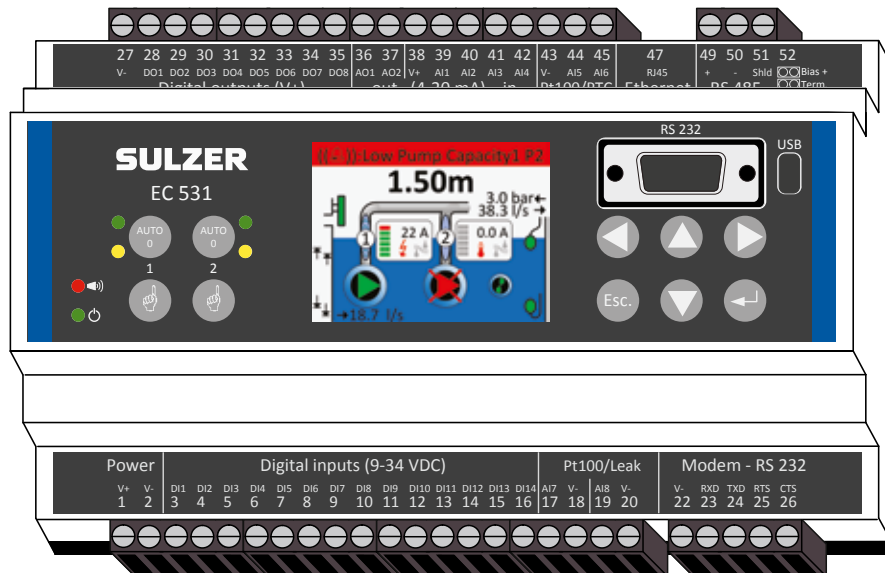


Pump controller EC 531



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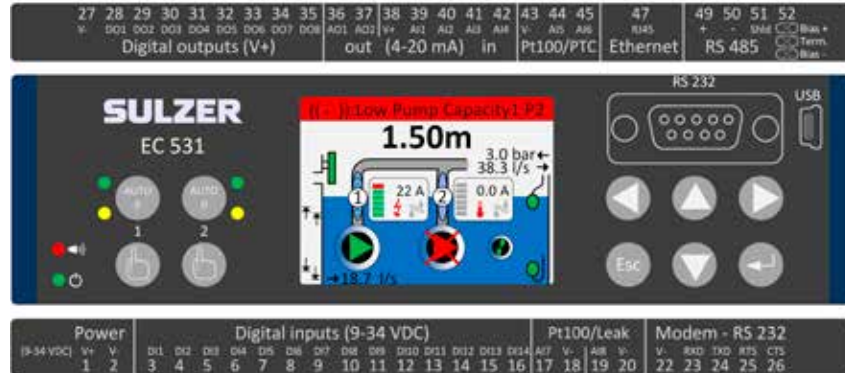
1 INSTALLATION

1.1 Mount the controller

Mount the controller on a 35 mm DIN rail. The physical dimensions of the controller is: 86 x 160 x 60 mm (3.39 x 6.30 x 2.36 inch) (H x W x D). If it doesn't easily snap onto the rail, you can pull the small tab at the bottom side of the unit, using a small screwdriver.

1.2 Make all connections

There are a total of 48 terminals that may be connected to power, sensors, switches, relays and a modem; these terminals are numbered from 1 to 52 according to the following figure:



WARNING! Ensure that **all power is off**, and that **all** output devices to be connected to the controller also is turned **off** before you connect anything!

Table 1 shows all connections to terminals 1–26 at the bottom side of the controller. The usage of the configurable **Digital in (terminals 3–16)** and **Analog in 7 and 8 (terminals 17–20)** for Leakage or Pt100 (these are **not** 4–20 mA inputs) shown in the table is the default configuration. A modem should be connected according to figure 11. For communications, see section 3.

Table 2 shows all connections to terminals 27–52 at the top side of the controller. The usage of the configurable **DO 1 to DO 8**, **AO 1 to AO 2** and **AI 1 to AI 6** shown in the table is the default configuration. “DO” stands for “Digital Outputs”, which are voltage outputs. “AI 1–8” stands for “Analog Input 1–8”. **AI 1–AI 4** are 4–20 mA inputs, it is recommended to use **AI 1** as input for the level sensor due to higher resolution on AI 1 port. AI 5 and AI 6 are configurable Pt100 or PTC / Bi-metallic switch inputs (these are **not** 4–20 mA inputs). AI 7 and AI 8 are configurable Pt100 or Leakage inputs (nor these are **not** 4–20mA inputs). For communications, see section 3.

The power must be between 9 and 34 volts DC. Figure 2 shows how to connect a power-fail switch to **Digital In 9** (terminal 11) and how to connect a battery pack for uninterrupted operation.

If pump is operated from a motor drive or frequency converter, special precautions are required.

