



## APPLICATION NOTES



# DEIF hybrid controller compatibility

## Photovoltaic, weather, and battery systems

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# 1. Introduction

## 1.1 DEIF's hybrid controllers

The DEIF hybrid controllers allow you to combine renewable energy with other power sources.

Controller	Function	Documentation
AGC 150 Hybrid	Integrate photovoltaic power in simple applications	<a href="http://www.deif.com/documentation/agc-150-hybrid">www.deif.com/documentation/agc-150-hybrid</a>
ASC-4 Solar	Integrate photovoltaic power in a wide range of applications	<a href="http://www.deif.com/documentation/asc-4">www.deif.com/documentation/asc-4</a>
ASC-4 Battery	Integrate battery energy and storage	<a href="http://www.deif.com/documentation/asc-4-battery">www.deif.com/documentation/asc-4-battery</a>

## 1.2 Compatibility and compliance

DEIF hybrid controllers are compatible with photovoltaic and battery systems from a wide range of manufacturers.

### SunSpec compliance

All DEIF hybrid controllers are compliant with the SunSpec standards (see [sunspec.org](http://sunspec.org)). DEIF controllers are therefore compatible with new inverters that use the generic SunSpec protocol.

### Testing

Many PV inverter makers and battery system makers use the same protocol for a wide range of their products. New PV inverters and battery systems often comply with the older protocol. If a specific inverter or battery management system is not listed here, but the maker is listed, there is a good chance that the DEIF controller is compatible.

If your PV inverter or Battery system is not listed, DEIF can help to confirm compliance using the Modbus protocol documentation.

### Implementing new protocols

Since new photovoltaic and battery systems are launched every year, DEIF developers continuously implement new protocols. If your system is not listed, please contact DEIF. We can work with you to quickly implement the required protocol.

## 1.3 Software versions

This document is valid for the following software versions.

Controller	SW version
AGC 150 Hybrid	1.10
ASC-4 Solar	4.22
ASC-4 Battery	4.22

## 2. Photovoltaic

### 2.1 ASC-4 Solar and AGC 150 Hybrid

#### 2.1.1 Compatible PV systems

Controller	Modbus RTU (RS-485)	Modbus TCP	PV protocol parameter
ASC-4 Solar	x	x*	7561
AGC 150 Hybrid	x	x	17321

**NOTE** \* An external converter is required. This can be supplied by DEIF.

COC = Certificate of compliance

**NOTE** If different PV inverter types from the same branch use the same SunSpec models, these can often be installed on the same communication bus and support broadcast.

#### 2.1.2 ABB/Fimer

ABB/Fimer	Interface	PV protocol	COC
Pro33	Modbus RTU (RS-485)	ABB PRO	
PVS 50/60	Modbus RTU (RS-485)	SunSpec Generic	
PVS 100/200	Modbus RTU (RS-485)	SunSpec Generic	
PVS 175	Modbus RTU (RS-485)	SunSpec Generic	
PVS 800	Modbus RTU (RS-485)	ABB PVS800	
Trio 5.8-8.0 (ID restricted)	Modbus RTU (RS-485)	ABB TRIO	
Trio 20.0	Modbus RTU (RS-485)	ABB TRIO	x
Trio 27.6	Modbus RTU (RS-485)	ABB TRIO	x
Trio 50.0	Modbus RTU (RS-485)	ABB Trio 50	

#### 2.1.3 Chint

Chint	Interface	PV protocol	COC
SCA14-36 KTL	Modbus RTU (RS-485)	CPS (Chint Power) 14/36kW	
SCA50-60 KTL	Modbus RTU (RS-485)	CPS (Chint Power) 50/60kW	
CPS SCHxxxKTL: <ul style="list-style-type: none"> <li>• 100kW_9Boost_1100V</li> <li>• 136kW_12Boost_1100V</li> <li>• 250kW_12Boost_1500V</li> </ul>	Modbus RTU (RS-485)	CPS (Chint Power) Boost 100-250kW	

#### 2.1.4 DEIF open

DEIF open	Interface	PV protocol	COC
Inverters using the DEIF open protocol	Modbus RTU (RS-485)	DEIF Open	

## 2.1.5 Delta

Delta	Interface	PV protocol	COC
RPI M6A	Modbus RTU (RS-485)	Delta RPI	
RPI M10A	Modbus RTU (RS-485)	Delta RPI	
RPI M15A (unicast only)	Modbus RTU (RS-485)	Delta RPI	
RPI M20A (unicast only)	Modbus RTU (RS-485)	Delta RPI	
RPI M30A	Modbus RTU (RS-485)	Delta RPI	
RPI M50A	Modbus RTU (RS-485)	Delta RPI	
RPI M88H	Modbus RTU (RS-485)	Delta RPI M88H	

