Details			
Project:	King's Cross Triangle W Zone	MAR Number:	ARK-TS-E010
		Contract number:	26A00060
Sender:	Charlie O'Connell	Date sent:	09/03/2020
Contact for further information if required:		Name:	Charlie O'Connell
		Phone:	07741150057
		Email:	Charlie.oconnell@arkme.co.uk
Subcontractor:		ARK M&E	
Specified product:		Photovoltaic System	
Proposed product:		Photovoltaic System	
Product Specification/Technical Data:		ATTACHED	
Manufacturer:		Van Der Valk Ja Solar Eland Solis Elster	
Supplier:		Ablaze	
Batch number/other Identification:		N/A	
Planned date for inclusion to the works:		TBC	
Part of works element:		W1 East / W2 North / W3 – Roof	
Contract specification:		Hoare Lea – Specification Volume 2 – Section V17	
Drawing Reference:		KXC-W0-001-E-HL9170-60-604	
Deviation from current Specification:		No	

Attachments	
Test Certs:	N/A
Technical Literature:	Technical data sheets attached as Follows: 1. Panel mounting system 2. Solar cells 3. PV solar cabling 4. Three phase inverter 5. Polyphase meter
Samples:	Available upon request

Photos:	See data sheets attached	

ARK Comments
Click here to enter text.

Midgard/Client Comments
Click here to enter text.

Client Monitoring Team (CMT) Approval Status
Approval Status: A ☐ Submission reviewed and accepted B ☐ Submission reviewed and accepted subject to incorporation of comments C ☐ Submission reviewed and rejected N ☐ Submission reviewed and no longer relevant or required Comments: (enter 'no comment' if applicable) Click here to enter text.

Signatures for Approval			
Client Name:		Date:	
Signature:			
Client Rep Name:			
Signature:			
Lead Reviewer:			
Signature:			
Main Contractor:			
Signature:			

VAN DER VALK SOLAR SYSTEMS

ValkPro+
ValkFlat - Portrait
ValkFlat - Landscape

Installing solar panels on buildings of any kind is a logical development, as the roof offers free space and often a surface large enough for a profitable additional function. Van der Valk's solar mounting system for flat roofs was developed while taking roof and wind loads into account and, consequently, complies with the most stringent safety requirements.

Our range for flat roofs is characterised by great efficiency and ease of assembly. The three south-oriented basic systems described below enable optimal utilization and maximum energy yield for each flat roof.

ValkPro+

Unique to this system:

- ✓ Mounting is faster than ever
- ✓ Metal connectors, no plastic
- ✓ Maximum logistical simplicity
- ✓ Also applicable to high roofs
- ✓ Low ballast due to coupled rows and wind deflectors
- ✓ Smart cablemanagement

ValkFlat - Portrait

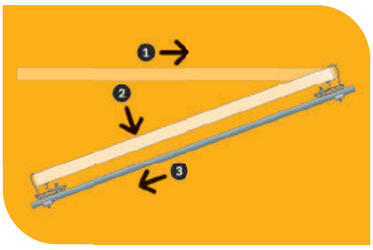
Unique to this system:

- ✓ Clamp system in portrait configuration
- ✓ Any tilt angle possible
- ✓ Universal mid- and end-panel clamps (H 28-50 mm)
- ✓ Quick assembly due to premounted A-frames
- ✓ Low ballast due to coupled design

ValkFlat - Landscape

Unique to this system:

- ✓ Insert system in landscape configuration
- ✓ Extremely fast panel mounting
- ✓ Self aligning panels during installation
- ✓ Support of the panels on the specified long sides
- ✓ Any tilt angle possible
- ✓ Quick assembly due to premounted A-frames
- ✓ Low ballast due to coupled design



Foundations Flat Roof Systems

The **ValkPro+**, the **ValkFlat - Portait** and the **ValkFlat - Landscape** utilize various foundations. For example, the systems can be attached using rubber tile carriers, mass blocks or consoles.

Rubber tile carriers offer ease of transport and installation due to their low weight and raise the system for maximum drainage.

Mass blocks have the advantage that they concurrently provide a significant part of the ballast. In addition, the system is raised higher which offers easy assembly on gravel roofs, for example.

Consoles provide a fixed mounting to the roof in areas with very high wind loads or to roofs that can't tolerate much weight. The special design guarantees watertight sealing.