The high electric noise level can distort electrical readings and in extension jeopardize functionality. To avoid conducted electrical noise, follow best practices and manufacturer EMC compliance recommendations when installing frequency converters. Use shielded cables and 50 cm separation between power and signal cables. Ensure that the cables are also separated from each other in cabinets.

Table 1:
Terminals at the bottom side of the pump controller

Factory settings	Logic mode (NO/NC)	Name	Term.
Voltage supply, 9–34 VDC		V+	1
		V-	2
Overflow level	NO	Digital in ¹	3
High level float	NO	Digital in ²	4
Power fail	NO	Digital in ³	5
Local mode	NO	Digital in ⁴	6
Motor protector pump 1	NO	Digital in ⁵	7
Pump 1 set auto	NC	Digital in ⁶	8
OFF	NO	Digital in ⁷	9
Motor protector pump 2	NO	Digital in ⁸	10
Pump 2 set auto	NC	Digital in ⁹	11
OFF	NO	Digital in ¹⁰	12
Low level float	NO	Digital in ¹¹	13
OFF	NO	Digital in ¹²	14
OFF	NO	Digital in ¹³	15
OFF	NO	Digital in ¹⁴	16
Leakage / (Pt100)	Leakage pump 1	Analog in 7	17
		V-	18
	Leakage pump 2	Analog in 8	19
		V-	20
Modem port RS 232		V-	22
	In	RXD	23
	Out	TXD	24
	Out	RTS	25
	In	CTS	26

i. "Digital In" means a signal that is either on or off (high or low), where high is anything between 5 and 32 volts DC and low is anything below 2 volts. All digital inputs are configurable in the menu Settings > Digital inputs, but the configuration shown here is the default one.

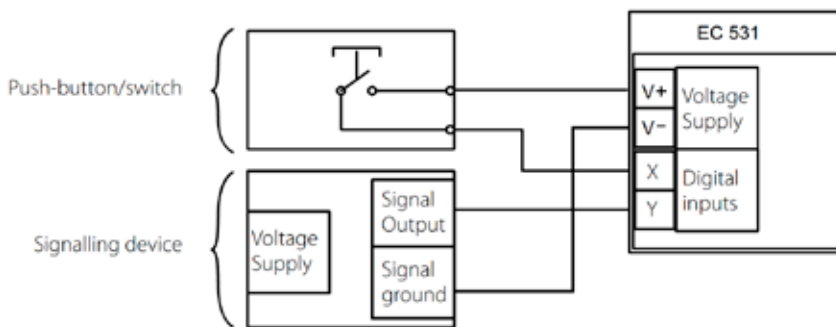
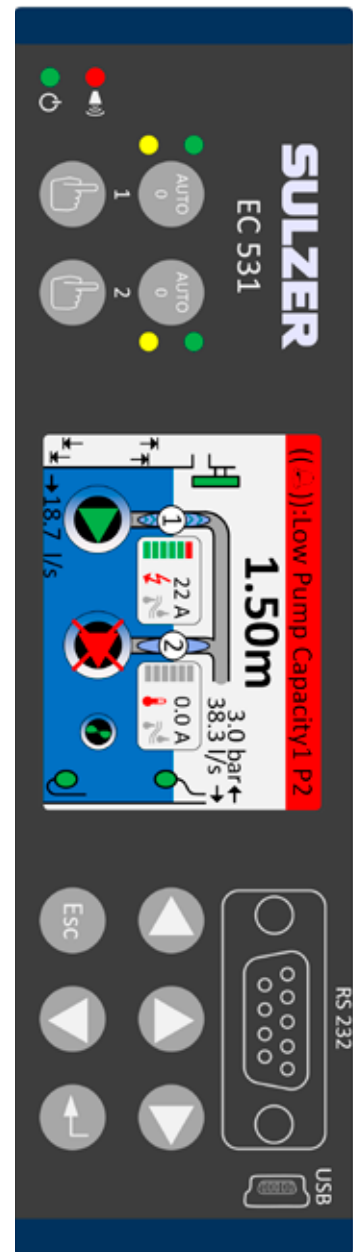


Figure 1
The Digital in terminals may be connected to either passive devices, such as switches, or active devices that are powered and deliver signals. Connect devices according to the figure.

