



E.DCONNECT MODBUS

Instruction and User Manual

1. Introduction

The purpose of this manual is to illustrate the correct use of the MODBUS interface for BMS to be applied to the DConnect Box device.

The additional interface (DA560 923 - E.DCONNECT MODBUS) allows all the electronic pumps and electric panels associated with the DConnect to be included in a MODBUS RTU supervision system.

This manual is intended for users who are familiar with Modbus devices. The reader should have a basic knowledge of this protocol and of the technical specifications.

It is also assumed that there is already a Modbus RTU network with a "master" device.

1.1. Abbreviations and definitions

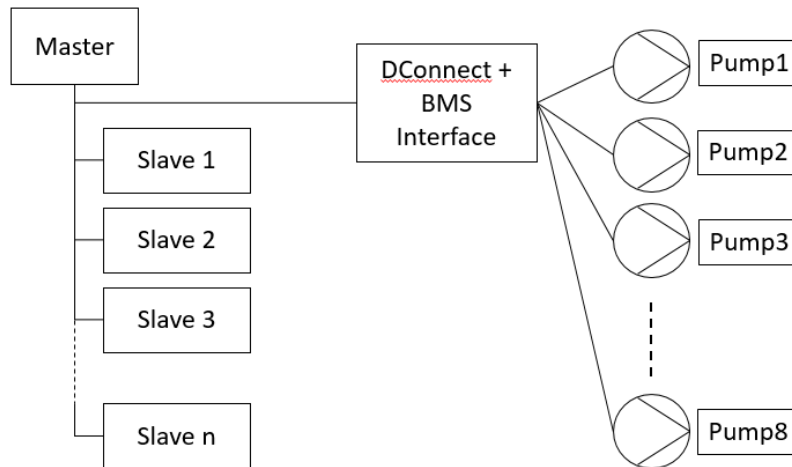
BMS	Building Management System
DConnect	DAB system for remote control of pumps via cloud, via Internet.
CRC	Cyclic Redundancy Check
RTU	Remote Terminal Unit
0x	Prefix identifying a hexadecimal number

1.2. Modbus specifications

Modbus specifications	Description	Notes
Protocol	Modbus RTU	Only "Slave" mode is supported
Connections	Terminal block	
Physical interface	RS485	
Slave address	From 1 (default) to 247	
Speed supported	4800, 9600, 19200	
Start bit	1	
Data bit	8	
Stop bit	1	
Parity	None	
Sample Rate	< 1 minute (reading), < 2 second (writing)	

1.3. Type of Modbus Network

The following graph provides a graphic representation of the type of network to be created using DConnect + BMS.



The DConnect Box, equipped with the additional device for MODBUS RTU, represents the interface between the pumps and the BMS supervisor: it collects the information of the DAB electronic pumps listed in paragraph 3.6 Product Type and displays it in a single object that can be queried by a control unit via Modbus RS485 RTU.

2. Modbus Configuration

2.1. Updating the DConnect Box

The use of the optional Modbus RTU interface requires a **software update of the DConnect Box**. To do this, make sure that there is an Internet connection via Ethernet or WiFi. See the Internet site <https://internetofpumps.com> for further details on the installation and use of the DConnect Box.

2.2. Wiring

Connect the interface accessory to any USB port on the DConnect Box. See the DConnect Box manual for the connection of the pumps.

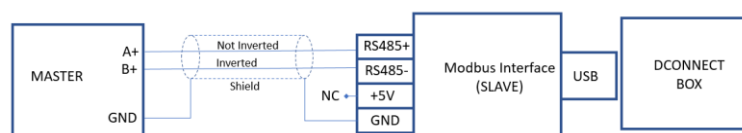
Connect the Modbus interface accessory to the Modbus RTU controller as follows.

Modbus communication with 2-wire RS485 contemplates the use of 2 cables, A and B plus a possible GND for shielding. It is recommended to use a cable with the following characteristics:

Cable suggested for MODBUS RTU

Multipair twisted cable 0.22 mm², 250 V, F/UTP shielding, PVC sheath.

