

# SD700SP

VARIABLE SPEED DRIVES

## Solar Pumping



## **SD700SP**

Power Electronics have a strong commitment to reduce the levelized cost of water (LCoW) by powering upgraded energy saving solutions. Synergies between our Industrial and Solar Divisions have come together in the SD700 SOLAR PUMPING - SD700SP. This unique product takes advantage of the outstanding features of the SD700 variable speed drive to power pumping systems from either the solar PV panels (off-grid) or simultaneously from the PV panels and grid supply (PV solar assisted).

The SD700SP is a customised SD700 VSD with extended DC range, adapted to work with AC or DC or from a hybrid supply. The SD700SP has modified firmware able to find and track the MPP to maximize the performance running in solar mode. Optional Solar Kits with diode, DC protections, disconnection and filtering are available. Our engineering and consulting department will support you with advice on PV sizing and SD700SP selection. Full integration into a cabinet is also available to enable easy installation and commissioning.

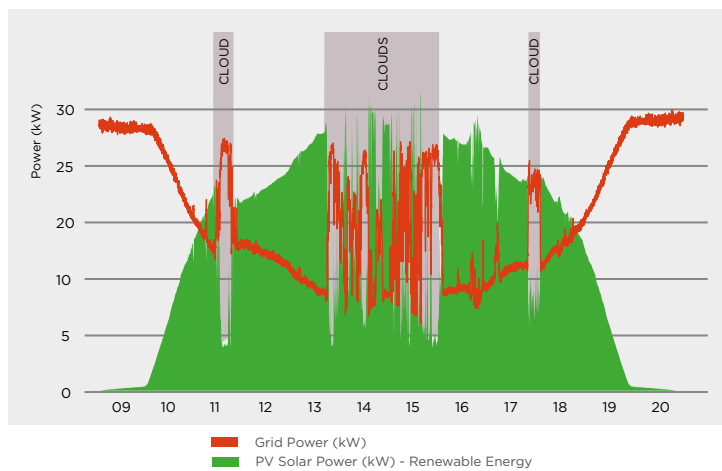
REDUCE YOUR LEVELIZED  
COST OF WATER (LCOW)  
BY INSTALLING SD700SP

- IP54 WITHOUT DUST FILTERS
- 50°C OPERATION WITHOUT POWER DERATING
- (FFA) FULL FRONTAL ACCESS
- BUILT-IN HARMONICS AND RFI FILTERS
- BUILT-IN DV/DT FILTER 500V/μS-800V/μS (UNSCREENED CABLE UP TO 300M)
- MODULARITY
- CONFORMALLY COATED ELECTRONICS WITH MILITAR AND AEROSPACE TECHNOLOGY

## HYBRID SYSTEM

The SD700SP is connected simultaneously to the AC mains and the PV DC field. The AC input voltage determines the SD700SP DC bus voltage and therefore the required DC voltage from the strings. The maximum energy produced at the fixed DC voltage depends on the number of PV panels connected in series. The number of strings in parallel will be determined according to the pump power. The figure shows the system performance with a pump continuously working. During broad daylight the energy generated by the PV panels (green area) is injected to the motor. This helps to proportionally reduce the power consumption from the grid (red line). When a cloud partially covers the panels, the drive will absorb more line power in order to keep the process constant.