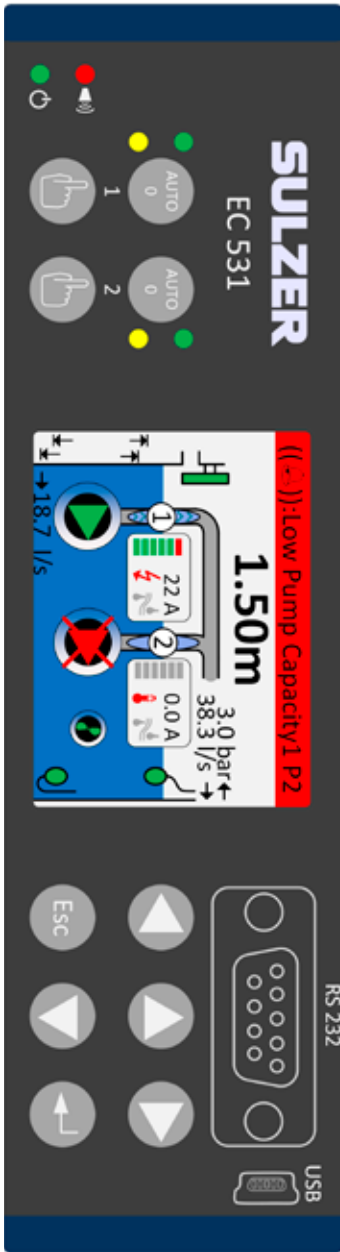


Table 2:
Terminals at the top side of the pump controller

Term.	Name	Factory settings	Logic mode (NO/NC)
27	V-		
28	Digital out ⁱ 1	Alarm alert	NC
29	Digital out ⁱ 2	Pump ctrl pump 1	NO
30	Digital out ⁱ 3	Pump ctrl pump 2	NO
31	Digital out ⁱ 4	OFF	NO
32	Digital out ⁱ 5	OFF	NO
33	Digital out ⁱ 6	Personnel alarm	NO
34	Digital out ⁱ 7	Mixer ctrl	NO
35	Digital out ⁱ 8	High level	NO
36	Analog out ⁱⁱ 1	Pit level	
37	Analog out ⁱⁱ 2	Pit outflow	
38	V+		
39	Analog in 1	Level sensor	4–20 mA Inputs
40	Analog in 2	OFF	
41	Analog in 3	OFF	
42	Analog in 4	OFF	
43	V-		
44	Analog in 5	Pump 1, PTC	Pt100 / PTC temperature
45	Analog in 6	Pump 2, PTC	
47	Ethernet		
49	RS 485 +		
50	RS 485 -		
51	RS 485 shield		
52	RS 485 Bias and termination	Jumpers see section 3.5.2 and figure 12	

i. Digital output is a voltage output. See the menu Settings > Digital outputs for configuration.

ii. Analog output, See Settings > Analog outputs for configuration.

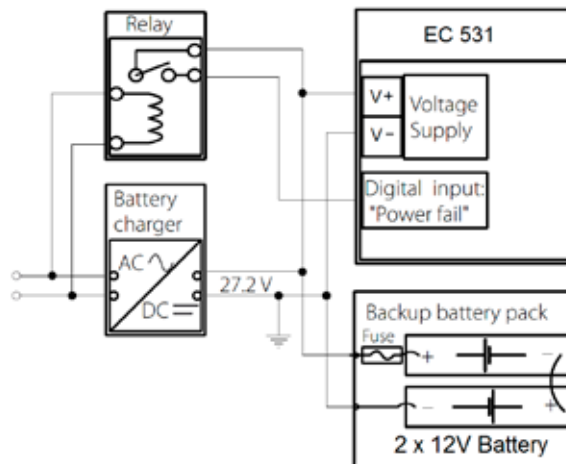


Figure 2 The power must be DC between 9 and 34 volts, but if it also charges 24 V batteries, it should be 27.2 V. Connect a power-fail switch to Digital in 9 (terminal 11) according to the figure. For uninterrupted operation in case of power failure, connect a battery pack according to the figure.

4-20 mA Analog input connection. Recommended to use *Analog Input 1* as *Level sensor* because highest resolution.

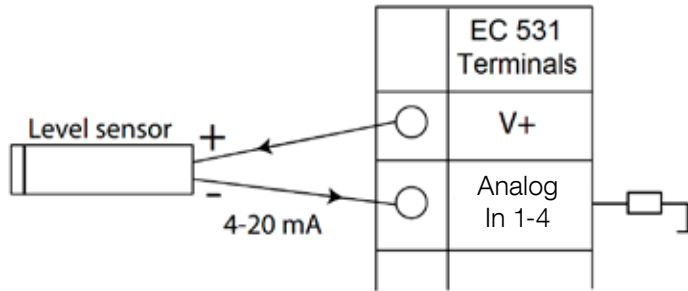


Figure 3 Analog input connection level sensor

Analog input 5-8 for connection of Pt100 sensors (temperature sensor).