	ValkPro+	ValkFlat Portrait	ValkFlat Landscape
Rubber tile carriers	✓	✓	✓
Mass blocks	✓	✓	✓
Consoles	✓	✓	✓

This specifies which foundation can be applied.

Glass panels

As well as the standard solar panels with a frame, solar panels without a frame can also be mounted using glass clamps.

Free software

With the 1-2-3 PV Planner, our free software, a complete project calculation, including a list of articles and project-specific installation manual, can be realised in three simple steps.

East west

The systems for flat roofs are also available in east west layout. Please check the separate leaflet for details.

WHY VAN DER VALK SOLAR SYSTEMS?

- Innovative systems developed in compliance with applicable worldwide standards
- Fast and reliable deliveries due to modern machinery and large stocks
- System supplier since 1963
- Free software for project design and calculation
- All systems applicable to any type of roof or surface
- Quick assembly due to premounting of essential components
- All systems available in portrait as well as landscape configuration
- Various systems also available as ready-to-use kits

The mounting systems of Van der Valk Solar Systems are delivered and installed by an extensive network of dealers and installers. We would be happy to help you find your closest point of contact.

Van der Valk Solar Systems develops and produces solar mounting systems for:

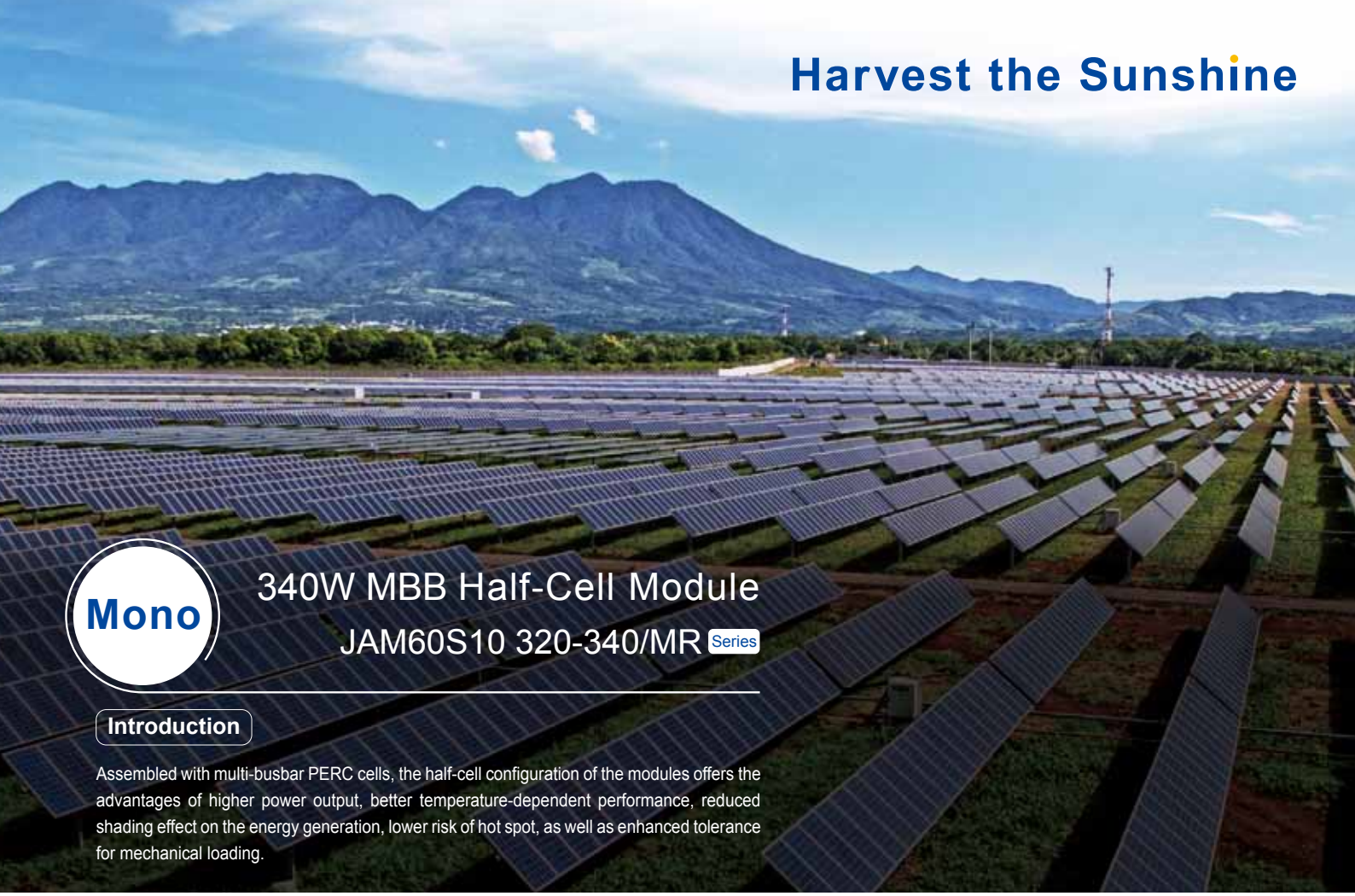
Pitched Roofs | Flat Roofs | Open fields | Greenhouses | Water features

