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Energy / Clean Energy	**EU-VERTRAGS NR. ENK5-2001-00536**

PROJEKTTITEL UND AKRONYM
RES2H2: cluster Pilot project for Integration of RES ibto European Sectors using Hydrogen

☒ **ZWISCHENBERICHT**

☐ **SCHLUSSBERICHT**

BERICHTSPERIODE : VOM 1.1.03 BIS 31.12.03

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Ort und Datum	**Unterschrift des Beitragsempfängers**

PROGRAMM: Energy / Clean Energy

PROJEKTTITEL: RES2H2: cluster Pilot project for Integration of RES ibto European Sectors using Hydrogen

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PROJEKTDAUER: 1.1.2002 - 31.12.2004
BEITRAG BBW CHF: 471'000.-
PROJEKTPARTNER: IDS AG

KEYWORDS:

Summary

ABSTRACT

DIESES ABSTRACT DIENT DEM BBW FÜR DIE JÄHRLICHE PUBLIKATION DER LAUFENDEN PROJEKTE, ES KANN IN EINER LANDESSPRACHE ODER IN ENGLISCH ABGEFASST WERDEN. ***DER TEXT SOLLTE NICHT LÄNGER ALS EINE SEITE SEIN UND KEINE BILDER ODER GRAFIKEN ENTHALTEN.***

Objectives: see RES2H2- Description of work

To develop a variable automatic control system that allows optimum selection of running parameters. A controller/power conditioning unit (CPCU) able to manage the output of the wind farm in order to provide a regulated supply of AC current to the consumer load at all times will be developed.
(The CPCU has to be able to forward AC from the wind farm to the desalination plant and the consumer load. Excess AC from the wind farm will be converted into DC with voltage matching that of the electrolyser. The fuel cell power output (DC) will be converted into usable AC and delivered to the consumer load. The CPCU will also handle the control and monitoring of the desalination plant, the fuel cell and electrolyser operational envelopes).

The first Task:

Task 9.1 Development of power conditioning system. (2002)

Task 9.2 Development of control system software (2003-2004)

Task 9.3 Development of instrumentation and control system (2003-2004)

Results:

- Adaptation of the power conditioning system to changes during 2003
- Preliminary structure for the control system software
- Design of the instrumentation and control system

After designing the power conditioning system in 2002 IDS has designed the instrumentation and control system. The structure of the software has also roughly designed. The software has to adapted in the end (before delivery) to the latest results of the project partners. The monitoring of the system is defined and has also to be adapted in the end to the latest results of the project partners.

The components for the control, el. sensors and power are already purchased depending on the information we got from the project partners.

The state of work is generally in time with the schedule of the project. Some delays occurred because some partners didn't passed their results to IDS in time.

Deliverable D9.1

Information provided for the engineering of the complete system for the Spanish side

		YES	NO
Distribution List:	**Instalaciones Inabensa, S.A.**	✓	
	Instituto Tecnológico de Canarias, S.A.		✓
	University of Las Palmas de Gran Canaria	✓	
	Instituto Nacional de Técnica Aeroespacial		✓
	OWK Umwelttechnik und Anlagenbau GmbH		✓
	Solantis Energy AG		✓
	Unión Eléctrica de Canarias, S.A.		✓
	Compañía Transportista de Gas Canarias, S.A.		✓
	Integral Drive systems AG		✓
	Centre for Renewable Energy Sources		✓
	Frederick Institute of Technology		✓
	Electricity Authority of Cyprus		✓
	C. Rokas, S.A.		✓
	PLANET – Planungsgruppe Energie und Technik GbR		✓
	European Commission		✓

E					
D					
C					
B					
A					
	01/09/03	**K.Ringold**	**A.Stoev**	**A.Stoev**	**C**
Rev.	**Date**	**Drafted**	**Checked**	**Approved**	**Status (C-P)***

