






Regione Emilia Romagna
Comune di Ferrara

IMPIANTO FOTOVOLTAICO E OPERE CONNESSE

Potenza Impianto 9,573 MWp



PROPONENTE	
LIGHTSOURCE RENEWABLE ENERGY ITALY SPV 14 S.R.L. VIA G. LEOPARDI, 7 - 20123 MILANO (MI) - P.IVA: 12593780963 – PEC: lightsourcespv_14@legalmail.it	
PROGETTAZIONE	
Ing. Antonello Rutilio  Via R. Zandonai, 4 – 44124 – FERRARA IT - P.IVA: 00522150382 – PEC: incico@pec.it Tel.: +39 0532 202613 – email: a.rutilio@incico.com	
COLLABORAZIONI	
Ing. Lorenzo Stocchino  Via R. Zandonai, 4 – 44124 – FERRARA IT - P.IVA: 00522150382 – PEC: incico@pec.it Tel.: +39 0532 202613 – email: l.stocchino@incico.com	
COORDINAMENTO PROGETTUALE	
SOLAR IT S.R.L.  VIA I. ALPI 4 – 46100 - MANTOVA IT - P.IVA: 02627240209 – PEC: solarit@lamiappec.it Tel.: +390425 072 257– email: info@solaritglobal.com	

TITOLO ELABORATO			
Schede Tecniche			
LIVELLO DI PROGETTAZIONE	CODICE ELABORATO	FILE NAME	DATA
DEFINITIVO	23-LS15787-IT-CONA-PG-R01	LS15781-PG-D02_0_Schede Tecniche.docx	08/03/2023

REVISIONI					
REV.	DATA	DESCRIZIONE	ESEGUITO	VERIFICATO	APPROVATO
0	08/03/2023	Emesso per filing	MCA	LST	ARU



SCHEDE TECNICHE

INDICE

Contenuto del documento

1. OGGETTO	2
2. SCHEDE TECNICHE	2
3. PANNELLI FV	3
4. COMBINER BOX	6
5. INVERTER FV	8
6. TRACKER.....	10
7. QUADRI MT	12

1. OGGETTO

La società proponente nell'ambito del proprio piano di sviluppo delle fonti energetiche rinnovabili prevede di realizzare un impianto di produzione da fonte rinnovabile - fotovoltaica - nel Comune di Alfonsine (RA) (nel seguito "Impianto FV"). Gli impianti saranno realizzati su due aree denominate S. Anna e Campeggia e saranno conformi all'impiego come Agrivoltaico.

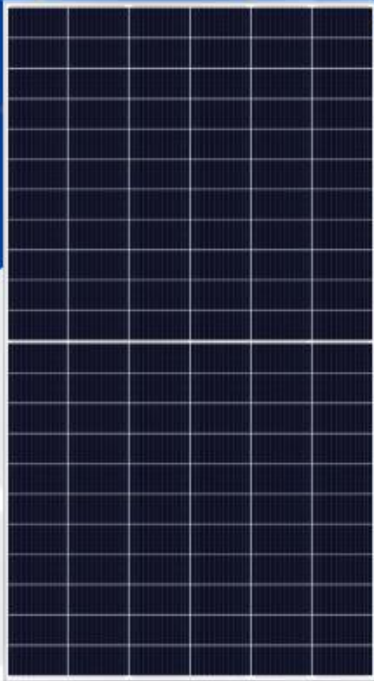
2. SCHEDE TECNICHE

Nel seguito riportiamo le schede tecniche dei componenti principali dell'impianto di cui all'oggetto.

In virtù di una continua evoluzione dei materiali disponibili sul mercato e la sempre crescente rapidità con cui si aggiornano le tecnologie, in fase esecutiva il proponente potrà comunque prevedere materiali equivalenti di costruttori diversi.