VAN DER VALK SOLAR SYSTEMS

V12-2014

PLEASE CONTACT VAN DER VALK SOLAR SYSTEMS, YOUR DEALER OR INSTALLER FOR FULL INFORMATION.

Valk Solar Systems UK Ltd, Innovation House, Discovery Park, Ramsgate Road, Sandwich CT13 9FF, United Kingdom, telephone +44 (0)1304 897658, website www.valksolarsystems.co.uk, e-mail info@valksolarsystems.co.uk. **DEVELOPER AND PRODUCER OF SOLAR MOUNTING SYSTEMS.**



Harvest the Sunshine

Mono

340W MBB Half-Cell Module

JAM60S10 320-340/MR Series

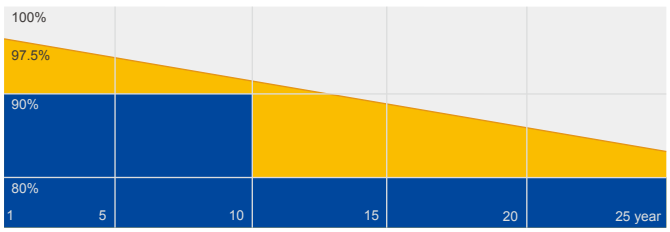
Introduction

Assembled with multi-busbar PERC cells, the half-cell configuration of the modules offers the advantages of higher power output, better temperature-dependent performance, reduced shading effect on the energy generation, lower risk of hot spot, as well as enhanced tolerance for mechanical loading.

- Higher output power
- Lower LCOE
- Less shading and lower resistive loss
- Better mechanical loading tolerance

Superior Warranty

- 12-year product warranty
- 25-year linear power output warranty



JA Linear Power Warranty Industry Warranty

Comprehensive Certificates

- IEC 61215, IEC 61730
- ISO 9001: 2015 Quality management systems
- ISO 14001: 2015 Environmental management systems
- OHSAS 18001: 2007 Occupational health and safety management systems
- IEC TS 62941: 2016 Terrestrial photovoltaic (PV) modules – Guidelines for increased confidence in PV module design qualification and type approval

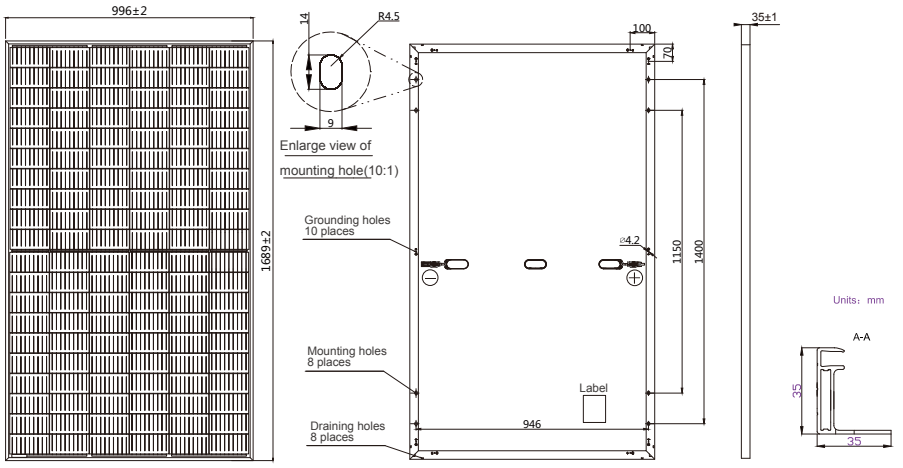
JA SOLAR

www.jasolar.com

JA SOLAR

JAM60S10 320-340/MR Series

MECHANICAL DIAGRAMS



Remark: customized frame color and cable length available upon request

SPECIFICATIONS

Cell	Mono
Weight	19.0kg±3%
Dimensions	1689±2mm×996±2mm×35±1mm
Cable Cross Section Size	4mm²
No. of cells	120(6×20)
Junction Box	IP68, 3 diodes
Connector	QC 4.10-35
Cable Length (Including Connector)	Portrait:300mm(+)/400mm(-); Landscape:1000mm(+)/1000mm(-)
Packaging Configuration	30 Per Pallet

