IMO

Established 1972

Solar Safety Product Range

featuring

AC & TRUE DC
Disconnects

www.imoautomation.com

IMO is at the forefront of control component technology specifically developed for the renewable energy market and in particular solar energy. Whether meeting the demands of safe and efficient DC switching or delivering tracking solutions that help to maximise solar energy conversion rates, you can be sure that IMO products have been developed to meet the highest technical and commercial standards.

Contents

IMO Solar Brief

AC	Alternating Current
DC	Direct Current
I_e	Rated Operational Current
IMO	IMO Precision Controls
I_{sc}	Short-Circuit Current
I_{th}	Thermal Current
MPPT	Maximum Power Point Tracking
PV	Photovoltaic
V_{oc}	Open-Circuit Voltage

References

BS 7671	Requirements for Electrical Installations
IEC/EN 60364-7-712	Low-voltage electrical installations. Part 7-712: Requirements for special installations or locations. Photovoltaic (PV) power systems
IEC/EN 60529	Specification for degrees of protection provided by enclosures (IP code)
IEC/EN 60947-1 **UL 60947-1**	Low-voltage switchgear and controlgear. Part 1: General rules
IEC/EN 60947-3 **UL 60947-3**	Low-voltage switchgear and controlgear. Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units
UL 60947-4-1	Low-voltage switchgear and controlgear. Contactors and motor-starters. Electromechanical contactors and motor-starters
IEC/EN 61215	Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval
IEC/EN 61646	Thin-film terrestrial photovoltaic (PV) modules - Design qualification and type approval
Nema 250	Enclosures for Electrical Equipment (1000 Volts Maximum)
UL 94	Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances
UL 508	Industrial Control Equipment
UL 508i	Manual Disconnect Switches intended for use in Photovoltaic Systems
DTI/Pub URN 06/1972	Photovoltaics in Buildings, Guide to the installation of PV systems 2nd Edition

Guide to Installation of PV Systems – 3rd Edition

Other Relevant References

G83/1-1	Recommendations for Connection of Small-scale Embedded Generators (Up to 16A per Phase) in Parallel with Public Low-Voltage Distribution Networks
G59/2	Recommendations for the Connection of Generating Plant to the Distribution Systems of Licensed Distribution Network Operators
NFPA70 2017	National Electrical Code

Introduction to PV design

A Photovoltaic (PV) power system primarily converts sunlight directly into electricity using a photovoltaic cell array. The conversion of the solar radiation into electric current is carried out using the photoelectric effect found when some semiconductors that are suitably “doped” generate electricity when exposed to solar radiation.

As an individual PV-cell gives a relatively low output, a number of PV-cells are connected in series to supply higher voltages and connected in parallel in order to offer higher current capability. These cell arrays are referred to as PV-panels, and a number of interconnected panels are referred to as PV-strings. If there is a requirement for increased capacity then a larger system can be constructed whereby the PV-strings are connected in parallel to form a PV-array that gives a DC output current equivalent to the sum of all the PV-string outputs.