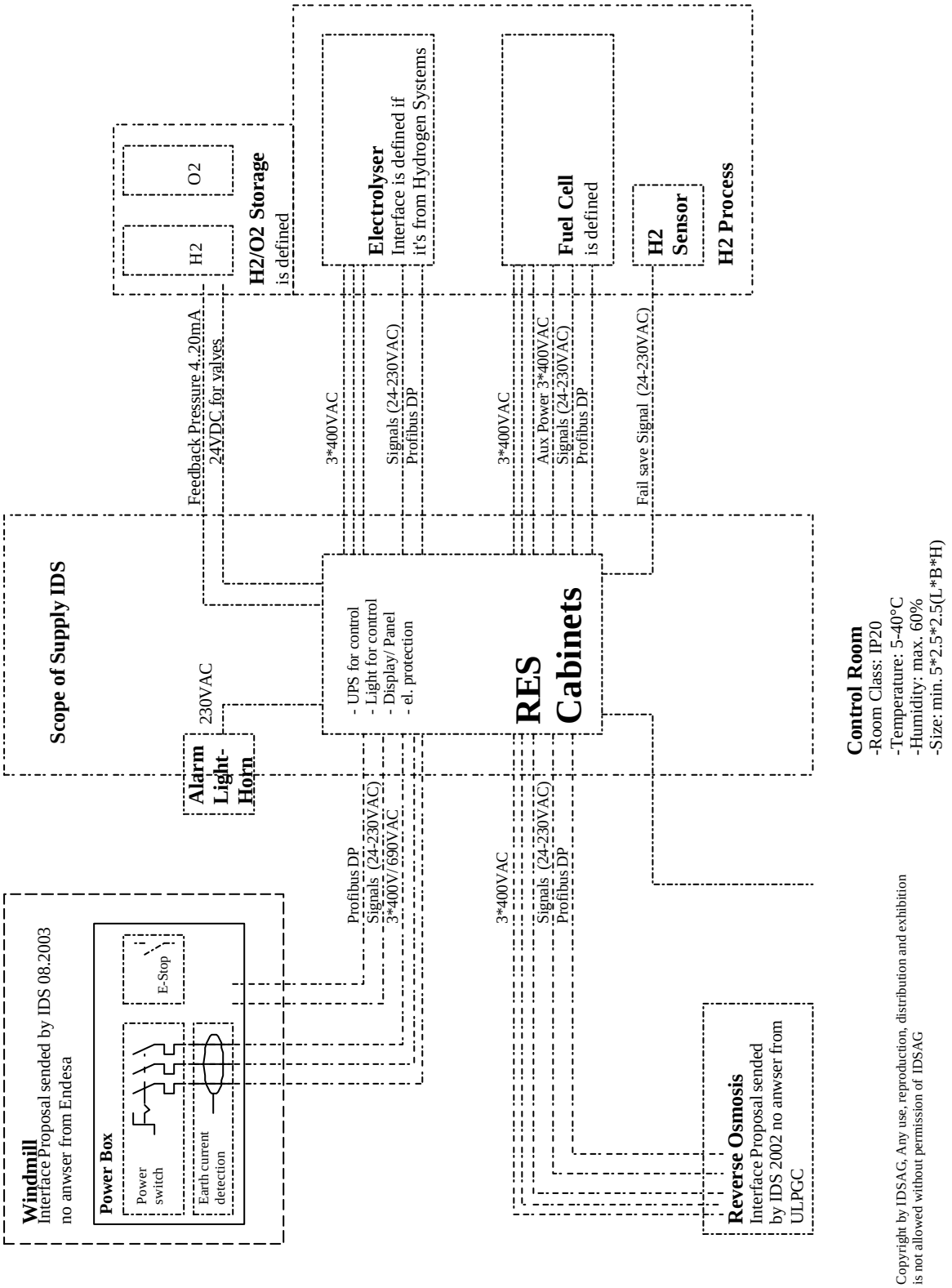
CONTENTS

1 EXECUTIVE SUMMARY

This deliverable should help to integrate the RES in the whole installation(WP12). IDS will send this deliverable 9.1 to the scientific coordinator Mr. Gotor(ULPGC) and the administrative coordinator and WP12 leader Mrs. Castro(Inabensa)

2 DIAGRAM

There are several system which should be connect by the RES. The diagram should help to understand how the electric connection will look like.



3 INTERFACES

IDS started to design the interfaces to the subsystems, in the time 08.02-10.02, based on the answers we got from the subsystem providers which are:

- ITC (wind generator WG)
- ULPGC (reverse osmosis RO)
- Solantis (electrolyser EL) ==> Hydrogen Systems
- Solantis (fuel cell FC) ==> Staxon
- OWK (H2/ O2 storage)
- Endesa (wind generator WG)

3.1 THE INTERFACES ALREADY DEFINED

This interfaces are defined and confirmed by IDS and the subsystem provider. You will find them in the annex of this document.

- ITC (wind generator WG)
- Solantis (electrolyser EL) ==> Hydrogen Systems
- Solantis (fuel cell FC) ==> Staxon
- OWK (H2/ O2 storage)

3.2 THE INTERFACES WHICH ARE NOT DEFINED

This interfaces are not confirmed by the subsystem provider yet. IDS send a proposal to all of them.

- ULPGC (reverse osmosis RO) send October 02
  IDS send the proposal for the interface of the RO to the ULPGC after Mr. Ringold and Mr. Nuez Pestana defined it at the Gran canaria meeting in September 02. IDS tried several times to get a constructive answer from ULPGC after sending the proposal. That has never happen.
- Endesa (wind generator WG) send August 03
  Since the meeting in September 02 in Gran Canaria ITC is not longer responsible for the providing of the wind generator. Endesa took over this part instead. IDS got in contact with Mr. Ballesteros at the meeting in Madrid August 03. Based on his information IDS send a proposal to Endesa. There is no response yet.

4 THE ENVIRONMENT

The RES is designed like all control systems for indoor installation.

4.1 THE INSTALLATION ROOM

The environment conditions are:

- The ambient temperature: 5°- 40°C
- The humidity: max. 60%
- The space for the installation: min. 5*2.5*2.5m (L*B*H)
- A telephone line to connect a modem with the possibility of min. 3 modem lines
- Attitude: max. 2000m (over sea)
- Vibration class: Stationary
- Space for operating: 1.5m in front of the cabinets
- Power Line: There should be a power supply for the room with 3*400VAC/40A

4.2 THE OPTIONS

If the RES takes place in a separate building IDS expect that the light and air conditioning control already exist.
If the RES should take place in a container the light and the air conditioning can be controlled by the RES.

5 SECURITY & SAFETY

IDS didn't get any security or safety concept yet(WP11). Anyway IDS has some basic needs to run the RES without danger for persons and equipment.