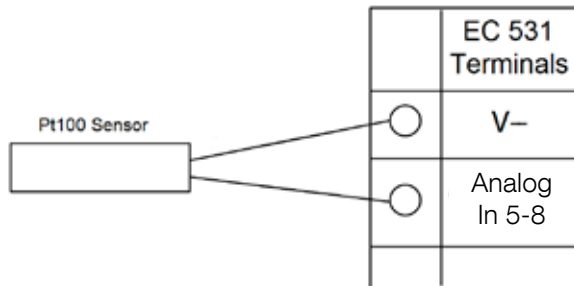


Figure 4 Connection of Pt100 use corresponding V-

Use Analog In 5-6 for temperature sensor PTC and/or Bi-metallic switches. If several PTC or Bi-metallic switch sensors: connect the sensors in serial.

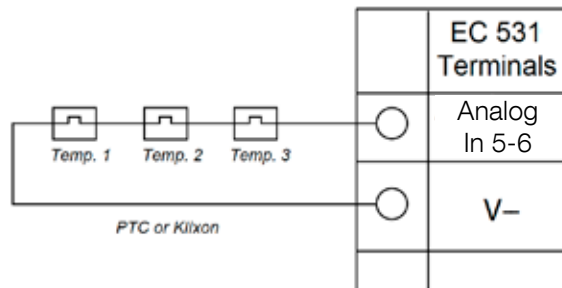


Figure 5 Analog input connection PTC and/or Bi-metallic switch (temperature sensors)

Analog In 7-8 for leakage sensor. If several leakage sensors: connect the sensors in parallel.

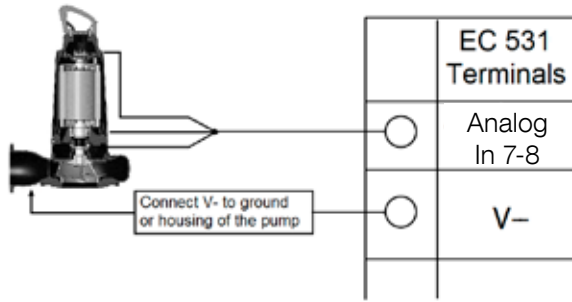


Figure 6 Analog input connection leakage sensors

Digital output connections. Recommendation is to use external relays together with a flyback diode to each relay according to figure.

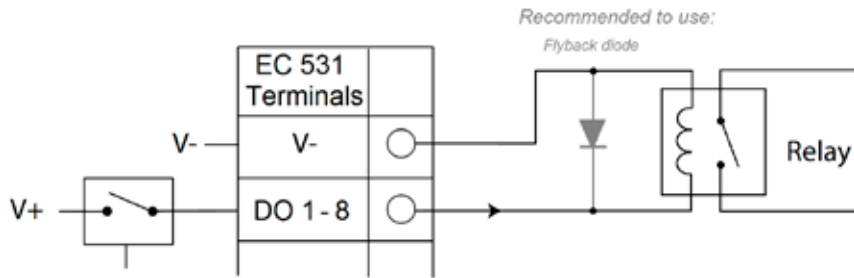


Figure 7 Digital output connection (external relay)

Analog output connections. Several loads must be in serial.

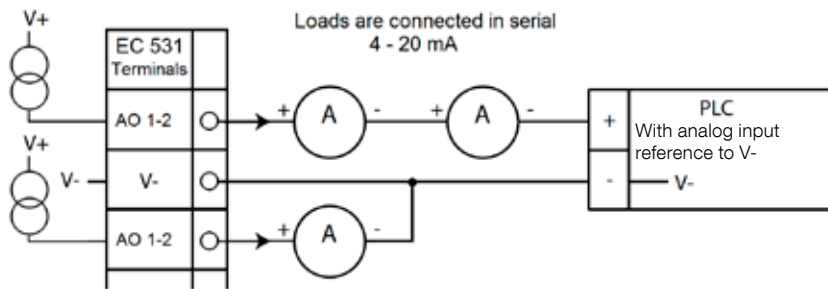


Figure 8 Analog Output connection

2 CHECK YOUR INSTALLATION

After the installation, there are possibilities to check the status of the digital and analog in- and outputs in the menus of EC 531. This could be used for validations of the installation and for fault tracking.

To check the Digital in- and outputs: Go into menus by pressing **[Down Arrow]**:

Main Menu – Quick Status – DI / DO Status – Enter:

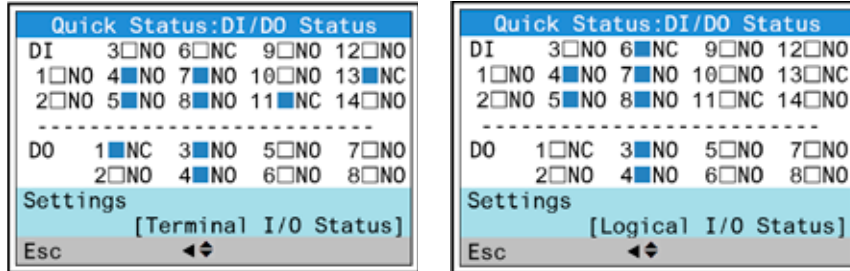


Figure 9 Status of Digital in- and outputs

NOTE! Toggle between *Terminal I/O status* and *Logical I/O status* by pressing Enter and up / down arrow. NO = Normally Open, NC = Normally closed

The difference between *Terminal I/O status* and *Logical I/O status* in DI / DO is how the EC 531 perceives the inputs as active or not in normal state depending if the inputs are set as *Normally open* or *Normally closed* (NO / NC).