ELECTRICAL PARAMETERS AT STC

TYPE	JAM60S10 -320/MR	JAM60S10 -325/MR	JAM60S10 -330/MR	JAM60S10 -335/MR	JAM60S10 -340/MR
Rated Maximum Power(Pmax) [W]	320	325	330	335	340
Open Circuit Voltage(Voc) [V]	40.60	40.87	41.08	41.32	41.55
Maximum Power Voltage(Vmp) [V]	33.73	33.97	34.24	34.48	34.73
Short Circuit Current(Isc) [A]	10.16	10.23	10.30	10.38	10.46
Maximum Power Current(Imp) [A]	9.49	9.57	9.64	9.72	9.79
Module Efficiency [%]	19.0	19.3	19.6	19.9	20.2
Power Tolerance	0~+5W				
Temperature Coefficient of Isc(α_Isc)	+0.044%/°C				
Temperature Coefficient of Voc(β_Voc)	-0.272%/°C				
Temperature Coefficient of Pmax(γ_Pmp)	-0.350%/°C				
STC	Irradiance 1000W/m², cell temperature 25°C, AM1.5G				

Remark: Electrical data in this catalog do not refer to a single module and they are not part of the offer.They only serve for comparison among different module types.

ELECTRICAL PARAMETERS AT NOCT

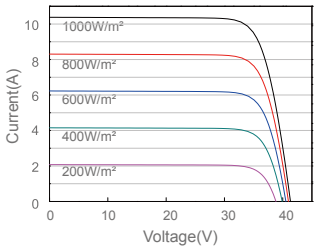
TYPE	JAM60S10 -320/MR	JAM60S10 -325/MR	JAM60S10 -330/MR	JAM60S10 -335/MR	JAM60S10 -340/MR
Rated Max Power(Pmax) [W]	241	245	249	253	257
Open Circuit Voltage(Voc) [V]	38.05	38.26	38.46	38.68	38.90
Max Power Voltage(Vmp) [V]	31.58	31.80	32.02	32.21	32.40
Short Circuit Current(Isc) [A]	8.07	8.14	8.21	8.28	8.35
Max Power Current(Imp) [A]	7.63	7.70	7.78	7.85	7.93
NOCT	Irradiance 800W/m², ambient temperature 20°C, wind speed 1m/s, AM1.5G				

OPERATING CONDITIONS

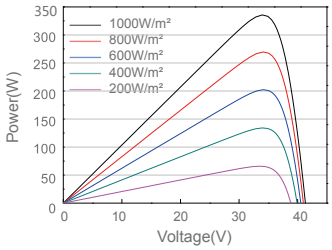
Maximum System Voltage	1000V/1500V DC(IEC)
Operating Temperature	-40°C~+85°C
Maximum Series Fuse	20A
Maximum Static Load,Front	5400Pa
Maximum Static Load,Back	2400Pa
NOCT	45±2°C
Application Class	Class A

CHARACTERISTICS

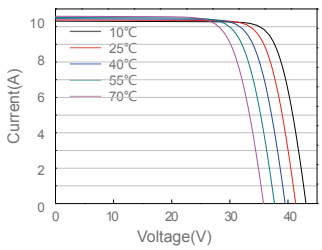
Current-Voltage Curve JAM60S10-335/MR



Power-Voltage Curve JAM60S10-335/MR



Current-Voltage Curve JAM60S10-335/MR



ELAND® CABLES

Photovoltaic Solar H1Z2Z2-K Cable

Eland Product Group: **A6S**

APPLICATION

Updated harmonised (H1Z2Z2-K) European standard solar cable intended for the interconnection within photovoltaic systems such as solar panel arrays. Suitable for fixed installations, internal and external, within conduit or systems, but not direct burial applications. Our solar cable is ozone-resistant according to BS EN 50396, UV resistant according to HD 605/A1, and is tested for durability according to EN 60216. For installations where fire, smoke emissions and toxic fumes create a potential risk to life and equipment.