- RES provides a hardware input for minimum one H2 sensor(fail save) and shut down the system if a H2-leak is detected. The H2 sensor is not part of the supply of IDS.
- RES provides two types of warning: signal horn, alarm light

6 PHYSICAL CONNECTIONS

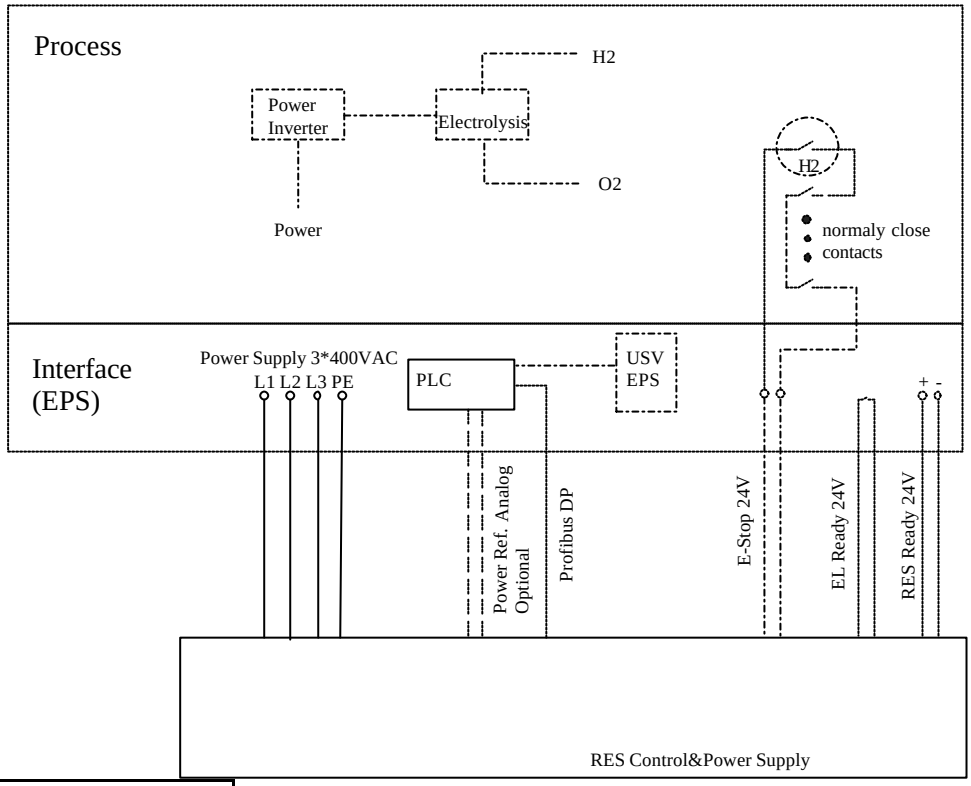
The physical connections between the RES and the subsystems are based on the distance and the environment between each other. The power cable should be conform to the EU electric regulations. To define the cable it's necessary to know how the topology and the installation of the subsystems and the RES will look like. Both information's are not clear yet.

Appendix

- Confirmed interface between RES and EL
- Confirmed interface between RES and FC
- Confirmed interface between RES and storage tank

- Not confirmed interface between RES and RO
- Not confirmed interface between RES and WG

Interface: Electrolyser (EL), confirmed



Power Specification

Signal Name	Name	Value	Unit	Tolerances	Comments
Input Power Voltage	U	400	VAC	+/- 40V	
Input Current	I	230	A	+/- 23A	Nominal Value
Input Frequency	F	50	Hz	+/- 5Hz	
Input Power	P	160	kVA		Nominal Value
Nominal Power Factor	cosf	???			Nominal Value
max. Dynamic of the Power Change	dPwg/dt	27	kVA/s		Max. Change of Power Input 160kVA/6s
min. Dynamic of the Power Change	dPwg/dt	16	kVA/s		Min. Change of Power Input in 160kVA/10s
Line Distortion (Sub characteristic) as Pn 200 kW Line					Net filter intern

Reduzierte Signale

Signal In- Outputs

Signal Name	Name	Value	Unit		Comments
Emergency-Stop Output	E-Stop EL	0..24	V	5A	E-Stop Signal (contact in EL unit)
Ready Signal Output	Ready EL	0..24	V	5A	Ready Signal from FC Unit(contact in EL Unit)
Ready Signal Input	Ready RES	0..24	V	5A	Ready Signal from RES Control
Ref. Value Power(optional)	Power-Ref	4 – 20	mA	10V (loop voltage up to 30V)	Reference Value for the Power (optional)

Vereinbarte Signale

Signal In-Outputs

Signal Name	Name	Value	Unit		Comments
Power Input	P-Ref	4..20	mA	10V	Reference Value for the power
Run enable	EnableIn	0..24	V	5A	Dig.Input from Host
Run enable	EnableOut	0..24	V	5A	Dig.Output to Host
Fault Host.	FaultIn	0..24	V	5A	Fault from Host
Fault Elektrolyser	FaultOut	0..24	V	5A	Fault of the Elektrolyser Output
Emergency Stop In	EStopHost	0..24	V	5A	Emergency Stop Input from Host
Emergency Stop Out	EstopElektrol	0..24	V	5A	Emergency Stop Output to Host
Power Output	P-Fdb	4..20	mA	10V	Feedback value for the power

Hardware Spec. of the Osmose-Controll

	Name	Value	Unit		Comments
Protocol Name	Profibus DP				Name of the Protocol
Max. Baud Rate		12	MByte		This is the max. Baud rate it's possible that not every partner unit support this rate A common rate is 1,5Mbyte(recommended)
RxD Signal	RxD				Receive Signal
TxD Signal	TxD				Transmit Signal etc.
Ground	GND				

