	11
Active Tariff CRC	-		C.80.1		-	4	CrC1
Deferred Tariff CRC	-		C.80.4		-	4	CrC4
CT Ratio	-		0.4.2			4	Ct

EOB Events (All Meters)	Code (HEX)		Display				
Program Date or Midnight	01		rESEt				
Change of Season	02		rESEt				
Deferred Tariff	04		rESEt				
Serial Port Command	08		rESEt				
Optical Port Command	10		rESEt				
Billing Pushbutton Press	20		rESEt				
CT Programming Event	40		rESEt				
Battery Fail	80		rESEt				

Meter Errors	-						
Power fail data	-		FF 0040		Error 0040		
Period backup data error	-		FF 0080		Error 0080		
ROM checksum error	-		FF 0100		Error 0100		
I^{2}C Bus error	-		FF 0200		Error 0200		
Internal battery life exceeded	-		FF 0400		Error 0400		
Internal battery fail	-		FF 0800		Error 0800		

Figure 8 - Display Table (continued)

Description	Units		OBIS Display Code		English Display		
	Note 1				Identifier	Chevron	Index
Historical (Most recent only)							
Total Import kWh	kWh		1.8.0.1		CUM	-	H1
Total Export kWh	kWh		2.8.0.1		CUM	-	H1
Q1 kvarh	kvarh		5.8.0.1		CUM	-	H1
Q2 kvarh	kvarh		6.8.0.1		CUM	-	H1
Q3 kvarh	kvarh		7.8.0.1		CUM	-	H1
Q4 kvarh	kvarh		8.8.0.1		CUM	-	H1
Import kVAh	kVAh		D.8.0.1		CUM	-	H1
Export kVAh	kVAh		E.8.0.1		CUM	-	H1
Customer Defined 1	*		A.8.0.1		CUM	-	H1
Customer Defined 2	*		B.8.0.1		CUM	-	H1
Historical MD's							
1 - 4 Import kW	kW		1.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 Import Time	-		1.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 Import Date	-		1.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 Export kW	kW		2.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 Export Time	-		2.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 Export Date	-		2.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 Q1 kvar	kvar		5.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 Q1 Time	-		5.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 Q1 Date	-		5.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 Q2 kvar	kvar		6.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 Q2 Time	-		6.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 Q2 Date	-		6.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 Q3 kvar	kvar		7.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 Q 3 Time	-		7.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 Q3 Date	-		7.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 Q4 kvar	kvar		8.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 Q4 Time	-		8.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 Q4 Date	-		8.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 kVA 1	kVA		D.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 kVA 1 Time	-		D.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 kVA 1 Date	-		D.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 kVA 2	kVA		E.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 kVA 2 Time	-		E.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 kVA 2 Date	-		E.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 CD 1	*		A.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 CD 1 Time	*		A.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 CD 1 Date	*		A.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 CD 2	*		B.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 CD 2 Time	*		B.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
1 - 4 CD 2 Date	*		B.6.(1 - 4).1		MAX DEM	-	H1 (1 - 4)
Historical Registers							
CUM MD 1- 4 Import kW	kW		1.2.(1 - 4).1		CUM MAX DEM	-	H1 (1 - 4)
CUM MD 1 - 4 Export kW	kW		2.2.(1 - 4).1		CUM MAX DEM	-	H1 (1 - 4)
CUM MD Q1 1 - 4 kvar	kvar		5.2.(1 - 4).1		CUM MAX DEM	-	H1 (1 - 4)
CUM MD Q2 1 - 4 kvar	kvar		6.2.(1 - 4).1		CUM MAX DEM	-	H1 (1 - 4)
CUM MD Q3 1 - 4 kvar	kvar		7.2.(1 - 4).1		CUM MAX DEM	-	H1 (1 - 4)
CUM MD Q4 1 - 4 kvar	kvar		8.2.(1 - 4).1		CUM MAX DEM	-	H1 (1 - 4)
CUM MD kVA 1 1 - 4 kVA	kVA		D.2.(1 - 4).1		CUM MAX DEM	-	H1 (1 - 4)
CUM MD kVA 2 1 - 4 kVA	kVA		E.2.(1 - 4).1		CUM MAX DEM	-	H1 (1 - 4)
CUM MD CD 1 1 - 4	*		A.2.(1 - 4).1		CUM MAX DEM	-	H1 (1 - 4)
CUM MD CD 2 1 - 4	*		B.2.(1 - 4).1		CUM MAX DEM	-	H1 (1 -4)
TOU 1 - 8 Import kWh	kWh		1.8.(1 - 8).1		TOU	-	H1 (1 - 8)
TOU 1 - 8 Export kWh	kWh		2.8.(1 - 8).1		TOU	-	H1 (1 - 8)
TOU 1 - 8 Q1 kvarh	kvarh		5.8.(1 - 8).1		TOU	-	H1 (1 - 8)
TOU 1 - 8 Q2 kvarh	kvarh		6.8.(1 - 8).1		TOU	-	H1 (1 - 8)
TOU 1 - 8 Q3 kvarh	kvarh		7.8.(1 - 8).1		TOU	-	H1 (1 - 8)
TOU 1 - 8 Q4 kvarh	kvarh		8.8.(1 - 8).1		TOU	-	H1 (1 - 8)
TOU 1 - 8 kVAh 1	kVAh		D.8.(1 - 8).1		TOU	-	H1 (1 - 8)
TOU 1 - 8 kVAh 2	kVAh		E.8.(1 - 8).1		TOU	-	H1 (1 - 8)
TOU 1 - 8 CD 1	*		A.8.(1 - 8).1		TOU	-	H1 (1 - 8)
TOU 1 - 8 CD 2	*		B.8.(1 - 8).1		TOU	-	H1 (1 - 8)
Rev Run Count	-		C.53.0.1		-	4	H1 5
Phase Fail Count	-		C.54.0.1		-	4	H1 3
Power Fail Count	-		C.7.0.1		-	4	H1 4
Program Count	-		C.2.0.1		-	4	H1 1
CT Ratio Change Count	-		C.72.0.1		-	4	H1 2
Main Cover Remove Count	-		C.70.0.1		-	4	H1 8
Term Cover Remove Count	-		C.71.0.1		-	4	H1 9
End Billing Count	-		0.1.0.1		-	4	H1 7
In Service Hours	-		C.8.0.1		-	4	H1 11
Estimated Battery Life	-		C.6.0.1		-	4	H1 10

Figure 8 - Display Table (continued)

Description	Units		OBIS Display Code		English Display		
			Note 1		Identifier	Chevron	Index
Instrumentation							
Volts Phase A	V		32.7.0		-	-	Ins A
Volts Phase B	V		52.7.0		-	-	Ins B
Volts Phase C	V		72.7.0		-	-	Ins C
Current Phase A	A		31.7.0		-	-	Ins A
Current Phase B	A		51.7.0		-	-	Ins B
Current Phase C	A		71.7.0		-	-	Ins C
Watts Phase A	kW		21.7.0		-	-	Ins A
Watts Phase B	kW		41.7.0		-	-	Ins B
Watts Phase C	kW		61.7.0		-	-	Ins C
Watts Phase System Import	kW		1.7.0		-	-	Ins
Watts Phase System Export	kW		2.7.0		-	-	Ins
Phase Angle Phase A	-		81.7.4		-	-	Ins A
Phase Angle Phase B	-		81.7.15		-	-	Ins B
Phase Angle Phase C	-		81.7.26		-	-	Ins C
Phase Rotation	-		C.90.0		-	-	Ins
Power Factor Phase A	-		33.7.0		-	-	Ins A
Power Factor Phase B	-		53.7.0		-	-	Ins B
Power Factor Phase C	-		73.7.0		-	-	Ins C
PF Phase System	-		14.7.0		-	-	Ins
Frequency Phase A	-		34.7.0		-	-	Ins A
Frequency Phase B	-		54.7.0		-	-	Ins B
Frequency Phase C	-		74.7.0		-	-	Ins C

* Units depend on register selected

Figure 8 - Display Table (Instrumentation)

Level 0   (Correct level 0 password [Read only])
Meter Serial Number
Meter Scheme Id

Level 1   (Correct level 1 password [Read only])
All data listed at level 0
Half hourly values of Load Profile
Total cumulative Active Energy
Total cumulative Reactive Energy
Total cumulative VA
Maximum Demand Registers (MD)
Time of Use Registers
Measurement transformer ratios
Measurement transformer error factor
Alarm indications

Level 2 (Correct level 2 password [Read and Program]**)**
All data listed in level 0 and 1
Correction to the time and date
End of Billing
Time set

Level 3 (Correct level 3 password [Read and Program]**)**
All operations listed in levels 0, 1 and 2
Programming
Setting the passwords for Levels 1, 2 and 3
Protocol Timeouts

Figure 9 – Password Access Levels

APPENDIX A - Checking kWh and kvarh Registration Accuracy

> ⚠ **WARNING**
>
> Only trained and competent personnel, familiar with meter test procedures should carry out the following operation.

A1   Introduction

Various methods of checking the accuracy of registration of the A1120/40 meter are available. Methods using the LED test indicators and Register advances are described below.

A2   Checking Meter Accuracy Using the LED Test Indicator

The LED test indicators are configured at manufacture to pulse for import kWh and import kvarh (import only meter) or pulse for import plus export kWh and kvarh (import/export or power flow insensitive meters).

A2.1   Comparing the number of LED pulses with substandard meter register advance

What you will need

Suitable test equipment with a sensor to detect LED pulses

A suitable substandard meter (set to the same system configuration as the meter under test)

A counter for counting the number of LED pulses

Checking registration

In order to achieve a repeatability of 0.1% the test time at any load needs to be a minimum of 60 seconds.

1. Connect the test equipment and a suitable load to the meter, then power up the meter

2. The right hand Test LED pulses for kWh

3. Run the test for a suitable duration and check the amount the substandard has advanced and the number of pulses detected

Calculate the registration by dividing the number of pulses by the meter constant.

e.g. $\dfrac{994 \text{ (LED count)}}{1000 \text{ (meter constant)}}$ = 0.994 kWh advance.

Compare this kWh advance with the amount the substandard has advanced.

Repeat for kvarh using left hand Test LED.

A2.2   Comparing LED pulses with substandard meter pulses

This method may be used where the test equipment has the facility to calculate meter errors based on the pulse output from a substandard meter. It will be necessary to set the pulse value of the meter under test (shown on the meter nameplate) into the meter test equipment.

The duration of each test must be at least 60 seconds

The number of LED pulses should be greater than:-

$$\frac{Itest \times V \times Pf \times N \times K}{1000 \times 60}$$

Itest = Test current

V = System voltage

Pf = Power factor of test load

N = Number of system elements

K = LED pulse value, impulses/kWh

A3   Checking Meter Registration Accuracy from Register Advances

For these methods the advance of the meter register is used rather than the LED Test Indicator.

A3.1   Using the 'Dial Test' values on the meter display

Meters may be set to show cumulative kWh and kvarh registers with increased resolution by using Power master Unit instructions via the optical or RS232 port. Dial test displays can be programmed to 0, 1, 2, 3 or 4 decimal places.

Import

The display resolution will revert to normal when a further appropriate instruction (Setting power down count to zero) is received, or after a programmable number of power cycles.

What you will need

A suitable supply and load or a meter test bench.

Substandard meter with a kWh (kvarh) display.

For each measured quantity:

1. Connect the meter and substandard meter to the supply

2. Instruct the meter to show register to suitable dial test resolution

3. Record initial values of the meter and substandard meter registers

4. Apply a suitable load to cause a significant register advance

5. Switch off the load to stop the register advancing. Leave the supply connected

6. Record the final register readings, compute the advances and compare the meter advance with the substandard advance

APPENDIX B - RS232 Multi-drop Mode

A1120/40 meters allow up to 12 meters to be connected in RS232 multi-drop configuration. Two-way RJ11 adaptors will be required to link each meter in the chain.

B1   RS232 Multi-drop Installation Procedure

The connection diagram for RS232 multi-drop mode is shown below

1. Observe all **Safety Warnings**, **Warnings, Precautions for handling electrostatic discharge sensitive devices** and **EMC Guidelines** in Section 2

2. Remove the terminal cover from the meters. If the terminal cover plate is not in place, switch off all supplies to the meter.

3. Connect a two-way RJ11 adaptor to the RJ11 port of the first meter in the multi-drop chain

4. Connect an RS232 cable from the PC to the first port of the RJ11 as shown below

5. Connect a Flat Pin Cable to the second port of the RJ11 adaptor

6. Replace the terminal cover and fit appropriate seals

7. Connect a two-way RJ11 adaptor to the RJ11 port of the second meter in the multi-drop chain

8. Connect the flat pin cable from the first meter to the RJ11 adaptor of the second meter in the multi-drop chain

9. Connect a Flat Pin Cable to the second port of the RJ11 adaptor

10. Replace the terminal cover and fit appropriate seals

11. Continue as steps 7 to 10 to the next meter

12. When all multi-drop connections are made and all terminal covers are in place, switch on the supplies

RJ11 Connector

6 5 4 3 2 1
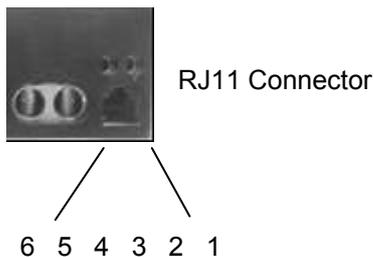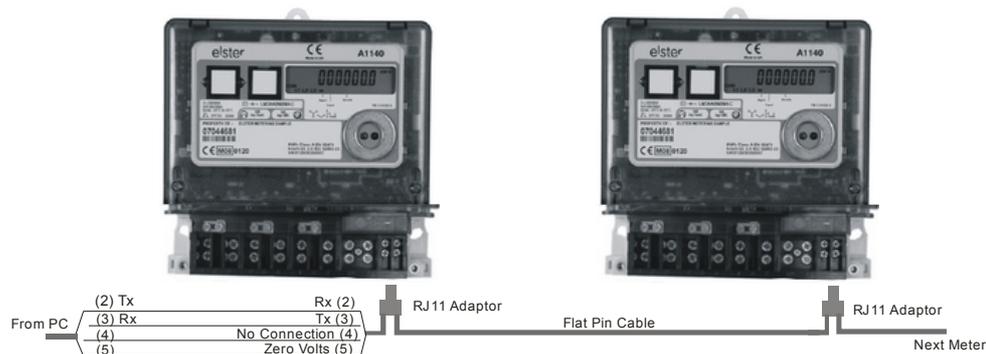
APPENDIX C - RS485 Multi-drop Mode

A1120/40 meters allow up to 12 meters to be connected in RS485 multi-drop configuration. Two-way RJ11 adaptors will be required to link each meter in the chain.
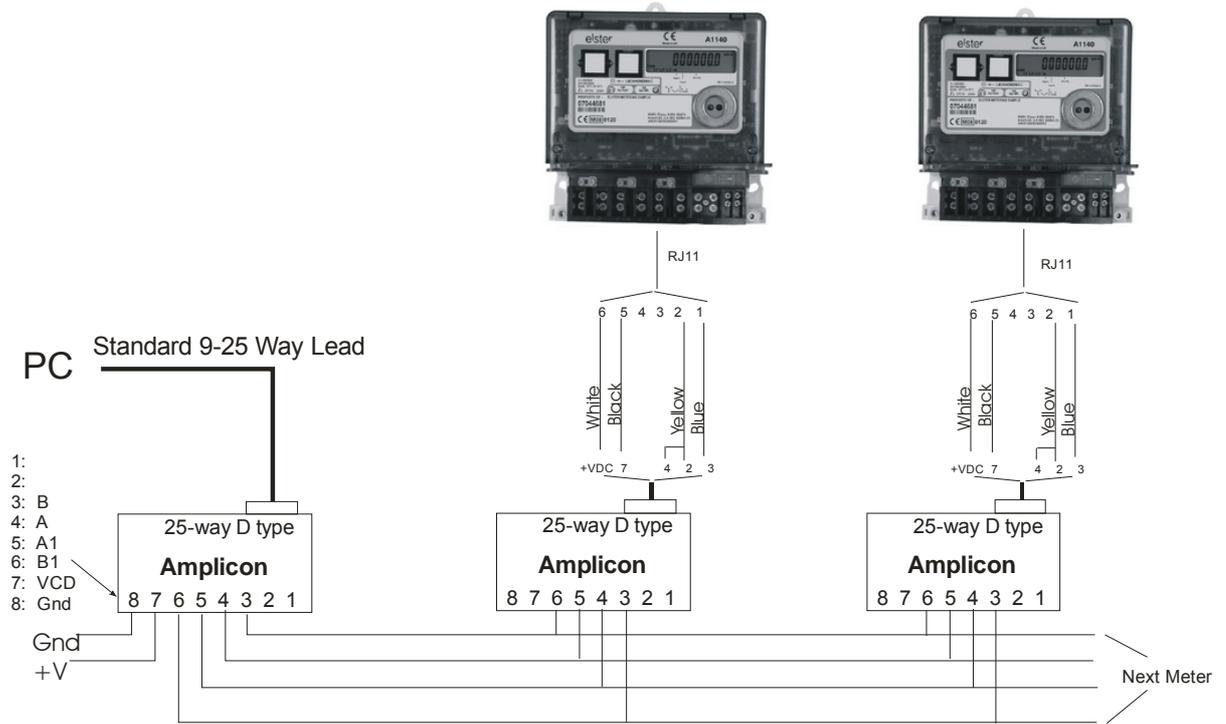
APPENDIX D - External Battery Module

D1   External Battery Module

An External Battery Module can be fitted as an option which allows reading of meter data via the optical port and access to the display facilities during power outages. The battery is housed in the Module Carrier that fits below the meter terminal cover.

The Battery Module connects to the meter via a special 'Molex' connector.

The 'Molex' connector is optional. The use of the External Battery Module must be specified at the time the meters are ordered.

External Battery Status

The battery voltage is monitored to detect if it has failed. A new battery install date can be programmed and can be read back from the meter.

Using the External Battery Facility during Power Outages

The External Battery facility will only operate when power has been removed from the meter. The module is energised by pressing the display pushbutton.

Once the module has been energised-

Displays can cycled in the normal way using the pushbuttons

Meter data can be read via the optical port (note that the communications session will always be completed before power is removed)

External Battery Module power will be removed from the meter if the 'No button time-out' (programmable from 10 to 120 seconds using the Power Master Unit) has expired.