## 2.1.6 EVVO

EVVO	Interface	PV protocol	COC
50-70kW	Modbus RTU (RS-485)	EVVO	
1110TL/1600TL/2200TL/3000TL	Modbus RTU (RS-485)	EVVO	

**NOTE** The EVVO PV protocol does not support broadcast. The protocol only supports Modbus function code 0x06 (single register write) for write telegrams. However, the DEIF controller can use unicast to communicate with multiple inverters.

## 2.1.7 Fimer

Fimer	Interface	PV protocol	COC
PVS980	Modbus RTU (RS-485)	FIMER PVS980	

## 2.1.8 Fronius

Fronius	Interface	PV protocol*	COC
Data manager	Modbus RTU (RS-485) or Modbus TCP	SunSpec Generic	
Eco	Modbus RTU (RS-485) or Modbus TCP	SunSpec Generic	
Tauro	Modbus RTU (RS-485) or Modbus TCP	SunSpec Generic	
Symo	Modbus RTU (RS-485) or Modbus TCP	SunSpec Generic	

**NOTE** \* Fronius inverters with firmware 3.7.1-4 and earlier must use the **Fronius before 3.7.1-5** protocol.

## 2.1.9 Gamesa

Gamesa	Interface	PV protocol	COC
E-series	Modbus TCP	Gamesa E-series	

## 2.1.10 Goodwe

Goodwe	Interface	PV protocol	COC
XS Series: 0.7-3 kW	Modbus RTU (RS-485)	Goodwe DT series	x
DNS Series: 3-6 kW	Modbus RTU (RS-485)	Goodwe DT series	x
MS Series: 5-10 kW	Modbus RTU (RS-485)	Goodwe DT series	x
A-MS Series: 5-9.6 kW	Modbus RTU (RS-485)	Goodwe DT series	x
SDT G2 Series: 4-15 kW	Modbus RTU (RS-485)	Goodwe DT series	x
SDT G2 Series: 17-25 kW	Modbus RTU (RS-485)	Goodwe DT series	x
LVSMT Series: 12-20 kW	Modbus RTU (RS-485)	Goodwe MT series	x
SMT Series: 25-36 kW	Modbus RTU (RS-485)	Goodwe MT series	x
MT Series: 50-80 kW	Modbus RTU (RS-485)	Goodwe MT series	x
HT Series: 73-136 kW	Modbus RTU (RS-485)	Goodwe HT series	x
HT Series: 225/250 kW	Modbus RTU (RS-485)	Goodwe HT series	x

## 2.1.11 Growatt

Growatt	Interface	PV protocol	COC
CP100, CP250	Modbus RTU (RS-485)	Growatt CP100-CP250	
CP500, CP630, CP850, CP1000, CP1700, CP2000, CP2520	Modbus RTU (RS-485)	Growatt CP500-CP2520	
MIN 2500TL-X to 6000TL-X MIN 2500TL-XE to 6000TL-XE MID 15KTL3-x to 40KTL3-X MAC 15KTL3-XL to 36KTL3-XL MAC 30KTL3-X LV to 60KTL3-X LV MAC 50KTL3-X MV to 70KTL3-X MV MAX 50KTL3-X LV to 125KTL3-X LV MAX 60KTL3-X MV to 100KTL3-X MV MAX 185KTL3-X HV to 253KTL3-X HV	Modbus RTU (RS-485)	Growatt MAC, MAX and MID series*	
10000UE/12000UE/18000UE/20000UE	Modbus RTU (RS-485)	Growatt UE-series**	

**NOTE** \* *Tx min interval* (parameter 7760) must be at least 0.85 s. Growatt recommends 1 s.

**NOTE** \*\* Previously *Growatt*.

## 2.1.12 Havells

Havells	Interface	PV protocol	COC
1-40kW	Modbus RTU (RS-485)	Havells 1-40kW*	
50-70kW	Modbus RTU (RS-485)	Havells 50-70kW*	
80-136kW	Modbus RTU (RS-485)	Havells 80-136kW	

**NOTE** \* *Tx write fnc* (ASC-4 parameter 7564, AGC 150 parameter 17324) must be **Single register 0x06**. To use broadcast, the inverter firmware must be at least 2.40. *Broadcast ID* (ASC-4 parameter 7515, AGC 150 parameter 17313) must be **Enabled** and set to **136**.