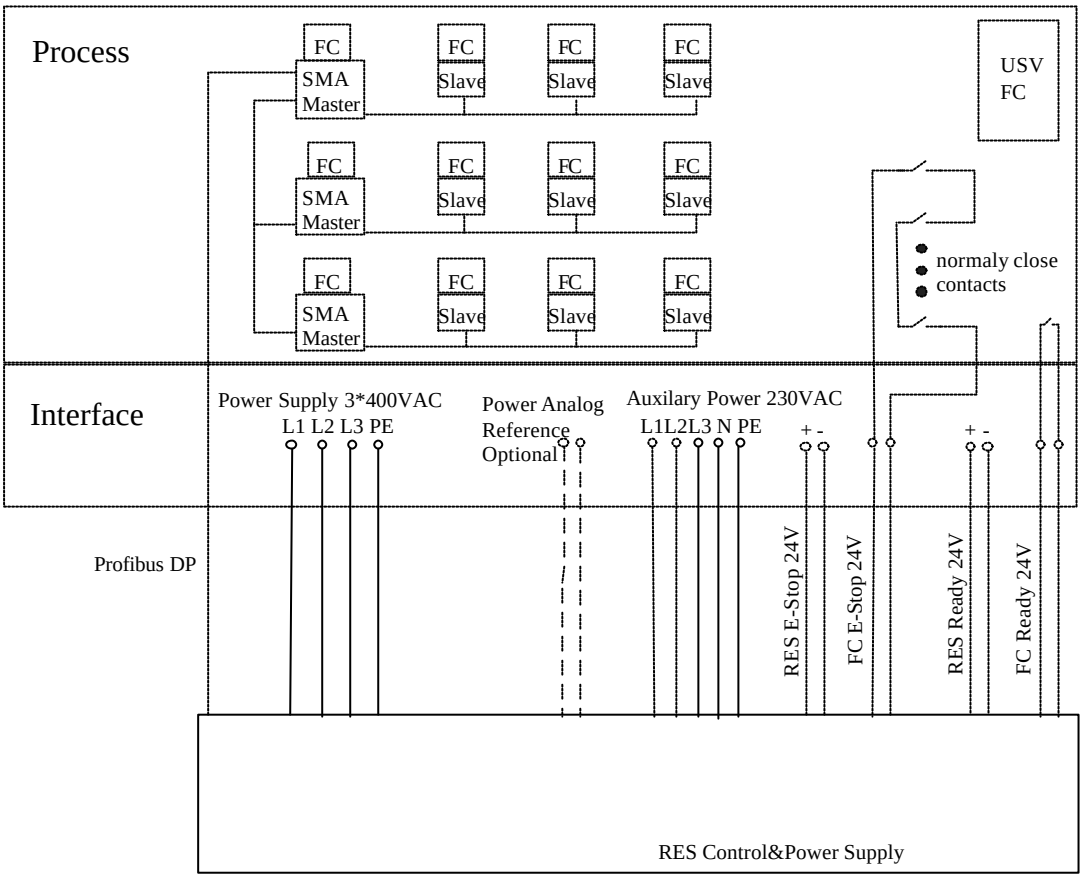
Signals Profibus

Name	Type	Limites	Unit	Comment
Reference value power	Integer	0..100	%	Reference power from the RES-Control
Feedback value power	Integer	0..100	%	Feedback power to the RES-Control
Feedback H2 Production	Integer		dm3/h	Feedback H2 Production to the RES Control
Feedback O2 Production	Integer		dm3/h	Feedback O2 Production to the RES Control
Run enable	Bit	0/1		Run enable to the EPS from RES Control
Parameter list				Have to be defined
Status	Byte	0..7		Status of the EL Unit to the RES-Control(have to be defined)
Alarms	Byte	0..255		Alarms of the EL Unit to the RES-Control(have to be defined)

General Informations	comments
Where takes the Power supply, control, converter (ext. sensors) and the process place	• The max. distance of the RES-Cabinet to the EPS ➔ ??? • Not necessary for us. • The size of the EPS-Cabinet and the Process-cabinet • EPS: 2 cabinets 800x800x2200 • Process: 1 cabinet 1600x1600x2200
Holding time of the internal USV	• 30min • Reloading time = 6h • Shot down after 10min. when no Power Supply(400V) from RES
Reaction of the system while start up procedure: Necessary Inputs/ Power supply	1. Ready Signal from RES Control 2. Run the internal USV in the EPS 3. Ready Signal from EPS 4. 400V connected to EPS ➔ stand by mode 5. Run enable from RES Control 6. Start up procedure Electrolysis Process

Reaction of the system while shut down procedure Necessary Inputs/ Power supply	• 400V to the RES can cut off immediately • No Ready signal from RES Control ➔ Run down the Electrolyser and shot down the USV after 10min. • The EL Unit is able to be run down without any extern Power needed • The time it takes to bring the production to 0 ➔ ??? • Production > 0: appr. 1-3sec • Depressurising if necessary: appr. 2min
New start: Time until system is ready to produce	• After RES ready signal: How much time does it takes to bring the Electrolysis Process in producing mode ➔ ??? • Depends on the starting pressure (Standby Mode) and on the pressure setpoint (5-10 min) • If the Electrolyser is in stand by mode(400V but no run enable): After Run enable, how much time does it takes to bring the Electrolysis Process in producing mode ➔ ??? • If we have a standbymode with pressure near the Setpoint ("hot standby", time must be defined) then we need appr. 30-60 sec. To ramp up the current.
Changing rate of the reference value for the power from RES-Control	The EPS takes care of the regulation of the power according to the reference signal from the RES Control.

Interface: Fuel Cell (FC), confirmed



Power Spezification					
Signal Name	Name	Value	Unit	Tolerances	Comments
Output Power Voltage	U	400	VAC	V	
Output Current	I	0..60	A	+/- A	
Output Frequency	F	50	Hz	+/- Hz	
Output Power	P	40	kW	kW	Nominal Value
Nominal Power Factor	cosf	???			Nominal Value
max. Dynamik of the Power Change	dPwg/dt	30	KW/s		Max. Change of Power Output in kW/s

Aux Power Needs					
Signal Name	Name	Value	Unit	Tolerances	Comments
Inpur Power Voltage	Uaux	3*400	V	+/- V	
Inpur Current	Iaux	7	A	+/- A	
Input Power	P	5	kW	kW	Nominal Value

Signal In- Outputs					
Signal Name	Name	Value	Unit		Comments
Emergency-Stop Output	E-Stop FC	0..24	V	1A	E-Stop Signal (contact in FC unit)
Emergency-Stop Input	E-Stop RES	0..24	V	1A	E-Stop Signal 24V from RES