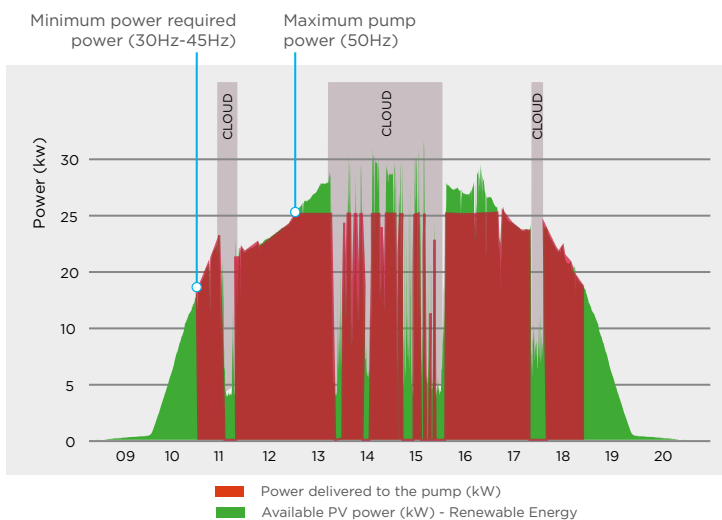
Power Electronics have developed a system, which is able to use all DC energy available and take from the AC supply only the complementary power. This system connects/disconnects the AC input to the mains therefore avoiding the need to have a "stand by" power source. SD700SP takes all energy possible from the PV field to pump the water needed, and if the energy of PV field is not enough, SD700SP switches on the AC input to "top up" and deliver all energy required by the motor. Once the energy available in the PV field is higher than the energy needed by the motor, SD700SP will disconnect the AC input. This feature is especially important when the AC is supplied by a generator; when the AC mains power it is not needed, the generator can be stopped.



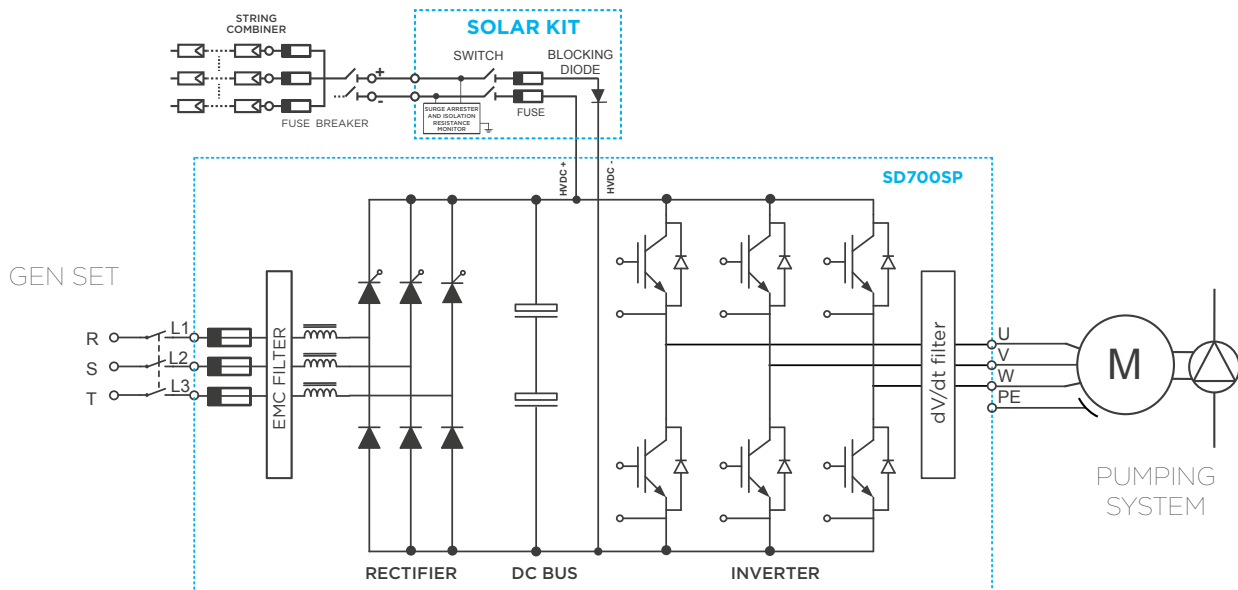
## ISOLATED SYSTEM

The SD700SP is only connected to the PV field, generating the necessary power to start and speed-up the pump. The minimum power required depends on the hydraulic response of the complete pump-load system. A complete study of the system determines the motor operation frequency range (typically from 30Hz to 45Hz) that generates a minimum pump flow. At the same time, the frequency range determines the minimum power threshold and therefore PV sizing.