Connect the cable according to the standard nomenclature:



Before starting work, disconnect the power from the supply line and use only the recommended cables and accessories.

3. Modbus RTU registers

The supported functions are shown in the following table:

Type	code	Hex	Name
16-bit data (registers)	03	0x03	Read holding registers
	06	0x06	Write input register
	16	0x10	Preset Multiple Registers

3.1. Type of Modbus messages

Below are the details of the Modbus message used for the DAB product code concerned.

The offsets to be queried change according to the product family as shown in the table:

Family	Offset 0x
Active Driver Plus	0000
ADAC	1000
DConnect Box	2000
e.Box	3000
e.Syline	4000
MCE-P	5000

See paragraph [3.8 Example](#)

3.2. Reading device serial number

Reading the device serial number, useful during the product identification, is carried out by the Function Code 0x03 (Read Holding Register) starting from register 0 of each product family for 25 subsequent registers.

Example: read the serial number of an e.sybox.

Slave Address	Function Code	Data	subsequent registers	CRC
01	03	4000	0025	CRC
DConnectBox Address	Read holding register	Offset Family + Offset Position + Offset Parameter 0x4000 + 0x0000 + 0x0000		

3.3. Status

The following table lists the Modbus RTU registers of the pump parameters (Function Code 0x03).

IMPORTANT: The pump returns correct values according to the selected measuring system (parameter "MS Measure System").

The measurement system can also be selected locally using the "MS Measure System" parameter on the pump itself. It is therefore advisable to set up the measurement system during product installation.

NOTE: refer to the manuals of the individual products for the meaning of the parameters and any necessary accessories.

Offset	Parameter	Description	Scale	Measuring unit	Type	Active Driver	ADAC-MCE	e.sylene	e. box	DConnect Box
1A	Product type	3.6 Product Type			R	•	•	•	•	
20	VP Pressure Bar		0.1	Bar	R	•	•	•	•	
21	VP Pressure Psi		1	Psi	R	•	•	•	•	
1C	SP Setpoint pressure Bar		0,1	Bar	R W	•	•	•	•	
1D	SP Setpoint pressure Psi		1	Psi	R W	•	•	•	•	
1E	RP Pressure fall to restart Bar		0,1	Bar	R W	•	•	•	•	
1F	RP Pressure fall to restart Psi		1	Psi	R W	•	•	•	•	
23	Pump status	0 Standby 1 Go 2 Fault 3 Warning 4 Not configured 5 Function F1 6 Function F3 7 Function F4 8 Manual Disable 9 Startup 10 Stop manual menu 11 Go manual menu			R	•	•	•	•	
24	System status	3.5 System Status and Errors			R	•	•	•	•	
25	Latest error	3.5 System Status and Errors			R	•	•	•	•	
3A	P1 Aux1 setpoint Bar		0,1	Bar	R W	•	•	•		
3B	P1 Aux1 setpoint Psi		1	Psi	R W	•	•	•		
3C	P2 Aux2 setpoint Bar		0,1	Bar	R W	•	•	•		
3D	P2 Aux2 setpoint Psi		1	Psi	R W	•	•	•		
3E	P3 Aux3 setpoint Bar		0,1	Bar	R W	•	•	•		
3F	P3 Aux3 setpoint Psi		1	Psi	R W	•	•	•		
27	C1 Pump phase current		0,1	A	R	•	•	•		
28	PO Output power		0,001	kW	R	•	•	•		
29	HO Pump run hours		1	Hours	R	•	•	•		
40	I1 Input1 function	0 disabled / inactive 1 float NO / active 2 Float NC 3 P aux NO 4 P aux NC 5 Enable NO 6 Enable NC			R	•	•	•		•