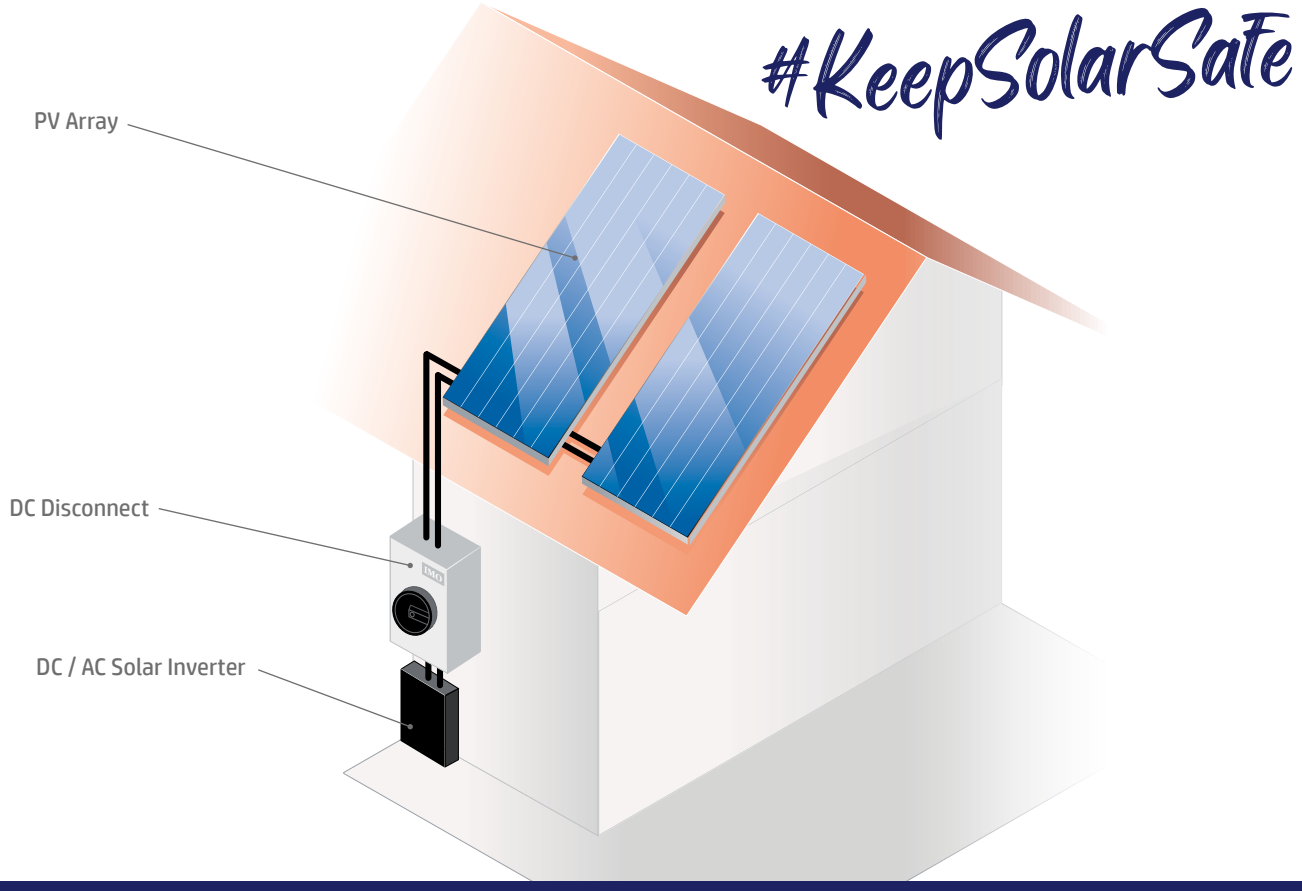
The main advantages of photovoltaic (PV) electricity generation are as follows:

- no fossil fuel usage and subsequent emission of pollution
- no nuclear fuel usage and disposal or storage of radioactive materials
- local distributed generation where needed
- installed system reliability and extended life
- reduced operating and maintenance costs
- ease of upgrading and replacement if necessary due to modularity of installation

When considering PV panels it is important to ensure that the units comply with all relevant standards for both electrical performance and for building requirements. It is recommended that, where possible, they comply with either IEC 61215 or IEC 61646, depending upon the structure of the cells. Once chosen the panels should be mounted in a location that maximises their exposure to sunlight for as long as possible and limits the possibility of shading, or future potential shading.

An inverter should be chosen to match the overall power capacity of the PV array, and like the arrays, it should operate as efficiently as possible. When considering the inverter, one using a Maximum Power Point Tracking (MPPT) system is preferential as this is a technique that grid connected inverters use to get the maximum possible power from one or more photovoltaic devices.

Where the PV installation is tied into the domestic grid system then the rules and procedures designated in G83 should be referred to and followed by a competent installer who is associated with a suitable accreditation scheme such as MCS.