Example: Digital In 11 is the *Low level float*, and it is normally always active (Normally closed) but the software interprets it as non-active until it gets released. This is exemplified in figure 9 above.

To check the Analog in- and outputs: Go into the menus by pressing **[Down Arrow]**:

Main Menu – Quick Status – AI / AO Status – Enter:

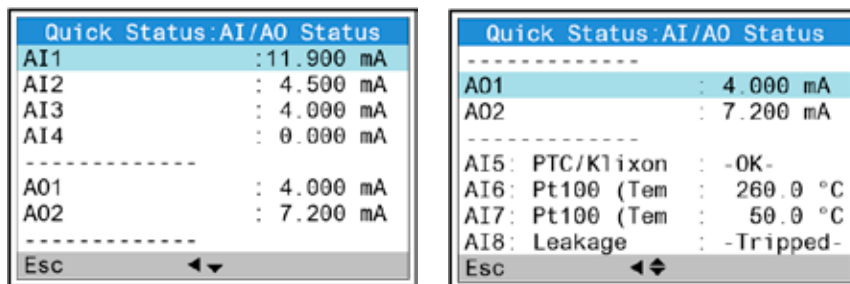


Figure 10 Status of the Analog inputs- and outputs

NOTE! Use the down arrow to step down to see all the analog signals.

3 COMMUNICATION PORTS

EC 531 has several communication ports, listed below.

3.1 USB Port (Mini-B)

This service port is primary for temporary connections to download configuration and updating firmware by using AquaProg.

Select Modbus RTU or TCP and Modbus ID in settings. Cross reference table is available.

First time a PC connects to EC 531, a wizard appears at the screen. Just follow the instructions on your PC.

3.2 RS 232 port (9-pols D-Sub on the front)

This service port is primary for temporary connections to download configuration and updating firmware by using AquaProg.

Select Modbus RTU or TCP and Modbus ID in settings. Cross reference table is available.

Communication parameters are configurable.

3.3 Modem Port RS 232 (screw terminals 22 – 26)

This port is designed for modem communication and has protocol Modbus RTU or Modbus TCP. Other protocol can be used by using modem, which converts the signal.

Default this port has:

Protocol: Modbus RTU,

Baud rate: 115200,

Parity: None,

Handshake: Off,

Protocol ID: 1.

Message Time Out: 2 s

On this port there are possibilities to change the properties of baud rate (300–115200), protocol ID (1–255), station ID (1–65535), parity (none, odd, even) and handshake (on / off) as well. For more settings, see user manual or menus.

Necessary for AquaWeb concept is that the station ID is set according to subscription and that the protocol ID is correct!

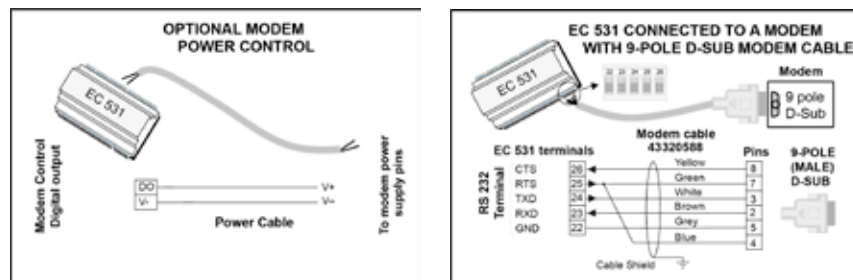


Figure 11 Modem connections, modem cable P/N: 43320588

3.4 Ethernet port (Terminal 47)

Ethernet port in a RJ45-jack. In the settings, select between **static** or **dynamic** IP-address. Default Modbus TCP port is 502.

3.5 RS 485 bus (Terminals 49 – 51)

A RS 485 network is of multi drop type, which means that all units are connected in parallel on the same cable. In a RS 485 network, every unit must have a unique Modbus ID-number.

3.5.1 Communication parameters RS 485

The EC 531 can act as a slave or master in the RS 485 network. If EC 531 is set as master, all the surrounding units must be set as slaves.

All the units in the RS 485 network must be using the same communication parameters; baud rate, parity and stop bits. Compare the setting in the menu of EC 531 and consult the manuals for surrounding units.

3.5.2 RS 485 cable and the termination

The RS 485 cable between EC 531 and surrounding units must be a shielded twisted pair cable. The RS 485 interface on EC 531 is galvanically isolated from the rest of the circuits. Therefore, the shield of the RS 485 communication cable between EC 531 and adjacent devices must be connected in both ends.

