iE 150, ASC 150

4189341463-B

Protocol configuration

Application notes

Improve Tomorrow

1. Introduction

1.1 Protocol configuration

The *Protocol configuration* interface in the utility software allows you to configure communication with many new battery systems and PV systems. You can also configure communication for power measurements from power meters and genset controllers. This document describes how to use the interface for each type of system.

More information
The DEIF controllers already include protocols for communication with systems from a wide range of manufacturers. See **Application notes Hybrid controller compatibility** for the battery systems, photovoltaic systems, and power measurements that the controllers support.

Is the communication simple or complex?

For **simple** ESS or PV communication, there are no limitations on sending start and stop commands over Modbus. For example, if the command is sent when the ESS or PV system is not ready, the ESS or PV system will not crash. Similarly, the controller can also simply send power set points.

For **complex** systems, the controller cannot simply send start and stop commands, and set points. For example, these systems may require a start sequence, and/or other sequences. A complex system may also require logic in addition to the power set points. DEIF support can help you to determine whether the system is simple or complex.

Complex systems

If your system is too complex to configure using the *Protocol configuration* interface, please contact DEIF support. We can work with you to implement the required protocol.

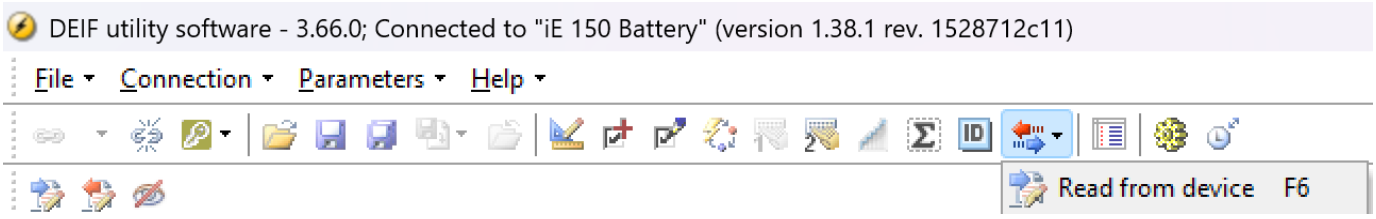
1.2 Feedback to DEIF

When you have configured a protocol, please send the USW file and information about the protocol to DEIF (www.deif.com/support/). See the protocol description for the list of information to include. DEIF can use your input for further development, and possibly include the protocol in future standard software.

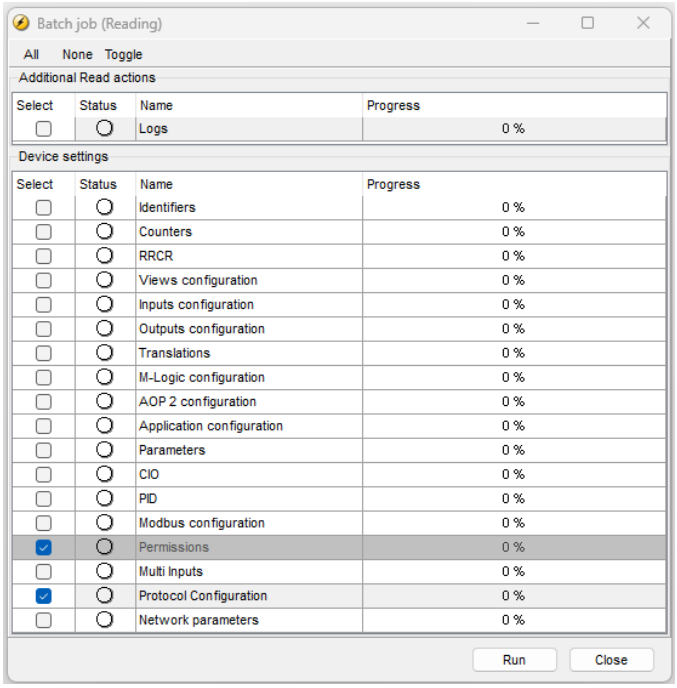
Creating the USW files

When the protocol is configured and tested, follow these steps to create the USW file:

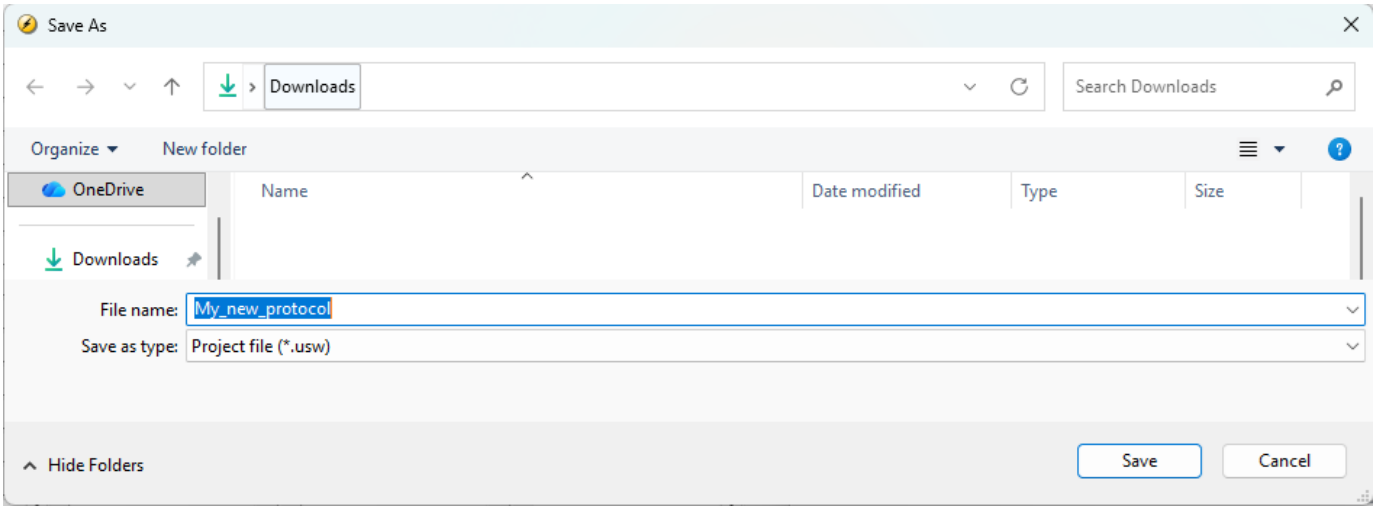
1. Use the utility software to connect to the controller.
2. Select *F6* or *Read from device* (in the drop down under *Batch read and write icon*).