With the MPPT dynamic search algorithm developed by Power Electronics, the SD700SP searches for the Maximum Power Point automatically, therefore the PV field will always deliver the maximum power available. Irrespective of whether the system is working in winter or summer, or of the intensity of sunlight.



## SD700SP OPERATIONAL DIAGRAM



## SD700SP TECHNICAL CHARACTERISTICS

|                                    |   |   |
|------------------------------------|---|---|
| INPUT                              | Power range                                     | 1,5kW - 560kW <sup>[1]</sup>  |
|                                    | Voltage power                                   | 380-500Vac, 3 phases (±10%) 540-900Vdc (830Vdc for Frame 1 & 2)   |
|                                    | Hybrid supply                                   | Yes, simultaneous connection  |
|                                    | Input frequency                                 | 50Hz/60Hz ± 6%  |
|                                    | Input rectifier technology                      | Thyristor-Diode   |
|                                    | DPF=cos φ / Power factor                        | ≥ 0.98 / ≥ 0.91   |
|                                    | EMC input filter                                | Frames 1 & 2: First environment (C2 standard); Frames 3 to 11: Second environment (Industrial) (C3 Standard); First environment (C2 Optional). C1 consult Power Electronics. Optional IT filter   |
|                                    | Current THDi (%) / Filter harmonics             | ≤ 40% / Choke coils 3% impedance  |
|                                    | Regenerative                                    | No  |
| OUTPUT                             | Output frequency <sup>[2]</sup>                 | 0...200Hz   |
|                                    | Overload capacity                               | Constant torque/heavy duty: 150% during 60 sec at 50°C  |
|                                    | Efficiency @rated current and voltage)          | ≥ 98%   |
|                                    | Switching frequency                             | 4 to 8kHz - PEWave  |
|                                    | Output dV/dt filter                             | 500 to 800V/μs <sup>[3]</sup>   |
| Output cable length <sup>[4]</sup> | USC 300m, SC 150m                               |   |
| ENVIRONMENTAL CONDITIONS           | Operation temp. / Storage temp.                 | -20°C to +50°C / -40°C to +70°C   |
|                                    | Altitude/Power altitude derating <sup>[1]</sup> | 1000m / >1000m, 1% PN(kW) per 100m; 4000m maximum   |
|                                    | Ambient humidity                                | <95%, non-condensing  |
|                                    | Degree of protection                            | IP20, IP54  |
| INPUTS / OUTPUTS                   | Digital inputs                                  | 6 programmable active high (24Vdc), Isolated power supply, 1 PTC input  |
|                                    | Digital outputs                                 | 3 Programmable changeover relays (250Vac, 8A or 30Vdc, 8A)  |
|                                    | Analogue input                                  | 2 Programmable differential inputs: 0 - 20mA, 4 - 20mA, 0 - 10Vdc and ±10Vdc. (Optically isolated)  |
|                                    | Analogue outputs                                | 2 Isolated programmable outputs: 0 - 20mA, 4 - 20mA, 0 - 10Vdc and ±10Vdc   |
|                                    | Encoder inputs (optional)                       | 2 differential encoders input. Voltages inputs from 5 to 24Vdc  |
|                                    | User power supply                               | +24Vdc user power supply (Max. 180mA) regulated and short-circuit protected<br>+10Vdc user power supply (Max. 2 potentiometers R= 1 kΩ) regulated and short-circuit protected   |
| COMMUNICATION                      | I/O Extension board (optional)                  | 4 Digital Inputs: Programmable inputs and active high (24Vdc). Optically isolated.<br>1 Analogue Input: Programmable and differential input.<br>5 Digital Outputs: Programmable multi-function relays.<br>1 Analogue Output: Programmable outputs in voltage / current. |
|                                    | External power supply (optional)                | 24V External Power Supply, Fault Relay integrated   |
|                                    | Standard protocol                               | Modbus-RTU  |
|                                    | Optional protocol                               | Profibus-DP, DeviceNet, Ethernet (Modbus TCP), Ethernet IP, CAN Open, N2 Metasys Gateway  |
| REGULATIONS                        | Certifications                                  | CE, cTick, UL <sup>[5]</sup> , cUL <sup>[5]</sup> , GL <sup>[6]</sup>   |
|                                    | Electromagnetic compatibility                   | EMC Directive (2004/108/CE), IEC/EN 61800-3   |
|                                    | Design and construction                         | LVD Directive (2006/95/CE), IEC/EN 61800-2, IEC/EN 61800-5-1, IEC/EN 60146-1-1, IEC60068-2-6, IEC/EN 61800-5-2(STO) TÜV Rheinland Certified   |