D2   Installation

> ⚠ **WARNINGS**
>
> Read Section 2 (Warnings) before installing the Battery Module.
>
> Check that the terminal cover plate is in place before installing the module.
> If the terminal cover plate is **not** in place, all supplies to the meter **must** be isolated.
>
> For correctly installed 3 phase 4 wire meters, one of the battery connections will be at 'Mains Neutral' potential. Under fault conditions, this connection could be raised to a 'Fatally Dangerous Potential'.
>
> For 3 phase 3 wire meters, one of the battery connections will be at 'Mains Phase Potential'.
>
> The External Battery Module and its connection leads are double insulated. No attempt should be made to modify the assembly or open the module housing. A replacement assembly must be used if the battery becomes exhausted.
>
> Failure to follow these instructions may result in electric shock or death.

Installing the Module

1. Read the **Warnings** above

2. Remove the meter terminal cover

3. If the terminal cover plate is **not** in place, do **not** attempt to install the module unless all supplies to the meter have been isolated

4. Clip the Battery Module over the Terminal Block as shown in Section D1

5. Connect the 'Polarised Molex connector' to the 'Molex socket' making sure the cable is routed in the recess by the 'Terminal Block Screw Holder' as shown in Section D1

6. Replace the terminal cover

Technical Information

Battery Type	(Alkaline zinc manganese dioxide) +9 Volt PP3 (IEC 6LR61)
Battery Life	5 years with one reading session each month
Battery Safety	See Warnings, Section 2
Specifications	550 mA hours

A1120/40 Programmable Electronic Polyphase Meter

Chapter 4 - Communications

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DRAFT

Contents

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FORWARD

> ⚠   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.

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Communications

1   SCOPE

This Chapter covers the operation and installation of the ASL A1120/40 GSM modem and Technolog A1120/40 GSM modem. Both modems are housed in a secure carrier that fits under the meter terminal cover.

Before installing a module or module peripheral equipment, read the **Safety Warnings, Warnings, Precautions for handling electrostatic discharge sensitive devices** and **EMC Guidelines** below.

2   WARNINGS, CE MARKING AND EMC

⚠ **SAFETY WARNINGS**

Dangerous voltages are present

If the Terminal Cover Plate is **not** fitted to the A1120 meter, all supplies to the meter **must** be isolated before a module or module peripheral equipment is installed or removed.

Failure to do so may result in electric shock or death.

When installing or removing a module, be aware that multi-drop terminals may be energised from other A1120 meters.

Caution

Installation of a faulty module or module peripheral equipment may affect the main meter functionality.

2.1   Handling

CAUTION

Observe precautions for handling electrostatic discharge sensitive devices

When handling communications modules and module peripheral equipment described in this manual, observe electrostatic discharge precautions at all times.

Avoid touching connector pins and printed circuit boards on communications modules and module peripheral equipment where the PCB is exposed.

Failure to adhere to this instruction may result in electrostatic damage, contamination or corrosion.

2.2   **CE Mark**

A1120/40 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:

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

EN 50081 - 1: 1992, Electromagnetic compatibility generic emission standard - Part 1: Residential, Commercial and Light Industry

EN 50082 - 1: 1992, Electromagnetic compatibility generic immunity standard - Part 1: Residential, Commercial and Light Industry

EN 60687 1992, Alternating current static watt-hour meters for active energy - (Class 0.2s and 0.5s)

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.

2.3   Guidelines for Compliance with EMC Directive

The A1120/40 meter has been designed and tested for compliance with the EMC and other applicable directives.

It is, however, the responsibility of the installer to ensure that an installed system conforms to the directives.

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 ever possible

2. Where a.c. and d.c. circuits cross, they must do so at right angles to each other

3. The cables for each circuit must be bunched together to minimise the loop area enclosed

4. Where the environment is electrically hostile, screened twisted pair cables may be required. The screen must be connected to earth at one point only

5. Ancillary equipment must also be CE marked

Recommended transmission distances for RS232 and RS485 are shown below:
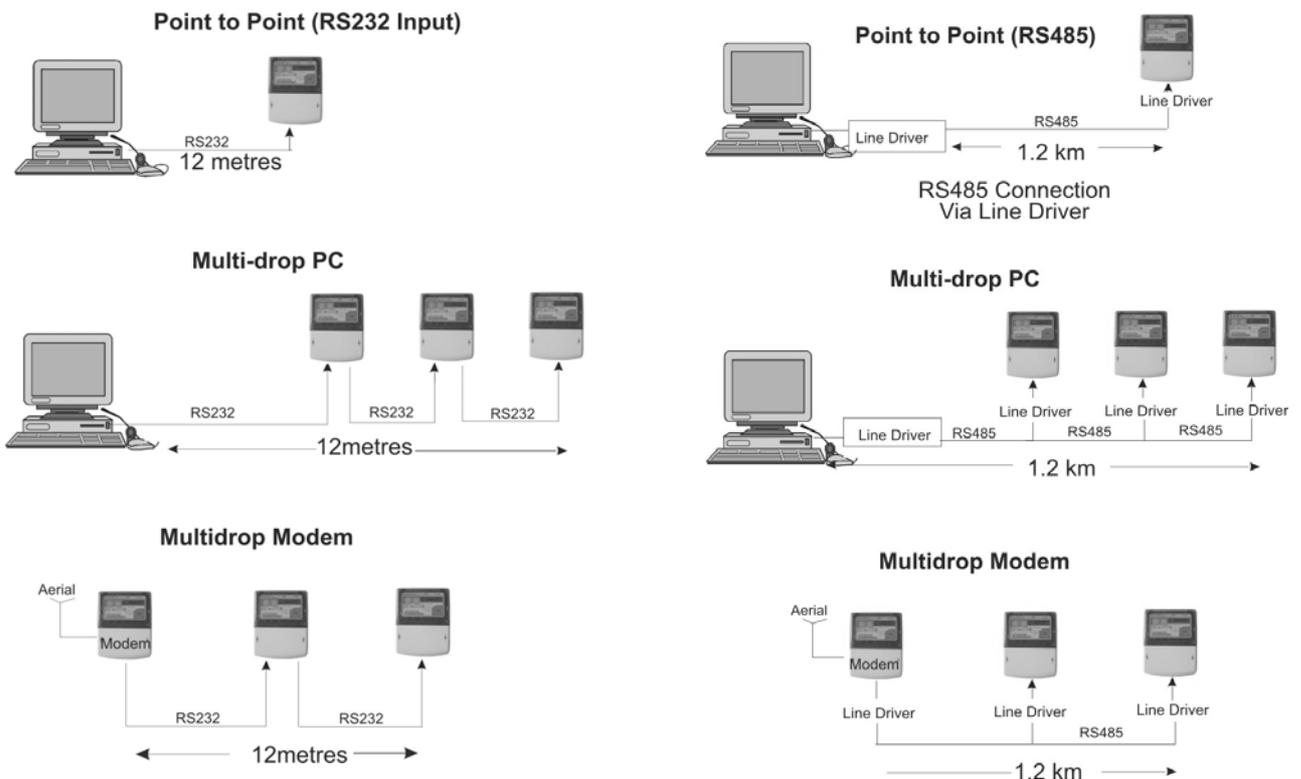
The RS232 or RS485 incoming cable should always be connected to the first meter in the multi-drop chain.

Connecting a cable to a meter in the middle of a chain is not recommended.

_____

3   GSM MODEMS GENERAL INFORMATION

GSM (**G**lobal **S**ystem for **M**obile) Communications Modems are ideally suited for use in remote areas where it is not practical to connect to a PSTN telephone network. The modems can be used in any area that provides GSM coverage.

Two types of GSM modems have been developed for use with the A1120/40 meter:

Technolog A1120/40 GSM Cello Modem

ASL A1120/40 GSM Modem

The modems have been custom designed for use with the A1120/40 meter and can be installed beneath the meter terminal cover.

GSM modems can be used with the Service provider of your choice.

Meters can be multi-dropped if required (See Section 4.2.1 for multi-drop Installation).

About the SIM

The SIM Card must be provided by the by the Network Service Provider (O2, Orange, Vodafone etc) with the following settings:

Data enabled
Air baud rate: 1200 - 9600 (the SIM baud rate must be configured to match the meter serial port baud rate)

Transparent (no error correction) or non-transparent (error correction)

The preferred settings for the A1120 are - 9600 baud, non-transparent

---

SIM security pin disable

It is a requirement that the **SIM Card Pin Security Number** for all types of GSM modem is disabled on installation. If the pin security number is enabled and the modem is powered down, a site visit will be necessary to re-enter the pin number.

Transmission speeds (all modems)

1200 baud   2400 baud   4800 baud   9600 baud

Error checking

The GSM system allows full verification of all data received when configured in non-transparent mode.

Antenna

There is a wide range of antennae, each with their own characteristics for use with GSM modems. It is therefore important to choose an antenna most suitable for your installation.

How to Site the Antenna

The antenna should be mounted vertically in a position where it is possible to receive good mobile phone reception from your Service Provider. Signal strength may be tested by using the monitor on a mobile telephone providing the mobile uses the same service provider as the SIM in the GSM.

It is recommended that the antenna is mounted at least 1 metre from the installation.

_____

4   TECHNOLOG GSM MODEM

Features

- Dual-band (900/1800 MHz)
- 1200 to 9600 baud rate
- RS232 port
- Transparent or non-transparent mode
- Fully compliant with ETSI GSM Phase 2+ specifications (Normal MS)
- Tri-coloured LED indicating modem status and signal strength
- Software reset facility
- 10 years design life
- Over the air programmable
- Powered from meter
- Power 500mA at 5V (min)

Automatic Reset Facility

An automatic reset is initiated to unlock a locked modem.

Connecting the Modem in Multi-drop Mode

Up to 10 meters (RS232) or 32 meters (RS485) can be connected in multi-drop mode.

For RS232 connection, see Section 4.1.

For RS485 connection, see Section 4.2

What You Will Need

Equipment	Description
GSM Modem	Technolog or ASL
SIM Card	(Supplied by Service Provider)
Antenna and Cable	To suit application Midi Mag 3db GSM 4m SMA (Example)
RS232 two-way Adaptor(s)	
Amplicon Line Driver(s)	Model 485

Note: There is a wide variety of equipment meeting the required specifications available for use with Elster GSM modems. Equipment listed is a representative sample only.

4.1 RS232 Multi-drop Mode

Up to 10 meters can be connected in multi-drop configuration from a single modem.
The maximum transmission distance is 12 metres. Each meter will require a two-way RJ11 adaptor to link to the next meter in the chain.

4.1.1 RS232 Multi-drop Installation Procedure

The connection diagram for RS232 multi-drop mode is shown below.

Each meter in the chain will require an RJ11 two-way adaptor.

1. Observe all **Safety Warnings**, **Warnings, Precautions for handling electrostatic discharge sensitive devices** and **EMC Guidelines** in Section 2

2. Remove the terminal cover from the meters. If the terminal cover plate is not in place, switch off all supplies to the meter.

3. Connect a two-way RJ11 adaptor to the RJ11 port of the first meter in the multi-drop chain

4. Connect the modem to the first port of the adaptor

5. Connect a Flat Pin Cable to the second port of the RJ11 adaptor

6. Replace the terminal cover and fit appropriate seals

7. Connect a two-way RJ11 adaptor to the RJ11 port of the second meter in the multi-drop chain

8. Connect the flat pin cable from the first meter to the RJ11 adaptor of the second meter in the multi-drop chain

9. Connect a Flat Pin Cable to the second port of the RJ11 adaptor

10. Replace the terminal cover and fit appropriate seals

11. Continue as steps 7 to 10 to the next meter

12. When all multi-drop connections are made and all terminal covers are in place, switch on the supplies

RJ11 Adaptor   RJ11 Adaptor

Flat 4-Pin Cable   Next Meter

_____
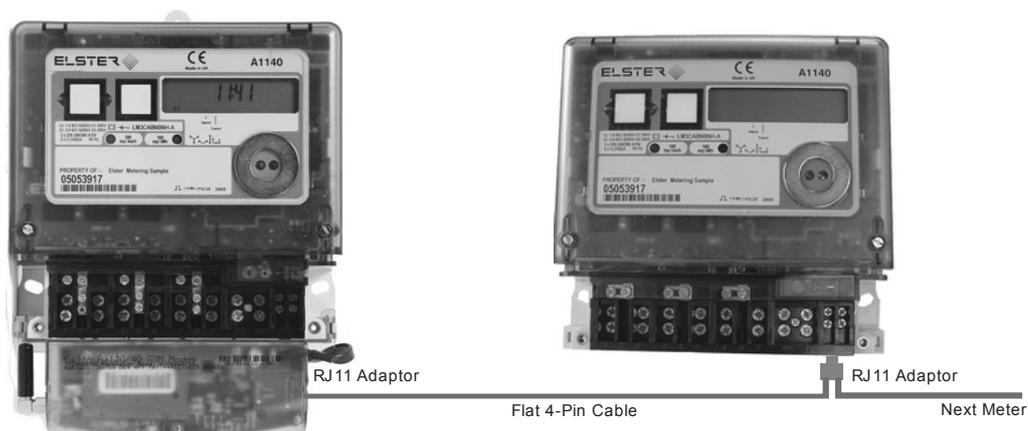
```
 A1120/40                              A1120/40
Two-way adaptor                     Two-way adaptor

 2   Tx                               Rx   2
     ─────────────────────────────────────
 3   Rx                               Tx   3
     ─────────────────────────────────────
     No Connection
 4   ─────────────────────────────────     4

 5   Zero Volts                            5
     ─────────────────────────────────────
```

4.2   RS 485 Multi-drop Mode

A1120/40 meters allow up to 32 meters to be connected in multi-drop configuration.
This configuration allows transmission over longer distances of up to 1.2km.

Each meter in the chain will require an Amplicon line driver to convert RS232 communications to RS485. The first meter in the chain will require a two-way RJ11 adaptor.

4.2.1   RS485 Multi-drop Mode Installation Procedure

The Figures below show the RS485 multi-drop connections.

1. Observe all **Safety Warnings**, **Warnings, Precautions for handling electrostatic discharge sensitive devices** and **EMC Guidelines** in Section 2

2. Remove the terminal cover of the first A1120/40 meter in the multi-drop chain

3. Check that the terminal cover plate **is** in place. If the terminal cover plate is **not** in place, switch off all supplies to the meter

4. Connect a two-way RJ11 adaptor to the RJ11 port of the first meter in the multi-drop chain

5. Connect the modem to the first port of the adaptor

6. Using a suitable lead, connect the D type of the Amplicon line driver to the RJ11 of the first meter in the chain

7. Wire pins 1-8 of the first line driver to pins 1-8 of the line driver of the second meter in the multi-drop chain.

8. At this point, communications with the meter be can checked by sending an appropriate scheme to the meter

9. Replace the terminal cover and fit appropriate seals

10. Follow steps 6 to 9 to connect the next meter in the chain

11. Replace the terminal cover and fit appropriate seals

12. Continue to the next meter
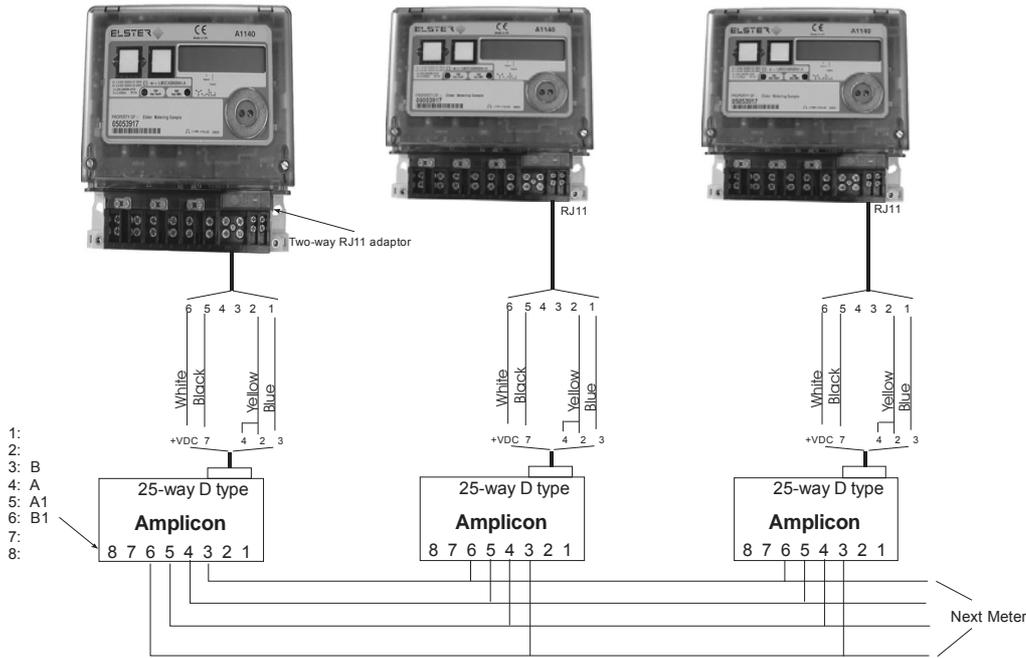
4.2.2   Amplicon Model RS485 Line Driver

The Amplicon line driver converts RS232 transmission to RS485

This configuration allows transmission over longer distances of up to 1.2km.

4.3   Configuring the Technolog Modem

The Technolog modem communications parameters can be configured using an SMS text message via a mobile phone.

The initial settings will depend on whether the meter is configured for a Standard Data to Read or Data Stream Mode.

Standard Data to Read Mode	**Data Stream Mode**
Enter Bits Per Second = 9600	Enter Bits Per Second = 9600
Data Bits = 7	Data Bits = 8
Parity = E	Parity = None
Stop Bits = 1	Stop Bits = 1
Flow Control = None	Flow Control = None

Inserting the SIM

The SIM should be set to the Service Provider settings detailed in Section C2, General Information (About the SIM).

SIM Card Type

Carefully slide the SIM into the SIM slot

_____

Modem Settings

Set up an SMS text message on your mobile phone as follows:

ZT1xyz	Where x is the baud rate	0 - 1200
		1 - 2400
		2 - 4800
		3 - 9600
	Where y is the parity	0 - Even
		1 - Odd
		2 - None
	Where z is the data bits	0 - 7
		1 - 8

Send the text message to the data number of the SIM Card

_____

5   ASL A1120/40 GSM MODEM

Features

- Modem compatible communications rates up to 9600 baud
- Error correction including V110 (for ISDN/GSM connected host
- IP connectivity for AMR using low cost GPRS services
- SMS AMR capability with programmable read time and remote diagnostics
- Industry standard RJ12 plug interface flying lead
- Host powered
- LED indication for modem status, network status and signal strength
- Standby mode with current drain of 50mW
- Typical average operating power of <500mW
- Local or remote antenna
- RS232/RS485 multi-drop option

Modem Installation

The modem connects to the meter in exactly the same way as the Technolog modem by using standard At Hayes commands

The ASL modem communications parameters can be configured using an SMS text message via a mobile phone.