## 2.1.13 HiQ

HiQ	Interface	PV protocol	COC
Truestring	Modbus RTU (RS-485)	HiQ solar truestring	

## 2.1.14 Huawei

Huawei*	Interface	PV protocol	COC
Smartlogger	Modbus TCP	Huawei smartlogger	
SUN2000-2KTL-L0/-L1	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-3KTL-CNL0/-L0/-L1/-M0/-M1	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-3.68KTL-L10	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-3.8KTL-USL0	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-4KTL-CNL0/-L0/-L1/-M0/-M1	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-4.6KTL-L1	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-4.95KTL-JPL0/-JPL1	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-5KTL-CNL0/-L0/-L1/-M0/-M1/-USL0	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-6KTL-CNL0/-L1/-M0/-M1	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-7.6KTL-USL0	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-8KTL-M0/-M1/-M2	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-9KTL-USL0	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-10KTL-M0/-M1/-M2/-USL0	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-11.4KTL-USL0	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-12KTL-M0/-M1/-M2	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-15KTL-M0/-M2/-M3	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-17KTL-M0/-M2/-M3	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-20KTL-M0/-M2/-M3	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-22KTL-US	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-23KTL-M3	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-24.5KTL-M3	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-24.7KTL-JP	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-25KTL-NAM3/-US	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-28KTL-M3	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-29.9KTL-M3	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-30KTL-A/-M3/-NAM3/-US	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-33KTL-A/-E001/-JP/-NAM3/-NHM3/-US	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-33KTL-A/-E001/-JP/-NAM3/-NHM3/-US	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-36KTL-M3/-NAM3/-US	Modbus RTU (RS-485)	Huawei V.3	



Huawei*	Interface	PV protocol	COC
SUN2000-40KTL/-JP/-M3/-NAM3/-NHM3/-US	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-42KTL/-M3	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-43KTL-IN-C1/-INM3	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-44KTL-M3	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-45KTL/-US-HV-D0	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-50KTL/-C1/-JPM0/-JPM1/-M0/-M3	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-55KTL-HV-D1/-HV-D1-001/-IN-HV-D1	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-60KTL-HV-D1/-HV-D1-001/-M0	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-63KTL-JPH0/-JPM0	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-65KTL-M0	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-70KTL-C1/-INM0	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-75KTL-C1	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-90KTL-H0/-H1/-H2	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-95KTL-INH0/-INH1	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-100KTL-H0/-H1/-H2/-INM0/-M0/-M1/-USH0	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-105KTL-H1	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-110KTL-M0	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-125KTL-JPH0/-M0	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-168KTL-H1	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-175KTL-H0	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-185KTL-H1/-INH0	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-193KTL-H0	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-196KTL-H0/-H1/-H3	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-200KTL-H2	Modbus RTU (RS-485)	Huawei V.3	
SUN2000-215KTL-H0	Modbus RTU (RS-485)	Huawei V.3	
SUN2000L-2KTL	Modbus RTU (RS-485)	Huawei V.3	
SUN2000L-3KTL/-CN/-CN-4G	Modbus RTU (RS-485)	Huawei V.3	
SUN2000L-3.68KTL	Modbus RTU (RS-485)	Huawei V.3	
SUN2000L-4KTL/-CN/-CN-4G	Modbus RTU (RS-485)	Huawei V.3	
SUN2000L-4.125KTL-JP	Modbus RTU (RS-485)	Huawei V.3	
SUN2000L-4.6KTL	Modbus RTU (RS-485)	Huawei V.3	
SUN2000L-4.95KTL-JP	Modbus RTU (RS-485)	Huawei V.3	
SUN2000L-5KTL/-CN/-CN-4G	Modbus RTU (RS-485)	Huawei V.3	
SUN8000-500KTL	Modbus RTU (RS-485)	Huawei V.3	
SUN2000 8-28KTL	Modbus RTU (RS-485)	Huawei SUN2000 8-28KTL *	
SUN2000 33-40KTL	Modbus RTU (RS-485)	Huawei SUN2000 33-40KTL *	

Huawei*	Interface	PV protocol	COC
SUN2000 50-60KTL	Modbus RTU (RS-485)	Huawei SUN2000 50-60KTL*	
SUN2000 55-60KTL	Modbus RTU (RS-485)	Huawei SUN2000 55-60KTL*	
SUN2000 90-105	Modbus RTU (RS-485)	Huawei SUN2000 90-105KTL*	
SUN2000 100-125KTL	Modbus RTU (RS-485)	Huawei SUN2000 100-125M0-M2*	

**NOTE** If the inverters have the latest software, use the **Huawei V.3** protocol. For older software, you may need to use one of the protocols marked with a star.