SI Solar Disconnects

TRUE DC Disconnects for PV Systems

- Market-leading design
- 2, 4, 6 & 8 pole versions available
- Max. rated current 85A@1000VDC (acc. to DC21B/DC-PV1 for SI55)
- Range of mounting options
- Guaranteed arc suppression (3ms typical)
- Operator independent switching mechanism
- Knife-edge contacts

5 YEAR WARRANTY

UL508i

SAFE-LOCK

Innovators in TRUE DC isolation

Since launch, the SI range of TRUE DC disconnects has set the benchmark safety standard for disconnection and isolation of the DC panel load in solar applications world-wide. Prior to the introduction of the SI series, AC modified disconnects in multi-pole linked form were commonly used with all the performance and safety issues that such devices presented.

The SI TRUE DC range was specifically developed to meet the needs of the solar industry with full operator independent switching mechanism, a guaranteed 5ms maximum arc suppression time and long-life knife edge contacts. Arc chambers built-in to the unit keep the device cool under repeated operation and the full range of mounting options provide a solution for almost every application.

Adopted as the standard by many of the largest solar equipment designers and installers around the world, the SI Series continues to set the benchmark in solar safety.

Additional Resources

There is only so much you can illustrate in printed form, so we have included a QR code which will take you directly to the Featured Spotlight for TRUE DC disconnects on the IMO website. Here you will be able to watch a couple of videos about solar safety and recommendations from the Institution of Engineering & Technology in conjunction with the BRE National Solar Centre, about raising the bar for quality in the solar PV industry.

SI Series Ordering Variations

Lever Handle Models

Panel Mount (4-screw) 64 x 64 Estcutcheon Plate Lever Handle, IP66, NEMA 3R	Single Hole Mount (22.5mm) 48 x 48 Escutcheon Plate Lever Handle, IP66, NEMA 4X	Base Mount (door coupling) 64 x 64 Escutcheon Plate Lever Handle, IP66, NEMA 4X	Modular Switch Lever Handle, IP40, NEMA 1
			
SIPM64***	**SI**SHM***	**SI**BMDC64***	**SI**DB***

Lever Handle Models with Lockable OFF SAFE-LOCK

Panel Mount (4-screw) 64 x 64 Estcutcheon Plate Lockable Lever Handle, IP66, NEMA 3R	Single Hole Mount (22.5mm) 48 x 48 Escutcheon Plate Lockable Lever Handle, IP66, NEMA 4X	Base Mount (door coupling) 64 x 64 Escutcheon Plate Lockable Lever Handle, IP66, NEMA 4X	Modular Switch Lockable Lever Handle, IP40, NEMA 1
			
SIPML64***	**SI**SHML***	**SI**BMDCL64***	**SI**DBL***

Rotary Handle Models with Lockable OFF SAFE-LOCK

Panel Mount (4-screw) 64 x 64 Lockable Rotary Handle, IP66, NEMA 4X	Base Mount (door coupling) 64 x 64 Lockable Rotary Handle, IP66, NEMA 4X	Enclosed Version Lockable Rotary Handle, IP67, NEMA 4X
		
SIPM64R***	**SI**BMDC64R***	**SI**PEL64R***

NOTE:

For description of each mounting mechanism please refer to pages 27 - 30.

IP ratings are for front panel and enclosed.

SI Series Part Number Configuration

SI **16** - **PM64R** - **2**

Series

SI DC Solar Disconnect	**SI**

Switch Rating

16 Amp	**16**	38 Amp	**38**
25 Amp	**25**	40 Amp	**40**
32 Amp	**32**	55 Amp	**55**

Number of Poles (see Switching Configurations on p.5)

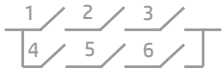
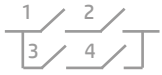
2	2-Pole
2H	2-Pole 4 Parallel Poles
4	4-Pole
4S	2-Pole 4 Poles in Series (Input Top, Output botton)
4T	2-Pole 4 Poles in Series (Input & Output bottom)
4B	2-Pole 4 Poles in Series (Input & Output top)
6	6-Pole
3H	2-Pole 6 Parallel Poles
8	8-Pole
4H	2-Pole 8 Parallel Poles