A rule of thumb is that the speed in bit/s multiplied by the length in meters should not exceed 108. Thus, a 50 meter cable should not signal faster than 2 Mbit/s. In strong electrical disturbing environments, it is recommended to keep the baud rate in lower speed. Never split the RS 485 communication line into several lines. The communication must go from one unit to next in a clear defined line.

EC 531 include biasing resistors to ensure stable data state even when communication is in idle. Consult the manuals for surrounding units if biasing is needed.

The RS 485 bus shall be terminated with 120 ohms resistor at both cable ends. The cable type must be a shielded twisted pair and all the shields in the RS 485 network shall be connected to ground in one point only.

NOTE! The RS 485 bus must be terminated in both ends, but not in between.

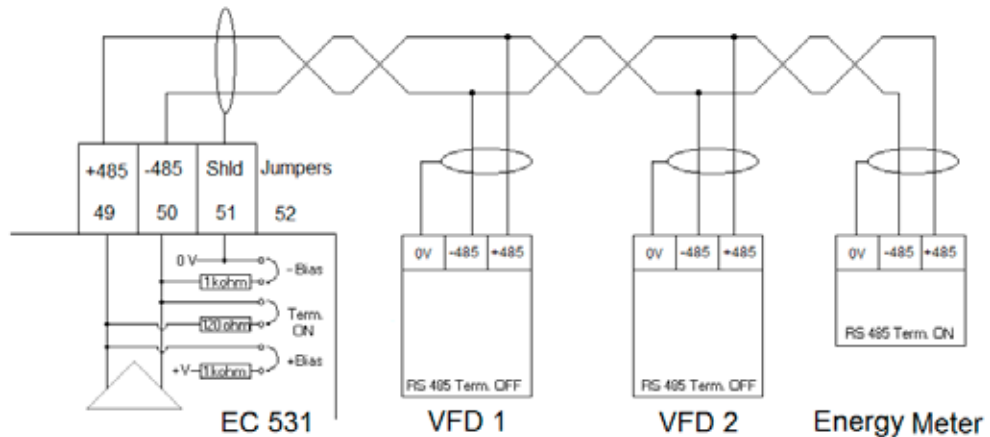


Figure 12 RS 485-bus drawing

4 MINIMUM REQUIRED VFD SETUP FOR EC 531 CONTROL

This section describes only the requirements to enable communication with device. All other parameters for the application and safety demands must be set according to actual vendor documentation. Baud and parity must be the same for all units on the same data-bus. Slave ID must be unique on every attached Modbus slave.

Modbus time out must be lower on the Modbus slaves than setting on EC 531 (default two seconds). RS 485 must have termination resistors at both cable ends (with jumper in terminal position 52 on EC 531 side). Missing termination at VFD end may cause communication to fail in presence of external electrical interference e.g. when motor is on.

4.1 ABB

ACQ 810		Variable speed drive
10.01 Ext 1 start func		FBA
21.01 Speed ref 1 sel		EFB ref 1 (P.02.38)
21.04 Neg speed ena	CONST	C.TRUE to enable pump reverse
50.04 FBA ref 1 modesel		Speed
50.15 FBA cw used		P.02.36 EFB main cw
58.01 Protocol ena sel		Modbus RTU
58.03 Node address		Unique slave ID corresponding to EC 531 setting
58.04 Baud rate		Same as EC 531
58.05 Parity		Same as EC 531
58.06 Control profile		ABB enhanced (default)
58.10 Refresh settings		Refresh
16.07 Param. save		Save

ACS 580		Variable speed drive
58.01 Protocol enable		Modbus RTU
58.03 Node address		Unique slave ID corresponding to EC 531 setting
58.04 Baud rate		Same as EC 531
58.05 Parity		Same as EC 531
58.33 Addressing mode		Mode 2 (32 bit)
58.06 Communication control		Refresh setting
20.01 Ext. 1 commands		Embedded fieldbus
28.11 Ext. 1 frequency ref 1		EFB ref 1
96.07 Parameter save manually		Save

ACS 550	Variable speed drive
9902 Applic. macro	1 = ABB standard
9802 Comm prot sel	1 = Std modbus
1001 Ext1 commands	10 = Comm
1103 Ref1 select	8 = Comm
1604 Fault reset sel	8 = Comm If remote drive reset is enabled in EC 531
5302 EFB station ID (Node address)	Unique slave ID corresponding to EC 531 setting
5303 EFB baud rate	Same as EC 531
5304 EFB parity	Same as EC 531
5305 EFB ctrl. profile	0 = ABB Drv Lim

For PSTx the "Poll interval" in controller must be set to 0 second (as fast as possible) to avoid drive trip, this as the PSTx have an internal (not adjustable) fieldbus timeout of 0.1 second, before drive trips and stops the motor.