The initial settings will depend on whether the meter is configured for a Standard Data to Read or Data Stream Mode.

Standard Data to Read Mode	Data Stream Mode
Enter Bits Per Second = 9600	Enter Bits Per Second = 9600
Data Bits = 7	Data Bits = 8
Parity = E	Parity = None
Stop Bits = 1	Stop Bits = 1
Flow Control = None	Flow Control = None

Inserting the SIM

The SIM should be set to the Service Provider settings detailed in Section C2, General Information (About the SIM).

SIM Card Type

Carefully slide the SIM into the SIM slot

_____

Configuring the Modem

1. Connect a PC with HyperTerminal installed to the modem

2. Open the HyperTerminal software. Type the name of the connection in the field provided

3. Press OK

4. The dialogue opposite is displayed

5. Select the PC Port to which the GSM modem is connected

6. Press OK

7. Enter the modem settings shown below

8. Disconnect the power

Modem Settings for ASL GSM Modem

Type the following commands to configure the modem:

ATQ0	<ENTER>	Quite mode off
ATE1	"	Echo on
AT&C1	"	Indicates remote carrier
AT&D0	"	Ignore DTR
ATS0 = 1	"	Answer after 1 ring
ATS10 = 50	"	Comms timeout
AT+CBST = 7,0,1	"	(These settings should be set by your service provider). [Speed], [Name], [Connection Element]

AT+0	Speed	9600 N81
AT+1		9600 E71
AT+2		4800 N81
AT+3		4800 E71
AT+5		2400 N81
AT+6		2400 E71
AT+7		1200 N81
		1200 E71

Once configured, remember to change HyperTerminal baud rate to match.

ATE0	<ENTER>	Echo off
ATQ1	"	Suppress result codes
AT&W	"	Save settings
AT&V	"	View modem settings

LED Status Indicators

The ASL modem has three status LED's

Modem Status (Green LED)

Slow flash (once every 3 seconds) CDS mode (waiting for call)
Fast flash (twice a second) during call

Network status (Red LED)

Off (module off)

On (Not registered)
Long pauses, short blinks (Registered with network)

Signal strength (Yellow LED)

Off/ Slow flash/ On (with increasing signal levels)
(The more 'on time' the better the signal)

A1120/40 Programmable Electronic Polyphase Meter

Chapter 3 - Software Support

M181 001 3C
12.2007

CONTENTS

Power Master Unit Meter Compatibility

Variants of the A1120/40 Meter that can be programmed with the Power Master Unit are shown opposite. This manual is for use with the A1120 meter and the A1140 load profile meter only.
See the list below for details of meter variants.

To program an A1700 (Vision) meter or PPM see manual M120 001 6.

To program an A120 or A140 single phase meter, see Manual M130 001 3.

For programming meters it is strongly recommended that only one meter variant is selected at a time.
If more than one type of meter is selected and a Scheme is created, scheme parameters applicable to the lowest specification of meter only will be programmed to the meter.

Scheme Compatibility

A1120/A1140

A1120
- ☑ A1120 (LM********-A)
- ☐ A1120 (LM********-C)

A1140
- ☑ A1140 (LM********-A)
- ☐ A1140 (LM********-C)

Meter variant
- ☑ LM*******B-* (Imp Wh Only)
- ☐ LM*******C-* (Imp Wh, Q1 and Q4 varh)
- ☑ LM*******D-* (Imp Wh, Q1, Q2, Q3, Q4 varh and Imp VAh)
- ☑ LM*******E-* (Imp/Exp Wh)
- ☑ LM*******F-* (Imp/Exp Wh Q1, Q2, Q3, and Q4 varh)
- ☐ LM*******G-* (Imp/Exp Wh and VAh1/2)
- ☐ LM*******H-* (Imp/Exp Wh Q1, Q2, Q3, Q4 varh and VAh1/2)

☐ Save As Default

✔ Ok   ✘ Cancel
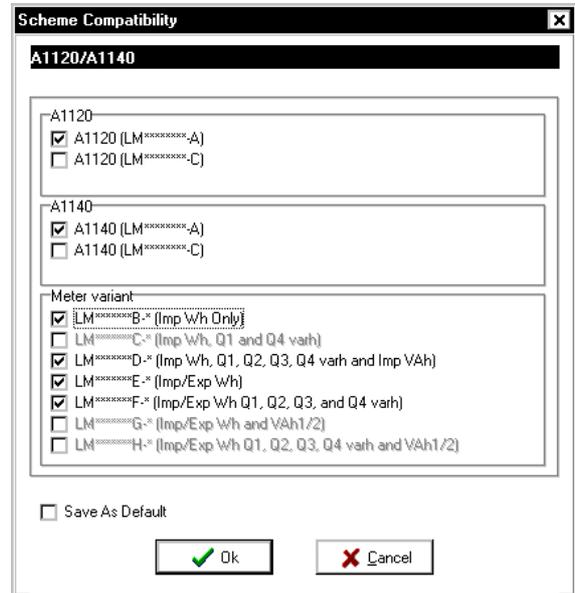
A1120/40 Meter Variants

	A1120/40 Versions
LM***** - A**	Times always show UTC/GMT
LM***** - C**	Times (as selected) show GMT/BST
LM*****B -**	Import (Wh)
LM*****C -**	Import (Wh), Q1 and Q4 (varh)
LM*****D -**	Import (Wh), Q1 and Q4 (varh), VA 1
LM*****E -**	Import/Export (Wh)
LM*****F -**	Import/Export (Wh), Q1, Q2, Q3, Q4 (varh)
LM*****G -**	Import/Export (Wh), VA 1/2
LM*****H -**	Import/Export (Wh), Q1, Q2, Q3, Q4, (varh), VA 1/2

Software Installation

What you will Need (Recommended Minimum Specification)
Pentium 3 Processor
256 MB RAM
CD ROM
60 MB free hard disk space
SVGA Display

The Power Master Unit has been developed as a 32-bit Windows™ application.
As such it should present no problems running on most configurations of Windows NT 4, Windows 2000 and Windows XP.

Several third party software packages (such as CHIRPS) are included in the Power Master Unit. Refer to their operating instructions/authoring company's to determine their levels of Windows compatibility.

The performance and operation of the Power Master Unit Software will inevitably depend on the way Windows has been set up on a given PC. There are a number of limitations when using a "single user" application in a fully networked environment and where the operating system controls the interaction between an application and the resources of the computer. Wherever possible it is recommended that the Power Master Unit machine is set to single application/single user mode with all local permissions, etc. set.

Operating recommendation

It is recommended that the Master Unit is operated using a mouse.
Portable computers should use an external mouse fitted to the mouse port.

The Power Master Unit can be operated from the keyboard if required.

Installing the Software

Before beginning installation, make sure all other programs are closed.

If upgrading the Master Unit to a later version, **ALWAYS make a back up of the database** prior to beginning the upgrade.

The installation can be halted by clicking on the "Cancel" button on the bottom right of the screen.

To install the software, follow the instructions below:

InstallShield

Click on the Install Software hypertext link in the Read Me. The InstallShield Wizard will run.

After a short time the screen opposite is displayed.
If the Power Master Unit is not already on your PC a prompt will be displayed to continue.
Click Upgrade Power Master Unit, Next to continue.

Read Me

If a new installation is being installed a Read Me screen is displayed.

Note: The Read Me contains important information on the Master Unit installation. Please familiarise yourself with the contents before proceeding with the installation.

Click Next to continue.

Type of Installation

The following types of installation can be selected:

1. New Installation

2. Upgrade PMU 16 bit -> PMU 32 bit

3. Upgrade PMU 32 bit -> later version 32 bit

Select your option and click Next to continue.

Note: If New Installation is selected and a 16 or 32 bit version of the Master Unit is already installed on your PC, a warning will be displayed to select an upgrade option or completely uninstall the Master Unit.
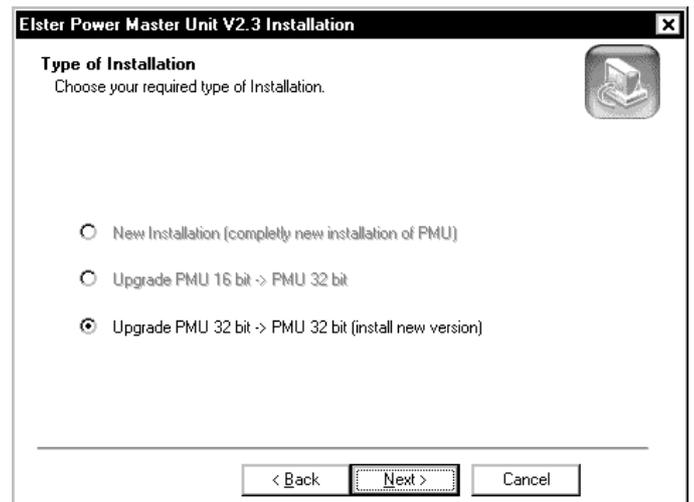
Choose Destination

The Power Master Unit will be installed in the selected folder. The default destination is C:\ELSTER\PMU\.

Use the Browse button to select another folder.

Click Next to continue.

A prompt is displayed if it is OK to overwrite the installation. Click Yes.
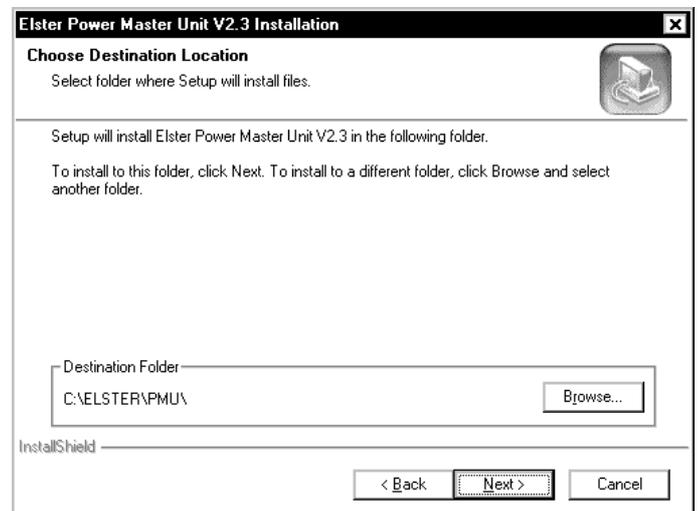
Installation Options

Click the installation options required.
The Master Unit can be installed in the default directories or a directory of your choice by using the Browse buttons.

Click Next to continue.

Note: For an upgrade it is recommended all installation options are selected and Use copy of existing database.
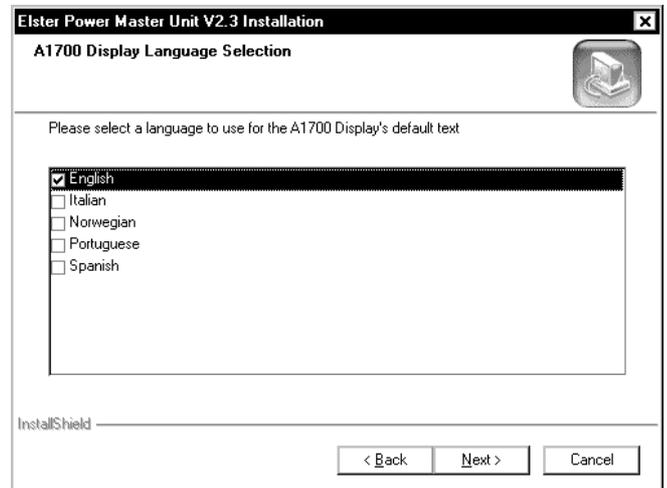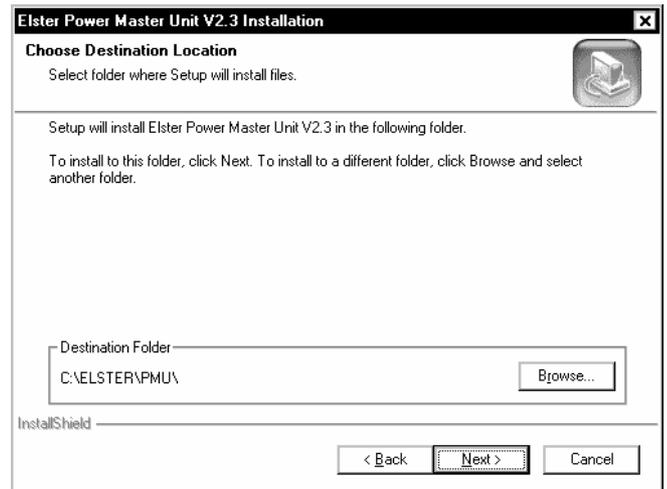
Flag Probe Selection

Various probes can be used to communicate with meters via the optical 'FLAG' communications port. These probes are one of two basic types:

Probe with DTR disabled

Probe with DTR enabled

It is important to choose the correct probe for your installation, as optical communications will not be available if the wrong probe is selected.
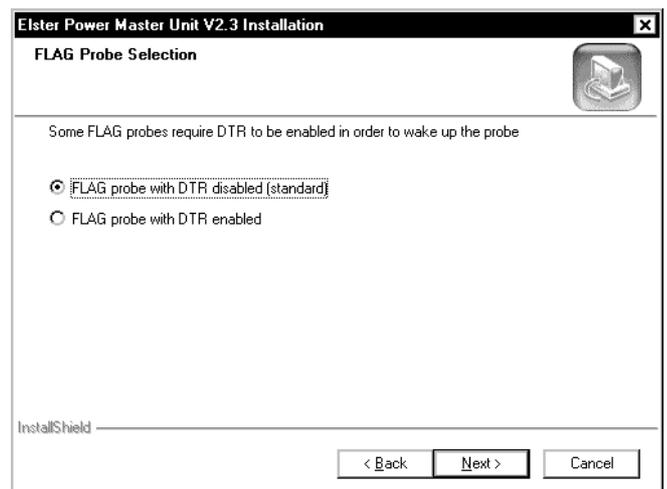
Select Program Folder

This allows the program to be stored on the Start Menu in the folder name of your choice.
You may select a folder already on your system or select a new folder. When you have chosen the folder:

Click Next to continue.

Start Copying Files

Before the files are copied to your PC, a summary of the files you have selected to install is displayed. Before continuing, check they are the options you require.

Click Next to continue.
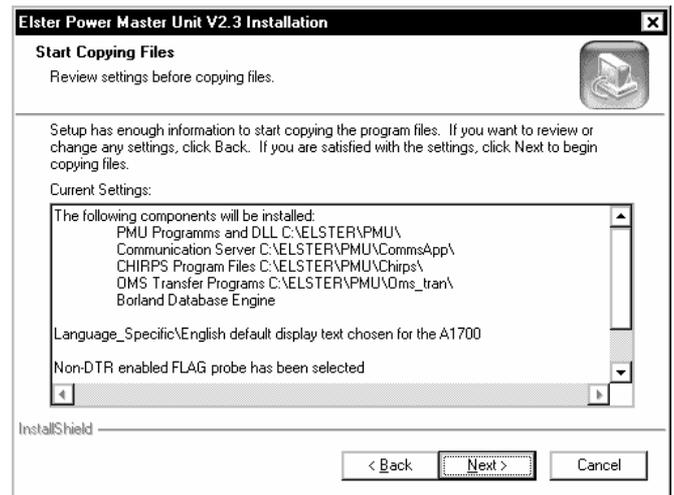
Installation Complete

The files are copied to your PC.

Click Finish.

Note 1: The Power Master Unit must have a printer attached for correct installation.
If a printer is not available a generic print driver may be used.

Scheme Manager

Scheme Editor	**Readings**
Meter Identifiers	As Scheme Editor +
Passwords	Current Values
Tariff /Display	Historical Registers
Deferred Tariff /Display	Instantaneous Values
Deferred Tariff Setup	Meter Physical Info
Billing Dates	Instrumentation Values
Meter Constants	
Relay Setup	
Load Profiling	
Meter Options	
User Interface Options	
Time & Date	

Meter Manager

Meter Information Editor
Connection (Comms)Type
Elements
Relays
Load Profile
Communication
OS & Telephone Number
Identifiers
Utility Codes
Passwords

Systems Administration
Changing Passwords
Defining a New User
File Locations
Meter Connection Setup
Comms Server Setup
Back-up Database
Time Set Mode
Language

Meter List

Meter Schemes

Quick Send

Execute Meter List

Examine Meter Readings

Register Values, Historical Registers, Load Profile Data, Instrumentation Profile Data, Security Data, Hardware Configuration
Meter Identifiers, Passwords, Tariff, Deferred Tariff, Billing Dates, Display, Meter Constants, Customer Registers, Relay Setup,
Load Profiling, , A1120 Options, A1120 UI Options, Time & Date

A1120/40 Power Master Unit Overview

Power Master Unit

1.1 Power Master Unit Introduction

This section gives the basics on how to use the Power Master Unit software.

The Power Master Unit (Referred to in this manual as the Master Unit) software is a menu driven package designed to support all variants of Elster Metering Systems:

A1700 (PPM) Polyphase Commercial and Industrial Meters

A1120/40 Light Industrial and Commercial Meters

A120/140 Electronic Single-phase Domestic Meters

Power Master Unit meter compatibility does not allow different meter types to be programmed by the same scheme, therefore a separate manual support's each application. This manual supports A1120 and A1140 meters only. For information on how to program the A1700 and PPM meters, see manual M120 001 6.

To program A120/140 meters, see manual M130 001 3.

The key features of the Master Unit software are:

Menu driven, using Microsoft ® Windows based operating software to guide the user through the process of setting up a meter for any particular application.

Programming structure to ensure that, if an attempt is made to program a feature that is not present in a meter, erroneous data cannot be programmed.

All other features are programmed normally.

The Software permits:

Reading and Programming directly through the optical port

Reading and Programming through the serial port either directly or via a modem

Reading and Programming indirectly via a Hand Held Unit (HHU) through the optical port

Transferring information to and from a HHU

1.2 Prerequisites

This tutorial assumes you are comfortable with the 'Microsoft Windows' environment.

The Master Unit is Windows™ compatible, but if you are uncertain of the Windows structure, it is worth spending a little time familiarising yourself with the 'Brief Tour of Microsoft Windows' in the Windows manual before entering the software.

1.3 Logging On to the System

Open the Power Master Unit from the appropriate directory to display the Master Unit Logon dialog.