Mounting Type

Panel Mount (4-screw), 64 x 64 Escutcheon Plate, Lever Handle	**PM64**
Panel Mount (4-screw), 64 x 64 Escutcheon Plate, Lockable Lever Handle	**PML64**
Panel Mount (4-screw), 64 x 64 Lockable Rotary Handle	**PM64R**
Single Hole (22.5mm) Mount, 48 x 48 Escutcheon Plate, Lever Handle	**SHM**
Single Hole (22.5mm) Mount, 48 x 48 Escutcheon Plate, Lockable Lever Handle	**SHML**
Base Mount (DIN Rail), 64 x 64 Escutcheon Plate, Lever Handle	**BMDC64**
Base Mount (DIN Rail), 64 x 64 Escutcheon Plate, Lockable Lever Handle	**BMDCL64**
Base Mount (DIN Rail), 64 x 64 Lockable Rotary Handle	**BMDC64R**
Modular Switch, Lever Handle	**DB**
Modular Switch, Lockable Lever Handle	**DBL**
Enclosed Version, Lockable Rotary Handle	**PEL64R**

SI Series Technical Data

Data according to UL508i File E362605, CCN: NMSJ and UL60947-1 & UL60947-4-1 File E146487, CCN: NRNT, NRNT7

Main Contacts		Type	SI16	SI25	SI32	SI38	SI40	SI55	SI65
Ampere-Rating "General Use"	DC								
1 pole	350V	A	4	5	6	6	7.1	10	10
1	500V	A	4	5	6	6	5.7	7	7
	600V	A	4	5	6	6	5	5.8	5.8
	700V	A					3.9	5	5
	800V	A					3.2	4.4	4.4
	900V	A					2.5	3.5	3.5
	1000V	A					1.5	2	2
2 poles in series	350V	A	16	25	32	45	48	55	65
2	500V	A	16	25	32	45	48	55	65
	600V	A	16	25	32	36	40	55	65
	700V	A					32	46	50
	800V	A					26	37	40
	900V	A					20	28	32
	1000V	A					16	20	25
2 poles in series	350V	A	29	45	58	58	72	85	85
+ 2 poles parallel	500V	A	29	41	43	45	53	66	73
2H	600V	A	21	30	33	36	42	55	65
	700V	A					35	47	50
	800V	A					30	40	40
	900V	A					26	32	32
	1000V	A					22	25	25
4 poles in series	350V	A	16	25	32	45	48	55	65
4S, 4B, 4T	500V	A	16	25	32	45	48	55	65
	600V	A	16	25	32	36	40	55	65
	700V	A					40	55	65
	800V	A					40	55	65
	900V	A					40	55	65
	1000V	A					40	55	65
3 poles in series	350V	A	29	45	58	58	72	85	85
+ 2 poles parallel	500V	A	29	41	50	50	56	80	85
3H	600V	A	21	38	45	45	52	65	72
	700V	A					46	58	66
	800V	A					40	51	60
	900V	A					36	45	54
	1000V	A					33	42	48
4 poles in series	350V	A	29	45	58	58	80	85	85
+2 poles parallel	500V	A	29	45	58	58	71	85	85
4H	600V	A	29	45	50	50	65	85	85
	700V	A					58	76	85
	800V	A					51	71	76
	900V	A					45	67	73
	1000V	A					42	64	70
AC Rating "General Use" 2 poles in series 	600V	A	16	25	32		40	55	-
2 poles in series + 2 poles parallel 	277V	A			50		72	85	-
3 poles parallel	3x480V	A			32		40	55	-
Fuse size (RK5) Industrial Control Switch									
5kA / 600V		A	40	60	80	80	-	-	-
5kA / 1000V		A					160	160	160
Maximum cable cross sections	(including jumper SIV-B1-1/B2-1)								
solid or stranded		AWG	12 - 10	12 - 10	12 - 10	12 - 10	16 - 10	16 - 10	16 - 10
flexible		AWG	12 - 6	12 - 6	12 - 6	12 - 6	14 - 4	14 - 4	14 - 4
flexible (+ multicore cable end)		AWG	12 - 6	12 - 6	12 - 6	12 - 6			
Size of terminal screw			M4 Pz2	M4 Pz2	M4 Pz2	M4 Pz2	M5 Pz2	M5 Pz2	M5 Pz2
Tightening torque		lb.inch	9 - 16	9 - 16	9 - 16	9 - 16	22 - 25	22 - 25	22 - 25

x - In Test

IMO

TRUE DC SOLAR DISCONNECTS

Over 8 Million Installed Units - ZERO FAILURES

In solar installations, the DC disconnect is like a vehicle air-bag. You never know it really works until you need it. So it's good to know that the IMO SI has now surpassed 8 million installed units without a single recorded failure.