Ready Signal Output	Ready FC	0..24	V	1A	Ready Signal from FC Unit(contact in FC Unit)
Ready Signal Input	Ready RES	0..24	V	1A	Ready Signal from RES Control
Power Reference (optional)	Power Reference	4..20	mA		Analog Reference Signal from the RES-Control

Hardware Spec. of the Osmose-Controll

	Name	Value	Unit		Comments
Protocoll Name	Profibus DP				Name of the Protokoll
Max. Baud Rate		12	MBit		This is the max. Baud rate it's possible that not every partner unit support this rate A common rate is 1,5Mbit(recommended)
RxD Signal	RxD				Receive Signal
TxD Signal	TxD				Transmit Signal etc.
Ground	GND				

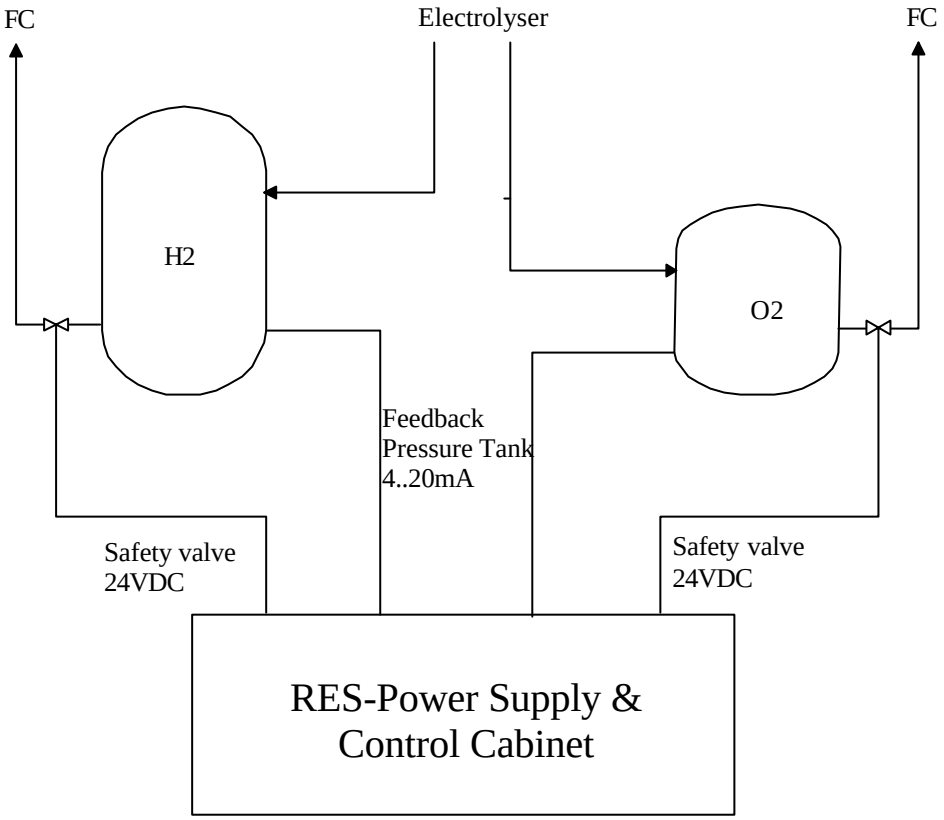
Signals Profibus

Name	Type	Limites	Unit	Commentes
Reference value power	Integer	0..100	%	Reference Power from the RES-Control
Feedback value power	Integer	0..100	%	Feedback Power to the RES-Control
Feedback H2 flow	Integer		dm3/h	Feedback H2 flow to the RES-Control
Feedback O2 flow	Integer		dm3/h	Feedback O2 flow to the RES-Control
Feedback H2 pressure	Integer		0.1bar	Feedback inlet pressure H2 to the RES-Control
Feedback O2 pressure	Integer		0.1bar	Feedback inlet pressure O2 to the RES-Control
Feedback Temp. cooling inlet	Integer		0.1°C	Feedback Temperature cooling system inlet to the RES-Control
Feedback Temp. cooling outlet	Integer		0.1°C	Feedback Temperature cooling system outlet to the RES-Control
Enable Run	Bit	0/1		Enable Run from the RES-Control
Status	Byte	0..7		Status of the FC Unit to the RES-Control(have to be defined)
Alarms	Byte	0..255		Alarms of the FC Unit to the RES-Control(have to be defined)
Feedbacks from each FC(12): • Current • Voltage • Temperature • Cooling System Pump • Blower	 Integer Integer Integer Integer Integer	12 0..100 0..100	FC 0.1A 0.1V 0.1°C % %	Parameters for each Fuel cell to the RES-Control • Current of the FC • Voltage of the FC • Temperature of the FC • Power of the cooling pump • Power of the blower

General Informations	comments
Where takes the Power supply, control, converter (ext. sensors) and the process place	• The max. distance of the RES-Cabinet to the FC-Cabinet ➔ ??? • The size of the system is not important because for the FC Unit the process and the electric part are not split off
Holding time of the internal USV	• ➔ ??? • Shot down after a while(10min) to protect the USV running low