### 2.1.15 Ingeteam

Ingeteam	Interface	PV protocol	COC
SUN 10 TL	Modbus RTU (RS-485)	Ingeteam 3Play	x
SUN 10 TL M	Modbus RTU (RS-485)	Ingeteam 3Play	x
SUN 15 TL	Modbus RTU (RS-485)	Ingeteam 3Play	x
SUN 15 TL M	Modbus RTU (RS-485)	Ingeteam 3Play	x
SUN 20 TL	Modbus RTU (RS-485)	Ingeteam 3Play	x
SUN 20 TL M	Modbus RTU (RS-485)	Ingeteam 3Play	x
SUN 33 TL	Modbus RTU (RS-485)	Ingeteam 3Play	x
SUN 33 TL M	Modbus RTU (RS-485)	Ingeteam 3Play	x
SUN 40 TL M480	Modbus RTU (RS-485)	Ingeteam 3Play	x
SUN 100 TL (360V)	Modbus RTU (RS-485)	Ingeteam 3Play	x
SUN 100 TL (380V)	Modbus RTU (RS-485)	Ingeteam 3Play	x
SUN 100 TL (400V)	Modbus RTU (RS-485)	Ingeteam 3Play	x
SUN 100 TL (420V)	Modbus RTU (RS-485)	Ingeteam 3Play	x
SUN 100 TL (440V)	Modbus RTU (RS-485)	Ingeteam 3Play	x

### 2.1.16 INVT

INVT	Interface	PV protocol	COC
iMars BG	Modbus RTU (RS-485)	INVT BG series	

### 2.1.17 Kaco

Kaco	Interface	PV protocol	COC
Blue Planet 5.0-10.0 TL3	Modbus UDP/TCP	SunSpec Generic	x
Blue Planet 15.0 TL3	Modbus UDP/TCP	SunSpec Generic	x
Blue Planet 20.0 TL3	Modbus UDP/TCP	SunSpec Generic	x
Blue Planet 50.0 TL3	Modbus UDP/TCP	SunSpec Generic	x
Blue Planet 60.0 TL3	Modbus UDP/TCP	SunSpec Generic	x
Blue Planet 87.0 TL3	Modbus UDP/TCP	SunSpec Generic	x
Blue Planet 150.0 TL3	Modbus UDP/TCP	SunSpec Generic	x

Kaco	Interface	PV protocol	COC
Powador 18.0-20.0 TL3	Modbus UDP/TCP	SunSpec Generic	x
Powador 60.0 TL3	Modbus UDP/TCP	SunSpec Generic	x

### 2.1.18 Kostal

Kostal	Interface	PV protocol	COC
PIKO IQ	Modbus TCP	SunSpec Generic	
PLENTICORE	Modbus TCP	SunSpec Generic	

### 2.1.19 Kstar

Kstar	Interface	PV protocol	COC
KSG1-60	Modbus RTU (RS-485)	KStar	

### 2.1.20 Polycab

Polycab	Interface	PV protocol	COC
50-60kW	Modbus RTU (RS-485)	Polycab 50-60kW	

### 2.1.21 Refusol

Refusol	Interface	PV protocol	COC
8-23K (kW only)	Modbus RTU (RS-485)	SunSpec Generic	
100K	Modbus RTU (RS-485)	SunSpec Generic	

### 2.1.22 Schneider

Schneider*	Interface	PV protocol	COC
CL 20E	Modbus RTU (RS-485)	Schneider Conext CL 20/25	x
CL 25E	Modbus RTU (RS-485)	Schneider Conext CL 20/25	x
CL 25 NA	Modbus RTU (RS-485)	Schneider Conext CL 20/25	x
CL 36E	Modbus RTU (RS-485)	Schneider Conext CL 60	x
CL 60 A/E	Modbus RTU (RS-485)	Schneider Conext CL 60	x

**NOTE** For the Schneider CL30-50 update, new CL inverters will be introduced, and old ones will be terminated.

### 2.1.23 SMA

SMA	Interface	PV protocol	COC
Cluster controller	Modbus TCP	SMA cluster controller	
EDML-10 (SMA Data Manager L)	Modbus TCP	SMA Data Manager*	
EDMM-10 (SMA Data Manager M)	Modbus TCP	SMA Data Manager*	
EDMM-US-10 (SMA Data Manager M)	Modbus TCP	SMA Data Manager*	