For security reasons, only users with a direct knowledge of the correct User id and Passwords will be permitted to Log On to the Master Unit software. The Password is initially set to Elster. This should be changed as soon as possible to prevent unauthorised access to the Master Unit. The password may be changed using the System/Change Password dialog from the Main Menu bar.
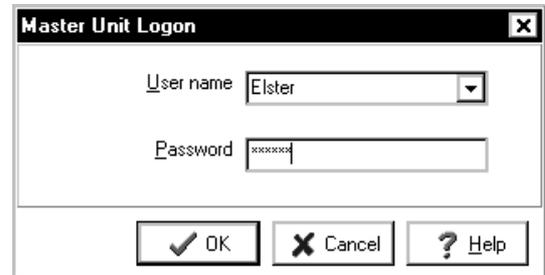
To enter the system a User name with the correct Password must be entered. Three attempts to match the Password with the User name are allowed before access is denied. If a match is not found, a message is displayed and the program exits.

Select the User Name and enter the password. The system enters the Master Unit main menu.

The default password is:

User Name   Elster

Password   Elster

Note: Administrator access is for certifying or building meters only.
For details of Administrator access, contact Elster Metering Systems.

1.4 Features of the Main Master Unit Window

When the software is first entered, the Main window is displayed. The Window is divided into elements consisting of three Action Windows and a Status Bar.

Action Windows

There are three action windows, the Scheme manager, Meter manager and the Meter list.

The Scheme and Meter manager function in a similar way and consist of two panes. The left pane is divided into a series of folders and sub folders. These folders represent Scheme related and meter information. The right pane consists of objects that relate to an opened folder.

The Meter list brings together a meter or number of meters from the Meter manager and a scheme or a number of schemes from the Scheme manager to produce a list of meters and their associated schemes.
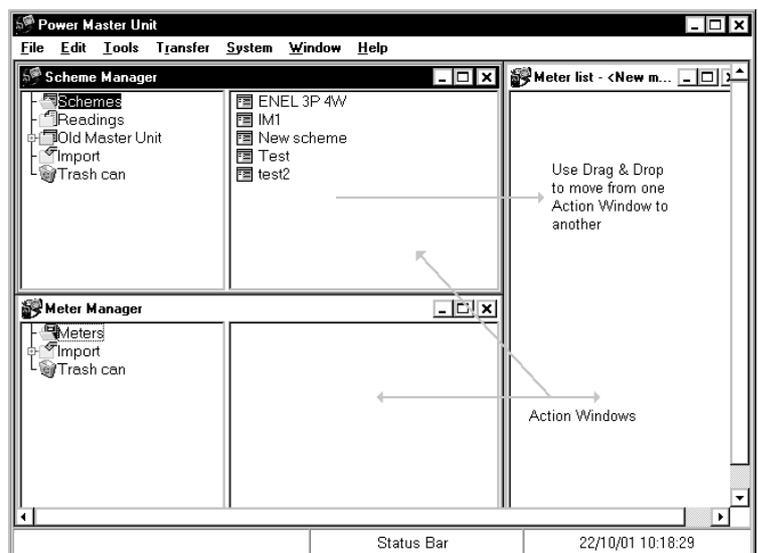
Techniques used on the action windows

Selecting Objects or folders

Point at the object or folder and click the left most mouse button.

The object or folder will appear highlighted.

Opening folders

In the Scheme Manager, double click the leftmost mouse button on Schemes. The folder will open to show further folders.
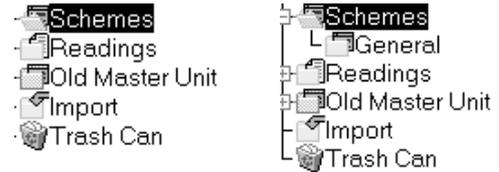
Dragging and dropping objects or folders

Valid objects or folders can be moved from the Meter manager or Scheme manager to the Meter list using drag and drop techniques.

Use of the rightmost mouse button

Point to an object in the Scheme manager and click the rightmost mouse button. A menu appears.
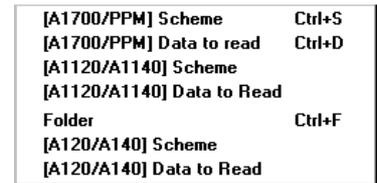
1.5   **The Main Window**

This section provides an overview of the Master Unit Software. The use of the components of the Window is detailed in the section, Features of the Main Master Unit.
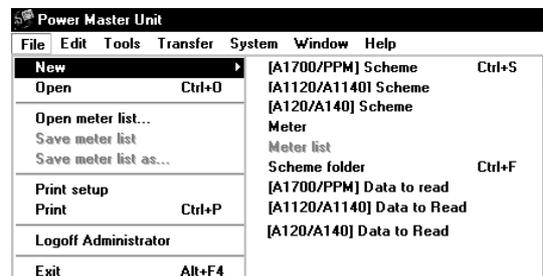
Menus

File

New
Scheme: Opens a new blank A1700 (PPM), A1120/40 or A120/40 Scheme in the Scheme manager ready to be edited.

Open: Opens an existing file ready to be edited

Open Meter List: Opens the Load Meter list Action Window. Select a Meter list and press Load to open the list.

Save Meter List: Allows a new Meter list to be saved.

Save Meter List As: Allows a Meter list to be edited and saved as a new name.

Logoff ELSTER: Logs off the current user

Exit: Quits the Master Unit

Edit

Cut - Remove a highlighted object and insert it on the clipboard, then use the paste facility to paste it in a folder

Paste - Paste a cut object from the clipboard to the selected Manager.

Rename - Rename a highlighted object.

Delete - Delete a highlighted object. (For the Scheme manager and Meter manager the object is inserted into the Trash can).

Tools

Delete RES Files

This option allows unwanted .RES files to be deleted.
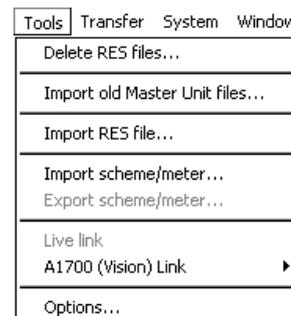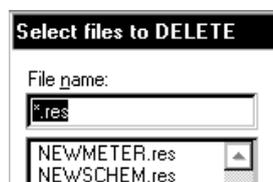
Import old Master Unit file - This allows files produced in the original Elster Metering Systems Master Unit to be converted for use in the Power Master Unit. Files are imported to the Old Master Unit folder and arranged as a scheme for use in the Power Master Unit.

Import RES file - This retrieves meter readings from different locations such as a:\ to be transferred to the Master Unit.

Import Scheme/meter - Import a Scheme or meter parameters from another source such as a floppy disk or Network drive.

Export Scheme/meter - Export a Scheme or meter parameters to another source such as a floppy disk or Network drive.

Options

Operation

Confirmation - Confirmation gives the option of warning the user if schemes, meters or folders are being moved or deleted.

Automatically Scan for Readings - When selected, all readings files will be automatically imported in the Scheme manager. The default of the scanning frequency is 10 seconds, but this can be altered using the scan frequency dropdown box.
If the Master Unit is networked or a low specification PC is being used, leave this option unchecked for faster Master Unit response. Check as required to update the readings using the Automatically scan for readings facility.
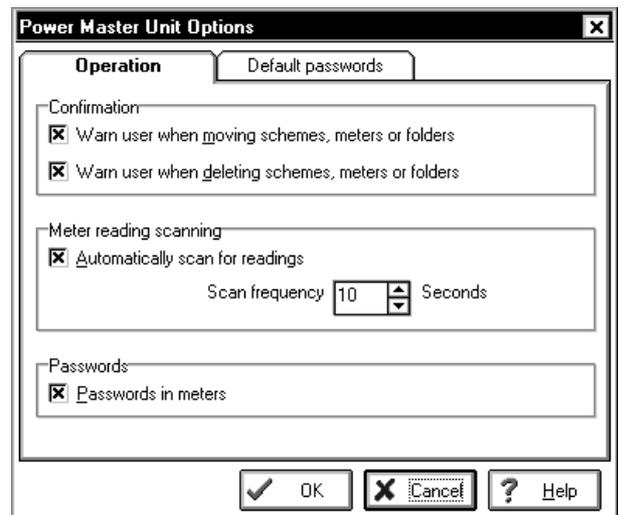
Passwords in Meters - This option allows the passwords of A1120/40 meters to be ignored.

Default Passwords - This option allows the default passwords to be entered and used as defaults in the Meter Manager. The passwords must match the passwords programmed to the meter.
Note: Only uppercase alphanumeric characters may be used.

Transfer

Execute Meter List - This will execute the Meter list currently selected.

Quicksend Scheme - This allows a Scheme currently selected to be programmed to a meter, bypassing the Meter list.

Launch Communications Server - Opens the Communications Server ready for a communications session

Launch CHIRPS - Opens CHIRPS ready for a communications session.

Launch OMS - Opens the Open Metering Systems software ready for a communications session with a Hand Held Unit.

System

Change Password - Used to change the Current User's password.

User Administration - Used to set a User's permissions or add New Users.

File Location - Used to locate System Files.

Meter Connection Setup - Allows communications facilities to be specified.

Communications Server Setup - Allows all communications ports to be configured

View Communications Log - Views the log of communications session.

Back-up Database - Allows a total back-up of the database to be created.

Time Set Mode - Allows a meter's time to be set automatically to the system time, or to a predetermined time.

Language - Allows a language choice to be selected for the strings resources.
The Master Unit is then restarted and the new language strings are implemented.
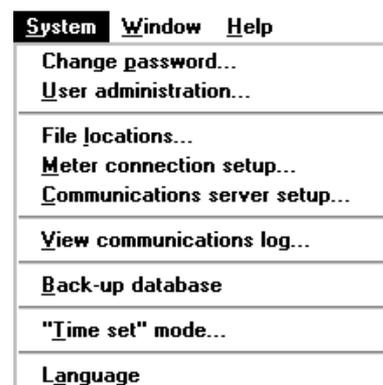
Window

Show Communications Failures Window - Allows all communications failures to be viewed or saved.
Saved files may be kept as a record for support purposes.

Arrange - Opens minimised Windows and re-arranges customised Windows to the Master Unit Set-up.
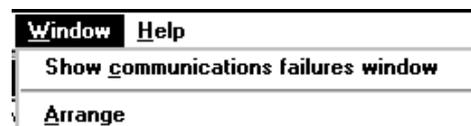
Scheme Editor Pages

Each page in the Scheme editor is similar in construction with all fields and controls being used in the same way.

The Meter Constants page is shown opposite. It consists of a Page Identifier and three Check Panels.
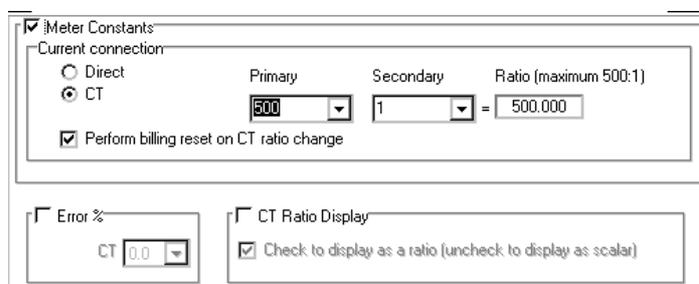
Page Name Identifier

This identifier is unique to the page currently being edited. Other pages of this type can be selected using the arrow by the side of the identifier. This allows editing of an existing scheme or new schemes using the same data to be created.

Check Panels

The Transformers ratio check panel is shown below and is selected or deselected using the check box in the top left corner.

☐ If the box is unchecked the contents of the panel cannot be altered. The meter functionality or data will remain unchanged.

☑ If the box is checked, the panel becomes operable and the meter functionality or data can be changed.

Using the Toolbar

Restore Scheme
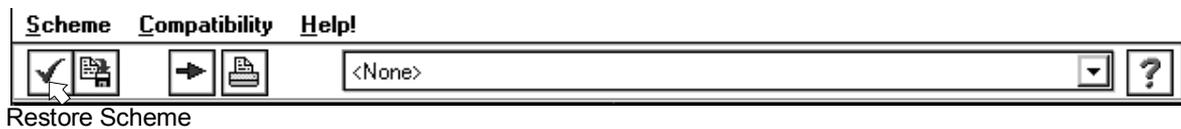
The toolbar allows special tasks to be performed by simply pressing the required toolbar button. By laying the cursor over a button, the button name is displayed.

About Help

The Power Master Unit Help gives a step-by-step guide on how to enter a scheme into an A1120 meter or A1140 meter.

All information required to program a meter is contained in the Help.

Using the F1 Key

Pressing F1 whilst a topic is selected in the Master Unit software displays the topic Help information.

_____

The Scheme Manager

2.1   Introducing Schemes

The Scheme manager allows schemes to be organised or read.

A Scheme can consist of an individual entry, such as a Tariff/Display sequence.
This Scheme may be used to program a number of different meters with the same Tariff and Display sequence. This gives the advantage of changing only one parameter or any combination of programmable features of a group of meters, all other parameters remaining unchanged.

2.2   The Scheme Manager Components

The Scheme manager is divided into five components.

Schemes - Used to store and organise Schemes.

Readings - Used to store the readings obtained from a meter after the Data transfer of a Scheme incorporating a Read.
The Readings can include all Scheme data, Diagnostic data, Load profile data and Status reports. Data Stream Mode allows fast reading of Register Readings, Historical Data and Load Profile Data.

Old Master Unit – Not applicable to A1120/40 meters.

Import - This option allows any valid Power Master Unit file to be imported. Individual or linked files can be selected. For example, if a Scheme is selected for Import, all pages will also be imported.

Trash Can - All files deleted from the Scheme manager are transferred to the Trash can.
They can be transferred back to the Scheme manager using cut and paste or by selecting the file and dragging it to the scheme folder. To empty the Trash can, select the items and press Delete. The entries are removed from the database.
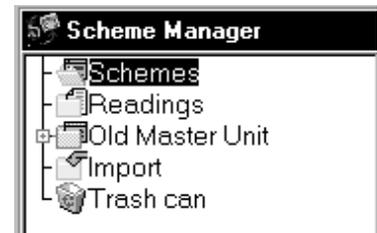
Warning - *Once files have been deleted they cannot be recovered***.**

2.3   Scheme Manager

Once a component of the Scheme manager has been selected, a Context Menu with the options shown opposite becomes available. Select A1120/40 scheme. Options obey standard Windows conventions and are viewed by pointing at the right pane of the Scheme manager, then right clicking the mouse.

_____
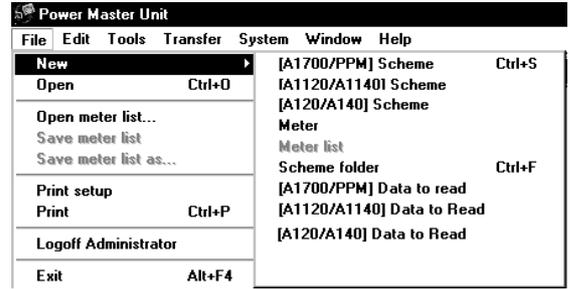
Scheme Editor

3.1   Selecting the Meter Type

Before using the Scheme editor, the type of meter to be programmed must be selected.
Select File/New/A1120/40 Scheme and open the scheme. Select Compatibility on the Main Menu Bar.

Select the appropriate meter variant only. From now on the Power Master Unit will only display parameters applicable to the selected model(s) of A1120/40 Meter. It is strongly recommended that only one meter variant is selected at a time. If more than one variant is selected and a Scheme is created, scheme parameters applicable to the lowest specification of meter only will be available for selection.

To Select meter compatibility - Select compatibility A1120 in the Scheme Editor then select meter variant.
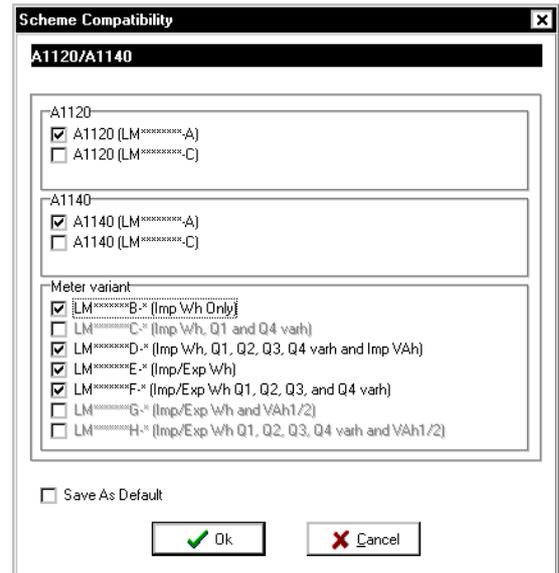
If 'Save as Default' is checked, the selection will be saved and used as the default when the Power Master Unit is powered up and new schemes are created.

3.2   Scheme Editor

As an entry is made to a Scheme**,** the entry in the Summary changes to **Bold** (See opposite). This allows quick verification of Scheme entries.

Care should be taken when entering a Scheme to ensure the correct parameters are selected for generic meter models. If a parameter is not available for a particular model of meter, the meters will still be programmed, but no action will take place for the unavailable parameter. For this reason it is recommended that meter compatibility is selected in isolation.

Meter Identifiers
Passwords
Tariff
Deferred Tariff
Deferred Setup
Billing Dates

Toolbar

The Scheme Toolbar is shown opposite. It consists of the following components:
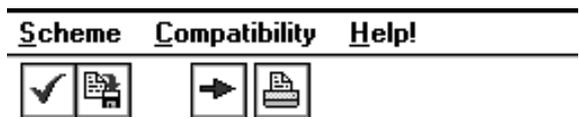
✓ Restore Scheme

If a scheme has been modified but not saved, restore returns the scheme to its original settings.

🖫 Save Scheme

Save scheme saves the current scheme settings.

➡ Quick Send

Quick send allows a scheme to be transferred to the meter.

🖨 Print

Sets up the properties for the system printer and allows all pages of the current scheme to be printed.

3.3   Starting a New Scheme

To enter a scheme from the Main Window, select File/New/A1120/40 scheme, or right click the mouse in the right pane of the Scheme manager and select New/A1120/40 Scheme.

To Enter a Scheme - In the Main Window, select the File/New/A1120/40 Scheme option.
A Scheme called New Scheme is entered in the Scheme manager and is highlighted.

Rename the scheme and press Enter.

3.4   Scheme Editor

The Scheme Editor can be used to program all variants of the A1120/40 meter.

Meter Constants	\<None\>
Relay Setup	\<None\>
Load Profiling	\<None\>
PPM Meter Options	\<None\>
Time and Date	Time and Date

_____

3.4.1   Summary

The Summary gives a quick preview of the schemes entered for each section in the Scheme editor.

Using the Summary Page

All items shown in bold will be programmed to the meter.

3.4.2   Meter Identifiers

This Page allows the Scheme id, Outstation number and Meter serial number to be entered.