3. PANNELLI FV

ULTRA-LOW CARBON HETEROJUNCTION TECHNOLOGY HJT BIFACIAL MODULE



RSM132-8-680BHDG-700BHDG

132 CELL HJT Bifacial Module	680-700Wp Power Output Range
1500VDC Maximum System Voltage	22.5% Maximum Efficiency

KEY SALIENT FEATURES

- Global, Tier 1 bankable brand, with independently certified state-of-the-art automated manufacturing
- N-type solar cell without LID caused by B-O
- No PID
- Better Temperature Coefficient
- Bifacial technology enables additional energy harvesting from rear side
- Positive power tolerance of 0~+3%
- Dual stage 100% EL Inspection warranting defect-free product
- Module Imp binning radically reduces string mismatch losses
- Excellent wind load 2400Pa & snow load 5400Pa under certain installation method
- Comprehensive product and system certification
 - IEC61215:2016; IEC61730-1/-2:2016;
 - ISO 9001:2015 Quality Management System
 - ISO 14001:2015 Environmental Management System
 - ISO 45001:2018 Occupational Health and Safety Management System



* As there are different certification requirements in different markets, please contact your local Risen Energy sales representative for the specific certificates applicable to the products in the region in which the products are to be used.

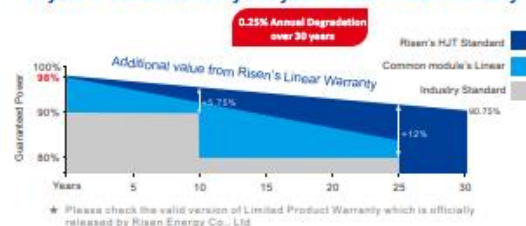
RISEN ENERGY CO., LTD.

Risen Energy is a leading, global tier 1 manufacturer of high-performance solar photovoltaic products and provider of total business solutions for residential, commercial and utility-scale power generation. The company, founded in 1986, and publicly listed in 2010, compels value generation for its chosen global customers. Techno-commercial innovation, underpinned by consummate quality and support, encircle Risen Energy's total Solar PV business solutions which are among the most powerful and cost-effective in the industry. With local market presence and strong financial bankability status, we are committed, and able, to building strategic, mutually beneficial collaborations with our partners, as together we capitalise on the rising value of green energy.

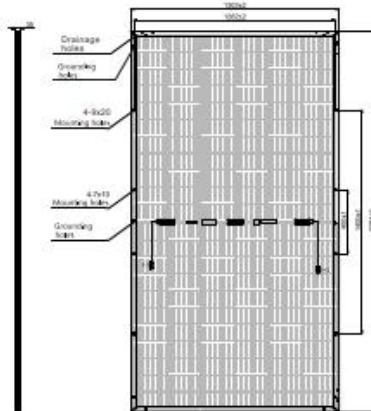
Tashan Industry Zone, Meilin, Ninghai 315609, Ningbo | PRC
Tel: +86-574-59953239 Fax: +86-574-59953599
E-mail: marketing@risenenergy.com Website: www.risenenergy.com



LINEAR PERFORMANCE WARRANTY 12 year Product Warranty / 30 year Linear Power Warranty



Dimensions of PV Module



ELECTRICAL DATA (STC)

Model Number	RSM132-8-680BHDG	RSM132-8-685BHDG	RSM132-8-690BHDG	RSM132-8-695BHDG	RSM132-8-700BHDG
Rated Power in Watts-Pmax(Wp)	680	685	690	695	700
Open Circuit Voltage-Voc(V)	49.47	49.58	49.69	49.80	49.91
Short Circuit Current-Isc(A)	17.26	17.33	17.40	17.46	17.52
Maximum Power Voltage-Vmpp(V)	41.48	41.57	41.67	41.76	41.85
Maximum Power Current-Imp(A)	16.41	16.49	16.58	16.66	16.74
Module Efficiency (%)	21.9	22.1	22.2	22.4	22.5

STC: Irradiance 1000 W/m², Cell Temperature 25°C, Air Mass AM1.5 according to EN 60904-3.
Bifacial factor: (%) 85±5 • Module Efficiency (%): Round-off to the nearest number

Electrical characteristics with 10% rear side power gain

Total Equivalent power -Pmax (Wp)	748	754	759	765	770
Open Circuit Voltage-Voc(V)	49.47	49.58	49.69	49.80	49.91
Short Circuit Current-Isc(A)	18.99	19.06	19.14	19.21	19.27
Maximum Power Voltage-Vmpp(V)	41.48	41.57	41.67	41.76	41.85
Maximum Power Current-Imp(A)	18.05	18.14	18.24	18.33	18.41

Rear side power gain: The additional gain from the rear side compared to the power of the front side at the standard test condition. It depends on mounting (structure, height, tilt angle etc.) and albedo of the ground.