CONSTRUCTION

Conductor
Class 5 flexible tinned copper conductor

Insulation
Halogen-free cross-linked compound

Sheath
Halogen-free cross-linked, flame retardant compound

CABLE STANDARDS

EN 50618:2014, TÜV 2 PfG 1169/08.2007, IEC 60228/VDE 0295, HD 605/A1, BS EN 60811-401, BS EN 60811-404, BS EN 60811-501, BS EN 60811-503-508, BS EN 53505, ASTM D624, BS EN 50289-3-7, HD516, BS EN 50396, BS EN 60068-2-78, IEC/BS EN 60332-1-2, IEC/BS EN 60754-1, IEC/BS EN 61034-1, IEC/BS EN 60754-2, IEC/BS EN 60754-1, IEC/BS EN 60754-2, BS EN 50395 Clause 9

The electrical and dimensional properties of this product are measured by the Technical and Quality Assurance department at the Eland Cables laboratory. Cable performance in respect of conductor resistance, construction quality (workmanship), dimensional consistency, and other parameters are verified to published standards and approved product drawings. Conformance to RoHS (Restriction of the use of Hazardous Substances) is determined and confirmed.

CHARACTERISTICS

Voltage Rating (Uo/U)
AC: 600/1000V
DC: 900/1800V

Temperature Rating
Fixed: -40°C to +90°C

Minimum Bending Radius
Fixed: 4 x overall diameter
Flexed: 5 x overall diameter

Maximum Voltage (Umax)
1.8kV DC (conductor/conductor, non earthed system, circuit not under load)

Maximum Conductor Temperature
+120°C (for 20000h)

Test Voltage
6.5kV AC according to BS EN 50395

Sheath Colour
● Black

Note
Other colours available on request

ISSUE NO 01-03 -2014

DIMENSIONS

ELAND PART NO.	NO. OF CORES	NOMINAL CROSS SECTIONAL AREA mm²	NOMINAL OVERALL DIAMETER mm	NOMINAL WEIGHT kg/km	TENSILE STRENGTH IN OPERATION N
E6S10025BK000	1	2.5	4.9	40	37
E6S10040BK000	1	4	5.4	56	60
E6S10060BK000	1	6	5.9	73	90
E6S10100BK000	1	10	6.9	115	150
E6S10160BK000	1	16	8.0	170	240
E6S10250BK000	1	25	10.3	270	375
E6S10350BK000	1	35	11.8	365	525
E6S10500BK000	1	50	13.5	508	750
E6S10700BK000	1	70	16.0	729	1050
E6S10950BK000	1	95	17.8	923	1350
E6S11200BK000	1	120	19.8	1178	1800
E6S11500BK000	1	150	21.1	1460	2250
E6S11850BK000	1	185	24.4	1777	2775
E6S12400BK000	1	240	27.1	2252	3600

CONDUCTORS

Class 5 Flexible Copper Conductors for Single Core and Multi-Core Cables

NOMINAL CROSS SECTIONAL AREA mm²	MAXIMUM RESISTANCE OF CONDUCTOR AT 20°C
	Metal-Coated Wires ohms/km
2.5	8.21
4	5.09
6	3.39
10	1.95
16	1.24
25	0.795
35	0.565
50	0.393
70	0.277
95	0.21
120	0.164
150	0.132
185	0.108
240	0.0817

The above table is in accordance with BS EN 60228 (previously BS 6360)

ISSUE NO 01-03 -2014

UK T 020 7241 8787 | F 020 7241 8700 | sales@elandcables.com | www.elandcables.com
International T +44 20 7241 8740 | F +44 20 7241 8700 | international@elandcables.com

ELECTRICAL CHARACTERISTICS

NO. OF CORES	NOMINAL CROSS SECTIONAL AREA mm²	CURRENT CARRYING CAPACITY
		In Air Amps
1	2.5	41
1	4	55
1	6	70
1	10	98
1	16	132
1	25	176
1	35	218
1	50	276
1	70	347
1	95	416
1	120	488
1	150	566
1	185	644
1	240	775