SMA	Interface	PV protocol	COC
EDML-10.A (SMA Data Manager M Lite)	Modbus TCP	SMA Data Manager*	
Core1	Modbus UDP/TCP	SunSpec Generic	
Core2	Modbus UDP/TCP	SunSpec Generic	
FSC	Modbus TCP	SMA FSC	
SHP 75	Modbus TCP	SunSpec Generic	
SMA inverter with firmware v2.82 or earlier	Modbus RTU (RS-485)	SMA SunSpec before v2.82	
Solid Q50-60	Modbus RTU (RS-485)	SMA Solid-Q 50	
Solid-Q PRO 60	Modbus RTU (RS-485)	SMA Solid-Q PRO 60	
STP 5000-12000 TL	Modbus UDP/TCP	SunSpec Generic	
STP 20000-25000 TL	Modbus UDP/TCP	SunSpec Generic	
STP 60	Modbus UDP/TCP	SunSpec Generic	

**NOTE** \* The DEIF controller cannot control the reactive power in the AC output for this protocol. The reactive power must be set up from the SMA Data Manager's web interface.

### 2.1.24 Sofar Solar

Sofar Solar	Interface	PV protocol	COC
1-40kW	Modbus RTU (RS-485)	Sofar Solar 1-40kW*	
50-70kW	Modbus RTU (RS-485)	Sofar Solar 50-70kW*	

**NOTE** \* *Tx write fnc* (ASC-4 parameter 7564, AGC 150 parameter 17324) must be **Single register 0x06**. To use broadcast, the inverter firmware must be at least 2.40. *Broadcast ID* (ASC-4 parameter 7515, AGC 150 parameter 17313) must be **Enabled** and set to **136**.

### 2.1.25 SolarEdge

SolarEdge	Interface	PV protocol	COC
SE15-27.6K	Modbus RTU (RS-485)	SolarEdge	

### 2.1.26 Solis

Solis (Ginlong)	Interface	PV protocol	COC
Grid-tied inverters	Modbus RTU (RS-485)*	Solis (Ginlong)	

**NOTE** \* Solis broadcast only works with newer Solis software.

### 2.1.27 Sungrow

Sungrow	Interface	PV protocol	COC
COM100E	Modbus RTU (RS-485) or Modbus UDP/TCP	Sungrow Logger 1000	
SunGrow Series	Modbus RTU (RS-485)	Sungrow SG series	

## 2.1.28 Vacon

Vacon	Interface	PV protocol	COC
Vacon 8000	Modbus RTU (RS-485)	Vacon8000	

## 3. Power meters

### 3.1 ASC-4 Solar

#### 3.1.1 Compatible power meters

The DEIF power meter system interface is Modbus RTU (RS-485). For ASC-4, you need option H2.8. Use parameter 7721 to select the meter protocol for DG power, 7723 for PV power, and 7725 for mains power.

Meter	Meter protocol	P	Q	Inputs
AGC-4 Mk II	DEIF Genset Control*	x	x	See note*
AGC-4	DEIF Genset Control*	x	x	See note*
AGC 150	DEIF Genset Control*	x	x	See note*
CGC 400	DEIF Genset Control*	x	x	See note*
MIC-2 MK II	DEIF MIC-2	x	x	-
MIC (MIC4002)	DEIF MIC4000	x	x	2
MIC (MIC4224)	DEIF MIC4000	x	x	4
MTR-4	DEIF MTR-3	x	x	-
ABB A43/44	ABB A43/A44	x	x	-
ABB SACE Emax 2 protocol	ABB SACE Emax 2	x	x	2
Accuenergy Acuvim-L series	Acuvim-L	x	x	-
Diris A40	Socomec Diris A40	x	x	-
EM6400	Schneider EM6400	x	x	-
EDMI Genius	EDMI	x	x	-
EDS MMCT3	EDS-MMCT3-E-C	x	x	-
iEM3000	Schneider iEM3000	x	-	-
iEM6400	Schneider EM6400	x	x	-
Mavolog Pro	Gossen	x	x	-
Multis L40	Socomec Multis L40	x	x	-
PM5560	Schneider PM5560	x	x	-
PMU-100	APS PMU-100	x	x	-