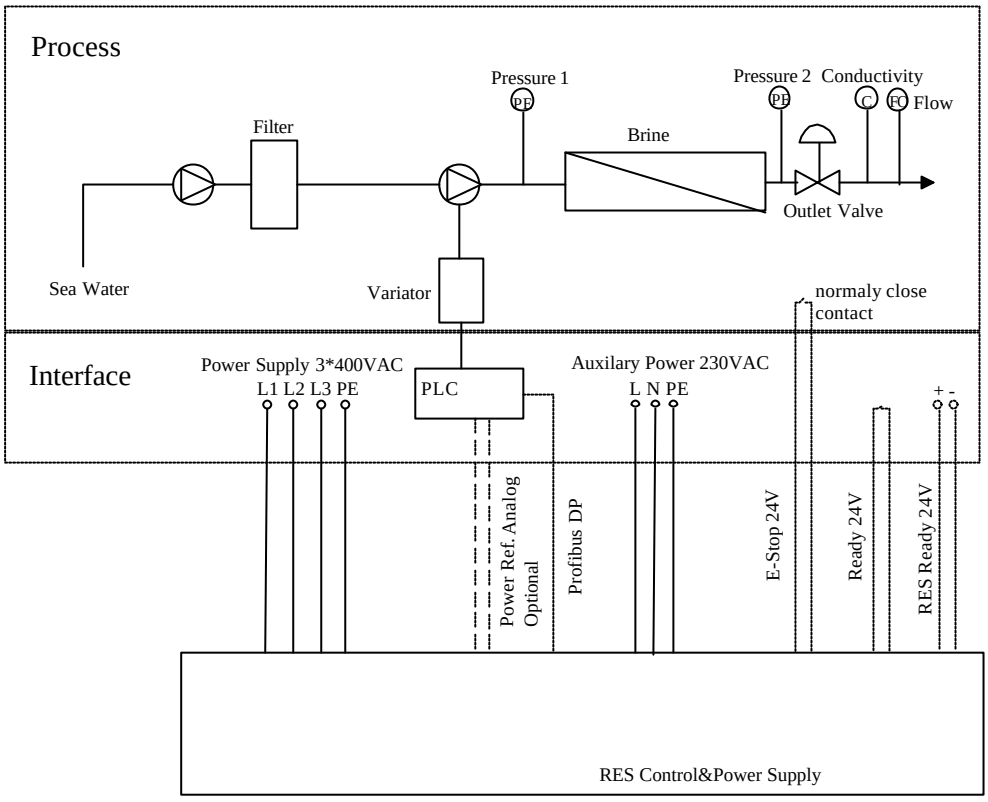
Reaction of the system while start up procedure: Necessary Inputs/ Power supply	7. Ready Signal from RES Control 8. Run the USV if disconnected before 9. Ready Signal from FC 10. 400V connected to RES Power Supply ➔ stand by mode 11. Run enable from RES Control ➔ Running mode 12. Start up procedure FC Process • 230VAC from RES Control only if the Wind Generator or and FC is producing power • No auxiliary power needed to start up the FC • Ready Signal needed to start the FC • Only start up when really needed, stand by modus destroys the Fuel cell
Reaction of the system while shut down procedure Necessary Inputs/ Power supply	• 400V to the RES can cut off immediately • 230V from the RES can take away immediately • The FC Unit is able to be run down without any extern Power needed • It takes 100ms to bring the outlet power to 0V • The intern grid of the FC Unit needs 10min. to bring the intern voltage to 0V
New start: Time until system is ready to produce	• FC Unit cold: 10s to get 50% output power • It takes 3min. till the FC Unit is warm • FC Unit warm: 10% ➔ 90% takes 1-3s
Changing rate of the reference value for the power from RES-Control	The SMA Controller takes care of the regulation of the power according to the reference signal from the RES Control.

Interface: H2/ O2 Storage (Tank), confirmed



Signal In- and Outputs					
Signal Name	Name	Value	Unit		Comments
Safety valve H2 Tank	Valve H2	0..24	VDC	1A	Safety valve (normally closed)
Safety valve H2 Tank	Valve O2	0..24	VDC	1A	Safety valve (normally closed)
Feedback Pressure H2 Tank	P H2	4..20	mA		Feedback of the Tank pressure
Feedback Pressure O2 Tank	P O2	4..20	mA		Feedback of the Tank pressure
Reaction of the system while producing	While normal producing the safety valve is open all the time. If there is something wrong with the pressure of the tanks or if there is an emergency at the Fuel cell Unit the safety valve will be closed by the RES-Control				

Specification: Reversible Osmosis (RO), not confirmed by ULPGC



Power Spezification					
Signal Name	Name	Value	Unit	Tolerances	Comments
Input Power Voltage	U	400	VAC	V	
Input Current	I	45	A	+/- A	
Input Frequency	F	50	Hz	+/- Hz	
Input Power	P	30	kW	kW	Nominal Value
Nominal Power Factor	cosfel	???			Nominal Value
max. Dynamik of the Power Change	dPwg/dt	???	KW/s		Max. Change of Power Input in kW/s

Aux Power Needs					
Signal Name	Name	Value	Unit	Tolerances	Comments
Inpur Power Voltage	Uaux	230	V	+/- V	
Inpur Current	Iaux	???	A	+/- A	

Signal In- Outputs					
Signal Name	Name	Value	Unit	Tolerances, Delays	Comments
Emergency-Stop Output	E-Stop ROS	0..24	V		E-Stop Signal (contact in ROS unit)
Ready Signal Output	Ready ROS	0..24	V		Ready Signal from ROS Unit(contact in ROS-PLC)
Ready Signal Input	Ready ROS	0..24	V		Ready Signal from RES Control

Hardware Spec. of the Osmose-Controll

	Name	Value	Unit		Comments
Protocoll Name	Profibus DP				Name of the Protokoll
Max. Baud Rate		12	MBit		This is the max. Baud rate it's possible that not every partner unit support this rate A common rate is 1,5MBit (recommended)
RxD Signal	RxD				Receive Signal
TxD Signal	TxD				Transmit Signal etc.
Ground	GND				