Offset	Parameter	Description	Scale	Measuring unit	Type	Active Driver	ADAC-MCE	e.sylene	e.box	DConnect Box
		7 En. NO reset 8 En. NC reset 9 Reset Fault 10 Low Press. NO 11 Low Press. NC 12 Low pr. NO MR 13 Low pr. NC MR								
41	I2 Input2 function	0 disabled / inactive 1 float NO / active 2 Float NC 3 P aux NO 4 P aux NC 5 Enable NO 6 Enable NC 7 En. NO reset 8 En. NC reset 9 Reset Fault 10 Low Press. NO 11 Low Press. NC 12 Low pr. NO MR 13 Low pr. NC MR			R	•	•	•		•
42	I3 Input3 function	0 inactive 1 active			R					•
43	I4 Input4 function	0 inactive 1 active			R					•
22	VF Flow	0 Absent 1 Present			R	•				
47	VF Flow Liter		1	liters /min	R			•		
48	VF Flow Gall		1	gall/min	R			•		
2C	Pump1	0 pump enable 1 pump disable			R					•
2D	P1 Output power		0,001	kW	R					•
2E	P1 Hours ON		1	hours	R					•
2F	P1 Phase current		0,1	A	R					•
31	Pump2	0 pump enable 1 pump disable			R					•
32	P2 Output power		0,001	kW	R					•
33	P2 Hours ON		1	hours	R					•
34	P2 Phase current		0,1	A	R					•
4A	Max Level	0 inactive 1 active			R					•
4B	High Level	0 inactive 1 active			R					•
4C	Medium Level	0 inactive 1 active			R					•
4D	Low Level	0 inactive 1 active			R					•

Offset	Parameter	Description	Scale	Measuring unit	Type	Active Driver	ADAC-MCE	e.sylene	e.box	DConnect Box
4E	Min Level	0 inactive 1 active			R				•	
4F	Max press	0 inactive 1 active			R				•	
50	High press	0 inactive 1 active			R				•	
51	Low press	0 inactive 1 active			R				•	
52	Min press	0 inactive 1 active			R				•	

Note: R = Read / Reading parameter

W = Write / Writing parameter

R W = Read and Write / Reading or writing parameter

3.4. Controls

The following table lists the Modbus RTU registers of the “controls” (Function Code 0x06).

Offset	Parameter	Description	Scale	Measuring unit	Type	Active Driver	ADAC-MCE	e.Syline	e.Box	DConnect Box
2B	Identify device (*)	1 Identify			W	•	•	•	•	•
1B	MS Measure system	0 International 1 Anglo-American			W	•	•	•	•	
1C	SP Setpoint pressure Bar		0,1	Bar	R W	•	•	•	•	
1D	SP Setpoint pressure Psi		1	Psi	R W	•	•	•	•	
1E	RP Pressure fall to restart Bar		0,1	Bar	R W	•	•	•	•	
1F	RP Pressure fall to restart Psi		1	Psi	R W	•	•	•	•	
26	Reset actual fault	1 Reset Actual Fault			W	•	•	•	•	
3A	P1 Aux1 Setpoint Bar		0,1	Bar	R W	•	•	•		
3B	P1 Aux1 SetpointPsi		1	Psi	R W	•	•	•		
3C	P2 Aux2 Setpoint Bar		0,1	Bar	R W	•	•	•		
3D	P2 Aux2 Setpoint Psi		1	Psi	R W	•	•	•		
3E	P3 Aux3 Setpoint Bar		0,1	Bar	R W	•	•	•		
3F	P3 Aux3 Setpoint Psi		1	Psi	R W	•	•	•		
44	O1 Output1 function	0 Disabled NC 1 Enabled NC 2 Fault NO 3 Fault NC			R W	•	•	•		•
45	O2 Output2 function	0 Disabled NC 1 Enabled NC 2 Run NO 3 Run NC			R W	•	•	•		•
49	e.sybox enable/disable	1 Enable 2 Disable			R W			•		
30	e.box pump1 enable/disable	0 disable, error 1 enable			R W				•	
35	e.box pump2 enable/disable	0 disable, error 1 enable			R W				•	
60	Set ID Address (**)	1-247 (1 default)			W					•
61	Set BMS Baudrate (**)	2 4800 bps 3 9600 bps 4 19200 bps			W					•