ELECTRICAL DATA (NMOT)

Model Number	RSM132-8-680BHDG	RSM132-8-685BHDG	RSM132-8-690BHDG	RSM132-8-695BHDG	RSM132-8-700BHDG
Maximum Power-Pmax (Wp)	519.3	523.0	527.1	530.8	534.5
Open Circuit Voltage-Voc (V)	46.35	46.46	46.56	46.66	46.77
Short Circuit Current-Isc (A)	14.15	14.21	14.27	14.32	14.37
Maximum Power Voltage-Vmpp (V)	38.78	38.87	38.96	39.05	39.13
Maximum Power Current-Imp (A)	13.39	13.46	13.53	13.59	13.66

NMOT: Irradiance at 800 W/m², Ambient Temperature 20°C, Wind Speed 1 m/s.

MECHANICAL DATA

Solar cells	HJT cell
Cell configuration	132 cells (6×11+6×11)
Module dimensions	2384×1303×35mm
Weight	41kg
Superstrate	High Transmission, Low Iron, Tempered ARC Glass
Substrate	Tempered Glass
Frame	High strength alloy steel
J-Box	Potted, IP68, 1500VDC, TÜV&UL Certified
Cables	4.0mm ² (12AWG), Positive(+)350mm, Negative(-)230mm (Connector Included)
Connector	Risen Twinsel PV-SY02, IP68

TEMPERATURE & MAXIMUM RATINGS

Nominal Module Operating Temperature (NMOT)	43°C±2°C
Temperature Coefficient of Voc	-0.22%/°C
Temperature Coefficient of Isc	0.047%/°C
Temperature Coefficient of Pmax	-0.24%/°C
Operational Temperature	-40°C~+85°C
Maximum System Voltage	1500VDC
Max Series Fuse Rating	35A
Limiting Reverse Current	35A

PACKAGING CONFIGURATION

	40ft(HQ)
Number of modules per container	558
Number of modules per pallet	31
Number of pallets per container	18
Box gross weight[kg]	1315

CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.
©2022 Risen Energy. All rights reserved. Contents included in this datasheet are subject to change without notice.
No special undertaking or warranty for the suitability of special purpose or being installed in extraordinary surroundings is granted unless as otherwise specifically committed by manufacturer in contract document.

Our Partners:

4. COMBINER BOX

INGECON

SUN

StringBox

SIMPLE AND SAFE CONNECTION OF PHOTOVOLTAIC STRINGS, 1500 V

12 / 16 / 18 / 20 / 24 / 32

The new INGECON® SUN StringBox is a cost-effective PV string combiner box series designed for central inverter-based PV systems. The INGECON® SUN StringBox features efficient input and output DC wiring with fully rated DC disconnect switches for safe maintenance.

When used in combination with INGECON® SUN series central inverters, the INGECON® SUN StringBox outputs can be monitored by means of the optional DC input groups monitoring kit available for B and C series.

A complete range of equipment for all types of projects

Available in models ranging from 12 to 32 inputs and 1,500 V max. DC voltage, the INGECON® SUN StringBox provide the maximum flexibility and expandability in system design. The compact and rugged IP65 enclosure is designed for installation in outdoor environments, such as roof-mounted systems and large-scale solar farms.

Maximum protection

The INGECON® SUN StringBox is a passive combiner box equipped with touch-safe DC fuse holders, DC fuses, lightning induced DC surge arresters and load disconnect switch.