3. In the *Batch job (Reading)* box, deselect all settings except *Permissions* and *Protocol Configuration* then select *Run*.



4. In the *Save As* box, select the location and name of the USW file.



5. The utility software creates and saves the USW file with the protocol configuration.

1.3 Software versions

This document is valid for the following software versions.

Utility software

Multi-line 2 Utility Software v.3.x: version 3.66.0.

Application software

Controller	Software version
iE 150 Battery	1.38
iE 150 Solar	1.38
ASC 150 Storage	1.38
ASC 150 Solar	1.38

2. Battery

2.1 Configurable PCS

You can use the *DEIF Generic V2* function to configure the Modbus communication to an PCS. This function is useful for an PCS that is not included in the **DEIF Hybrid controller compatibility** list.

Minimum configuration

The PCS application and functions determine the minimum protocol configuration.

At the very least, for a simple PCS in P/Q mode or grid following, the protocol must be able to write:

- Start/stop *
- Power set point

NOTE * To start, you can use *Start/stop command* or *Start command*. Similarly, for stop, you can use *Start/stop command* or *Stop command*.

The protocol must also be able to read:

- State of charge (SOC) *
- Charge capacity *
- Discharge capacity *

NOTE * These are only required if they are not available from a BMS protocol.

If reading and writing other values is possible, more functions may be available in the controller. For example, to use power measurements from the PCS (parameter 7021), the protocol must be able to read the voltage, current, frequency, and so on.

The controller can show the values that it reads from the PCS. Other systems can also read these values from the controller (using Modbus).

Parameter

For *ESS Modbus prot.* (parameter 7561), select *DEIF Generic V2*.

Information for PCS protocols

When sending the USW file to DEIF, please include the following information for PCS protocols.

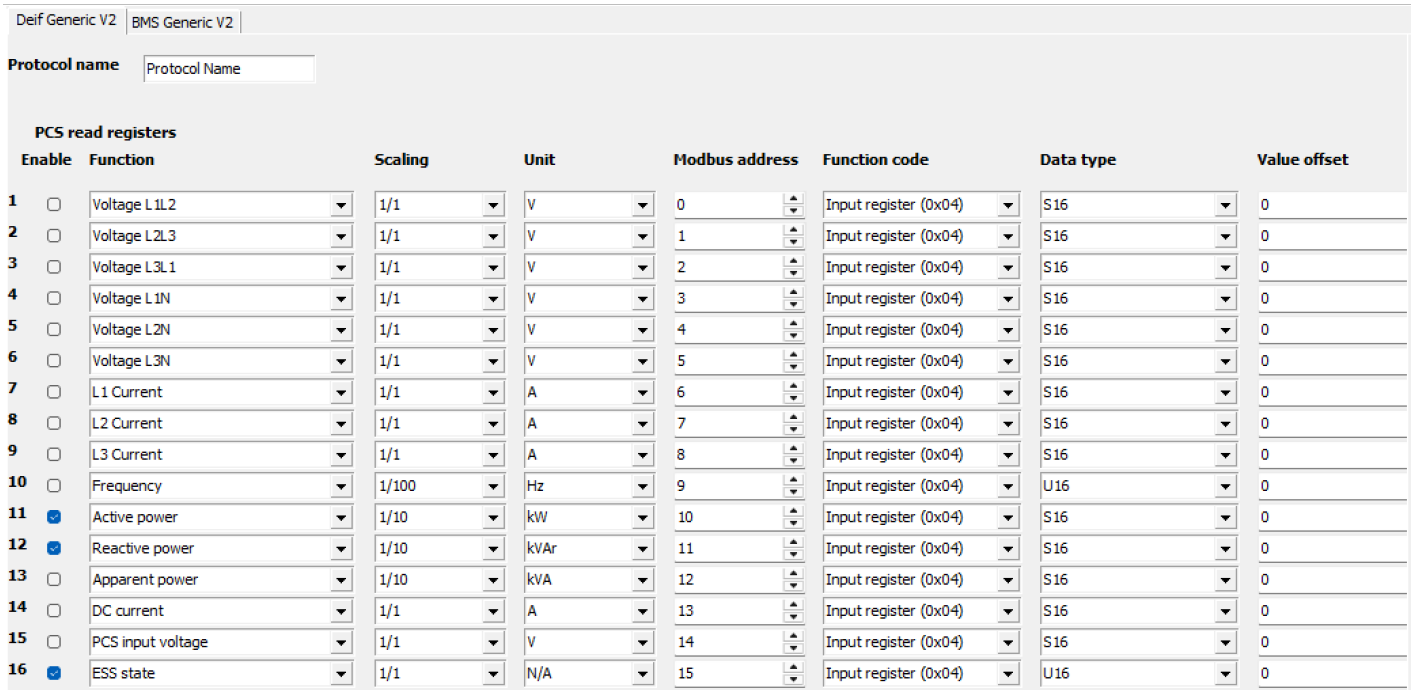
	Information		
PCS maker			
PCS system name			
Proposed protocol name			
Interface	☐ Modbus RTU	☐ Modbus TCP	
Control type	☐ BCU control	☐ PCS control	☐ PCS and BCU control
Power modes	☐ P/Q	☐ V/f	☐ Droop
Any other information			

NOTE If you have also configured a BMS protocol, please also send that information.

2.1.1 PCS read registers

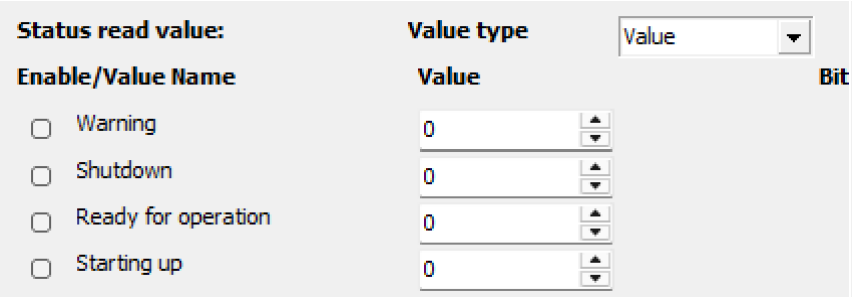
In the utility software, under *Protocol Configuration*, select the *DEIF Generic V2* tab.