With this short timeout, only one corrupt Modbus message may trip the drive. Adjust drive setting 19.04 to the safety level required for your application.

PSTx	Soft starter
12.01 Com3 function	Modbus RTU slave
12.02 FB interface connector	Modbus RTU
12.03 Fieldbus control	Off if "Monitor" On if "Control ON/OFF" over fieldbus
12.04 Fieldbus address	Unique slave ID corresponding to EC 531 setting
12.09 FB baud rate*	Same as EC 531 limited to 9600 or 19200
12.10 FB parity	Same as EC 531
12.11 FB stop bits	Same as EC 531
12.12 Fieldbus DI 1	Run status (default)
12.13 Fieldbus DI 2	TOR status (default)
12.14 Fieldbus DI 3	Line (default)
12.15 Fieldbus DI 4	Phase sequence (default)
12.16 Fieldbus DI 5	Start feedback (default)
12.17 Fieldbus DI 6	Stop feedback (default)
12.18 Fieldbus DI 7	Event group 0 status (default)
12.19 Fieldbus DI 8	Event group 1 status (default)
12.20 Fieldbus DI 9	Event group 2 status (default)
12.21 Fieldbus DI 10	Event group 0 status (default)
12.22 Fieldbus AI 1	Phase L1 current
12.23 Fieldbus AI 2	Phase L2 current
12.24 Fieldbus AI 3	Phase L3 current
12.25 Fieldbus AI 4	Motor current
12.26 Fieldbus AI 5	Mains frequency
12.27 Fieldbus AI 6	Mains voltage
12.28 Fieldbus AI 7	Apparent power
12.29 Fieldbus AI 8	Active power

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PSTx	Soft starter
12.30 Fieldbus AI 9	Power factor
12.31 Fieldbus AI 10	Not used
19.04 Fieldbus failure op.	Consider change to "Stop-automatic" for avoiding manual trip reset in case of intermittent corrupted Modbus messages

4.2 Danfoss - Vacon

FC 200	Variable speed drive
4-10 Motor speed direction	[2] Both directions
8-01 Control site	[2] Ctrl. word only
8-02 Control source	[1] FC port
8-30 Protocol	[2] Modbus RTU
8-31 Address	Unique slave ID corresponding to EC 531 setting
8-32 Baud rate	Same as EC 531
8-33 Parity / Stop bits	Same as EC 531
8-43 PCD Read	
• [02] Configuration	[1612] Motor voltage
• [03] Configuration	[1613] Frequency
• [04] Configuration	[1616] Torque [Nm]
• [05] Configuration	[1617] Speed [RPM]
• [06] Configuration	[1622] Torque %
• [07] Configuration	[1610] Power [kW]
• [08] Configuration	[1614] Motor current

MCD 200 - With optional RS 485 expansion.

Add a cable jumper between terminal A1–N2.

MCD 500 - With optional RS 485 expansion.

Add cable jumpers between terminal 17–18 and 18–25. Use max 19200 Baud.

MCD 200, MCD 500	Soft starter
Protocol	Modbus RTU
Slave ID	Unique slave ID corresponding to EC 531 setting
Baud rate	Same as EC 531. Max 19200 baud.
Parity	Same as EC 531

Vacon 100	Variable speed drive
P5.8.1.1 RS 485 Protocol	1= Modbus RTU
P5.8.3.1.1. Slave address	Unique slave ID corresponding to EC 531 setting
P5.8.3.1.2 Baud rate	Same as EC 531
P5.8.3.1.4 Stop bits	1=1 stop bit
P5.8.3.1.3 Parity type	Same parity as EC 531 ¹
P3.2.1 Rem control place	Select fieldbus CTRL for EC 531 operation
P3.3.1.10 Fieldbus ref sel	Select fieldbus for EC 531 speed control

¹Note! Mark parity in EC 531 is the same as 2 stop bit. No parity in Vacon drive.

Vacon 20	Variable speed drive
P2.1 Remote control place selection	1= Fieldbus
P3.3 Remote freq. reference	3 = Fieldbus
S System parameters	
S-P2.2 Fieldbus protocol	1 = Modbus used
S-P2.3 Slave address	Unique slave ID corresponding to EC 531 setting
S-P2.4 Baud rate	Same as EC 531
S-P2.6 Parity type	Same parity as EC 531 ¹

¹Note! Mark parity in EC 531 is the same as 2 stop bit. No parity in Vacon drive.

4.3 Yaskawa

P 1000	Variable speed drive
H5-01 Drive node address	Same as EC 531
H5-02 Communication speed	Same as EC 531
H5-03 Communication parity	Same as EC 531
b1-01 Frequency reference	[2] for Modbus control
b1-02 Run command	[2] for Modbus control

Select "P 1000 > 11 kW" if current (0.01 A) and power (0.01 kW) is scaled to 0.1 A and 0.1 kW.