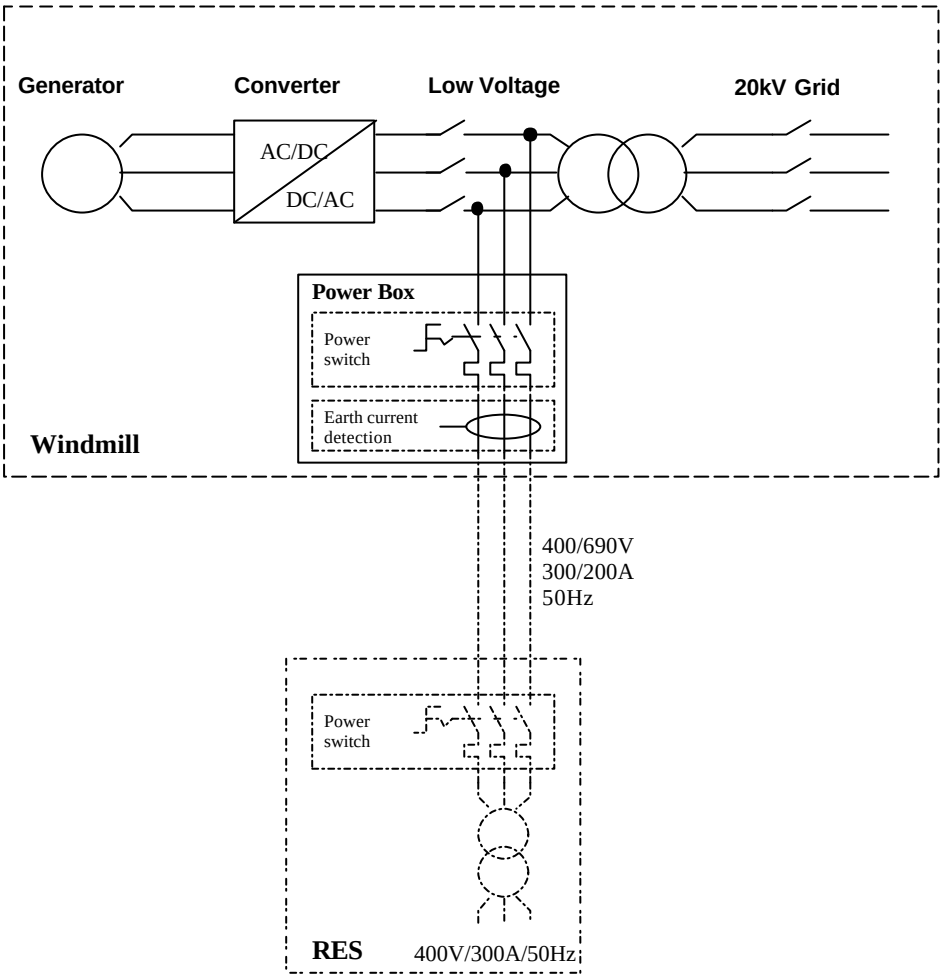
Signals Profibus

Name	Type	Limits	Unit	Comments
Reference value power	Integer	20..100	%	Reference Power from the RES-Control
Feedback value power	Integer	0..100	%	Feedback Power to the RES-Control
Feedback value pressure 1	Integer		0.1bar	Feedback Pressure1 to the RES-Control
Feedback value pressure 2	Integer		0.1bar	Feedback Pressure2 to the RES-Control
Feedback value outlet flow	Integer		L/h	Feedback outlet flow to the RES-Control
Feedback value outlet conductivity	Integer		mS	Feedback outlet conductivity to the RES-Control
Enable Run	Bit	0/1		Enable Run from the RES-Control (ready for 400V)
Status ROS	Byte	0..7		Status of the ROS to the RES-Control (have to be defined)
Alarms	Byte	0..7		Alarms of the ROS to the RES-Control(have to be defined)

General Informations	comments
Where takes the Power supply, control, converter (ext. sensors) and the process place	The max. distance of the RES-Cabinet to the ROS-Cabinet ➔ ???
Holding time of the internal USV	No USV needed?
Reaction of the system while start up procedure: Necessary Inputs/ Power supply	13. 230VAC from RES Control 14. Ready Signal from EPS 15. Ready Signal from RES Control 16. 400V connected to ROS ➔ stand by mode 17. Run enable from RES Control ➔ Running mode 18. Start up procedure RO Process
Reaction of the system while shut down procedure Necessary Inputs/ Power supply	• 400V can take away immediately • 230V can take away immediately • The ROS system is able to be run down without any extern Power needed
New start: Time until system is ready to produce	• 10min
Changing rate of the reference value for the power from RES-Control	The changing rate of the power reference can be faster then the effective changing rate of the ROS because the rate depends on the working point of the system. The lowering of the power is faster(10s) then the increasing of the power(1-2min) because the outlet valve is very slow. The ROS PLC takes care of the regulation of the power according to the reference signal from the RES Control.