Using the PCS Modbus tables, configure the read registers. For each line, you can choose the function, scaling, unit, Modbus address (use digital format), function code, data type, and offset. You can also choose whether to enable the function.



	Enable	Function	Scaling	Unit	Modbus address	Function code	Data type	Value offset
1	☐	Voltage L1L2	1/1	V	0	Input register (0x04)	S16	0
2	☐	Voltage L2L3	1/1	V	1	Input register (0x04)	S16	0
3	☐	Voltage L3L1	1/1	V	2	Input register (0x04)	S16	0
4	☐	Voltage L1N	1/1	V	3	Input register (0x04)	S16	0
5	☐	Voltage L2N	1/1	V	4	Input register (0x04)	S16	0
6	☐	Voltage L3N	1/1	V	5	Input register (0x04)	S16	0
7	☐	L1 Current	1/1	A	6	Input register (0x04)	S16	0
8	☐	L2 Current	1/1	A	7	Input register (0x04)	S16	0
9	☐	L3 Current	1/1	A	8	Input register (0x04)	S16	0
10	☐	Frequency	1/100	Hz	9	Input register (0x04)	U16	0
11	☑	Active power	1/10	kW	10	Input register (0x04)	S16	0
12	☑	Reactive power	1/10	kVAr	11	Input register (0x04)	S16	0
13	☐	Apparent power	1/10	kVA	12	Input register (0x04)	S16	0
14	☐	DC current	1/1	A	13	Input register (0x04)	S16	0
15	☐	PCS input voltage	1/1	V	14	Input register (0x04)	S16	0
16	☑	ESS state	1/1	N/A	15	Input register (0x04)	U16	0

For the *ESS state*, configure the corresponding values or bits (you may need to scroll right to see this).



Remember to use the *Write to device* icon  to write the configuration to the controller.

List of PCS read registers

Name	Default unit	Description
Not defined	N/A	Not defined
Active power	kW	Active power from the PCS
Reactive power	kVAr	Reactive power from the PCS
Apparent power	kVA	Apparent power from the PCS
Inverted Active power		
Inverted Reactive power		
Voltage L1N	V	Voltage L1-N
Voltage L2N	V	Voltage L2-N
Voltage L3N	V	Voltage L3-N
Voltage L1L2	V	Voltage L1-L2

Name	Default unit	Description
Voltage L2L3	V	Voltage L2-L3
Voltage L3L1	V	Voltage L3-L1
Current L1	A	Current L1
Current L2	A	Current L2
Current L3	A	Current L3
Frequency	Hz	Frequency
PCS input voltage	V	Voltage on the DC side of the PCS
DC current	A	DC current
ESS state	N/A	The PCS state Modbus address and data type. The exact status (warning, shutdown, ready for operation, starting up) values or bits are defined under *Status read value*.
PCS Contactor state	N/A	Maker-dependent
Grid mode	N/A	0 = Internal 1 = P/Q mode 2 = V/f mode 3 = Droop 4 = VSG P/Q 5 = VSG V/f
Fault flags	N/A	Maker-dependent (shown in the controller, but action not implemented)
Warning flags	N/A	Maker-dependent (shown in the controller, but action not implemented)
State of charge (SOC)	%	% of nominal capacity
State of health (SOH)	%	% of nominal capacity
Energy capacity	kWh	
DC voltage	V	DC voltage
DC current	A	DC current
Discharge capacity	kW	kW
Charge capacity	kW	kW
Total charge	kWh	kWh
Total discharge	kWh	kWh
BMS state	N/A	Maker-dependent (shown in the controller, but action not implemented)
Temperature	°C	PCS temperature
Max. charge voltage	V	Maximum charge voltage
Max. charge current	A	Maximum charge current
Min. discharge voltage	V	Minimum discharge voltage
Max. discharge current	A	Maximum discharge current
Max. cell voltage	V	Maximum cell voltage
Avg. cell voltage	V	Average cell voltage
Min. cell voltage	V	Minimum cell voltage
Max. cell temperature	°C	Maximum cell temperature
Avg. cell temperature	°C	Average cell temperature
Min. cell temperature	°C	Minimum cell temperature

Name	Default unit	Description
EMS custom output 1-3	N/A	Future use: These bits activate M-Logic *Events > Events - Battery > Custom output [1 to 3] from ESS*
BMS custom output 1	N/A	Future use: This bit activates M-Logic *Events > Events - Battery > Custom output from BMS*

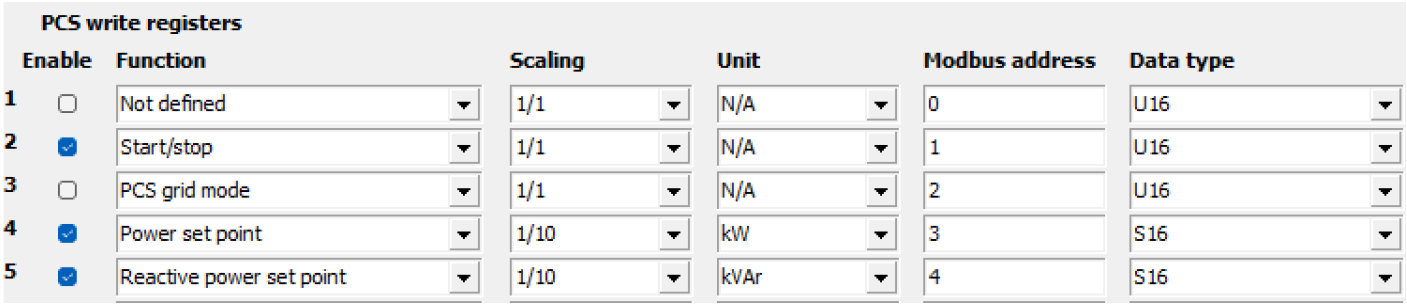
2.1.2 PCS write registers

Write registers

For *Tx write fnc.* (parameter 7566) select the function code for the write register telegrams (*Multiple register 0x10* or *Single register 0x06*).