PROTECTIONS

- Up to 32 pairs of DC fuses.
- Available fuses: 10A, 12A, 15A, 16A, 20A, 25A, 30A, 32A (15A standard).
- Lightning induced DC surge arresters, type 2.
- Manual DC isolating switch.

OPTIONAL ACCESSORIES

- Lightning induced DC surge arresters, type 1+2.
- Pole mounting kit.
- PV connectors.

MAIN FEATURES

- Built to minimize system costs by providing the maximum flexibility.
- Available in 12, 16, 18, 20, 24, 32 inputs configurations.
- Rated for 1,500 Vdc maximum voltage
- Simplifies input and output wiring.
- Capability to connect up to 2 DC output cables per polarity (only for 12 and 16 inputs).
- IP65 protection rating.
- Maximum protection to corrosion and pollution thanks to the isolating polyester enclosure reinforced with fiberglass.



www.ingeteam.com
solar.energy@ingeteam.com

Ingeteam

INGECON

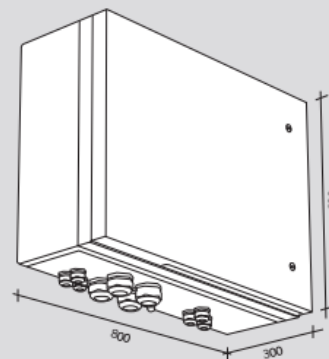
SUN

StringBox

	1,500 V			
	StringBox 12	StringBox 12B	StringBox 16	StringBox 16B
Input				
Maximum number of input strings	12 / 24 ⁽¹⁾	12 / 24 ⁽¹⁾	16 / 32 ⁽¹⁾	16 / 32 ⁽¹⁾
Maximum current per input (A)	12 / 24	12 / 24	12 / 24	12 / 24
Number of protection fuses	12	24	16	32
Type of fuses	gPV fuses, 10 x 85 mm, 30 kA			
Available fuses	10 A, 12 A, 15 A, 16 A, 20 A, 25 A, 30 A, 32 A (15 A / 30 A standard)			
Maximum DC voltage	1,500 Vdc			
Cable inlet	M40 cable glands (n.4 cables entry diameter: 6 to 10 mm for each cable gland)			
Inlet connections	Direct connection to fuse holders or distribution bar, wiring gauge 1.5 to 16 mm ²			
Output				
Rated total current (A) ⁽²⁾	144 / 288	144 / 288	192 / 384	192 / 384
Cable outlet	Up to 2 pairs of M50 cable glands (cable diameter: 27 to 35 mm)			
Outlet connections	Direct connection on copper plates, wiring gauge up to 2 x 240 mm ² per pole			
DC switch disconnect rating (A)	315 / 400	315 / 400	315 / 400	315 / 400
SPD				
Type	Type 1 (optional: Type 1+2)			
Grounding connection	M20 cable gland (cable diameter: 7 to 13 mm, wiring gauge 2.5 to 35 mm ²)			
General Information				
Enclosure type	Outdoor use, insulating cabinet (polyester reinforced with fiberglass)			
Protection rating	IP65			
Impact strength	IK10			
Operating temperature range	-20 °C to +55 °C			
Relative humidity (non-condensing)	0 to 95%			
Maximum altitude ⁽³⁾	2,000 m a.s.l.			
DC switch handle	Internal, lockable in open position			
Consumption (W)	0 W			
Size (mm)	800 x 600 x 300 (W x H x D)			
Weight (kg)	35	36	36	38
Marking	CE			
Electrical installations	IEC 60364-7-712			
LV Switchgear standards	IEC 61439-1, IEC 61439-2, AS/NZS 61439-2, AS/NZS 5033			
Electric shock protection	Class II equipment			

Notes: ⁽¹⁾ With external over-molding in line fuses and branch connectors ⁽²⁾ Over 50 °C ambient temperature, the current will be reduced at the rate of 3.5% every °C up to 55°C
⁽³⁾ Please contact Ingeteam for altitudes higher than 2,000 m.

Size (mm)



12
35 kg.
12B / 16
36 kg.
16B
38 kg.