This isn't surprising considering the product carries all the most important approvals including UL508i, TUV (IEC 60947-1 & IEC 60947-3), CE and CCC. In fact, the IMO SI solar disconnect has been tested by some of the most rigorous examiners and OEM manufacturers in the world, passing with flying colors every single time.

As ever, the SI range has a guaranteed arc suppression time of under 5mS, in built arc cooling chambers, operator independent switching mechanism and Safe-Lock handle, making it one of the safest DC disconnects available, no matter who uses it or how slowly they operate it.

Why take a risk on safety? Insist on TRUE DC, contact us for a quotation and see why the IMO SI TRUE DC Isolator is the sensible choice for the PV installer.

Keep Solar Safe

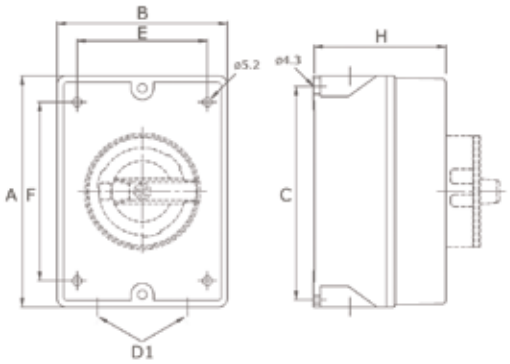
Enclosed AC Disconnects - PE69

- 3, 4, 6 and 8 pole versions available
- On load 20A - 100A
- Red/Yellow
- 3 Padlock positions
- IP65
- IP66 taller enclosure available
- Aux. Contacts available

Part number	Number of poles	Rating @ 3~400V			
		AC21/Amps	AC3/kW	AC23/Amps	AC23/kW
PE69-3020	3	20	5.5	16	7.5
PE69-3025	3	25	7.5	20	10
PE69-3032	3	32	11	25	12.5
PE69-3040	3	40	15	32	16
PE69-3063	3	63	18.5	45	22
PE69-3080	3	80	18.5	45	22
PE69-30100	3	100	30	72	37
PE69-4020	4	20	5.5	16	7.5
PE69-4025	4	25	7.5	20	10
PE69-4032	4	32	11	25	12.5
PE69-4040	4	40	15	32	16
PE69-4063	4	63	18.5	45	22
PE69-4080	4	80	18.5	45	22
PE69-40100	4	100	30	72	37
PE69-6020	6	20	5.5	16	7.5
PE69-6025	6	25	7.5	20	10
PE69-6032	6	32	11	25	12.5
PE69-6060	6	40	15	32	16
PE69-6063	6	63	18.5	45	22
PE69-6080	6	80	18.5	45	22
PE69-8020	8	20	5.5	16	7.5
PE69-8025	8	25	7.5	20	10
PE69-8032	8	32	11	25	12.5
PE69-8080	8	40	15	32	16
PE69-8063	8	63	18.5	45	22
PE69-8080	8	80	18.5	45	22

Dimensions (mm)

Type	Pole	A	B	C	D1	E	F	H
PE69..20-40	3, 4	130	98	120	2x25.5/20,5	75	150	76
PE69..63-100	3, 4	200	140	188.5	40.5/32.5 +16.5	100	160	86
PE69..20-40	6	200	140	188.5	40.5/32.5 + 16.5	100	160	86
PE69..20-40	8	240	176	228.5	40.5/32.5	120	200	120
PE69..63-80	6, 8	240	176	228.5	40.5/32.5	120	200	120



Distribution/String Boxes

- 4 to 48 poles
- High thermal stability - ASA plastic
- Transparent door
- UV stabilized
- IP65 rating - Inside / Outside use
- Earth & neutral bars included
- Suitable for Photovoltaic applications
- Optional Key Lock (E-Lock)