Based on a 60°C ambient temperature

DE-RATING FACTORS

AIR TEMPERATURE	UP TO 60°C	70°C	80°C	90°C	100°C	110°C
DE-RATING FACTOR	1.00	0.91	0.82	0.71	0.58	0.41

ISSUE NO 01-03 -2014

3P 4G

10kW

4G NEW

Solis 3P 4G Three Phase Inverter

- Solis 4G Three Phase Range
- 160V-850V MPPT voltage range-ultra low startup
- Dual MPPT design with precise MPPT algorithm
- THDi＜1.5%, low harmonic distortion against grid
- Over 98.7% Max.efficiency
- RS485, WiFi/LAN/GPRS (optional) interface
- Multiple protections levels
- WiFi monitoring available-iphone and android app available
- 5 years standard warranty, 20 years optional upgrade

Model:

Solis–3P10K–4G

Features:

THDi	IP65	160-850	AFCI	WiFi/GPRS	App Store
<2%		MPPT voltage range	Optional	Real time monitoring	Available on the iPhone App Store / Available on the iPhone App Store

Datasheet

Model	Solis-3P10K-4G
Energy Source	PV
Input Side(DC)	
Max. DC input power(kW)	12
Max. DC input voltage(V)	1000
Start-up voltage(V)	180
MPPT voltage range(V)	160-850
Max. input current per MPPT(A/B)	11A+11A
MPPT number/Strings per MPPT input	2 / A:1; B:1
Output Side (AC)	
Rated output power(kW)	10
Max. apparent output power(kVA)	11
Max. output power(kW)	11
Rated grid voltage(V_{LL})	400
Grid voltage range(V)	313-470
Rated grid frequency(Hz)	50/60
Operation phase	three
Rated grid output current(A)	14.4
Max. output current(A)	16.7
Power Factor (at rated output power)	0.8 leading ... 0.8 lagging
THDi (at rated output power)	<2%
DC injection current	<0.5%In
Grid frequency range(Hz)	47-52 or 57-62
Efficiency	
Max.efficiency	98.7%
EU efficiency	98.1%
MPPT efficiency	>99.5%
Protection	
DC reverse-polarity protection	Yes
Short circuit protection	Yes
Output over current protection	Yes
Output over voltage protection	Yes
Insulation resistance monitoring	Yes
Residual current detection	Yes
Surge protection	Yes
Islanding protection	Yes
Temperature protection	Yes
Integrated DC switch	Optional
General Data	
Dimensions(mm)	310W*538H*158D
Weight(kg)	14.1
Topology	Transformerless
Self consumption (night)	<1W(Night)
Operating ambient temperature range	-25~60℃
Ingress protection	IP65
Noise emission{typical}	<30 dBA
Cooling concept	Natural convection
Max.operation altitude	4000m
Designed lifetime	>20 years
Grid connection standard	EN50438, G59/3, AS4777, VDE0126-1-1, IEC61727, VDE N4105
Relative humidity	0~100%
Safety/EMC standard	IEC62109-1/-2, AS3100
Features	
DC connection	MC-4 mateable
AC connection	IP67 rated plug
Display	LCD,2×20 Z.
Communication connections	4 pins RS485 connector
Warranty	5 years standard (extend to 20 years)

A1100 Electronic Polyphase Meter

Advanced, cost effective polyphase metering...

Features

- Accuracy – Class 1 or Class 2, EC Directive 2004/22/EC (MID) - kWh Class A or Class B
- kWh import or kWh import/export
- Direct or CT connected
- 3 phase, 4 wire or 3 phase, 3 wire
- 16 year product life
- Large figure display (9.8mm)
- Extensive security data
- IrDA (Infrared Data Association) output for transmitting billing, security and status data
- 12kV impulse withstand
- Compact design
- Double insulated, glass filled polycarbonate case
- DIN 43857 Part 2 and Part 4 (except for top fixing centres)
- IP53 in accordance with IEC 60529:1989

Options

- Liquid Crystal Display or mechanical register
- One or two rates controlled by an external device (LCD meter only)
- Auxiliary terminals configured for:
  - SO pulsed output (IEC 62053-31)
  - Rate selection (two rate meters)
  - Serial data output
- Extended terminal cover with or without cut-out

The use of innovative metering technology provides cost-effective metering that is highly secure and maintains a high degree of accuracy over its full operating range. The A1100 meter is suitable for direct connected or CT operated domestic, commercial and light industrial polyphase applications.