NOTES [1] Other configuration, consult Power Electronics.  
[2] For operation frequencies higher than 100Hz consult Power Electronics.  
[3] Valid for frames 3 to 11, depending on the rated power, the input voltage and under Power

Electronics' installation recommendations. For frames 1 and 2 it is available optional filters.  
[4] SC: Shielded cable, USC: Unshielded Cable. Follow Power Electronics installation recommendations. For greater cable lengths and first environment (C2)

consult Power Electronics.  
[5] On certification process.  
[6] SD700 series from frame 5 on. For further information, please consult with Power Electronics.



# Configuration table Standard ratings

## SD700SP CONFIGURATION TABLE

| SD700SP Series model |                       | Output Current <sup>[1]</sup> |      | Input Voltage |               | Degree of protection |                     | Cabinet plinths <sup>[2]</sup> |                     | EMC Filter |                                  | Floating Earth |                        | Solar Kit |                    |
|----------------------|-----------------------|-------------------------------|------|---------------|---------------|----------------------|---------------------|--------------------------------|---------------------|------------|----------------------------------|----------------|------------------------|-----------|--------------------|
| SD7SP                | SD700SP SOLAR PUMPING | 0006                          | 6A   | 5             | 380Vac-500Vac | 2                    | IP20                | -                              | Standar             | -          | Second environment               | -              | Without Floating Earth | -         | -                  |
|                      |                       | 0100                          | 100A |               |               | 5                    | IP54                | 20                             | Total height 2000mm | E          | First environment <sup>[3]</sup> | T              | With Floating Earth    | K         | Solar kit included |
|                      |                       | ...                           | ...  |               |               | 22                   | Total height 2200mm | M                              | Optional IT filter  |            |                                  |                |                        |           |                    |
|                      |                       | 990                           | 990A |               |               |                      |                     |                                |                     |            |                                  |                |                        |           |                    |

NOTES [1] Verify the rated current of the motor nameplate to guarantee the compatibility with the selected drive.  
[2] SD700 frame 4 available with standard height and with 1712mm total height.

[3] Floating earth drive not available with first environment filter. For more ordering info contact our sales representatives.