5. INVERTER FV

SG3125/3400HV-MV-30

Turnkey Station for 1500 Vdc System MV Transformer Integrated

NEW



HIGH YIELD

- Advanced three-level technology, max. inverter efficiency 99%
- Effective cooling, full power operation at 50 °C



SMART O&M

- Integrated zone monitoring and MV parameters monitoring function for online analysis and trouble shooting
- Modular design, easy for maintenance
- Convenient external touch screen



SAVED INVESTMENT

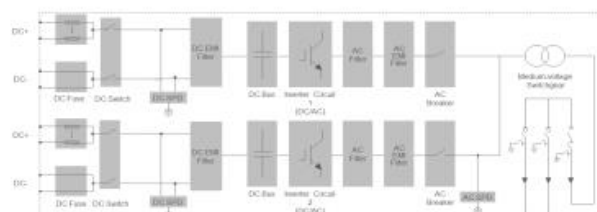
- Low transportation and installation cost due to 20-foot container design
- DC 1500V system, low system cost
- Integrated MV transformer, switchgear, and LV auxiliary power supply
- Q at night function optional



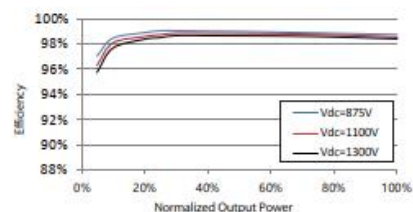
GRID SUPPORT

- Compliance with standards: IEC 62271-202, IEC 62271-200, IEC 60076
- Low/High voltage ride through (L/HVRT)
- Active & reactive power control and power ramp rate control

CIRCUIT DIAGRAM



EFFICIENCY CURVE



Type designation	SG3125HV-MV-30	SG3400HV-MV-30
Input (DC)		
Max. PV input voltage	1500 V	
Min. PV input voltage / Startup input voltage	875 V / 915 V	
MPP voltage range	875 – 1300 V	
No. of independent MPP inputs	2	
No. of DC inputs	16 / 18 / 22 / 24 / 28 (max. 24 for floating system)	
Max. PV input current	3997 A	
Max. DC short-circuit current	10000 A	
PV array configuration	Negative grounding or floating	
Output (AC)		
AC output power	3125 kVA @ 50 °C / 3437 kVA @ 45 °C	3437 kVA @ 45 °C
Max. inverter output current	3308 A	
AC voltage range	20 kV – 35 kV	
Nominal grid frequency / Grid frequency range	50 Hz / 45 – 55 Hz, 60 Hz / 55 – 65 Hz	
Harmonic (THD)	< 3 % (at nominal power)	
DC current injection	< 0.5 % In	
Power factor at nominal power / Adjustable power factor	> 0.99 / 0.8 leading – 0.8 lagging	
Feed-in phases / AC connection	3 / 3-PE	
Efficiency		
Inverter max. efficiency	99.0%	
Inverter Euro. efficiency	98.7%	
Transformer		
Transformer rated power	3125 kVA	3437 kVA
Transformer max. power	3437 kVA	
LV / MV volatage	0.6 kV / (20 – 35) kV	
Trnsformer vector	Dy11	
Transformer cooling type	ONAN (Oil-natural, air-natural)	
Oil type	Mineral oil (PCB free) or degradable oil on request	
Protection & Function		
DC input protection	Load break switch + fuse	
Inverter output protection	Circuit breaker	
AC MV output protection	Circuit breaker	
Surge protection	DC Type I + II / AC Type II	
Grid monitoring / Ground fault monitoring	Yes / Yes	
Insulation monitoring	Yes	
Overheat protection	Yes	
Q at night function	Optional	
General Data		
Dimensions (W*H*D)	6058 * 2896 * 2438 mm	
Weight	15 T	
Degree of protection	Inverter: IP65 / Others: IP54	
Auxiliary power supply	5 kVA (optional: max. 40 kVA)	
Operating ambient temperature range	-35 to 60 °C (> 50 °C derating)	-35 to 60 °C (> 45 °C derating)
Allowable relative humidity range	0 – 100 %	
Cooling method	Temperature controlled forced air cooling	
Max. operating altitude	1000 m (standard) / > 1000 m (optional)	
Display	Touch screen	
Communication	Standard: RS485, Ethernet; Optional: optical fiber	
Compliance	CE, IEC 62109, IEC 61727, IEC 62116, IEC 62271-202, IEC 62271-200, IEC 60076	
Grid support	Q at night (Optional), L/HVRT, active & reactive power control and power ramp rate control	