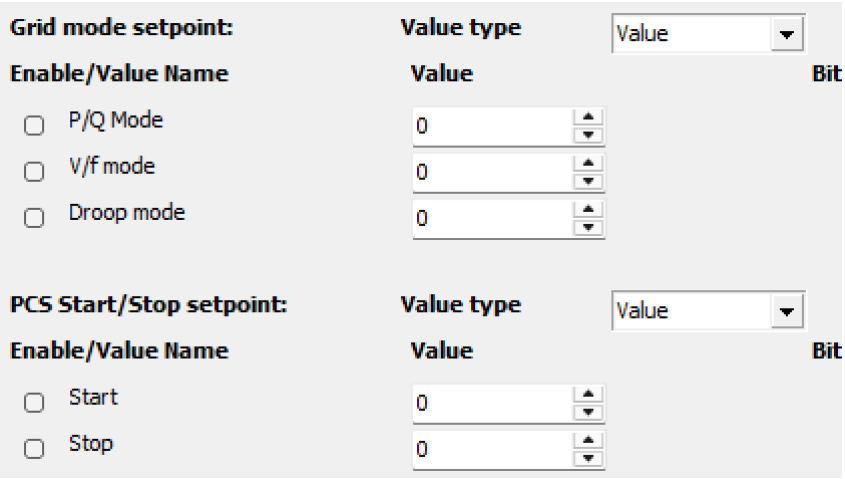
In the utility software, under *Protocol Configuration*, select the *DEIF Generic V2* tab.

Using the PCS Modbus tables, configure the write registers. For each line, you can choose the function, scaling, unit, Modbus address (use decimal format), and data type. You can also choose whether to enable the function.



For the *PCS grid mode*, configure the corresponding values or bits.

For the *Start / Stop command*, *Start command*, and/or *Stop command* functions, configure the values or bits that correspond to start and stop (you may need to scroll right and to the top of the page to see this).



List of PCS write registers

Name	Default unit	Description
Not defined	N/A	Not defined
Start/stop	N/A	The start and stop Modbus address and data type. The exact start and stop values or bits are defined under *PCS start/stop set point*.
Power set point	kW	Power set point

Name	Default unit	Description
Reactive power set point	kVAr	Reactive power set point
Microgrid mode (0=Grid, 1=Island)	N/A	PV grid mode (0=Grid, 1=Island)
Fallback timer		
Epoch timestamp	s	UNIX timestamp (seconds since 1 January 1970)
PCS grid mode	N/A	The PCS grid mode Modbus address and data type. The exact mode (P/Q mode, V/f mode, Droop mode) values or bits are defined under *Grid mode set point*.
PCS voltage reference	V	PCS voltage reference
PCS frequency reference	Hz	PCS frequency reference
PCS set max. SOC	%	Set point for maximum SOC
PCS set min. SOC	%	Set point for minimum SOC
Start command	N/A	The start Modbus address and data type. The exact start value or bit is defined under *PCS start/stop set point*.
Stop command	N/A	The stop Modbus address and data type. The exact stop value or bit is defined under *PCS start/stop set point*.
Set droop delta frequency set point for V/f operation (Island and droop)	Hz	Set droop delta frequency set point for V/f operation (Island and droop)
Set droop delta voltage set point for V/f operation (Island and droop)	V	Set droop delta voltage set point for V/f operation (Island and droop)
Heartbeat Incrementing 0 - 65535		
Heartbeat (toggle 0x55AA/0xAA55 for each cycle)	N/A	Heartbeat (toggle 0x55AA/0xAA55 for each cycle)
DEIF Generic V1 configuration (Phase rotation/M-Logic commands)	N/A	**Bit 0**: 0 = L1-L2-L3, 1 = L1-L3-L2 **Bit 3**: M-Logic output `Command Battery > Custom input to ESS` 0 = False, 1 = True **Bit 4**: Acknowledge inverter alarms **Bit 5**: Acknowledge BMS alarms
Ground relay closed	N/A	0 = Open ground relay 1 = Close ground relay
Inverted Power set point		
Inverted Reactive set point		

2.2 Configurable BMS

You can use the *BMS Generic* function to configure the Modbus communication to a BMS. This function is useful for a BMS that is not included in the **DEIF Hybrid controller compatibility** list.

Minimum configuration

If there is a PCS protocol with the required minimum configuration, there is no minimum configuration for the BMS protocol.

The protocol must also be able to read:

- State of charge (SOC)
- Charge capacity
- Discharge capacity

If reading and writing other values is possible, more functions may be available in the controller.

The controller can show the values that it reads from the BMS. Other systems can also read these values from the controller (using Modbus).

Parameter

For *BMS Modbus prot.* (parameter 7682), select *DEIF Generic*.

Information for BMS protocols

When sending the USW file to DEIF, please include the following information for BMS protocols.

	Information	
BMS maker		
BMS system name		
Proposed protocol name		
Interface	☐ Modbus RTU	☐ Modbus TCP
Any other information		

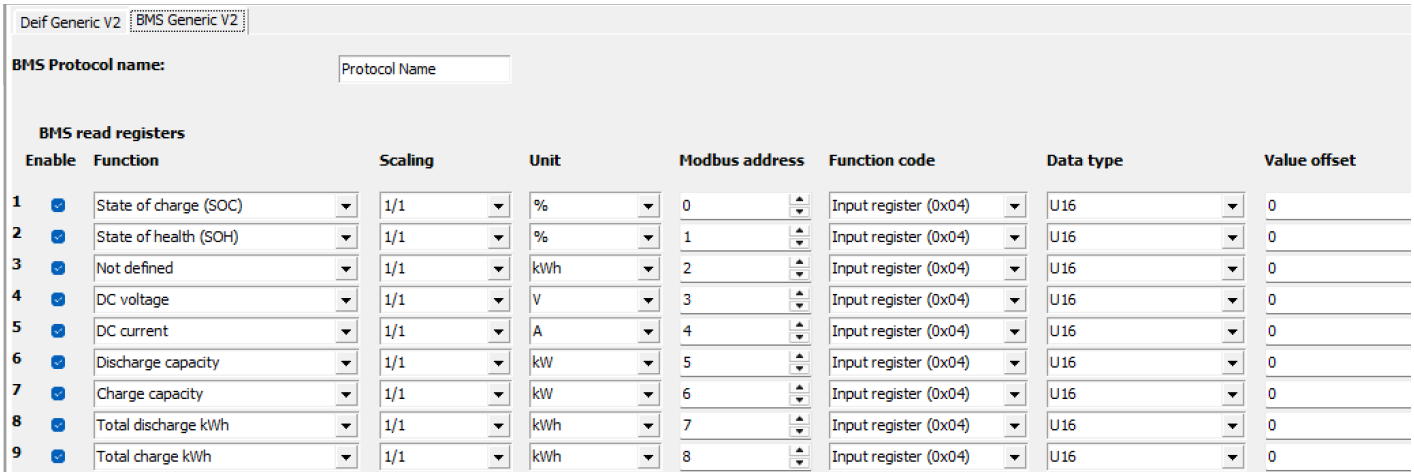
NOTE If you have also configured a PCS protocol, please also send that information.