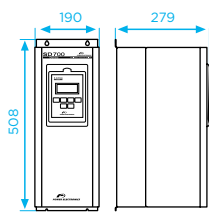
## STANDARD RATINGS

| 400Vac - 565Vdc |             |   |                            |                   |                   |                             |
|-----------------|-------------|---|----------------------------|-------------------|-------------------|-----------------------------|
| FRAME           | CODE        | Operation Temperature 50°C<br>AC SUPPLY |                            |                   | DC SUPPLY @565Vdc |                             |
|                 |             | I(A) Rated                              | Motor Power (kW) at 400VAC | 150% Overload (A) | I(A) DC input     | I(A) DC input 120% Overload |
| 1               | SD7SP0006 5 | 6                                       | 2,2                        | 9                 | 4                 | 5                           |
|                 | SD7SP0009 5 | 9                                       | 4                          | 14                | 7                 | 8                           |
|                 | SD7SP0012 5 | 12                                      | 5,5                        | 18                | 10                | 12                          |
|                 | SD7SP0018 5 | 18                                      | 7,5                        | 27                | 13                | 16                          |
|                 | SD7SP0024 5 | 24                                      | 11                         | 36                | 19                | 23                          |
| 2               | SD7SP0032 5 | 32                                      | 15                         | 48                | 27                | 32                          |
|                 | SD7SP0038 5 | 38                                      | 18,5                       | 57                | 33                | 39                          |
|                 | SD7SP0048 5 | 48                                      | 22                         | 72                | 39                | 47                          |
| 3               | SD7SP0060 5 | 60                                      | 30                         | 90                | 53                | 64                          |
|                 | SD7SP0075 5 | 75                                      | 37                         | 113               | 65                | 79                          |
|                 | SD7SP0090 5 | 90                                      | 45                         | 135               | 80                | 96                          |
|                 | SD7SP0115 5 | 115                                     | 55                         | 173               | 97                | 117                         |
| 4               | SD7SP0150 5 | 150                                     | 75                         | 225               | 133               | 159                         |
|                 | SD7SP0170 5 | 170                                     | 90                         | 255               | 159               | 191                         |
| 5               | SD7SP0210 5 | 210                                     | 110                        | 315               | 195               | 234                         |
|                 | SD7SP0250 5 | 250                                     | 132                        | 375               | 234               | 280                         |
|                 | SD7SP0275 5 | 275                                     | 150                        | 413               | 265               | 319                         |
| 6               | SD7SP0330 5 | 330                                     | 160                        | 495               | 283               | 340                         |
|                 | SD7SP0370 5 | 370                                     | 200                        | 555               | 354               | 425                         |
|                 | SD7SP0460 5 | 460                                     | 250                        | 690               | 442               | 531                         |
| 7               | SD7SP0580 5 | 580                                     | 315                        | 870               | 558               | 669                         |
|                 | SD7SP0650 5 | 650                                     | 355                        | 975               | 628               | 754                         |
|                 | SD7SP0720 5 | 720                                     | 400                        | 1080              | 708               | 850                         |

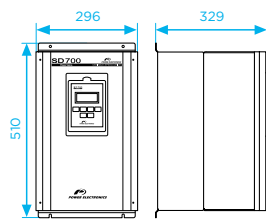
Higher power drives available. Consult Power Electronics.

# SD700 SP | Dimensions

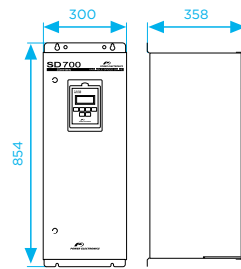
## DIMENSIONS



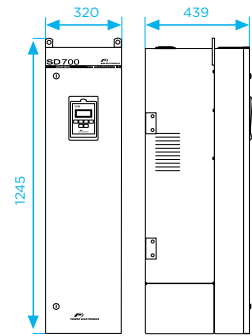
| FRAME | WEIGHT (kg) |
|-------|-------------|
| 1     | 15          |



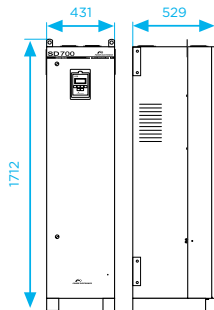
| FRAME | WEIGHT (kg) |
|-------|-------------|
| 2     | 26          |



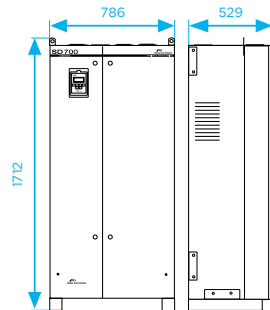
| FRAME | WEIGHT (kg) |
|-------|-------------|
| 3     | 67.5        |



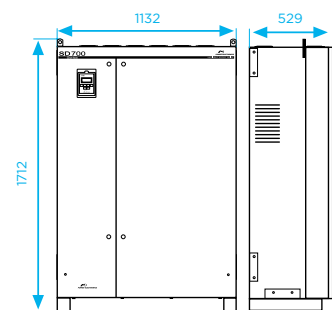
| FRAME | WEIGHT (kg) |
|-------|-------------|
| 4     | 94          |



| FRAME | WEIGHT (kg) |
|-------|-------------|
| 5     | 200         |



| FRAME | WEIGHT (kg) |
|-------|-------------|
| 6     | 335         |



| FRAME | WEIGHT (kg) |
|-------|-------------|
| 7     | 479         |