6. TRACKER

MONOLine⁺

1P



ADAPTED TO **XXL MODULES**



IN-HOUSE **MANUFACTURING**

* providing local content if required



BIFACIAL OPTIMIZED



TERRAIN RESPONSE



PV CLEANER TESTED

Certified by module manufacturer



MADE WITH **MAGNELIS®**

* Optional

General specifications

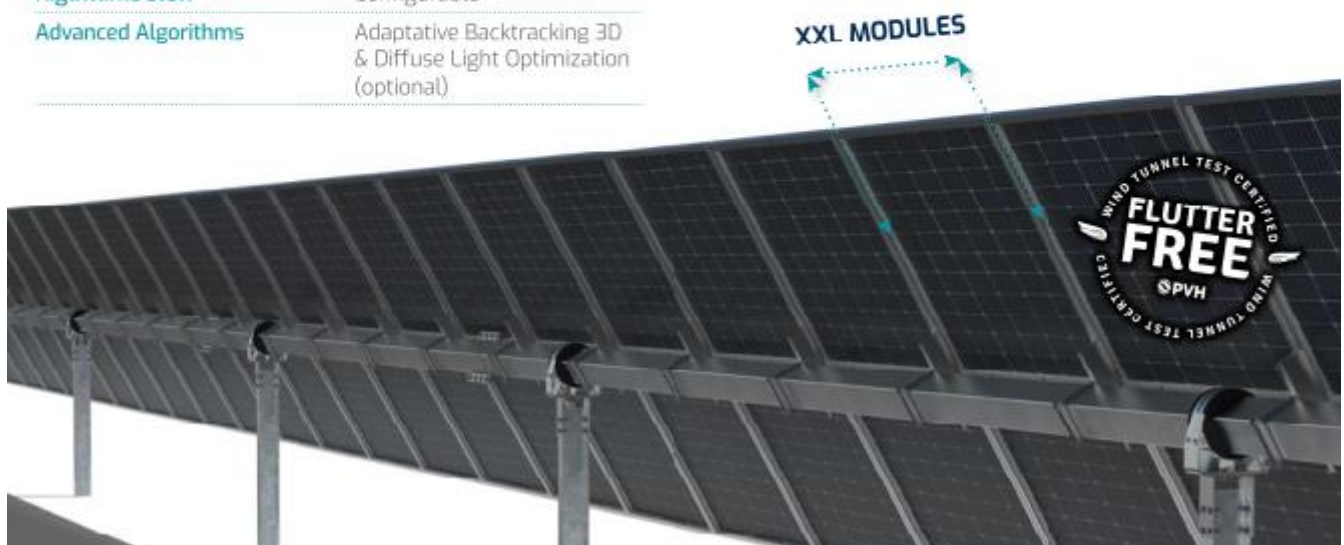
Tracker	Independent-row, horizontal single-axis
Maximum length	100 m.
Maximum width	2.5 m.
Module configuration	1 module in portrait
Rotational range	E-O: +/- 60°
Motor per MWp	Depending on the size, the type of the module and the number of modules per string, 1 motor per row. (Maximum 100 meters lenght)
Ground cover ratio	30-50%
Modules supported	All market available modules
Slope tolerance	N-S: up to 23.5° E-W: unlimited
Module attachment	By bolts and nuts, rivet or clamps for frameless modules
Allowable wind load	Tailored to site specific conditions
Wind alarm	Controlled by ultrasonic anemometer
Prepared for XXL modules	