2.2.1 BMS read registers

Read registers

In the utility software, under *Protocol Configuration*, select the *BMS Generic V2* tab.

Using the BMS Modbus tables, configure the read registers. For each line, you can choose the function, scaling, unit, Modbus address (use decimal format), function code, data type, and offset. You can also choose whether to enable the function.



	Enable	Function	Scaling	Unit	Modbus address	Function code	Data type	Value offset
1	☑	State of charge (SOC)	1/1	%	0	Input register (0x04)	U16	0
2	☑	State of health (SOH)	1/1	%	1	Input register (0x04)	U16	0
3	☑	Not defined	1/1	kWh	2	Input register (0x04)	U16	0
4	☑	DC voltage	1/1	V	3	Input register (0x04)	U16	0
5	☑	DC current	1/1	A	4	Input register (0x04)	U16	0
6	☑	Discharge capacity	1/1	kW	5	Input register (0x04)	U16	0
7	☑	Charge capacity	1/1	kW	6	Input register (0x04)	U16	0
8	☑	Total discharge kWh	1/1	kWh	7	Input register (0x04)	U16	0
9	☑	Total charge kWh	1/1	kWh	8	Input register (0x04)	U16	0

Remember to use the *Write to device* icon to write the configuration to the controller.

List of BMS read registers

Name	Default unit	Description
Not defined	N/A	Not defined
State of charge (SOC)	%	State of charge (SOC)
State of energy (SOE)	%	State of energy (SOE)
Discharge capacity	kW	Discharge capacity

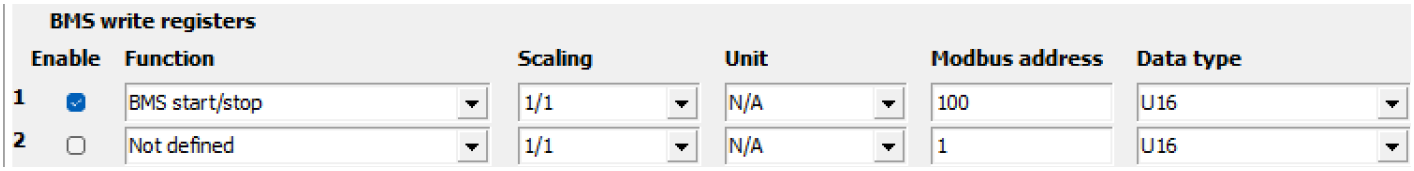
Name	Default unit	Description
Charge capacity	kW	Charge capacity
State of health (SOH)	%	State of health (SOH)
DC voltage	V	DC voltage
State	N/A	Maker-dependent
DC current	A	DC current
Temperature	°C	Temperature
Total charge Ah	Ah	Total charge Ah
Total Discharge Ah	Ah	Total discharge Ah
Total charge kWh	kWh	Total charge kWh
Total discharge kWh	kWh	Total discharge kWh
Max. charge voltage	V	Maximum charge voltage
Max. charge current	A	Maximum charge current
Max. discharge voltage	V	Maximum discharge voltage
Max. discharge current	A	Maximum discharge current
BMS Contactor state	N/A	
Min. cell voltage	V	Minimum cell voltage
Avg. cell voltage	V	Average cell voltage
Max. cell voltage	V	Maximum cell voltage
Min. cell temperature	°C	Minimum cell temperature
Avg. cell temperature	°C	Average cell temperature
Max. cell temperature	°C	Maximum cell temperature

2.2.2 BMS write registers

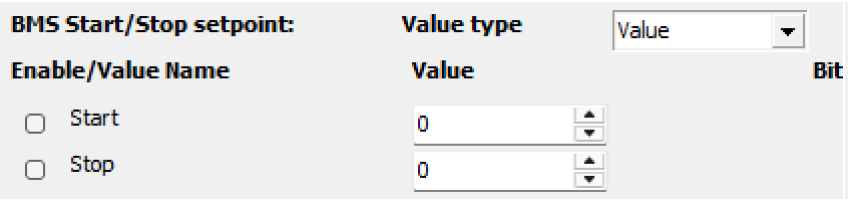
For *Tx write fnc.* (parameter 7566) select the function code for the write register telegrams (*Multiple register 0x10* or *Single register 0x06*).

In the utility software, under *Protocol Configuration*, select the *BMS Generic V2* tab.

Using the BMS Modbus tables, configure the write registers. For each line, you can choose the function, scaling, unit, Modbus address (use decimal format), and data type. You can also choose whether to enable the function.



For the *BMS Start / Stop* command, configure the corresponding values or bits (you may need to scroll right and to the top of the page to see this).



List of BMS write registers

Name	Default unit	Description
Not defined	N/A	Not defined
Heartbeat Incrementing 0 - 65535	N/A	
Heartbeat (toggle 0x55AA/0xAA55 for each cycle)	N/A	Heartbeat (toggle 0x55AA/0xAA55 for each cycle)
BMS start/stop	N/A	The start and stop Modbus address and data type. The exact start and stop values or bits are defined under *BMS start/stop set point*.

3. Photovoltaic

3.1 Configurable PV

You can use the *DEIF Generic V2* function to configure the Modbus communication to a PV system. This function is useful for a PV system that is not included in the **DEIF Hybrid controller compatibility** list.