Technical Data

Protection class	IP65	Temperature range	-25°C to 60°C
Isolation class	II ⧈	Colour	RAL 7035
Impact kit	IK07	IEC capability	60670-25

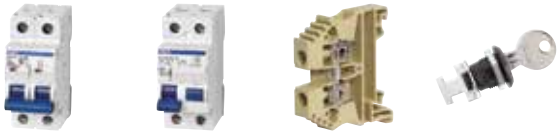
Type	Description	Number of terminals PE/N	Dimensions H x W x D (mm)
E-04W	4 Module Enclosure	4/4	201 x 128 x 120
E-08W	8 Module Enclosure	8/8	201 x 202 x 120
E-12W	12 Module Enclosure	10/10	259 x 319 x 144
E-24W	24 Module Enclosure	13/13	384 x 319 x 144
E-36W	36 Module Enclosure	15/15	534 x 319 x 144
E-48W	48 Module Enclosure	20/20	664 x 319 x 141

Type	Cable Entries
E-04W	4 x M20 4 x M25/M32
E-08W	8 x M20 6 x M25 /M32
E-12W	12 x M20 10 x M25/M32 4 x M32/M40 2 x side knockout 90 x 37mm
E-24W	12 x M20 10 x M25/M32 4 x M32/M40 4 x side knockout 90 x 37mm
E-36W	12 x M20 10 x M25/M32 4 x M32/M40 6 x side knockout 90 x 37mm
E-48W	12 x M20 10 x M25/M32 4 x M32/M40 6 x side knockout 90 x 37mm

Step 1 - Select your box:

Step 2 - Select your disconnect:

Step 3 - Select your accessories:



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UL Miniature Circuit Breakers

The entire range of UL 489 and UL 1077 approved MCBs feature design developments which incorporate a protective contact position indicator and a high performing, high quality switching mechanism for extended life and reliability. UL 489 approved MCBs are required to pass stringent short circuit and switching test requirements, along with having larger clearances and electrical spacings.

UL 489 Approved MCBs

Designed for protection of electrical installations against overcurrent in the branch circuit, whilst also allowing motor branch circuit protection, this high performing range of DIN rail mountable MCBs have been manufactured in accordance with UL 489.

- Available from 0.5 Amps to 63 Amps
- Thermo-magnetic overcurrent protection
- 10kA short circuit protection
- RoHS compliant
- B, C & D Type tripping curves
- Contact position indicator

c UL us

File No.: E495936

UL 489 Listed Performance

Our range is available in single, double or triple poles, with current ranges from 0.5 Amps to 63 Amps, with the choice of B, C & D tripping curves.
A full range of complimentary accessories are also available from stock, including auxiliary contacts, shunt trips, undervoltage trips, alarm contacts and locking devices.

For the complete range...

QR CODE SCAN ME

UL 1077 Approved MCBs

Designed for protection of electrical installations against overload and short circuits, this high performing range of DIN rail mountable MCBs have been manufactured in accordance with UL 1077.

- Available from 0.5 Amps to 63 Amps
- Thermo-magnetic overcurrent protection
- 10kA short circuit protection
- RoHS compliant
- B, C & D Type tripping curves
- Contact position indicator

c US

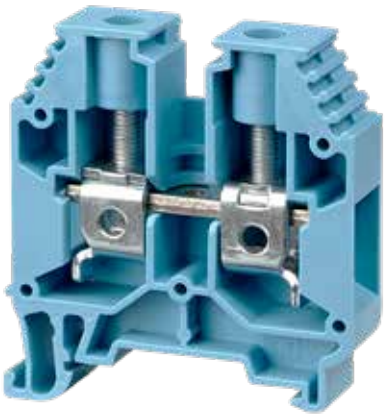
File No.: E495935

UL 489 Listed Performance

The range is available in single, double or triple poles, with current ranges from 0.5 Amps to 63 Amps, and with the choice of B, C & D tripping curves. A full range of complimentary accessories are also available from stock, including auxiliary contacts, shunt trips, undervoltage trips, alarm contacts and locking devices.