Specification: Wind generator (WG), not confirmed by Endesa

Block Diagram: Power communication

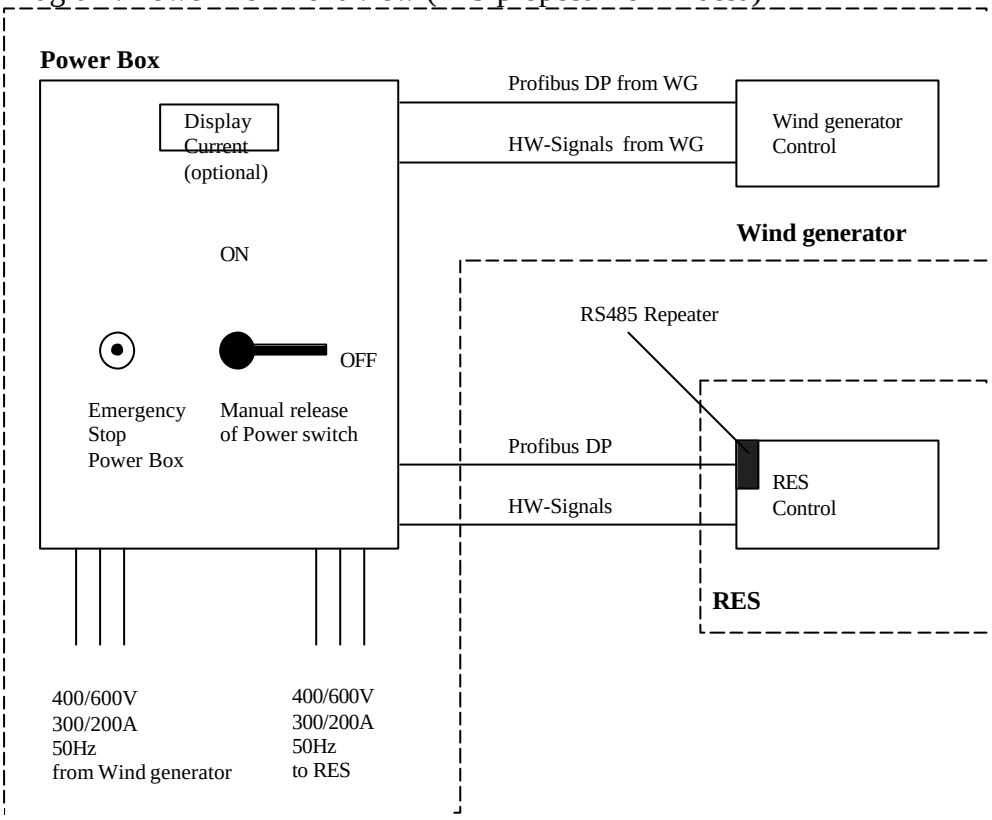


Name of the Subunit	Wind generator
Name of RES - Supplier	Endesa (Unelco)
Name of Producer	Have to be defined up to September 2003

Power Box			
Power			
Signal	Symbol	Value	Comments
Voltage Power Box*	Upb*	400/690 V	+/- 10% tolerance (400 V Recommended)
Current Power Box	Ipb	300/200 A	
Frequency Power Box	Fpb	50 Hz	+/- 5% tolerance
*If the output voltage of the windmill converter is more than 690V a step up transformer is necessary after the PSbp			
Power switch			
Type		Comments	
Power Switch	PSpb	Thermo, magnetically switching (for example: ABB, SACE ISOMAX S5)	
Short cut current	70kA	Short cut current switching capacity	
Thermo release	1.05-1.3In	In = operational current, adjustable	
Magnetic release	3-10*In	adjustable	
Manual Release of the Power Switch		The hand gear is mounted on the front door of the Power Box see Diagram below	
Security & Protection			
HW-Signals are fail save (high = OK / Low = Fault)			
Signal	Short cut	Comments	
Emergency Stop Mounted on the front door of the Power Box	E-STOPpb	If the E-Stop is activated the PSpb must disconnect the power line to the RES	
Earth current protection Mounted in the Power Box	ECpb	If the ECpb is activated the PSpb must disconnect the power line to the RES	

Cables		
• To chose the right power cables it's necessary to know the distance between the Power Box and the RES and way of how they will be installed and in which environment (Temperature, mechanical influence, etc.) • Signal and Bus cable have to be installed separate from the power cables (not in the same pipe, in separated canals)		
Power connection Power Box – RES 400V	TT 3*120-150mm2	If the Voltage of the Power Box is 400V
Power connection Power Box – RES 690V	TT 3*70-195mm2	If the Voltage of the Power Box is 690V
Signal Connection	TT 16*1mm2 shielded	
Pipes		
• It's recommended to pass about 4 pipes under earth between the RES and the Power Box (Windmill)		
power cable	120mm diameter	
signal and bus cable	50mm diameter	
2 reserve pipes	50mm diameter	

Diagram: Power Box front view (IDS proposal for Endesa)



HW Signals		
• HW-Signals are fail save (high = OK / Low = Fault) • All the HW-signals are connected in the Power Box there is no direct connection from the RES to the windmill control • Type of signal depends on the distance[0-200m => 24VAC/20mA] [200-400m => 48VAC/100mA] [>400m => 230VAC/1A] • Signal cable are twisted and shielded		
Clamp Nr.	Signal	Description
1	RS 1	Reserve for Profibus DP signal 1
2	RS 2	Reserve for Profibus DP signal 2
3	Grnd RES	Ground of the RES
4	Grnd WG	Ground of the wind generator control
5	Status WG	Status of the wind generator (high=OK/ Low=Stop)
6	Status PB	Status of the Power Box (high=Switch closed/ Low=Switch open)
7	E-STOPwg	Emergency stop from the wind generator
8	E-STOPpb	Emergency stop from the Power Box
9	RUNwg	Start signal from the RES to the wind generator
10	RUNpb	Start signal from the RES to the Power Box
11-20		Reserve
Data Connection: (Bus)		
• There is a data connection between the wind generator control and the RES control, connected in the Power Box • the field bus of the RES system is Profibus DP		

Protocol: Profibus DP	RS485	Baud rate: 187,5kbit/s
Distance cable electric	Max. 400m	With repeater mounted in the Power Box See Annex B

Data Signals		
Signal	Symbol	Description
Power Output WG	Pwg	Power Output of the wind generator
Status WG	Statuswg	Status: Run, Ready, Fault
Fault number	Fnr	The number of the fault of the wind generator
Wind speed (optional)	Wv	The wind speed measured at the wind generator

Annex 1: Topology of the installation field (Have to be confirmed and a more detailed plan and description of the environment is needed)