Minimum configuration

As a minimum, the protocol must be able to write:

- PV start
- PV stop
- Power set point

For PV start, you can use *Start /Stop command* or *Start command*. Similarly, for PV stop, you can use *Start /Stop command* or *Stop command*.

If reading and writing other values is possible, more functions may be available in the controller.

The controller can show the values that it reads from the PV system. Other systems can also read these values from the controller (using Modbus).

Parameter

For *PV protocol* (parameter 7561), select *DEIF Generic V2*.

Remember to use the *Write to device* icon  to write the configuration to the controller.

Information for PV protocols

When sending the USW file to DEIF, please include the following information for PV protocols.

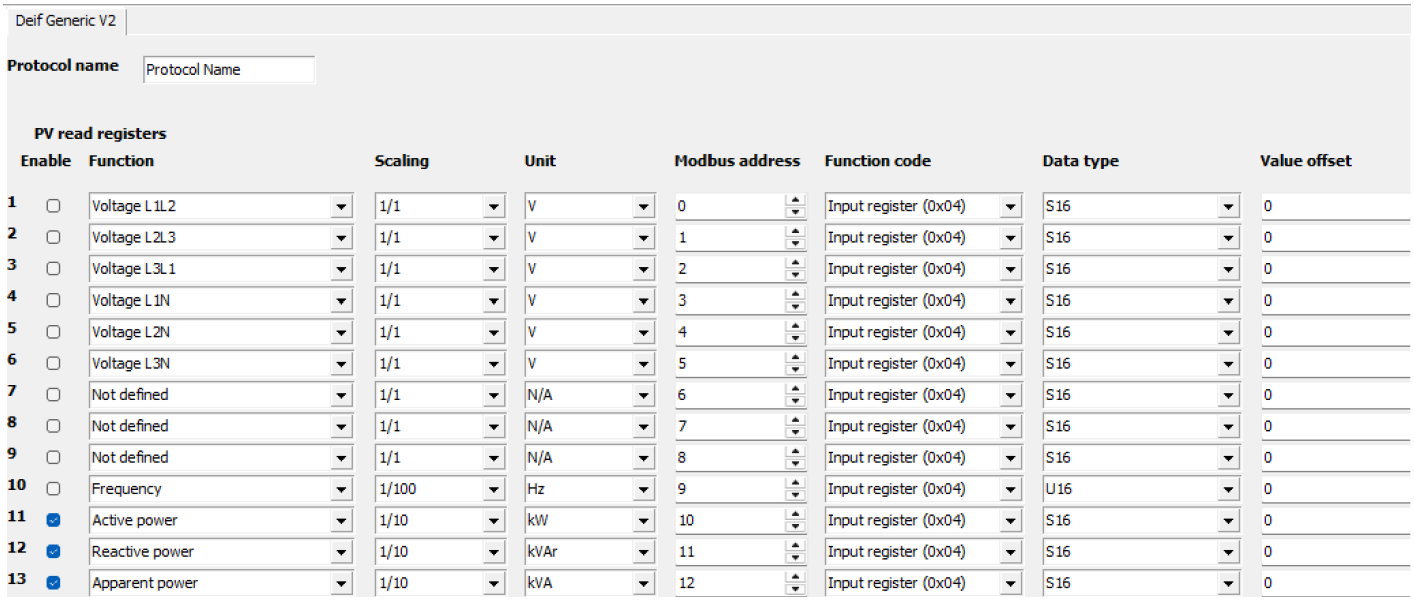
	Information	
PV system maker		
PV system name(s)		
Proposed protocol name		
Interface	☐ Modbus RTU	☐ Modbus TCP
Any other information		

3.1.1 PV read registers

Read registers

In the utility software, under *Protocol Configuration*, select the *DEIF Generic V2 tab*.

Using the PV system Modbus tables, configure the read registers. For each line, you can choose the function, scaling, unit, Modbus address (use decimal format), function code, data type, and offset. You can also choose whether to enable the function.



Remember to use the *Write to device* icon to write the configuration to the controller.

List of PV read registers

Name	Default unit	Description
Not defined	N/A	Not defined
Inverter serial number 01-02 (format maker-dependent)	N/A	Inverter serial number 01-02 (format maker-dependent)
Inverter serial number 03-04 (format maker-dependent)	N/A	Inverter serial number 03-04 (format maker-dependent)
Inverter serial number 05-06 (format maker-dependent)	N/A	Inverter serial number 05-06 (format maker-dependent)
Inverter serial number 07-08 (format maker-dependent)	N/A	Inverter serial number 07-08 (format maker-dependent)
Inverter serial number 09-10 (format maker-dependent)	N/A	Inverter serial number 09-10 (format maker-dependent)
Inverter serial number 11-12 (format maker-dependent)	N/A	Inverter serial number 11-12 (format maker-dependent)
Inverter serial number 13-14 (format maker-dependent)	N/A	Inverter serial number 13-14 (format maker-dependent)
Inverter serial number 15-16 (format maker-dependent)	N/A	Inverter serial number 15-16 (format maker-dependent)
Inverter serial number 17-18 (format maker-dependent)	N/A	Inverter serial number 17-18 (format maker-dependent)
Inverter serial number 19-20 (format maker-dependent)	N/A	Inverter serial number 19-20 (format maker-dependent)
Inverter serial number 21-22 (format maker-dependent)	N/A	Inverter serial number 21-22 (format maker-dependent)
Inverter serial number 23-24 (format maker-dependent)	N/A	Inverter serial number 23-24 (format maker-dependent)
Inverter serial number 25-26 (format maker-dependent)	N/A	Inverter serial number 25-26 (format maker-dependent)