The Scheme id is 8 alpha-numeric characters long. An un-programmed meter will have a scheme id of 00000000.
A Scheme id must be entered if it is to appear when the meter is read.

The Outstation number is 3 digits long.

The Meter Serial number is completed if the identifier currently programmed into the meter is to be changed. The identifier consists of up to 16 characters.
Note that only an Administrator can change the meter Serial Number.

☑ Scheme Identifier
New scheme identifier [training]

☑ Outstation Number
New outstation number [001]

☑ Serial Number
New serial number [0000000000000000]

3.4.3   Passwords

Password Security

Three levels of Password Security protect the A1120/40 meter.
For information on the levels of security, see the A1120/40 meter hardware manual (M181 001 2).

Each level of password consists of eight characters. The Passwords are right padded with dashes.

Passwords
☑ Level 1
New password (level 1) [--------]

☑ Level 2
New password (level 2) [--------]

☑ Level 3
New password (level 3) [--------]

This dialog is used to change the meter password security. The password to communicate with a meter is entered in the Meter Information Editor or Quick-send password box.

Note - The integrity of the A1120/40 meter passwords should always be protected. This can be achieved by ensuring the ability to change passwords is controlled and only made available to Administrative personnel. The level 3 password should be changed at regular intervals. It may be appropriate for no more than 100 meters to be protected by the same level 3 password.

Calibration values, zeroing of registers etc. are protected by a security link that is removed at the factory before the meter is sealed.

3.4.4   Tariff/Display

The Tariff/Display Page is divided into six Tabs, Register sources, Define season, Season change over dates, Default, Utility display and Checksum.

Complex tariffs should be entered in a logical manner, by completing each Tab working from left to right.

Note – All tab's should be completed otherwise some information may be cleared from the meter.

Register Sources

8 Rate Registers, 4 Maximum Demands, 2 Customer Defined Registers
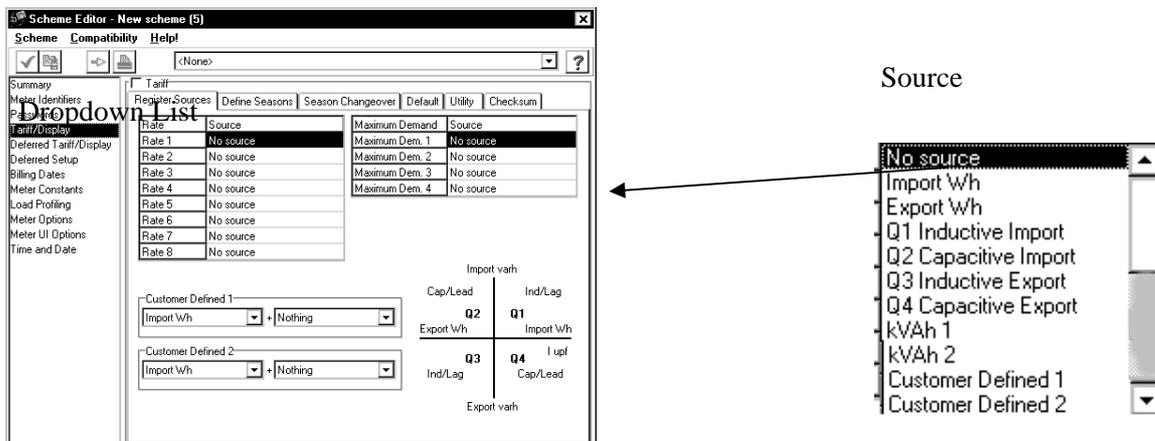
The source of each of the Rate Registers and MD Registers must be defined.

To Select Rate Sources - Double click source for the required rate to reveal the dropdown list then select the required source from the list by hitting return.

Customer Defined Registers

Two **C**ustomer **D**efined (CD) Registers can be used throughout for tariff scheme, cumulative, load profile data and display. They are programmable to accept values from any two of the following like-unit registers:

a) kWh total import
b) kWh total export

c) Q1 kvarh Import Lagging Energy
d) Q2 kvarh Import Leading Energy
e) Q3 kvarh Export Lagging Energy
f) Q4 kvarh Export Leading Energy

g) Add import kVAh
h) Add export kVAh

_____

Examples of their use are:
CD Register 1   kWh import + kWh export (a + b) = Total kWh
CD Register 2   kvarh import lagging + kvarh import leading (c + d) = Total Import kvarh

Define Seasons

12 Seasons

This Tab allows the Seasons to be created. The Seasons are then applied to the Season change over dates.

Each Season must be given a unique name.

This Tab also allows the Rate Source Clock to be displayed in steps of 5, 10, 15 or 30 minutes.

To Defining a Season - Select required Season and name the Season

Click on New Day, name the Day, then press the Add button
Double click on Monday to reveal the dropdown list, then select New Day

Click on the Add Rate button. The Rate Source
clock is displayed

Place the cursor on the leading edge of the active time (a double arrow will be displayed), then drag to the start time for the Rate. Repeat for the end time of the rate. Alternatively time may be entered directly on the right hand side.

Click on the Add Rate button and repeat for all required Rates and MD's for this Season

Repeat for all required Days and Seasons

Select Scheme/Save page as from the main menu and save the page

Note 1 - **Use copy of existing day type** allows a similar day type to be created and saved as a new name.

To create a similar day type, press the New Day button and Check the Use copy of existing day type box. Select the Day type from 'Existing day types' then Type the New day name, then press the 'Add' button.

Season Changeover Dates

24 Season Changeover Dates

Season Changeover Dates are the dates on which a new season begins. Season Change Over Dates are defined by day, month and season number.

Entering the seasons changeover dates

To enter a fixed date - Select the first season then click on the Season Dates column at the start of the required Season.

Click and drag to the Season end date

Repeat for all Seasons

Select Scheme/Save page

If a date other than the first day of the month is required for the season start date, click on the 'day' tab and use the scroll bar to find the start of the season. Click and drag to the Season end date
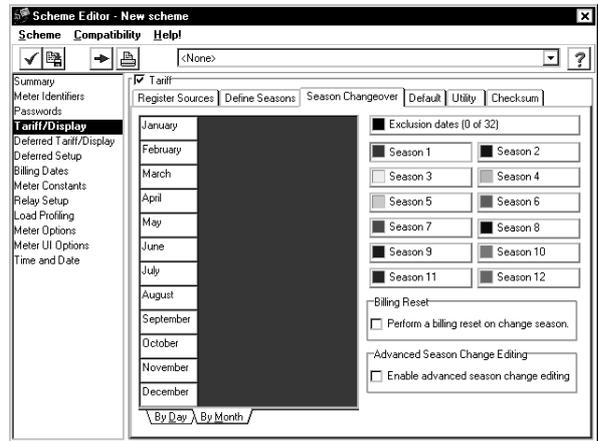
To enter a variable date - Check Enable Advanced Season Editing then select the Season.

From the Season Change Editor, select Last Monday in April.

Selecting Next starts on Last Sunday in September.

Select OK.

Note: February 29 will only be activated on leap years even if selected, otherwise the February 28 will be used.

The calendar can be viewed by day or by month by selecting the appropriate option at the bottom of the calendar.
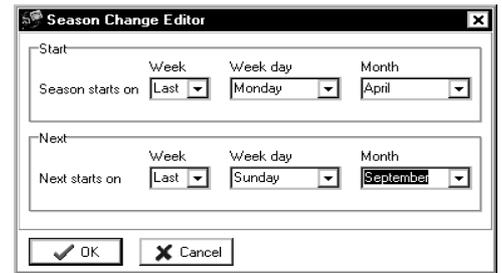
Billing Reset
A Billing Reset can be activated by selecting 'perform a billing reset on change season'.

Exclusion Dates
32 Exclusion Dates
Exclusion Dates are the dates when the normal switching times for that season are not to be adopted i.e. Public Holidays. Instead, Switching times with defined actions take over.

A switching time for the 1 Jan is shown opposite.
The shaded box indicates the season or day to switch to i.e. Holiday is the day type selected to use.

_____
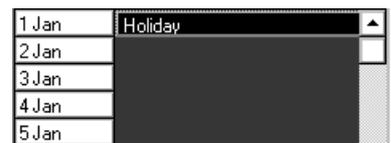
Choosing the Exclusion Date Type

The Exclusion Date can be set to one of the following options:

Set to day type – this sets an Exclusion Date to a particular day as defined in the Define season day list

Set to specific day of the same season – this sets the Exclusion date to a specific day of the Season currently selected

Set to specific season – this sets the Exclusion date to the day currently selected of a specific Season.

Exclusion Date Repetition

The A1120/40 meter Exclusion Date repetition can be applied in the following ways:

Every year

Specified year only

Repeated every four years from the specified date

The set to first option allows the Exclusion date to be applied on a selected day of the week on or after the specified date.

e.g. set 1st Monday after April 25th to obtain 1st Monday in May.
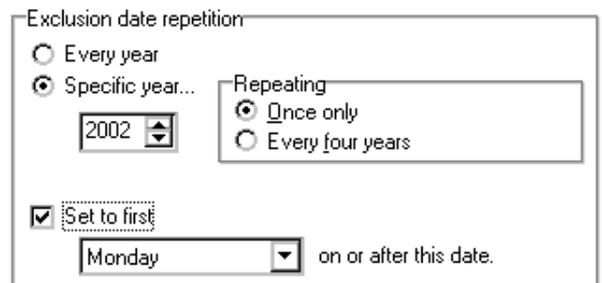
Default Display

Up to 40 Displays can be shown in the A1120/40 Default display sequence.

For ease of building, the displays are arranged in a number of sections which can be chosen from the Selection drop down box. Displays can be in English or displayed as OBIS codes.

To display OBIS codes, check the Enable OBIS codes checkbox.

To change or enter OBIS codes, select the Defaults Tab. Highlight the field to be changed and type in the new code (A maximum of five characters are allowed for the full OBIS code).
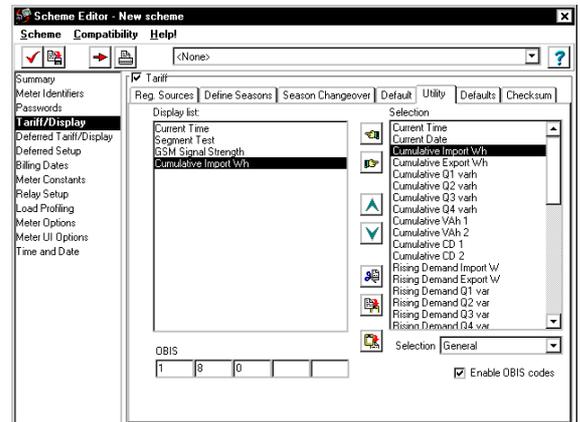
Building the display

The available displays can be entered using Drag and Drop or by using the ✎ Button.

Drag and Drop

Click on the required display from the Available displays list and hold down the leftmost mouse button. Drag the selected display Item from the Available display list to the Display list.

To transfer a group of sequential displays - Click on the first display in the list.

Hold down the shift key.

Click the last display required in the list (the displays will appear highlighted) then drag the highlighted displays to the display list.

Using the Buttons

To Transfer a display - Select the required display from the Available display list.

Click the ⬎ button. The display is transferred from the Available display list to the Display list.

To Remove a display from the display list - Click on the required display

Click the ⬏ button. The display is removed.

To Change the display order - Click on the required display and click the ⬈ button to move the display upwards in the display order.

Click on the required display and click the ⬇ button to move the display downwards in the display order.

Utility Display

Up to 40 Displays can be shown in the A1120/40 Utility display sequence.

The displays are entered in exactly the same way as the Consumer Display.

Checksum

This includes a checksum of the complete Tariff/Display Scheme. The checksum can be used to verify the meter is running the same scheme as in the PMU.

3.4.5   Deferred Tariff/Display

The deferred Tariff/Display is a pre-defined tariff that will become active specified by the user in the Deferred Tariff Setup.

The setup for the deferred Tariff/Display is exactly the same as Tariff/Display.

_____

3.4.6   Deferred Setup

This Page allows the Deferred Tariff/Display to be disabled, or enabled on a specified date.

A Billing Reset on switching to Deferred Tariff can also be actioned.

3.4.7   Billing Dates

13 Billing Dates

This Page allows the End of billing dates to be set. The dates can be set to a date specified by the user or to the last day of each month.

Sort Table: Press Sort table to arrange the dates in sequential order.

End of month: Press End of month to enter the last day for all months.

Note: Although the 29th February may be entered, the End of billing will occur on the 28th of February for non-leap years.

Perform billing reset during communications option - When selected, this option causes a billing reset to be performed at the end of each communications session.

Enable Auto-reset - When selected the meter will perform a Billing Reset and store all Historical data every midnight. At each Billing Reset the oldest of the fifteen historical data records will be overwritten. Automatic end of billing dates take precedence over the enable auto reset.

Reset Maximum demands - When Enable Auto Reset is enabled, checking the Reset Maximum Demands checkbox will reset the maximum demand registers.

The highest demand of each maximum demand register is added to the corresponding cumulative maximum demand register.

3.4.8   Meter Constants

Transformer Ratios

The A1120/40 Meter can be supplied for the following types of connection:

Direct connected or CT operated.

The screen shows connection for a CT operated meter.

The maximum CT Ratio is 500:1

Performing a Billing Reset on CT Ratio Change

Check the panel to perform a billing reset when the meter CT Ratio is changed.

CT Ratio Display

The meter can display the CT as a ratio or as a scalar quantity. Check the panel to display as a CT Ratio. Leave unchecked to display as scalar.

CT Error

The CT error can be compensated for.

To compensate for a CT error of +0.4%, enter a value of +0.4%, then a compensation value of -0.4% will be applied.

Note: If the CT programming switch is fitted to the meter, the switch must be activated in order to change the CT ratio.

3.4.9   Relay Setup

The pulsing output of the A1120/40 meter can be configured to one of the following options:

Retransmit
Rate indication

Retransmit

Retransmit is selected along with the appropriate Source, Pulse value and the Pulse width.

Ensure that the chosen pulse value and pulse width leaves adequate gaps between pulses at maximum meter loads.

_____

Rate Registers

This option is used to close the relay if any of the rate registers or combinations of the rate registers are active.

Using the buttons
Use the ≤ button to select the Rate(s)

Remove a rate register, use the ≥

To St all rate registers, use the ‹‹Remove all rate registers, Use the ››
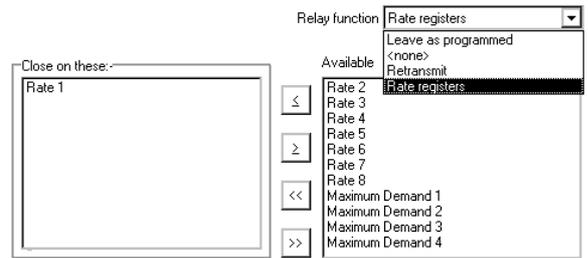
3.4.10   Load Profiling

The A1140 meter records block demand only. The Integration period may be set to 1, 2, 3, 4, 5, 6, 10, 15, 20, 30 or 60 minutes.

Up to four channels can be selected to be included in the load profile definition.
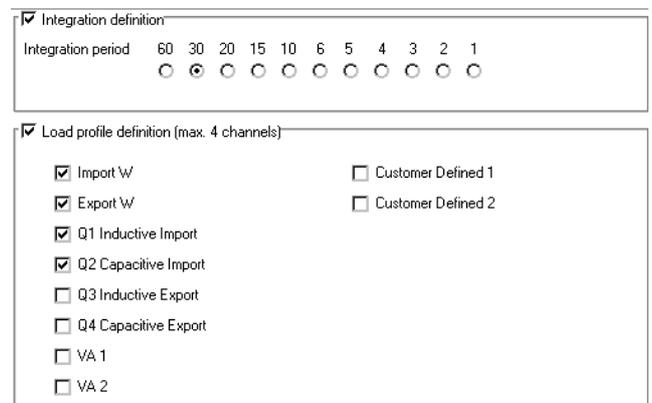
3.4.11   Meter Options

Clock

Clock source - The time keeping of the meter can be derived from the AC supply or from the internal crystal oscillator.
If AC supply is selected, the crystal will take over in the event of a supply failure.

Load profiling – The A1140 can be set to observe daylight savings (See 3.4.13, Time and date) or to ignore daylight savings.

Register Formats (LM ********-A)

Register formats allow the decimal point style and the number of digits, number of decimal places and the display scale to be selected for cumulative and demand registers.

LM ********-C
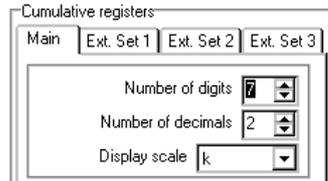
Custom Cumulative Register Formats can be set for Main, Ext Set 1, Ext Set 2 and Ext Set 3.
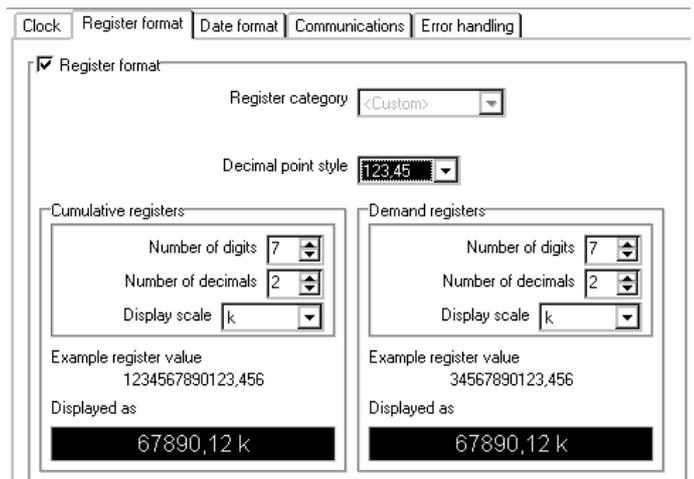
Date Formats

This defines the way the Date is displayed on the LCD. The selection is made from the dropdown lists.
The following formats are available –
dd mm yy
mm dd yy
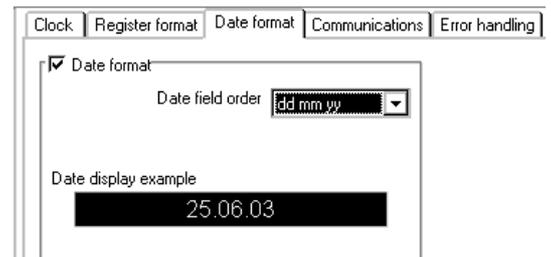
Communications

The communications TAB gives the following option:

Enable or Disable Serial port

Allows the serial port to be enabled or disabled.