Offset	Parameter	Description	Scale	Measuring unit	Type	Active Driver	ADAC-MCE	e.Syline	e.Box	DConnect Box
2C	DConnect box reboot	0 reset only micro 1 reset DConnect Box			W					●

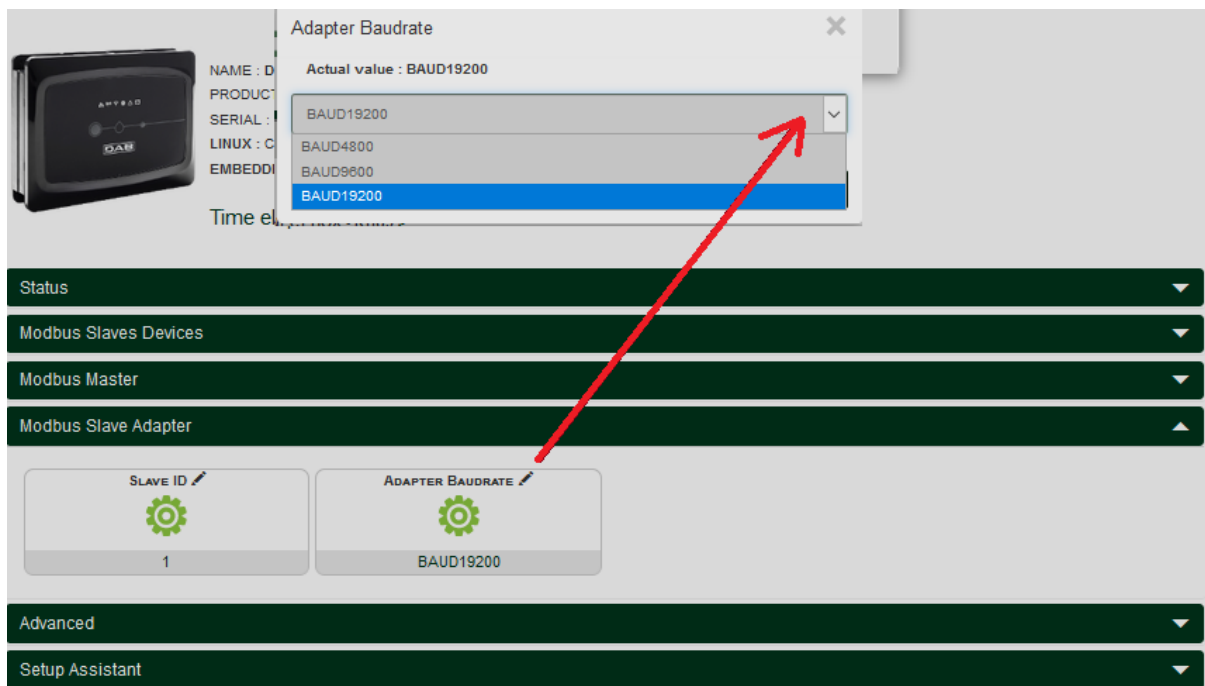
(*) this control physically identifies the device by flashing the display or acoustic sounds in the case of the DConnect Box.

(**) in order to act these commands, they have to be executed sequentially.

3.4.1. Change parameters by webApp

To configure the system in a more intuitive, simple and fast way, you can take advantage of the DConnect webAPP, already used for updating the DConnect Box.

To change the parameters via the Modbus protocol, see the example shown in paragraph 3.8.1 (Change DConnect Box Configuration).