**NOTE** \* The ASC reads the P, Q, and breaker feedbacks from the DEIF controller over an RS-485 connection.

## 4. Weather stations

### 4.1 ASC-4 Solar and AGC 150 Hybrid

#### 4.1.1 Compatible weather stations and forecast systems

##### Weather stations

Maker	Type	Interface	ASC Weather prot. (7661)
ABB	TRIO VSN800	Modbus RTU (RS-485)	ABBTRIO VSN800
Delta	GHI sensor Modbus	Modbus RTU (RS-485)	Delta Ohm
Kipp & Zonen	RT1 Smart Rooftop Monitoring System	Modbus RTU (RS-485)	Kipp and Zonen - RT1

##### Forecast systems

Maker	Type	Interface	ASC Forecast prot. (7631)
Reuniwatt	SkyInSight	Modbus TCP	Reuniwatt SkyInSight
SteadySun	SteadyEye	Modbus TCP	SteadySun SteadyEye

## 5. Storage

### 5.1 ASC-4 Battery

#### 5.1.1 Compatible battery energy storage systems

##### Interfaces

The standard DEIF battery system interface is Modbus RTU (RS-485). When a TCP/IP interface is required, DEIF can supply and support an external converter.

##### System types

		ASC ESS (7561) protocol	ASC BMS (7681) protocol
BCU	Battery control unit	x	
BMS	Battery management system		x
PCS	Power conversion system	x	
ESS	Energy storage system	x	

#### 5.1.2 Power and droop/VSG modes

The ESS protocols can support one or more of these power modes.

##### Power-reactive power (P/Q)

The inverter is grid-following. The inverter matches the busbar voltage and frequency, and generates power based on a P and Q reference. Before the inverter can start, a grid-forming energy source, like a genset or a mains connection, must be connected to the busbar.

If the grid-forming genset or mains trips, the inverter cannot keep the voltage and frequency stable. The inverter therefore also trips, which causes a blackout.

##### Voltage-frequency (V/f)

The inverter is grid-forming. The inverter tries to keep the output voltage and frequency constant (usually at the nominal voltage and frequency of the grid). This allows the PCS/BCU to generate power and charge without any gensets or mains connected to the busbar.

However, since the inverter keeps the voltage and frequency constant, the inverter generally cannot be connected work in parallel with a genset or mains connection. The constant voltage and frequency would conflict with other voltage and frequency sources. Therefore, if a genset or mains is connected to busbar, the inverter must generally switch back to P/Q mode. Depending on the inverter, a blackout might be required.

Some PCS/BCU support running in V/f mode while parallel with other identical PCS/BCU (which are also in V/f mode).

##### Droop/VSG

Droop mode is also called VSG-mode (Virtual Synchronous Generator mode). The inverter acts like a generator, which allows the inverter to always be grid-forming. In addition, in droop mode, the output voltage and frequency are controlled using predefined droop slopes. This allows the inverter to be connected in parallel with gensets and sometimes also a mains connection.

If the gensets or mains connection trip, the inverter can then immediately keep the voltage and frequency stable based on the droop slope, to prevent a blackout. The gensets and mains are also able to synchronise back to the inverter.



### 5.1.3 List for BCU control

Maker	Type	Modbus RTU	Modbus TCP	COC
Any maker	DEIF Generic Modbus protocol for implementation	x	x	
Aggreko	Y.Cube		x	
ATESS-Growatt	HPS, PCS and PBD series	x		x
GPSS	GPSS-240-020K-3P-Cxx		x	x
H2	Enerflow		x	x
LS PowerBRiC	E-series		x	
Qinous	Qinous RDD		x	x
SunGrow	SunGrow LC100 Utility LFP		x	
SunGrow	SunGrow local controller	x	x	
SunGrow	SC XXX (Upper Computer Communication Protocol for PCS (V1.2.1.1))	x		
Tesla	Tesla Powerpack		x	

### 5.1.4 List for BCU and PCS control

Maker	Type	Modbus RTU	Modbus TCP	COC
Any maker	DEIF Generic Modbus protocol for implementation	x	x	
ABB	PQ Plus		x	
Ausar	Ausar MAE	x		
Danfoss Vacon	Danfoss NXP		x	
Delta	PCS100	x		
Fimer	PVS980-58BC	x		
Sinexcel	PWS1-50K to 250K Series	x		
SMA	Sunny Island		x	
TRUMPF	TruConvert AC3025		x*	
TRUMPF	TruConvert DC1008		x*	
Vertiv	V1EA series	x	x	