Serial Port Baud Rate

Allows the serial port baud rate to be set to one of the following: 300, 600, 1200, 2400, 4800, 9600.

Serial Port Configuration

Allows the port data bit configuration to be set to an option from the dropdown list.
The following options are available:

7 bits, even parity, 1 stop bit

8 bits, no parity, 1 stop bit

Data Stream Mode meters should be set to 8, None, 1.
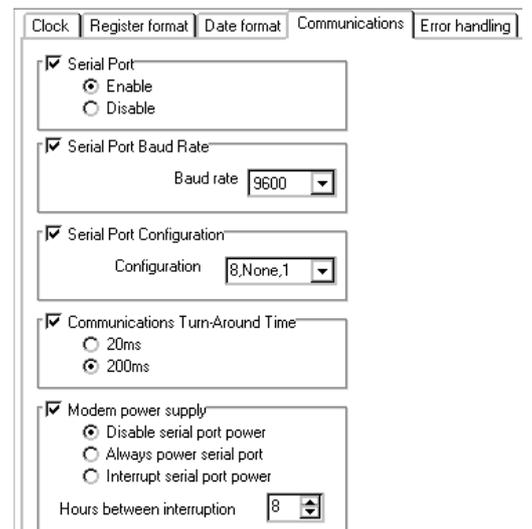
Communication Turn-around Time

This is a programmable time before which the meter will respond for a request for data.
The default is 200ms.

_____

Modem Power Supply

Disable Serial Port Power - The power for the modem is disabled

Always Power Serial Port - The power to the modem is permanently enabled

Interrupt Serial Port Power - To ensure the correct operation of any device connected to the serial port, power to the port is interrupted for 20 seconds at a programmable period (1 - 24 hours) set by the user.
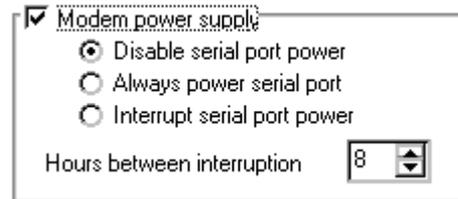
If a communications session is active the reset will occur at the end of the communications session.

Note: If a modem is installed which draws too much power from the meter, a transient reset occurs and the modem power supply is disabled to prevent continuous resetting of the meter. The power supply can be re-enabled via the IEC 1107 port by using the 'Always power serial port' or 'Interrupt serial port power' facility.

Error Handling

The Error handling tab is shown opposite.

Battery or Clock Fail Action - If the battery in the meter has failed and a supply failure also occurs, when power is restored the time and date of the battery failure will be logged.

In this event the meter can do one of three things:

Continue on the tariff scheme, with a consequent time error equal to the duration of the supply failure.

Action End of Billing Reset, then continue using the tariff as normal.

Action End of Billing Reset and freeze the tariff.
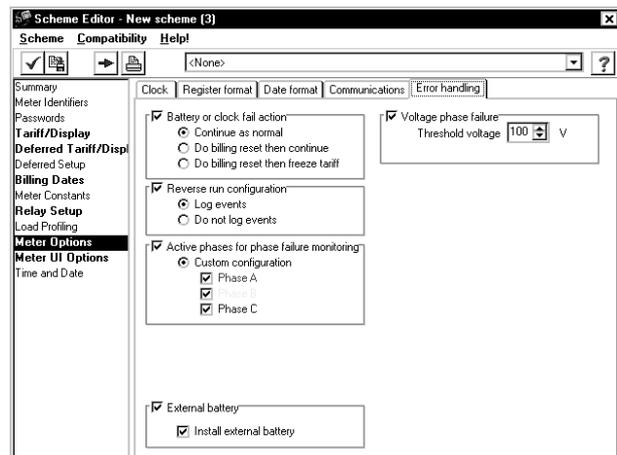
Reverse Run Configuration - This allows reverse run events to be recorded for an import only meter, or to be omitted for an import/export meter.

Active Phases for Phase Failure Monitoring - For normal operating conditions, all three phases are enabled. For certain configurations (e.g. 2 phases of a 3 phase 4 wire) only the red and blue phases are activated. Leaving the yellow phase unchecked allows display messages and load profile flags to be inhibited for the yellow phase.

Install External Battery - This allows the Read Without Power battery to be installed.

Voltage Phase Failure Threshold - The voltage phase failure threshold is applied to the voltage connected directly to the meter terminals.

Other (VAh 1)

This allows the user to specify the way VAh is calculated.

Select the 'All Wh and varh pulses' radio button to calculate VAh using all pulses.

Select the 'User selectable' radio button and check the quadrant check boxes to calculate VAh using selected quadrants.

VAh(2)

This is used in exactly the same way as VAh 1
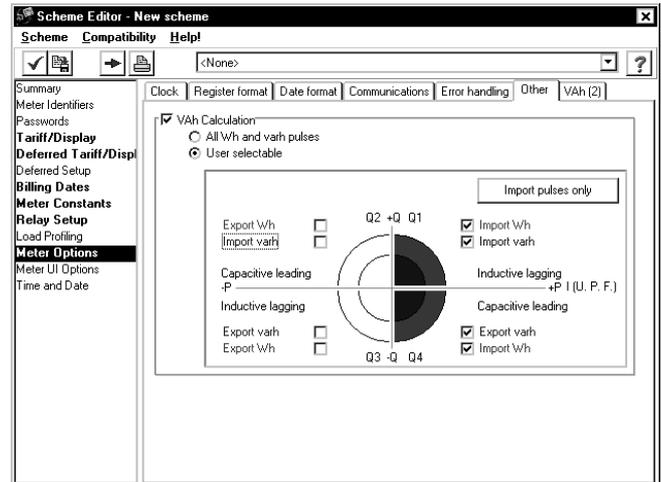
3.4.12 A1120/40 Meter User Interface Options

The User Interface allows the following parameters to be set:

Dial Test Mode allows the resolution of the display to be increased for test purposes.

Power Down Count - determines the number of times the meter can be powered down and remain in Dial Test Mode. When a count of zero is reached the meter automatically switches out of Dial Test Mode.

No. of Decimal Places – determines the number of places the decimal point can be displaced for Dial test Mode (0, 1, 2, 3 or 4)
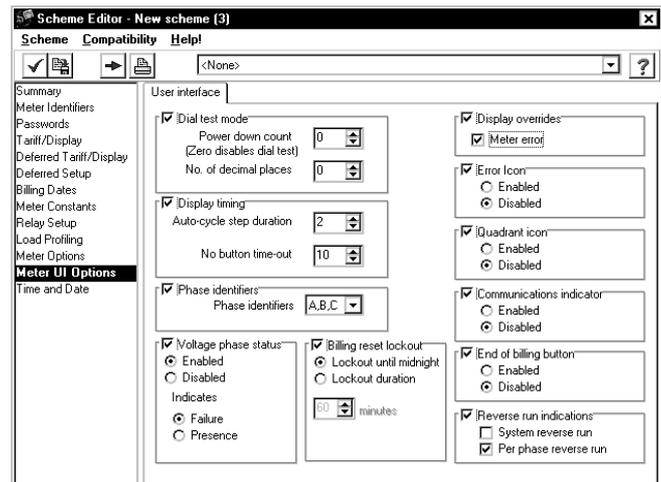
Display Timing

Auto-cycle Step Duration - Dwell time between displays in auto-cycle mode (2 - 30 seconds)

No Button Time-out - Time after which the display will return to auto-cycle mode after the last press of either pushbutton (10 to 120 seconds)

Phase Identifiers - Formats the instrumentation displays to one of the following formats [A, B, C] [1, 2, 3] [R, Y, B]

_____

Voltage Phase Status - Allows the voltage phase indicators (L1, L2, L3) to be displayed as phase fail or phase present. The indicators can be enabled or disabled from the display.

Billing Reset Lockout - Manual billing resets can be locked out until midnight or locked out for a set duration.

Display Overrides - Allows the meter error message to be omitted from the display.

Error (Alarm) Icon - This option allows the Error Icon to be omitted from the display.

Quadrant Icon - This option allows the quadrant icon to be omitted from the display.

Communications Indicator - This option allows the communications indicator (o optical, r remote) to be omitted from the display.

End of Billing Button - This option allows the End of Billing button to be enabled or disabled.

Reverse Run Indicators - This option allows the System Reverse Run Indicator to be enabled or disabled and the per phase reverse run indicators (flashing L1, L2, L3) to be enabled or disabled.

3.4.13   Time & Date

Meter Time Adjustment

This allows the meter time to be adjusted in the following ways.

1. Set the Meter time to the PC (or HHU) clock time

    Password level 1 allows Time Adjust

    Password level 3 allows Time Set

2. Time adjust the Meter time (by 5 seconds every integration period), until the Meter time matches the PC Clock time. The maximum time a meter can be adjusted is +/-7.5 minutes.
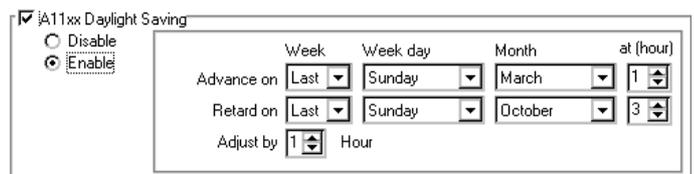
Daylight Savings

Daylight Savings can be advanced or retarded by 1 or 2 hours or can be disabled.

Enter the Week (1 to 4, Last), Weekday, Month and Hour for Advance and Retard for Daylight Savings. Week/Last will action Daylight Savings on the last Weekday of the month.

Note. The advance and retard need to be the same.

_____
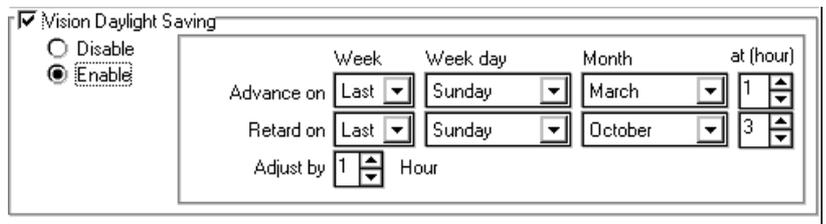
Reading & Examining Meter Data

4.1   Open Data to Read Editor

To open the Read Editor, refer to Section 2.1.
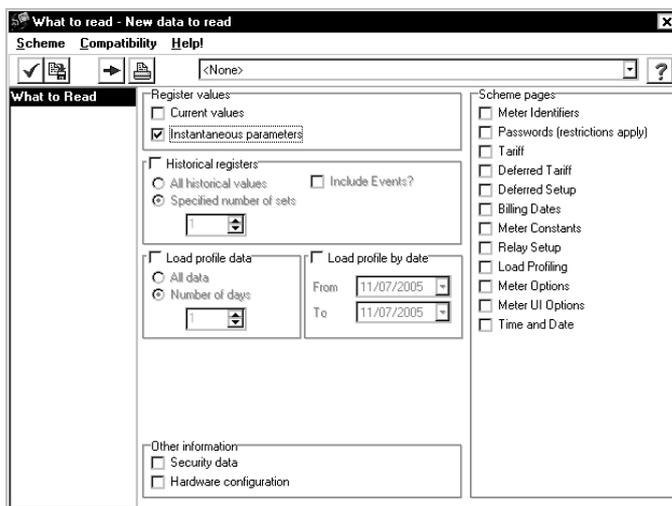
This Editor allows the Register Values, Instantaneous Values, Load Profile Data, Scheme Page Information and Other information to be read back from a meter.

Note: If 1 Day's **Load Profile Data** is selected, the data read back is the current day's data from midnight to the end of the last demand period.

Current Values

Instantaneous values

4.1.1   Data Stream Mode

Data Stream Mode allows data to be read back from the meter via the serial port and optical communications port much faster than the normal Data to Read mode. Data Stream Mode is available to read all data.

To use the Data Stream option via the serial port, the Serial Port configuration in the A1120/40 options/communications page must be set to 8 (eight bits), none (no parity), 1 (one stop bit)

4.2   Readings Viewer

The Readings Viewer allows data read back from a meter to be examined.

To View the Readings

Double click on the new data to read in the scheme manager

Double click one of the readings to view the data read back from the meter.

Generally these are displayed in a similar format to which the data is entered.

_____

4.2.1 Viewing Load Profile Data

Load profile data read back from a meter can be viewed using the readings Viewer.

Click on Load Profile Data from the readings to view the screen below.
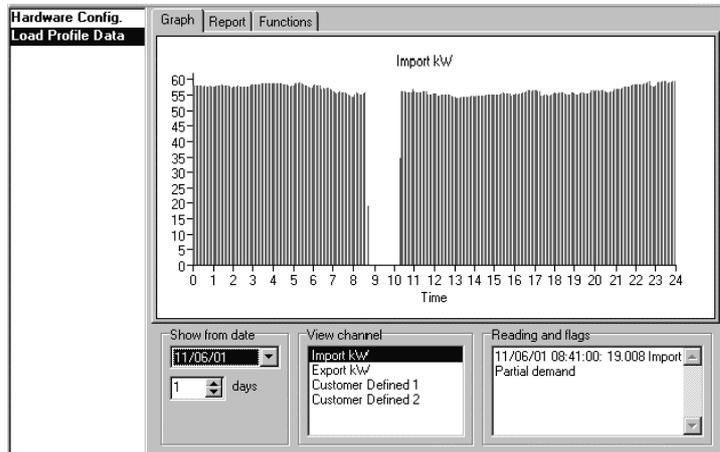
Graph

Load Profile readings can be displayed as a graph.

The actual value of data can be viewed by placing the cursor on the plotted readings.

Data shown in red shows data with a 'Flag' set.

To determine the type of flag set, simply lay the cursor over the red area of data. The type of Flag in Readings and Flag box can be viewed in the bottom right hand corner of the screen.

View the type of Flag in the Readings and Flags box in the bottom right hand corner of the screen.

Report

A Report of the number of days Load Profile data for a given channel can be displayed and printed from a given date.

The Hardware configuration of the meter can also be displayed.

Functions

This dialogue allows a CSV (Comma, separated variable) file to be exported ready for viewing in a spreadsheet such as Excel. Alternatively the data can be exported in a file format that is suitable for being transferred into an MV90 system.

| Graph | Report | Functions |

Export CSV...

Export MV90...

_____
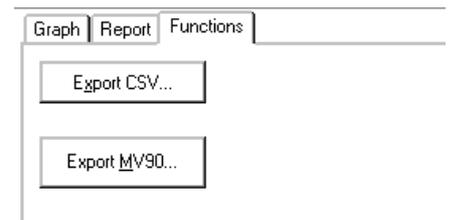
Meter Manager

5.1 Meter Manager Introduction
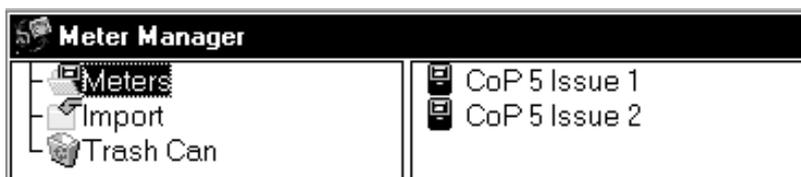
The Meter manager is used to organise the systems meter's. It is used to invoke the Meter Information editor.

The Meter manager consists of three components.

Meters - This is a list of meters available on the system. It allows Meter Connection information, Identifiers and Security information to be configured.

To Enter a New Meter

Right click in the right hand pane of the Meter manager, select New Meter and rename the meter.

Import - Schemes/meter that have been set up in other Master Units can be imported and placed in the Schemes/meter Import folder.

Trash Can - All files deleted from the Meter manager are transferred to the Trash Can.
They can be transferred back to the Meter manager if required. Once deleted from the Trash Can the files are no longer available to the system.

Meter Manager Context Menu

Most of the features of the Context Menu are the same as the Scheme manager. The menu is made available by right clicking the mouse in the right pane of the Meter manager.

Meter Information Editor

This Editor is used to reference data related to a specific meter and its location, the type of communications and security information. To open the Information Editor, double click on a meter.

The dialog is divided into three Tabs, Communications, Hardware and Identifiers.

Hardware

Information on the Meter type, Connection type, number of elements, Number of internal relays and Plug in modules is entered (see above).

Communications

This page allows the Communications parameters to be entered.

To Enter Communications Parameters

Enter the connection method and any outstation no., telephone no., baud rate as required

Note:- If a suitable Connection method already exists, it can be selected from the Connection List.

For new connections refer to Section 8.1

_____

Note 2:- The PC's baud rate should be set as follows – For RS232 connection the PC baud rate must match the A1120/40 baud rate – For Modem connection the baud rate should be set to the specification of modem connected to the A1120/40 meter.

Identifiers

Identifiers allow the Meter Serial Number, the Site id and a description of the meter to be entered.

| Hardware | Communications | Identifiers |

Identifiers

Serial number | -------New meter

Meter Site IDentifier (MSID) |

Description

_____

Meter List

6.1   The Meter List Components

The Meter list consists of a list of meters with their associated Schemes brings together meters configured in the Meter manager, and Schemes created in the Scheme manager, to create a list of meters and their associated schemes.

This is achieved by copying a Meter and a Scheme into the Meter list.

Note 1: If a Scheme is incompatible with a meter, warning triangles appear as shown opposite. Right click on the meter or scheme and select Show Conflicts to establish the reason.

Note 2: Multiple schemes can be sent to a meter as a single communications session by attaching the schemes to the meter using drag and drop. It should be noted that if the same scheme page (e.g. display page) is contained in more than one of the schemes, only the page from the last scheme attached is programmed to the meter.

Meter List Context Menu

The options available from the dropdown list are shown opposite.
The Context Menu list is made available by right clicking the mouse in the right pane of the Meter list.

New Meter List

The New option clears the Meter list ready for a new Meter list to be created.

Open Scheme - This allows information on the meter or meter scheme to be viewed or edited using Save. A new Meter List can also be created by editing the Meter List and Using the Save As facility.

Remove - Removes the selected list from the Meter List

Show Conflicts - Shows any discrepancies between the scheme and the meter

New Meter List - Allows a new Meter list to be created

Open Meter List - Allows a selected Meter list to be opened

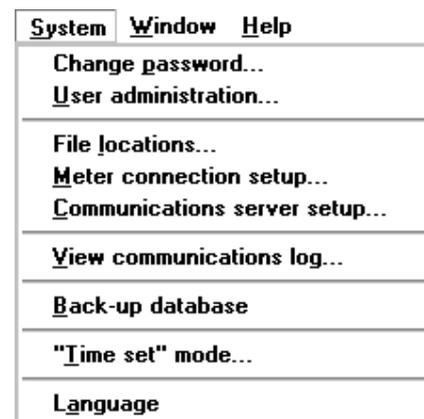**Save Meter List -** Allows the current Meter list to be Saved

Save Meter List As - Allows the selected Meter list to be saved as a new name

Execute Meter List - Execute Meter List is used for communicating with a meter.
It is used with the Meter Communications Server to Program or Read.