3.5. System Status and Errors

Errors	Active Driver Plus	ADAC MCE-P	e.Syline	e.Box	Type
Shot circuit HV	18,19,20	18,19,20	18,19	13,83,84	error
Voltage error	21,23,24,25,26,27,38	21,23,24,25,26,27	25,27,28,29,30,31	17,18,19,	error
Overload input	28,29,30	28,29,30	32,33,		error
Operation mode change				10	error
Keys error				12	error
V Selector error				14	error
Relay/contact alarm				25,79,80	error
Not configured				32	error
Too high start frequency				35,85,86	error

Errors	Active Driver Plus	ADAC MCE-P	e.Syline	e.Box	Type
Locked pump				59,87,88	error
Inconsistent fl. sw. status				70	error
Inconsistent lvl prb. status				71	error
Incons. pressostats status				72	error
Depth sensor				74	error
Internal error	1-16,17,22	1-16,17	1-16,17,20, 21,22,23,24,26	1-16,20,21,29, 38,39,50, 51,54,55,63	error
Warnings	Active Driver Plus	ADAC MCE-P	e.Syline	e.Box	Type
Over temperature	33,34,35,36,37	33,34,35,36,37	35,36,37,38		warning
Low voltage LP	39	38	39,40,	23	warning
High voltage HP	40	39	41	24	warning
Over current	41,42	40,41	42,43	26,75,76	warning
Input voltage				22	warning
Dry run	45	47	49	34,81,82	warning
Hot pump PH	48	46	46		warning
Over power OP			44		warning
Pressure sensor BP	49, 50,51	48,49,50	50,51,52,	73	warning
Anti-cycling AY	56		57	53,89,90	warning
Pump oscillation PO		55			warning
Plant error WP		56			warning
Disconnected pump			53	27,77,78	warning
Fluid hot HL			54		warning
Over pressure			55	37	warning
Loss LK			56		warning
Min level				41,44	warning
Max level				42, 45	warning
Max pressure pressostat				64	warning
Min level float switch				65	warning
Min level probe				66	warning
Max level float switch				67	warning
Max level probe				68	warning
Min pressure pressostat				69	warning

3.6. Product Type

The following tables represent the product types for the product families.

The product type can be obtained with offset register 001A.

FAMILY	VALUE	PRODUCT TYPE
Active Driver Plus	41	M/M 1.1 kW 8.5 A
	42	M/M 1.5 kW 11.0 A

FAMILY	VALUE	PRODUCT TYPE
	43	M/M 1.8 kW 14.0 A
	44	T/T 5.5 kW 13.3 A
	45	T/T 3.0 kW 7.5 A
	46	M/T 2.2 kW 10.5 A
	47	M/T 1.0 kW 4.7 A
	48	T/T 5.5 kW 13.3 A
	49	T/T 3.0 kW 7.5 A
	50	M/T 2.2 kW 10.5 A
	51	M/T 1.0 kW 4.7 A
	52	M/M 1.8 kW 14.0 A
	53	M/M 1.5 kW 11.0 A
	54	M/M 1.1 kW 8.5 A
ADAC / MCE-P	11	ADAC T/T 15
	12	ADAC T/T 11
	13	ADAC T/T 7.5
	14	ADAC T/T 5.5
	15	ADAC T/T 4.0
	16	ADAC T/T 3.0
	17	ADAC M/T 2.2
	18	ADAC M/T 1.5
	19	ADAC M/T 1.0
	20	MCE-P 150
	21	MCE-P 110
	22	MCE-P 55
	23	MCE-P 30
	24	MCE-P 22
	25	MCE-P 15
	26	MCE-P 11
e.Syline	65	e.sybox 1.5 kW NP
e.Box	77	EBOX Basic D
	78	EBOX Plus D

3.7. Addition of a new product and replacement

Each product family can virtually contain up to 16 devices. Once connected to the DConnect Box, a pump will receive a unique serial port and will occupy the first free position of the 16 available. This position will remain occupied even if the pump is switched off or replaced. To refer to the next pump of the same family present in the system, an offset of 0x0100 must be added.