**NOTE** \* Modbus UDP/TCP

### 5.1.5 List for BMS control

Maker	Type	Modbus RTU	Modbus TCP	COC
Any maker	DEIF Generic Modbus protocol for implementation	x	x	
Allsparkpower	Allsparkpower	x	x	
CATL	CATL BMS systems		x	
EOS Energy Block	EOS Energy Block		x	
Hangzhou Huasu	CELLCHECK H3G-TA	x		

Maker	Type	Modbus RTU	Modbus TCP	COC
LFP	LiFe Po	x		
Narada	NESP and NPFC series	x		
PylonTech	PowerCube H1/H2	x		
Samsung	E1	x		

### 5.1.6 Any maker (generic protocols)

#### DEIF Generic (PCS or BCU)

Maker	Any
Type	Modbus protocol for implementation
Interface	Modbus RTU (RS-485) or Modbus TCP
ASC ESS (7561) protocol	DEIF Generic
System	PCS or BCU
Power mode(s)	P/Q, V/f, Droop
Notes	For more information, see the <b>ASC-4 Modbus master User manual</b> .

#### DEIF Generic (BMS)

Maker	Any
Type	Modbus protocol for implementation
Interface	Modbus RTU (RS-485) or Modbus TCP
ASC BMS (7681) protocol	DEIF Generic
System	BMS
Notes	For more information, see the <b>ASC-4 Modbus master User manual</b> .

#### DEIF Open

Maker	Any
Type	BESS using the DEIF open protocol
Interface	Modbus RTU (RS-485)
ASC ESS (7561) protocol	DEIF Open
System	PCS and/or BMS
Power modes	-

### 5.1.7 ABB

Maker	ABB
Type	PQ Plus
Interface	Modbus TCP
ASC ESS (7561) protocol	
System	PCS
Power mode(s)	
Notes	Under development. Contact DEIF for more information.

### 5.1.8 Aggreko

Maker	Aggreko
Type	Y.Cube
Interface	Modbus TCP
ASC ESS (7561) protocol	Aggreko Y-Cube*
System	BCU
Power mode(s)	P/Q
Notes	* Requires a special Aggreko option in ASC-4.

### 5.1.9 Allsparkpower

Maker	Allsparkpower
Type	Allsparkpower
Interface	Modbus RTU (RS-485) or Modbus TCP
ASC BMS (7681) protocol	Allsparkpower BMS
System	BMS

### 5.1.10 ATESS-Growatt

Maker	ATESS-Growatt
Type	HPS, PCS and PBD series
Interface	Modbus RTU (RS-485)
ASC ESS (7561) protocol	ATESS Growatt
System	BCU
Power mode(s)	P/Q
Notes	Certificate of conformity

### 5.1.11 Ausar

Maker	Ausar
Type	Ausar MAE
Interface	Modbus RTU (RS-485)
ASC ESS (7561) protocol	Ausar MAE v2
System	PCS, ESS
Power mode(s)	P/Q, V/f

### 5.1.12 CATL

Maker	CATL
Type	CATL BMS systems
Interface	Modbus TCP
ASC BMS (7681) protocol	CATL BMS
System	BMS

### 5.1.13 Danfoss Vacon

Maker	Danfoss Vacon
Type	Danfoss NXP
Interface	Modbus TCP
ASC ESS (7561) protocol	*
System	PCS
Power mode(s)	
Notes	* Mapping needed. Contact DEIF for more information.

### 5.1.14 Delta

Maker	Delta
Type	PCS100
Interface	Modbus RTU (RS-485)
ASC ESS (7561) protocol	
System	PCS
Power mode(s)	P/Q, V/f

### 5.1.15 EOS Energy Block

Maker	EOS
Type	Energy Block
Interface	Modbus TCP
ASC BMS (7681) protocol	EOS Energy Block*
System	BMS
Notes	*This protocol will be in the next software release.

### 5.1.16 FIMER

Maker	FIMER
Type	PVS980-58BC
Interface	Modbus RTU (RS-485)
ASC ESS (7561) protocol	FIMER PVS980-58BC
System	PCS
Power mode(s)	P/Q, Droop

### 5.1.17 GPSS

Maker	GPSS
Type	GPSS-240-020K-3P-Cxx
Interface	Modbus TCP
ASC ESS (7561) protocol	GPSS
System	BCU

Power mode(s)	P/Q
Notes	Certificate of conformity

### 5.1.18 H2

Maker	H2
Type	Enerflow
Interface	Modbus TCP
ASC ESS (7561) protocol	Enerflow
System	BCU
Power mode(s)	P/Q
Notes	Certificate of conformity

### 5.1.19 Hangzhou Huasu

Maker	Hangzhou Huasu
Type	CELLCHECK H3G-TA
Interface	Modbus RTU (RS-485)
ASC BMS (7681) protocol	CellCheck CM BMS
System	BMS
Notes	The charging and discharging capacity are not available in this protocol. The DEIF controller therefore uses the nominal power.