PV Rated DIN Rail Terminals

- 1000V Rated up to 232A
- Up to 95mm² wiring capacity
- UL94-V0 Materials
- Various colours available
- Labelling options
- UR/cUR approved (E244285)



General Product Information	ER16V	ER35PV	ER50V	ER70V	ER70PV
Insulating material	PA 66	PA 66	PA 66	PA 66	PA 66
Inflammability class acc. to UL 94	V0	V0	V0	V0	V0
Dimensions					
Width	12 mm	16 mm	20 mm	22 mm	22 mm
Length	50 mm	52.8 mm	80 mm	74.0 mm	80.0 mm
Height (MR 35x7,5)	55.5mm	58.7 mm	84.7mm	67.5 mm	88.7 mm
IEC Technical Data					
Nominal Voltage	1000 V	1000 V	1000 V	750 V	1000 V
Nominal Current	76 A	115 A	150 A	192 A	232 A
Wire Cross Section	16 mm²	35 mm²	50 mm²	70 mm²	70 mm²
UR / cUR Technical Data					
Nominal Voltage	1000 V	1000 V	1000 V	1000 V	1000 V
Nominal Current	85 A	115 A	150 A	175 A	175 A
Wire Cross Section	12 - 4 AWG	12-2 AWG	6-1/0 AWG	6-2/0 AWG	6-2/0 AWG
Connection Data					
Minimum solid strand cross section	2.5 mm²	1.5 mm²	16 mm²	10 mm²	25 mm²
Maximum solid Strand cross section	25 mm²	35 mm²	70 mm²	70 mm²	95 mm²
Minimum fine Strand cross section	4 mm²	1.5 mm²	16 mm²	16 mm²	35 mm²
Maximum fine strand cross section	25 mm²	35 mm²	50 mm²	70 mm²	95 mm²
AWG Conductor Range	12 - 4	12-2	6 - 1/0	6 - 2/0	6 - 2/0
Connection Type	screw (1,0x5,5)	screw (1.2x6,5)	hexagonal socket screw S5 (DIN 6911)	hexagonal socket screw S6 (DIN 6911)	hexagonal socket screw S6 (DIN 6911)
Insulation Stripping length	16 mm	18 mm	24 mm	24 mm	24 mm
Tightening torque	1,2 - 2,0 Nm	2,5 - 3,5 Nm	6,0 - 10 Nm	6,0 - 12 Nm	6,0 - 12 Nm

IMO Worldwide Offices

IMO Precision Controls Limited
The Interchange
Frobisher Way
Hatfield, Herts AL10 9TG
United Kingdom

Tel: 01707 414 444
Fax: 01707 414 445
Email: imo@imopc.com
Web: www.imopc.com

IMO Jeambrun Automation SAS
Parc de la Broye
14 rue du Chafour
59710 ENNEVELIN
France

Tel: 0800 912 712 (nº gratuit)
Fax: 0145 134 737
Email: imo-fr@imopc.com
Web: www.imojeambrun.fr

IMO Automazione
Via Belfiore 10,
50144 Firenze (FI)
Italia

Tel: 800 930 872 (toll free)
Fax: 8000 452 6445
Email: imo-it@imopc.com
Web: www.imopc.it

IMO Canada
1B-701 Rossland Road East
Suite #608
Whitby, Ontario L1N 9K3
Canada

Tel: 416 639 0709

Email: sales-ca@imopc.com
Web: www.imopc.com

IMO Automation LLC
Suite 112,
5910 Shiloh Road East
Alpharetta, GA 30005
USA

Tel: 404 476 8810

Email: sales-na@imopc.com
Web: www.imoautomation.com

IMO South Africa (Pty) Ltd
5 Osdam Park,
Rivergate Business Park
Cape Town 7441
South Africa

Tel: 021 551 1787
Fax: 021 555 0676
Email: info@imopc.co.za
Web: www.imopc.co.za

IMO Pacific Pty Ltd
Unit 9, Dillington Pass
Landsdale
Perth WA 6065
Australia

Tel: 1300 34 21 31

Email: sales@imopacific.com.au
Web: www.imopacific.com.au

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UKAS MANAGEMENT SYSTEMS 0015

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