Communications & Control

Solar tracking method	Astronomical algorithm
Control System	Central control unit connected to plant SCADA Redundant wireless gateways to guarantee communication Self-powered DC Motor Drive Box with auxiliary panel
SCADA interface	Modbus TCP or OPC-UA
Communication	Wireless (LoRa)
Nighttime stow	Configurable
Advanced Algorithms	Adaptive Backtracking 3D & Diffuse Light Optimization (optional)

Installation & Services

On-site training and commissioning	
Warranty	Structure: 10 years Electromechanical components: 5 years
PV Cleaner	Optional
Certifications	UL 3703, IEC 62817 on going



7. QUADRI MT

SM6

A truly professional **solution!**



Schneider Electric has developed protection, monitoring and control solutions specifically dedicated to Medium Voltage networks for over 40 years.

SM6 switchgear has been specifically designed on the basis of that extensive experience.

It also incorporates some very new solutions, giving the best in terms of continuity of service and operators' safety.

High-performance breaking devices



(*) Not available at 36 kV.

A comprehensive solution

SM6 switchgear is fully compatible with

- PowerMeter metering units.
- Easergy P3 relay and Easergy Sepam multi-function protection relays
 - Protection
 - Measurements and diagnosis.
- VIP protection self powered relay for protection. SM6 switchboards can thus be easily integrated into any monitoring and control system.
 - Local & remote indication and operation.



Enclosures able to withstand internal arcing

Internal Arc Classification: A-FL and A-FLR.

- 3-sides internal arc protection IAC: A-FL, 12.5 kA 1s, 16 kA 1s and 20 kA 1s for SM6-24 and 16 kA 1s for SM6-36.
- 4-sides internal arc protection IAC: A-FLR, 12.5 kA 1s, 16 kA 1s and 20 kA 1s for SM6-24.
- Choice of exhaust:
 - downwards exhaust
 - upwards exhaust for SM6-24.

General characteristics

Main characteristics



The hereunder values are for working temperatures from -5°C up to +40°C and for a setting up at an altitude below 1000 m.

Electrical characteristics

Rated voltage	Ur	kV	7.2	12	17.5	24	36
Insulation level							
Insulation	Ud	50/60 Hz, 1 min (kV rms)	20	28	38	50	70
Isolation	Ud	50/60 Hz, 1 min (kV rms)	23	32	45	60	80
Insulation	Up	1.2/50 μs (kV peak)	60	75	95	125	170
Isolation	Up	1.2/50 μs (kV peak)	70	85	110	145	195
Breaking capacity							
Transformer off load		A	16				
Cables off load		A	31.5				
Rated current	Ir	A	400 - 630 - 1250				
Short-time withstand current	Ik/tk ⁽¹⁾	kA/1 s	25	630 - 1250			
			20 ⁽²⁾	630 - 1250			
			16	630 - 1250			
			12.5	400 - 630 - 1250			
Making capacity (50 Hz)	Ima	kA	62.5	630	NA		
			50	630			
			40	630			
			31.25	400 - 630	630		
Maximum breaking capacity (Isc)							
Units IM, IMC, IMB, IMM		A	630 - 800 ⁽³⁾				
NSM-cables, NSM-busbars		A	630 - 800 ⁽³⁾				
QM, QMC, QMB		kA	25		20	20	
PM		kA	25	20			
CVM		kA	6.3	NA			
CVM with fuses		kA	25	NA			
SF6 circuit breaker range			7.2	12	17.5	24	36
DM1-A, DM1-D, DM1-W	kA	25	630-1250				
		20	630-1250				
DM1-S, DM1-M	kA	25	630				
DM1-Z		25	1250				
DM2	kA	20	630				
		25	630				
Vacuum circuit breaker range			7.2	12	17.5	24	36
DMV-A, DMV-D	kA	25	630-1250				
DMVL-A	kA	20	630				
DMVL-D	kA	25	630				

NA: Non Available

⁽¹⁾ 3 phases

⁽²⁾ In 20 kA/3 s for SM6-24 only, consult us

⁽³⁾ In 800 A, consult us.