For example: Installation consisting of 3 MCE-Ps and an Active Driver Plus. Supposing there is a failure of the MCE-P in the second position (offset 0x5100). The new MCE-P will occupy the first free position within the registers assigned to that family, so it will have an offset of 0x5300.

N°	Family	Original offset	Replacement of MCE-P no. 2
1	MCE-P	0x5000	0x5000
2	MCE-P	0x5100	-> Replacement -> 0x5300
3	MCE-P	0x5200	0x5200
4	Active Driver Plus	0x0000	0x0000

NOTE: the DConnect Box manages up to a maximum of 8 pumps but this number may vary depending on the complexity of the installation. It is advisable to contact the DAB Customer Service for a large number of pumps.

3.8. Examples

3.8.1. Changing DConnect Box configuration

To ensure proper operation within the supervision system, the slave address and the serial data rate of the DConnect Box must be set.

To avoid losing communication with the device, the two registers must be written sequentially, using Function Code 16 (Preset Multiple Registers).

If the operation is successful, an acoustic signal ("beep") will be emitted from the DConnect Box. See example below.

a. Configure the DConnectBox with the Modbus address 100 and baud rate 19200 bps:

Slave Address	Function Code	Offset	Value	CRC
01	10	2060	0064	YYYY *
DConnectBox Address default	Preset Multiple Registers	Offset Family + Offset Position + Offset Parameter 0x2000 + 0x0000 + 0x0060	100 HEX = 0x0064	
01	10	2061	4	YYYY *
DConnectBox Address default	Preset Multiple Registers	Offset Family + Offset Position + Offset Parameter 0x2000 + 0x0000 + 0x0061	4 = 19200	

* YYYY CRC16 calcolato.

b. Then modify the baud rate with 9600 bps.

Slave Address	Function Code	Offset	Value	CRC
64	10	2060	0064	YYYY *
DConnectBox Address 100	Preset Multiple Registers	Offset Family + Offset Position + Offset Parameter 0x2000 + 0x0000 + 0x0060	100 HEX = 0x0064	
64	10	2061	3	YYYY *
DConnectBox Address default	Preset Multiple Registers	Offset Family + Offset Position + Offset Parameter 0x2000 + 0x0000 + 0x0061	3 = 9600	

* YYYY CRC16 calcolato.

3.8.2. Example of Parameter reading

Consider a system consisting of two ADACs and an e.sybox.

a. Pressure request in Bar of the **first ADAC**:

Slave address	Function Code	Data	CRC
01	03	1020	YYYY *
DConnectBox Address	Read holding registers	Offset Family + Offset Position + Offset Parameter 0x1000 + 0x0000 + 0x0020	

Note: (MS_Measure System set as International)

b. Pressure request in Psi of the **second ADAC**:

Slave address	Function Code	Data	CRC
01	03	1120	YYYY *
DConnectBox Address	Read holding registers	Offset Family + Offset Position + Offset Parameter 0x1000 + 0x0100 + 0x0020	

Note: (MS_Measure System set as International)

c. Power output request of the **e.sybox** (scale 0.001kW):

Slave address	Function Code	Data	CRC
01	03	4028	YYYY *
DConnectBox Address	Read holding registers	Offset Family + Offset Position + Offset Parameter 0x4000 + 0x000 + 0x0028	

Note: (MS_Measure System set as International)

* YYYY CRC16 calculated.

3.8.3. Example of Parameter writing

Consider the same system consisting of two ADACs and an e.sybox.

a. Setting of the pressure setpoint in Bar of the **second ADAC** at the value **3.3 Bar**:

Slave address	Function Code	Offset	Value	CRC
01	06	111C	0021	YYYY *
DConnectBox Address	Write input registers	Offset Family + Offset Position + Offset Parameter 0x1000 + 0x0100 + 0x001C	3.3 / 0.1 = 33 HEX = 0x0021	

Note: (MS_Measure System set as International)

* YYYY CRC16 calculated.