Name	Default unit	Description
Inverter serial number 27-28 (format maker-dependent)	N/A	Inverter serial number 27-28 (format maker-dependent)
Inverter serial number 19-30 (format maker-dependent)	N/A	Inverter serial number 19-30 (format maker-dependent)
Inverter serial number 31-32 (format maker-dependent)	N/A	Inverter serial number 31-32 (format maker-dependent)
Inverter model 01-02 (format maker-dependent)	N/A	Inverter model 01-02 (format maker-dependent)
Inverter model 03-04 (format maker-dependent)	N/A	Inverter model 03-04 (format maker-dependent)
Inverter model 05-06 (format maker-dependent)	N/A	Inverter model 05-06 (format maker-dependent)
Inverter model 07-08 (format maker-dependent)	N/A	Inverter model 07-08 (format maker-dependent)
Inverter model 09-10 (format maker-dependent)	N/A	Inverter model 09-10 (format maker-dependent)
Inverter model 11-12 (format maker-dependent)	N/A	Inverter model 11-12 (format maker-dependent)
Inverter model 13-14 (format maker-dependent)	N/A	Inverter model 13-14 (format maker-dependent)
Inverter model 15-16 (format maker-dependent)	N/A	Inverter model 15-16 (format maker-dependent)
Inverter model 17-18 (format maker-dependent)	N/A	Inverter model 17-18 (format maker-dependent)
Inverter model 19-20 (format maker-dependent)	N/A	Inverter model 19-20 (format maker-dependent)
Inverter model 21-22 (format maker-dependent)	N/A	Inverter model 21-22 (format maker-dependent)
Inverter model 23-24 (format maker-dependent)	N/A	Inverter model 23-24 (format maker-dependent)
Inverter model 25-26 (format maker-dependent)	N/A	Inverter model 25-26 (format maker-dependent)
Inverter model 27-28 (format maker-dependent)	N/A	Inverter model 27-28 (format maker-dependent)
Inverter model 19-30 (format maker-dependent)	N/A	Inverter model 19-30 (format maker-dependent)
Inverter model 31-32 (format maker-dependent)	N/A	Inverter model 31-32 (format maker-dependent)
Rated active power size	kW	Rated active power size
Rated reactive power size	kVAr	Rated reactive power size
Country code (format maker-dependent)	N/A	Country code (format maker-dependent)
DC voltage string [01 to 12]	V	DC voltage for strings 01 to 12
DC power string [01 to 12]	kW	DC power string for strings 01 to 12
DC current string [01 to 12] P calc	kW	DC current for strings 01 to 12. If the PV system does not include a power measurement, this current is used together with the voltage to calculate the power.
Active power	kW	Total active power
Reactive power	kVAr	Total reactive power
Apparent power	kVA	Total apparent power
Inverted active power		
Inverted apparent power		
Energy produced	kWh	Energy produced
Energy produced today	kWh	Energy produced today
Operating hours	h	Operating hours
Operating minutes today	min	Operating minutes today
Cabinet temperature	°C	Cabinet temperature
Voltage L1N	V	Voltage L1-N

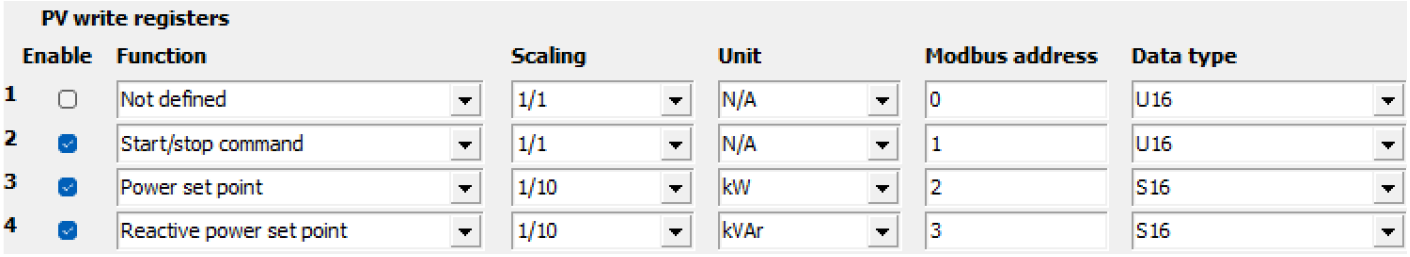
Name	Default unit	Description
Voltage L2N	V	Voltage L2-N
Voltage L3N	V	Voltage L3-N
Voltage L1L2	V	Voltage L1-L2
Voltage L2L3	V	Voltage L2-L3
Voltage L3L1	V	Voltage L3-L1
Frequency	Hz	Frequency
Inverter state (format maker-dependent)	N/A	Inverter state (format maker-dependent)
Fault code (format maker-dependent)	N/A	Fault code (format maker-dependent)
Grid frequency L1	Hz	Grid frequency L1
Grid frequency L2	Hz	Grid frequency L2
Grid frequency L3	Hz	Grid frequency L3
DC current string [01 to 12]	A	DC current for strings 01 to 12
Watch dog will increment continuously. To be used for PV/DEIF communication supervision on DEIF side.	N/A	A watch dog that increments continuously. This can be used by the controller for supervision of the communication between the PV system and the controller.

3.1.2 PV write registers

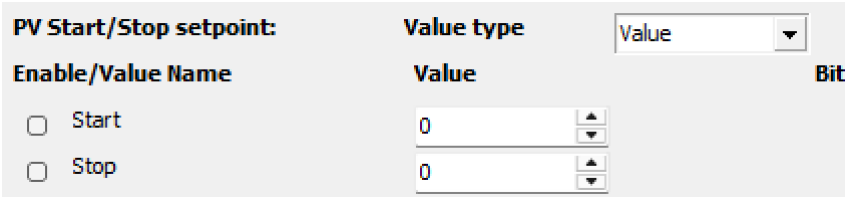
For *Tx write fnc.* (parameter 7564) select the function code for the write register telegrams (*Multiple register 0x10* or *Single register 0x06*).

In the utility software, under *Protocol Configuration*, select the *DEIF Generic V2* tab.

Using the PV system Modbus tables, configure the write registers. For each line, you can choose the function, scaling, unit, Modbus address (use digital format), and data type. You can also choose whether to enable the function.



For the *Start / Stop command*, *Start command*, and/or *Stop command* functions, configure the values or bits that correspond to start and stop (you may need to scroll right and to the top of the page to see this).



Remember to use the *Write to device* icon to write the configuration to the controller.