System Administration

7.1   System

The System menu allows Users to change their password and create new users. It also allows other parameters shown opposite to be entered.

```
System  Window  Help
  Change password...
  User administration...

  File locations...
  Meter connection setup...
  Communications server setup...

  View communications log...

  Back-up database

  "Time set" mode...

  Language
```

Changing Passwords

This allows the password for a User to be changed.

```
Change password for 'Elster'.                    [x]

  Type your password and the new password in the boxes
  provided.

       Password  [                    ]

   New Password  [                    ]

 Verify Password [                    ]


        [ ✓ OK ]   [ X Cancel ]   [ ? Help ]
```

_____

Defining a New User

To protect the Schemes and Data, Users can define `lower levels' of Users who do not require full access to the system resources. Click on System then select User administration. This opens the Security Dialog.

Note: Properties can be moved from one window to another using drag and drop.
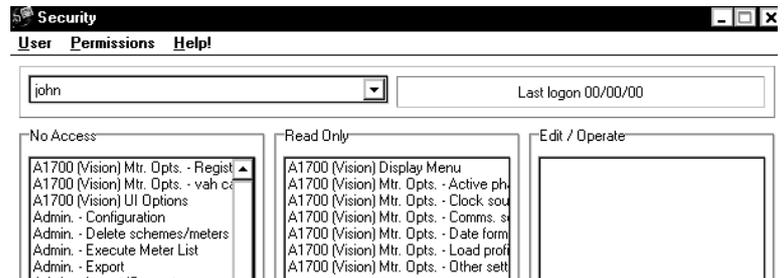
To Create a New User

Select User Administration, User, Create New User

Type the new user name

Go to User Change Password, enter the new password and press OK

Click on a permission and drag it to the required window (Read Only or No Access)

Select other required permissions and repeat

Select User, Save

Don't forget your Password

Note: Users can grant access to new users they create only if they have access to the permissions themselves.

If a number of permissions require dragging to another window, hold down the shift key, drag the cursor over the required permissions to select a block of permissions then click on the highlighted permissions and drag them to the required window.

Permissions - Permissions are used to transfer topics from one window to another in the same way as drag and drop.

Select a topic in No Access, select Permissions/Move to Edit. The topic then moves to the Edit panel.
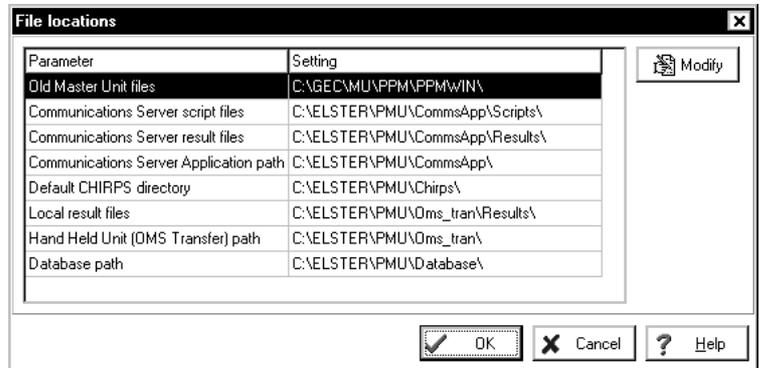
Use the Restore option from the Users dropdown list to return to the original Administrator selection.

Use the Delete option from the Users menu list to delete the selected User.

File Locations

File location points the Master Unit to the location of externally produced files that may require importing into the Master Unit. File types are shown in the left column and the setting (location) in the right column.

To Modify a File Location, click on Modify and select the directory where the files of the selected type are located then Press OK.
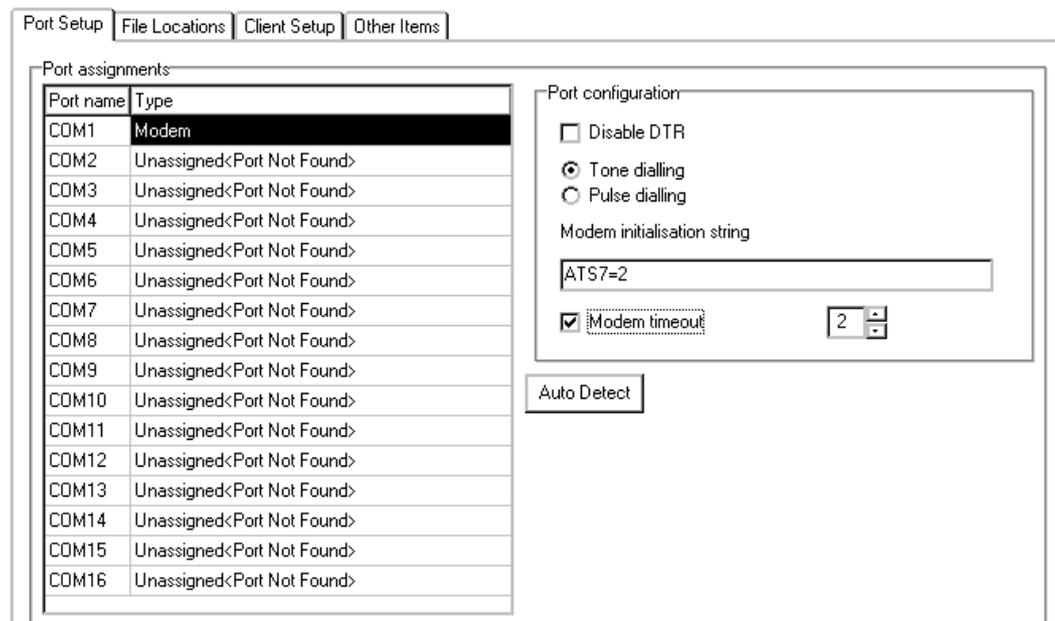
Parameter	Setting
Old Master Unit files	C:\GEC\MU\PPM\PPMWIN\
Communications Server script files	C:\ELSTER\PMU\CommsApp\Scripts\
Communications Server result files	C:\ELSTER\PMU\CommsApp\Results\
Communications Server Application path	C:\ELSTER\PMU\CommsApp\
Default CHIRPS directory	C:\ELSTER\PMU\Chirps\
Local result files	C:\ELSTER\PMU\Oms_tran\Results\
Hand Held Unit (OMS Transfer) path	C:\ELSTER\PMU\Oms_tran\
Database path	C:\ELSTER\PMU\Database\

Meter Connection Setup

This dialog is used in exactly the same way as the Connections Setup in the **Meter information editor**.

Communications Server Setup

The Communications Server Setup is used to assign the type of communication to be used on each port and organise the Server File paths.

Port name	Type
COM1	Modem
COM2	Unassigned<Port Not Found>
COM3	Unassigned<Port Not Found>
COM4	Unassigned<Port Not Found>
COM5	Unassigned<Port Not Found>
COM6	Unassigned<Port Not Found>
COM7	Unassigned<Port Not Found>
COM8	Unassigned<Port Not Found>
COM9	Unassigned<Port Not Found>
COM10	Unassigned<Port Not Found>
COM11	Unassigned<Port Not Found>
COM12	Unassigned<Port Not Found>
COM13	Unassigned<Port Not Found>
COM14	Unassigned<Port Not Found>
COM15	Unassigned<Port Not Found>
COM16	Unassigned<Port Not Found>

Port configuration
☐ Disable DTR
◉ Tone dialling
○ Pulse dialling
Modem initialisation string
ATS7=2
☑ Modem timeout   2

Auto Detect

To enter the server setup, Select System/Communications Server Setup from the Scheme manager Main menu.

_____

To select the comms port - Select the comms port (1 - 16) then double click on the type of communications from the dropdown list.

Auto Detect - This automatically detects the hardware available on a selected port and assigns it to the port.

Disable DTR

Various probes can be used to communicate with meters via the optical 'FLAG' communications port. These probes are one of two basic types:

Probe with DTR disabled

Probe with DTR enabled

It is important to choose the correct probe for your installation, as optical communications will not be available if the wrong probe is selected.

Modem Init - If a modem is selected on a port, Modem Initialisation allows the initialisation string to be set. The modem type (tone or pulsed dialling) must first be selected.

To set the string, select Modem, select the type of dialling then type the string in the box provided and press Save

File Location - To modify a file path, press Modify and edit the file path accordingly.

Use number of retries to set the number of times the computer tries to connect.
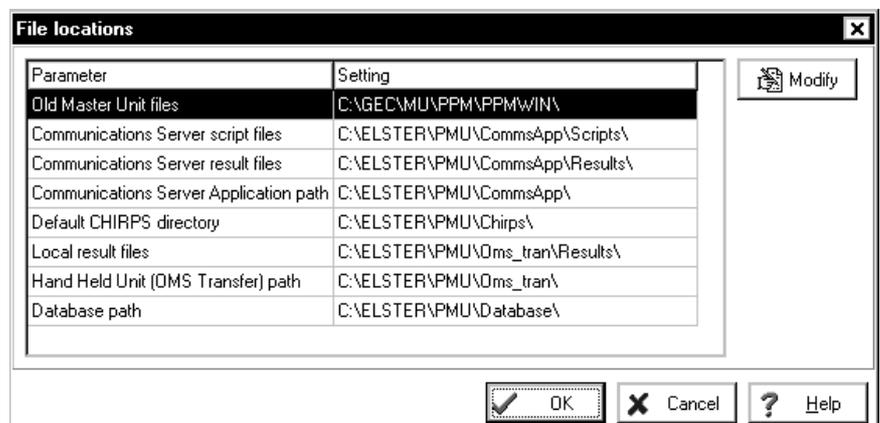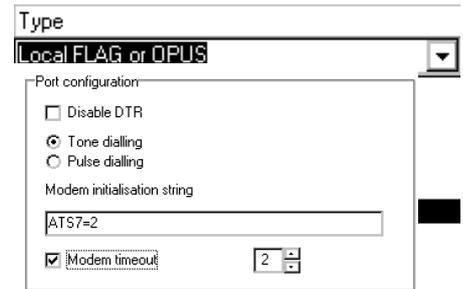
Result (.RES) File Management - This option allows the user to Append new data to a .RES file or Always overwrite the .RES file with new data.

If Append new data is selected, any new data is added to the .RES file. This option is used if the .RES files are to be used outside the Power Master Unit.

Note – If this option is used, old readings are stored in the database and new readings are appended.

Always overwrite with new data is the option normally used. This overwrites any old data with the new data.

Communications Server Log

The communications server log keeps a record of all communications sessions with meters. The log records the following parameters:-

Time and Date,   Meter Serial Number,   Scheme Identifier,   Transmit/Receive data,   Status.
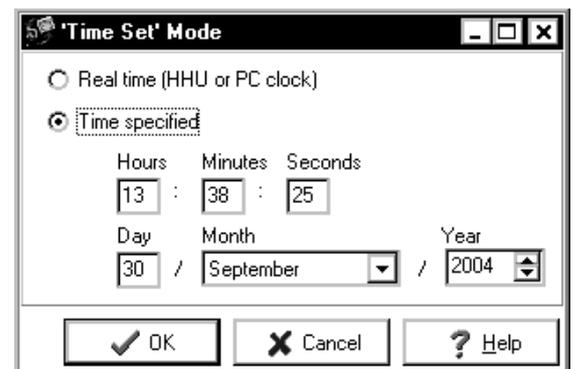
Back-up Database

Back-up database allows all files in the database to be backed up. It is recommended that the database is backed up at least once a week and that the files are stored on a separate computer. The file format is shown opposite.

Power Master Unit

Database back-up to location 'C:\ELSTER\PMU\Database\20050113.001' completed

OK
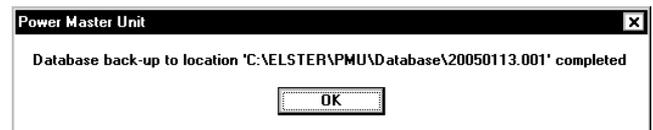
Time Set Mode

Time set mode can be set from the Real Time Clock (RTC) or Hand Held Unit (HHU) or from a time specified by the User. This mode is used to override the Set to PC option in Scheme manager Time and Date. It does not affect the System time.

'Time Set' Mode

○ Real time (HHU or PC clock)

⦿ Time specified

Hours   Minutes   Seconds
13   :   38   :   25

Day   Month   Year
30   /   September   /   2004

✓ OK   ✗ Cancel   ? Help

Note:- This option will only take effect if the Scheme has Set to PC/HHU Clock configured as part of the Scheme.

_____

Communications

8.1 Communications Methods

Communications are set up within the Meter manager using the Meter information editor.

The set up requires the communications type etc., an outstation number and telephone number depending on the communications type to be defined.

Connections

To Set- up/Modify a Connections for a modem

Create a New Meter from the Meter manager. Type in the new name (Test)

Double click on the meter and Select Communications

Press New/Edit to display the dialog above

Click New Connection and enter the connection name

Select the method of connection (Modem)

Select the modem serial port (Com 1)

Press Save, then Close

Once the Connection is complete, type in the Outstation number, Telephone number and Baud rate to complete the communications setup.

Methods of Connection

Modem - Modems are connected to a meter via the RS232 communications port and the Elster Metering Systems Communications Server. The Communications Serial Port, Outstation number and Telephone number also require entering.

PAKNET - PAKNET connects a meter via a PAKNET Radio PAD and the RS232 communications port and the communications server. The Communications Serial Port, Outstation number and PAKNET PAD number also require entering.

Flag - Flag connection allows communication with a meter via the meter's Optical Port.

RS232 - RS232 connection allows an A1120/40 to be targeted for communications. The baud rate is selectable. Data Steam Mode allows fast data readings.

CHIRPS - This option allows CHIRPS files to be created.

To create a CHIRPS file, select CHIRPS, select the Directory where the Chirps files are stored and press OK

Hand Held Unit - This allows the Master Unit to communicate with a Hand Held Unit via OMS software.

Proxy Flag - Manufacturing facility only

Network Flag – For connection to Ethernet, select Hardware and select the meter type, select Communications and Connection/Network flag then Press New/Edit and enter the Host and Port address.

The Host port address of the Ethernet module connected to the meter would be typically 192.168.0.2:14001 (Contact your local IT Department).

_____

**8.2   Sending a Scheme to Meter**

There are two ways of sending a Scheme to a meter, by executing the Meter list or by Quick send scheme.

Execute Meter List

Execute Meter list can be selected from Transfer in the Main menu, or by right clicking in the Meter list.

To Transfer a Meter List

Select the Meter list to be transferred then select Transfer/Execute Meter list. File transfers should be visible in the Communications Server
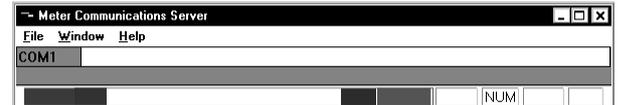
Quick Send Scheme

This allows the user to send a complete scheme to a meter, by-passing the Meter list. Quick send can be selected using the toolbar or by saving the scheme, then right clicking on the scheme icon.

To Quick send a Scheme

Select the Scheme to be transferred

Select Quick send Scheme from Transfer in the Main Menu. This will open the Quick send Setup dialog

Fill in the dialog referring to Connections

Press OK. File transfers should be visible in the Communications Server
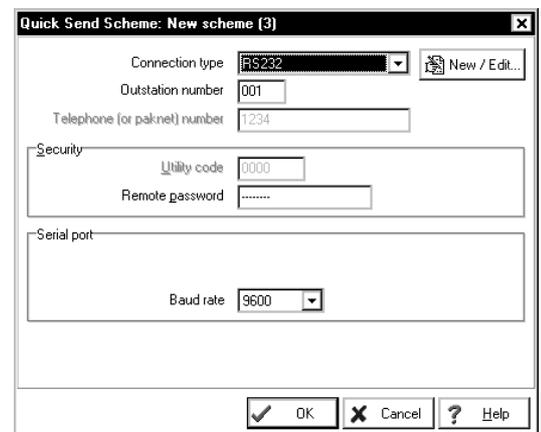
8.3   Communications Server

Introduction

Communications with a meter is automatically established via the Communications Server, when a Scheme is executed from a Meter list or in Quick send mode. The server is used for the following modes of operation that are set in Meter Information Editor/Communications:

Modem, Paknet, Flag or RS232
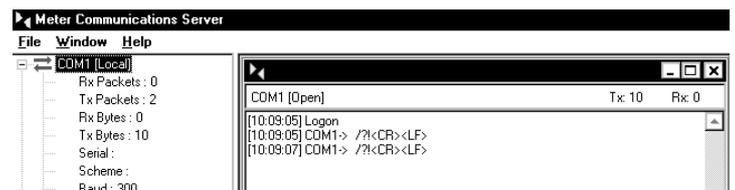
When a Meter list is executed, the Communications Server opens on the desktop, showing data being transferred in Red (Transmit) or Green (Receive) blocks of data in the Communications window. Communications can take place on up to nine Ports.

To view data in the form of a Log while it is being transferred, click in the Communications Window. The data being transferred is displayed as a log while communications take place.

> **Data Log**
>
> ```
> Logon
>  COM1-> /?!<CR><LF>
>  <-COM1  /GEC2070010090100@000<CR><LF>
>  COM1-> <ACK>021<CR><LF>
>  <-COM1  <SOH>P0<STX>{143660C08501060C]<ETX>I
>  COM1-> <SOH>P2<STX>[0000000000000000]<ETX>b
> ```

Notes

1. During Comms the Serial number and Scheme name are displayed once connection to the meter is established. If this data is not available, ? is displayed

2. The number of sent and received Packets is displayed with the number of bytes

3. The program can be aborted during comms by clicking Exit. This will end all sessions in an orderly manner.

4. It is recommended that the comms application is closed down once the **Master Unit** has been closed

8.4   Main Menu

File

Open - Allows files stored on the PC to be Read and Viewed

Close - Closes an opened file

Save - Saves an opened file

Save/As - Saves a file as a New Name

Print Preview - Shows page layout of a file to be printed

Print - Prints an opened file

Print Setup - Configures the System Printer

**Exit -** Exits the Communications Server

Window

Arrange - Arranges customised Meter manager, Meter list and Scheme manager windows to original view.

8.5   Viewing Communications Failures

To view the log of communications failures select Window, Show communications failures.