Two main versions of the A1100 meter are available. The liquid crystal display version of the meter can be supplied as a one or two rate meter. The meter is available as import only or import and export. The display has a customer defined display sequence that can include security information. Chevrons and legends on the nameplate identify the data being displayed.

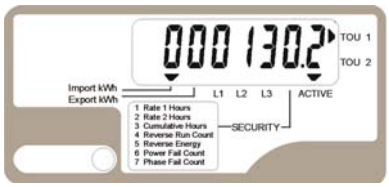
The mechanical register version only offers import kWh, one rate. Five LED's are used to identify the status of the meter.

Communications is provided via the IrDA port allowing the meter registers and security data to be read electronically using a hand-held device. As an option the same absolute data can be transmitted via the meter's auxiliary terminals making it ideal for AMI applications.

Meters can be supplied to meet accuracy Class 1 or Class 2 or EC Directive 2004/22/EC (MID) - kWh Class A or Class B.

elster

Display



The LCD version of the A1100 displays register and security information by the use of chevrons and digits. The mechanical register version has up to 7 digits and five LED's for reporting status information.

Meter nameplates can be printed in any language.

Security

The A1100 offers high security with many useful security features. The meter stores all registration and configuration data to non-volatile memory. All data is retained for the life of the meter.

Security features are illustrated below.

	LCD Meter		Mechanical Meter	
Event	LCD	IrDA/Serial	LED	IrDA/Serial
Phase A Present	+		+	
Phase B Present	+		+	
Phase C Present	+		+	
Reverse Event Count	+	+		+
Reverse Run Reading	+	+		+
Reverse Alarm	+		+	
Power Fail Count	+	+		+
Phase Fail Count	+	+		+
Elapsed Hours Rate 1	+	+		+
Elapsed Hours Rate 2	+	+		+
Elapsed Hours Cumulative Display	+			
Meter Error	+	+	+	+

As an option the kWh register can increment in power flow insensitive mode i.e. it increments regardless of energy flow direction.

Pulse Output

An opto-isolated pulse output can provide the basis for an energy management system or AMR. These pulses are output via the meter's auxiliary terminals. The output conforms to IEC 62053-31.

System Connections

2 Element	3 phase, 3 wire
3 Element	3 phase, 4 wire
	2 phases of a 3 phase, 4 wire
	2 phase, 3 wire
	1 phase, 3 wire
	1 phase, 2 wire (LCD meter only)

Elster Metering Systems
Tollgate Business Park,
Beaconside, Stafford,
Staffordshire, ST16 3HS
United Kingdom
Tel: 44 (0) 1785 275200
www.elstermetering.com

IrDA Communications

The IrDA (Infrared Data Association) communications port provides one way communications, transmitting a continual data stream from the meter to an external device. An error checking algorithm protects the integrity of the data.

As an option the same absolute data is available via the meter's auxiliary terminals. Both ports use the OBIS: IEC 62056-61 data identifiers.

Important information is provided:

Meter registers
Security features
Status information
Identification

The port transmits over a distance of 250mm.

Technical Data

Current Range	Direct connected 20 - 100A, 10-60A CT operated 5-6A or 5-10A
Voltage Range	220-240V (L-N) or 220-240V (L-L) 110-120V (L-N) or 110-120V (L-L)
Frequency	50 or 60Hz
Burden Voltage Circuits (230V) Current Circuits	 0.9W, 9VA capacitive burden/phase [max] 2VA @ 100A/phase [max]
Insulation Impulse Withstand	4kV RMS 50Hz 12kV 1.2/50µs 500 ohm source
Display LCD	9.8 x 3.5mm characters High contrast, wide angle 5, 6 or 7 digits
Mechanical Register	6.7 x 3.5mm characters 6 or 7 digits
IrDA Baud Rates Serial Baud Rates	2400, 4800 or 9600 (Without serial port) 2400 or 4800
Product Life	16 years
Certified Product Life	10 years
Temperature	-40° to + 55° C (Operational range) -40° to + 85° C (Storage)
Humidity	Annual mean 75% (For 30 days spread over one year, 95%)
Pulse Width Wh/pulse	10 to 250ms or equal mark/space 1, 2, 4, 5, 10, 20, 25, 40, 50, 100
Weight	860 grams
Specifications	kWh Class 1 or 2 IEC 61036:1996 EC Directive 2002/22/EC (MID) kWh Class A or Class B
Case	IP53 to IEC 60529:1989

Dimensions and Fixing Centres