List of PV write registers

Name	Default unit	Description
Not defined	N/A	Not defined
Start/stop command	N/A	The start and stop Modbus address and data type. The exact start and stop values or bits are defined under *PV start/stop set point*.
Power set point	kW	Power set point
Reactive power set point	kVAr	Reactive power set point
Fallback timer	s	Timer for when communication with the PV system is lost.
Epoch timestamp	s	UNIX timestamp (seconds since 1 January 1970)
Start command	N/A	The start Modbus address and data type. The exact start value or bit is defined under *PV start/stop set point*.
Stop command	N/A	The stop Modbus address and data type. The exact stop value or bit is defined under *PV start/stop set point*.
Heartbeat (toggle 0x55AA/ 0xAA55 for each cycle)	N/A	Heartbeat (toggle 0x55AA/0xAA55 for each cycle)
Ground relay closed	N/A	0 = Open ground relay 1 = Close ground relay
Inverted Power set point		
Inverted Reactive set point		

4. Power measurements

4.1 Configurable power meter

You can use the *Configurable power meter* function to configure the Modbus communication to power meters. This function is useful for a power meter that is not included in the **DEIF Hybrid controller compatibility** list.

Parameters

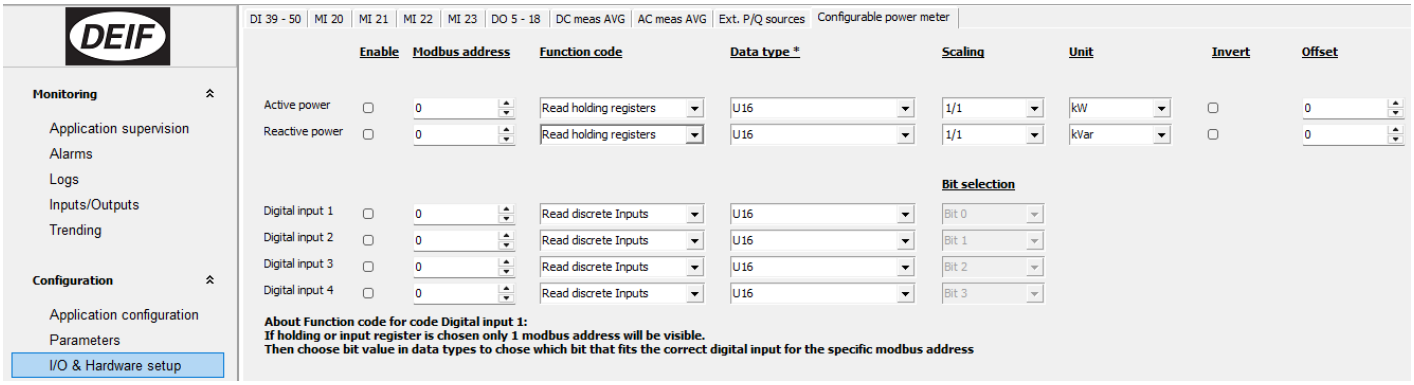
Select *Configurable power meter* in the relevant parameter(s).

Controller	Parameter name	Parameter number	Measurements
All	GEN meter prot.	7721	Generator power
Battery/Storage	ESS meter prot.	7723	ESS power
Solar	PV meter prot.	7723	PV power
All	Mains met. prot	7725	Mains power

NOTE You can only have one type of configurable power meter in a controller.

Configurable power meter setup

In the utility software, under *I/O & Hardware setup*, select the *Configurable power meter* tab.



Configure the power measurements

1. Select **Enable** for the power measurements that the power meter supports.
2. For each power measurement, configure the Modbus address, function code, data type, scaling, and power unit. If the sign (positive or negative) of the value must be reversed, select *Invert*. If the measurement value is offset, configure the offset.

Example of power measurement configuration

The controller has the following power measurement configuration:

	Enable	Modbus address	Function code	Data type *	Scaling	Unit	Invert	Offset
Active power	Enable	1	Read holding registers	U16	1/100	kW	☑	2000
Reactive power	Enable	2	Read holding registers	U16	1/100	kVar	☑	1000

If the value that the controller reads from the power meter for active power is 19876, and the reactive power value is 12345:
Active power = - (19876 + 2000)/100 kW = -218.76 kW
Reactive power = - (12345 + 1000)/100 kvar = -133.45 kvar

Remember to use the *Write to device* icon to write the configuration to the controller.

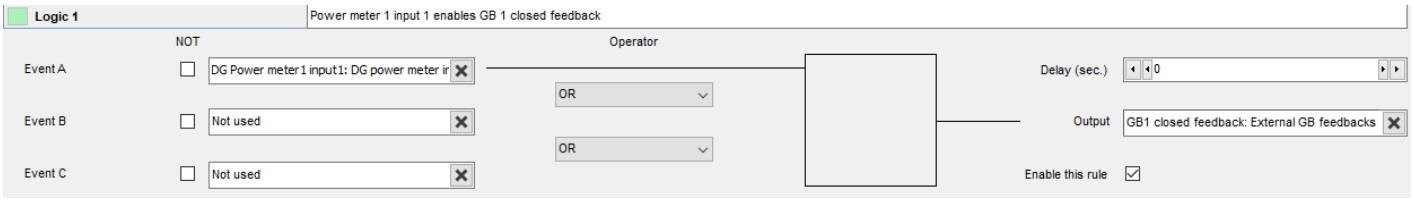
Configure the digital inputs

1. Select **Enable** for the digital inputs that the power meter supports.
2. For each digital input, configure the Modbus address, function code, and data type.
   a. If you select *Read holding registers* or *Read input registers* for the function code, you can only use the first Modbus address for the digital inputs.
   b. When the data type is *Bit value*, select the bit under *Bit selection*.

Connect the digital inputs to breaker feedback

If the breaker status is included in the power meter protocol, configure M-Logic to connect the output from the power meter to enable the corresponding equipment.

For example, in an Open PMS application, external source 1 is a genset. Digital input 1 from the power meter is activated when the generator breaker is closed:



Check the configuration

In the utility software, under *Application supervision*, select the *Power meter data* icon to open the *Power meter data* window. Here you can see the power measurement values, as well as the bit values for the digital inputs.

Information for power meter protocols

When sending the USW file to DEIF, please include the following information for Modbus RTU (RS-485) power meter protocols.

	Information	
Power meter name		
Proposed protocol name		
Power meter type	☐ Power meter	☐ Genset controller
Active power measurement supported	☐	
Reactive power measurement supported	☐	
Breaker feedback supported	☐	
Any other information		