A log of all failures encountered during the current Master Unit session will be displayed.
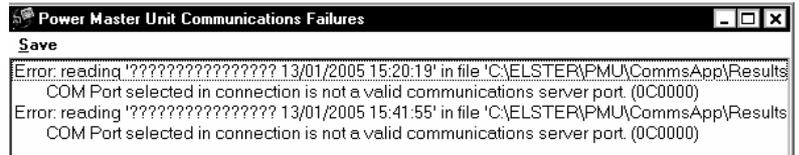
Use Save to save the error messages as Text Files. The file will contain information required to analyse the failure. Use the text files if support is required when contacting Elster Metering Systems about communications failures.

8.6   Networking the Power Master Unit

The Power Master Unit can communicate over a network by installing the Communications Server on a remote PC and sharing the directory. The file location must be set in the Communications Server Setup.

Client PC running
Power Master Unit Software

Server PC with
Communications Server installed
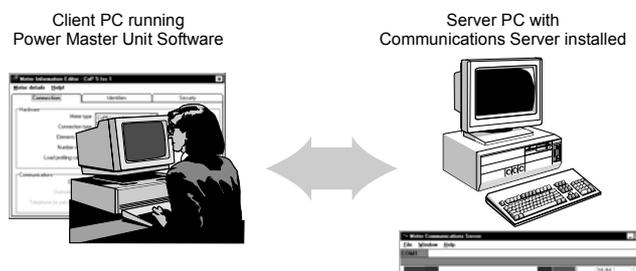
Setting the File Paths

At the Server PC:

Install the Communications Server in the required directory and share the directory including the Script, Result and Log subdirectories with the Client PC

Select the Communications Server Setup and change the Script, Log and Results path to the correct location on the Server PC

At the Client PC:

Connect to the share on the remote PC running the Communications Server

Select the Communications Server Setup from the System Menu and set the Script, Log and Results path to the correct location on the Server PC

Note:

To allow communications from a number **of Power Master Units** connected to a network, the Communications Server must be left running when it is installed on a remote drive.

Appendix A

A1   Exporting Readings as a Text Only File

Readings and Schemes can be exported and printed as a text only file by setting up a "generic/text only" printer on port "file". This feature allows schemes/readings (or selected parts of) to be cut and pasted into other applications such as Bug Collector Pro, Word etc.

Setting up the File printer

From the Main Window, choose Start/Settings/Printers

Select Add/New/Printer. The Add Printer Wizard appears

Press Next. Select File

Press Next. Select Manufacturer/Generic, Printer Generic/ Text only
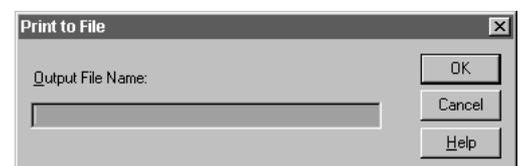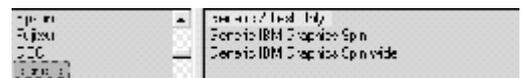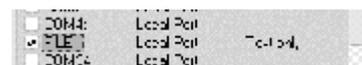
Press Next. Select keep existing drivers

Press Next. Select No for default printer

Press Finish

A Print to File dialog appears

Name the file (text Printer)

All files output to this printer will be printed as text only files and can be viewed in Notepad.
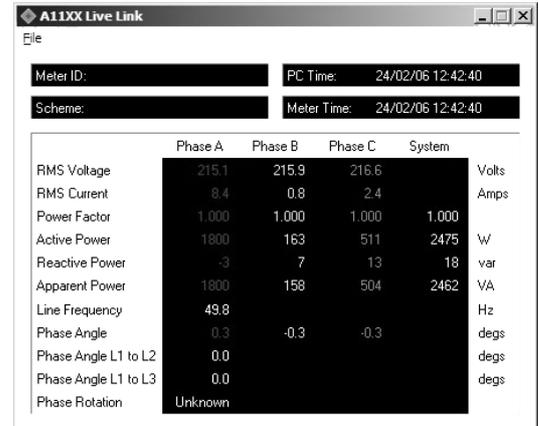
_____

A2   Live Link

The live link software displays instrumentation details as shown in the display opposite.

Using the software

Select a meter from the Meter Manager
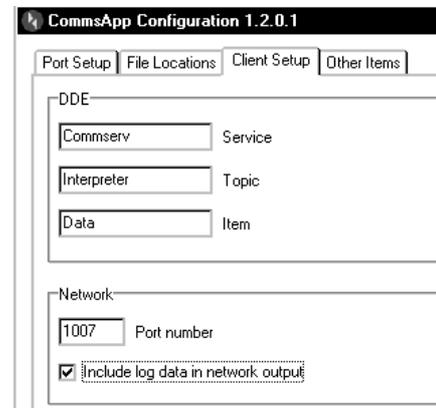
Right click and select Live Link

Data will be read back from the meter

Note: The Include log data in network output box in System/Communications Server Setup/Client setup must be checked for data to be viewed.

Appendix B

B1   OMS Software

OMS software forms part of CHIRPS and is configured in the CHIRPS directory.

OMS will allow a variety of Hand Held Units (HHU) to be used with the system.

The software can be used to transfer schemes to a HHU from the Power Master Unit, using either Quick send or executing a Meter list.

The software can also be used to upload .RES or .BUD files from a HHU by launching the OMS Transfer program.

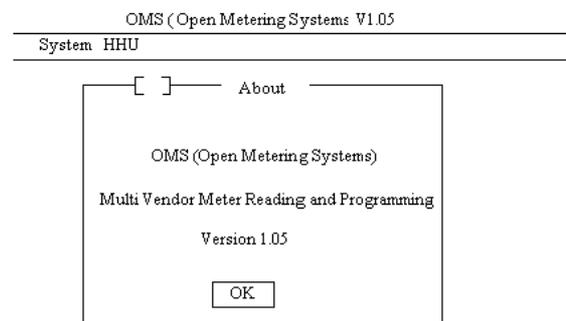## B2   Downloading Schemes

Select Quick-send

Select the connection type (HHU) and enter the password as required

Click OK

The Window shown is displayed

Click OK

The OMS top level menu is displayed

OMS (Open Metering Systems V1.05

System HHU

About

OMS (Open Metering Systems)

Multi Vendor Meter Reading and Programming

Version 1.05

OK

Hand Held Unit (HHU)

HHU allows data files and configuration data to be downloaded using a HHU.

Click on HHU to reveal the following menu.

System	HHU
	Set Up
	Transfer
	Save Set Up
	Config File

Set Up

Click on Set Up

The meter, Master Unit path and procedures are set up automatically by the Power Master Unit and should not be changed. The HHU and the Comm port should be set up as appropriate.

Click OK when all parameters are set.

Note: If any modifications are made they can be saved by selecting HHU/Save Set Up.

CHIRPS File Upload/Download

Meter	Master Unit Path	Procedures
[X] GEC	.	[ ] Upload Response Files
[ ] FML		[ ] Delete Response Files
[ ] LGB		[X] Download New Commands
[ ] SLB		[X] Delete Old Commands
[ ] CWI		[ ] Download HHU Config
[ ] HST		[ ] Upload BUD Files
[ ] ...		[ ] Download Walk Order
[ ] ...		[ ] Path from Sign On File
[ ] GMX		[ ] Execute Batch File
[ ] OMS		

Hand Held Unit

( ) Psion HC
( ) AMS 1V
(●) HUSKY FS/2
( ) IPD HMT
( ) Mpalm 3000
( ) ...
( ) ...
( ) ...
( ) BCHAT

Batch File Name

Cancel

OK

COMM Port
(●) Com1
( ) Com2

Download - To download the files to HHU, follow the flowchart below:

At the HHU   **At the PC**

With CHIRPS for the HUSKY
Select Comms
This starts HCOM
or
At C> Type HCOM
Press Enter
→ HUSKY File transfer Utility
'Press Escape to Exit' is displayed
→ Select HHU
Click Transfer
Files are transferred to the HHU

After Transfer Press ESC

Select System
Exit
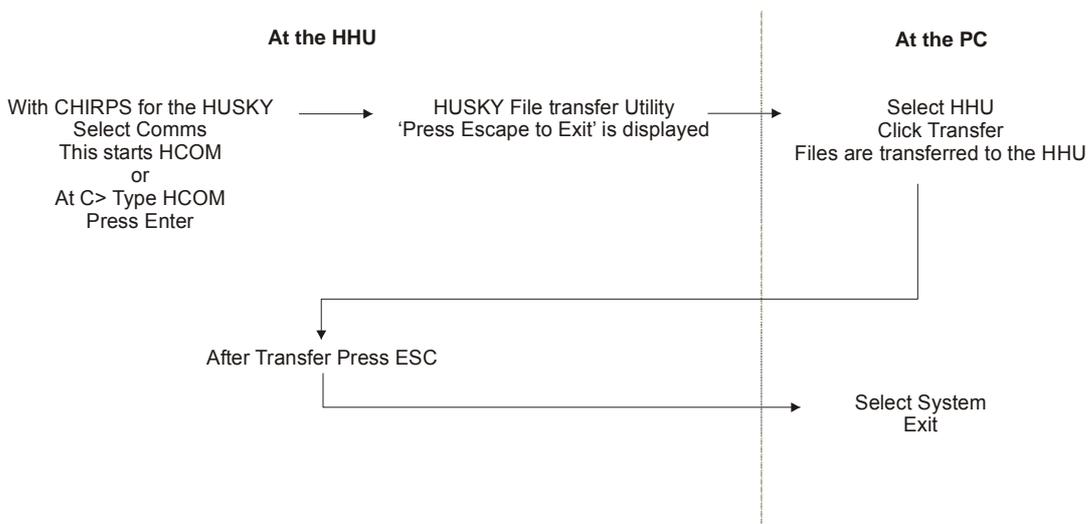
Programming/Reading a Meter

At the HHU

At the C> prompt type
CHK (HUSKY)
Press Enter
→
Select Manual
Press Enter
Select scheme to be transferred
Press Enter
→
When the transfer is complete
the HHU responds with an
Achievement Byte
(0 if successful)
→
Select Quit
Press Enter

Uploading Readings - In the Power Master Unit, select Transfer/Launch OMS HHU Transfer Program from the Main Menu.

Click OK (OMS top level menu is displayed)

Click on HHU/Set up

Power Master Unit sets up the Meter, Master Unit path and Procedures automatically. If the load profile data has been read, check Upload BUD Files. The HHU and the Comm port should be set up as appropriate.

Click OK when all parameters are set.

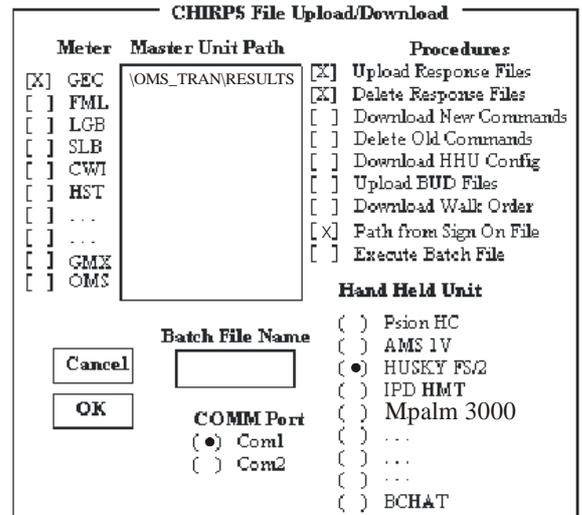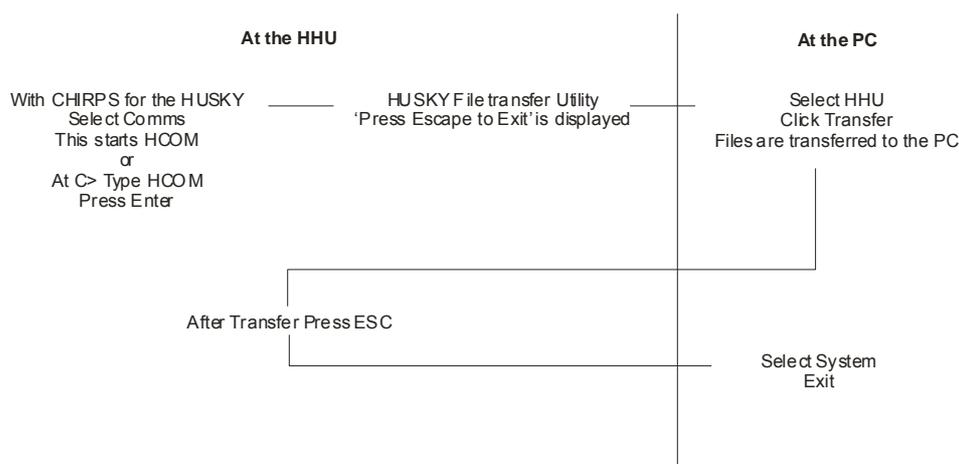Note: If any modifications are made, selecting HHU/Save Set Up can save them.

```
┌──────── CHIRPS File Upload/Download ────────┐
│ Meter   Master Unit Path          Procedures │
│ [X] GEC  \OMS_TRAN\RESULTS  [X] Upload Response Files │
│ [ ] FML                     [X] Delete Response Files │
│ [ ] LGB                     [ ] Download New Commands │
│ [ ] SLB                     [ ] Delete Old Commands   │
│ [ ] CWI                     [ ] Download HHU Config    │
│ [ ] HST                     [ ] Upload BUD Files       │
│ [ ] . . .                   [ ] Download Walk Order    │
│ [ ] . . .                   [X] Path from Sign On File │
│ [ ] GMX                     [ ] Execute Batch File     │
│ [ ] OMS                                                │
│                              Hand Held Unit            │
│                  Batch File Name   ( ) Psion HC        │
│ ┌────────┐     ┌───────────┐       ( ) AMS 1V          │
│ │ Cancel │     │           │       (●) HUSKY FS/2      │
│ └────────┘     └───────────┘       ( ) IPD HMT         │
│ ┌────────┐                         ( ) Mpalm 3000      │
│ │   OK   │       COMM Port         ( ) . . .           │
│ └────────┘     (●) Com1            ( ) . . .           │
│                ( ) Com2            ( ) . . .           │
│                                    ( ) BCHAT           │
└──────────────────────────────────────────────┘
```

Upload - To Upload the files from HHU, follow the flowchart below:

At the HHU   **At the PC**

With CHIRPS for the HUSKY
Select Comms
This starts HCOM
or
At C> Type HCOM
Press Enter
————
HUSKY File transfer Utility
'Press Escape to Exit' is displayed
————
Select HHU
Click Transfer
Files are transferred to the PC

After Transfer Press ESC

Select System
Exit

Configuration

If the HHU.CFG on the HHU is lost or corrupt, a new configuration file can be downloaded to the HHU.

Select HHU/Config File.

Set the parameters as shown below:

| HHU Config. File	
Number of Retries	5
Date of Expire	311279
Number of Sessions	0000
HHU Identification	HuskyFS2
File Size	12
Comms Port	COM1
Timing 1	1600
Timing 2	3000
Timing 3	0200
Timing 4	0100
OK Cancel	

Click on data to be edited and type changes. (TAB can also be used to move between entries).

Click on OK

Select HHU/Set up

In the procedures section, only Download HHU Config should be selected

Click OK
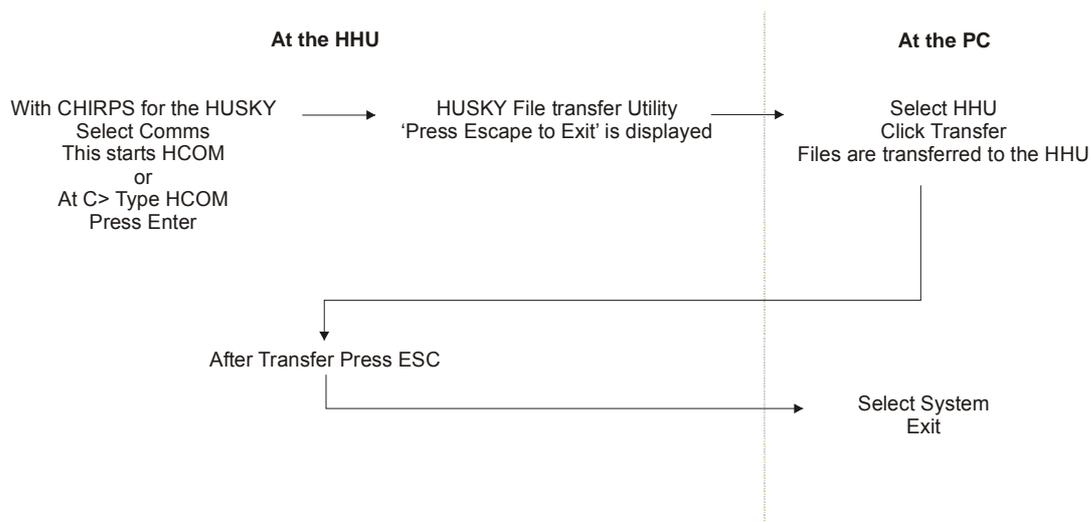
Number of retries - This is the number of tries CHIRPS repeats the FLAG message before terminating with an error message.

Date of Expiry - This is the date of expiry of the current CHIRPS Configuration File. A new file with the following format must be loaded.

Day of Month	(2 Characters)	01-31
Month	(2 Characters)	01-12
Last 2 digits of Year	(2 Characters)	00-99

Number of Sessions - This is the number of sessions that CHIRPS will run in the range of 0000 to 9999. After entry the value decrements by one until it reaches 0001. CHIRPS will then cease to run.

If the number is initially set to zero, CHIRPS will run for an indefinite number of times.

HHU Identification - This is an eight digit identifier determining the type of HHU that CHIRPS is running on.

File Size - The file size should always be set to 12

Comms Port - If the first three characters are set to COM. then the fourth character is interpreted as the comms port (e.g. COM1) which is the default value.

Timings - CHIRPS timing protocols should be set to the following values and not changed.

Timing 1	1600
Timing 2	3000
Timing 3	0200
Timing 4	0100

Load Default - The default file is identical to the Configuration File and can be loaded in case CHIRPS has been corrupted.

A new default file can be generated by saving the data and re-saving the file HHU.CFG to HHU.DEF.

Click System Exit to return to the Power Master Unit.

About Elster Group

Elster Group is the world's leading manufacturer and supplier of highly accurate, high quality, integrated metering and utilisation solutions to the gas, electricity and water industries.

In addition, through its subsidiary Ipsen International, it is the leading global manufacturer of high-level thermochemical treatment equipment.

The group has over 9,000 staff and operations in 38 countries, focused in North and South America, Europe and Asia. Elster's high quality products and systems reflect the wealth of knowledge
and experience gained from over 170 years of dedication to measuring energy and scarce natural resources.

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