### 5.1.20 LFP

Maker	LFP
Type	LiFe Po
Interface	Modbus RTU (RS-485)
ASC BMS (7681) protocol	LFP
System	BMS
Power mode(s)	Not relevant
Notes	The charging and discharging capacity are not available in this protocol. The DEIF controller therefore uses the nominal power.

### 5.1.21 LS PowerBRiC

Maker	LS PowerBRiC
Type	E-series
Interface	Modbus TCP
ASC ESS (7561) protocol	LS PowerBRiC*
System	BCU
Power mode(s)	P/Q, V/f
Notes	*This protocol will be in the next software release.

### 5.1.22 Narada

Maker	Narada
Type	NESP and NPFC series
Interface	Modbus RTU (RS-485)
ASC BMS (7681) protocol	Narada BMS
System	BMS

### 5.1.23 PylonTech

Maker	PylonTech
Type	PowerCube H1/H2
Interface	Modbus RTU (RS-485)
ASC BMS (7681) protocol	PowerCube H1/H2
System	BMS

### 5.1.24 Qinous

Maker	Qinous
Type	Qinous ESS
Interface	Modbus TCP
ASC ESS (7561) protocol	Qinous
System	BCU
Power mode(s)	V/f, Droop
Notes	Certificate of conformity

### 5.1.25 Samsung

Maker	Samsung
Type	E1
Interface	Modbus RTU (RS-485)
ASC BMS (7681) protocol	Samsung BMS
System	BMS

### 5.1.26 Sinexcel

Maker	Sinexcel
Type	PWS1-50K to 250K Series
Interface	Modbus RTU (RS-485)
ASC ESS (7561) protocol	SinExcel
System	PCS
Power mode(s)	P/Q, V/f, Droop

## 5.1.27 SMA

Maker	SMA
Type	Sunny Island
Interface	Modbus TCP
ASC ESS (7561) protocol	SMA Sunny Island
System	PCS
Power mode(s)	P/Q
Notes	Awaiting PQ mode-test. Only one cluster, not possible to control multi-cluster box.

## 5.1.28 SunGrow

### SunGrow LC100 Utility LFP

Maker	SunGrow
Type	SunGrow LC100 Utility LFP
Interface	Modbus TCP
ASC ESS (7561) protocol	SunGrow LC100 Utility LFP
System	BCU
Power mode(s)	P/Q, V/f, Droop

### SunGrow local controller

Maker	SunGrow
Type	SunGrow local controller
Interface	Modbus RTU (RS-485) or Modbus TCP
ASC ESS (7561) protocol	Sungrow STXXXCP-50HV
System	BCU
Power mode(s)	P/Q, V/f

### SunGrow SC XXX

Maker	SunGrow
Type	SC XXX (Upper Computer Communication Protocol for PCS (V1.2.1.1))
Interface	Modbus RTU (RS-485)
ASC ESS (7561) protocol	Sungrow PCS
System	BCU
Power mode(s)	P/Q

## 5.1.29 Tesla

Maker	Tesla
Type	Tesla Powerpack
Interface	Modbus TCP
ASC ESS (7561) protocol	Tesla PowerPack
System	BCU

Power mode(s)	P/Q, Droop
Notes	An SEL700B relay, acting as a mains breaker, is needed to switch between grid-tied mode and island (droop mode) without a blackout.

### 5.1.30 TRUMPF

#### TruConvert AC3025

Maker	TRUMPF
Type	TruConvert AC3025
Interface	Modbus UDP/TCP
ASC ESS (7561) protocol	TRUMPF TruConvert ACDC
System	PCS
Power mode(s)	P/Q, V/f

#### TruConvert DC1008

Maker	TRUMPF
Type	TruConvert DC1008
Interface	Modbus UDP/TCP
ASC ESS (7561) protocol	TRUMPF TruConvert DCDC
System	PCS
Power mode(s)	Not relevant: Only controls DC power.

### 5.1.31 Vertiv

Maker	Vertiv
Type	V1EA series
Interface	Modbus RTU (RS-485) or Modbus TCP
ASC ESS (7561) protocol	Vertiv Custom*
System	PCS
Power mode(s)	P/Q, V/f
Notes	* This is a customer-specific version of the Vertiv PCS.