4.4 CG (Emotron)

Emotron use two stop bits as standard, this is the same as "MARK" parity in EC 531. Optional RS 485 expansion board is required.

TSA	Soft starter
260 Serial com.	
• 261 Com type	Select RS 485
• 262 Modbus RTU	
◦ 2621 Baud rate	Same as EC 531
◦ 2622 Address	Unique slave ID corresponding to EC 531 setting
• 264 Com fault	Select preferred behaviour
210 Operation	
• 215 Action ctrl	
◦ 2151 Run / Stp ctrl	Select "Com" for fieldbus control

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FDU 2	Variable speed drive
260 Serial com	
• 261 Com type	Select RS 232 / 485
• 262 RS 232 / 485	
◦ 2621 Baud rate	Same as EC 531
◦ 2622 Address	Unique slave ID corresponding to EC 531 setting
• 264 Com fault	Select preferred behaviour
210 Operation	
• 214 Ref ctrl	Select "Com" for fieldbus control
• 215 Run/Stp ctrl	Select "Com" for fieldbus control

4.5 *Invertek*

Control and inhibit terminals must have some jumpers to enable Modbus control.

Place a cable between terminal one to two, to enable start command, 1–12 and 9–13 for inhibit and safety control.

Optidrive	Variable speed drive
P5-01 Drive fieldbus address	Unique slave ID corresponding to EC 531 setting
P5-03 Modbus / BACnet baud rate	Same as EC 531
P5-04 Modbus / BACnet format	Same parity as in EC 531
P1-12 Command source select	4:Fieldbus control

4.6 *NFO Drives*

Sinus G2	Sinewave variable speed drive
Par group:	
Serial	
• Bustype	Mbus RTU
• Address	Unique slave ID corresponding to EC 531 setting
• Si Baud	Same baud rate as EC 531
• Si Prot	Same parity as EC 531 ¹
Control	
• Auto	Start OFF

¹ Note! Mark parity in EC 531 is the same as 2 stop bit. No parity in NFO drive.

Enable "Run input" with a cable jumper between terminal 1 and 5 to allow Modbus control.

4.7 Schneider

ATS 48	Soft starter
COP menu:	
• Add	Unique slave ID corresponding to EC 531 setting
• tbr	Same baud rate as EC 531
• FOr	Same parity as EC 531
• tLP	1.8 if using default EC 531 setting
• PCt	ON to enable new settings with a power reset

Enable with a power reset (OFF / ON).

Place a jumper between terminal +24 V and STOP to allow Modbus control.

ATV 12	1->3 phase variable speed drive
COnF menu:	
• FULL	
◦ COM-	
▪ Add	Unique slave ID corresponding to EC 531 setting
▪ Tbr	Same baud rate as EC 531
▪ Tfo	Same parity as EC 531
◦ Ctl-	
▪ Fr 1 = Mdb	Select modbus for control over RS 485 fieldbus

Enable with a power reset (OFF / ON).

ATV 61	Variable speed drive
1.9 COMMUNICATION	
• MODBUS NETWORK	
◦ Modbus address	Unique slave ID corresponding to EC 531 setting
◦ Modbus baud rate	Same baud rate as EC 531
◦ Modbus format	Same parity as EC 531
1.6 COMMAND	
• Ref.1 channel = Modbus	Select modbus for control over RS 485 fieldbus

Enable with a power reset (OFF / ON).

ATV 600 series	Variable speed drive
6.1 Comm parameters	
• Modbus SL	
◦ Modbus fieldbus	
▪ Modbus address	Unique slave ID corresponding to EC 531 setting
▪ Modbus baud rate	Same baud rate as EC 531
▪ Modbus format	Same parity as EC 531
5.4 Command and refere.	
• RefFreq 1 config	
◦ = Ref. freq modbus	Select modbus for control over RS 485 fieldbus

Enable with a power reset (OFF / ON).

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4.8 Supported function table

Brand:	ABB				Danfoss			CG (Emotron)		Invertek	NFO	Vacon	Yaskawa	Schneider				Accuenergy	Lumel	Carlo Gavazzi				
Model:	ACQ 810	ACS 580	ACS 550	PSTx	FC 200	MCD 200	MCD 500	TSA	FDU 2	Optidrive	Sinus	100 FLOW	20	P 1000	ATS 48	ATV 12	ATV 61	ATV 600	PM 5100	PM 710	Acuvim II	ND10	EM210	
Type of unit:																								
VFD / VSD	X	X	X		X				X	X	X	X	X	X		X	X	X						
Soft starter				X		X	X	X							X									
Energy meter																			X	X	X	X	X	
Control:																								
On / Off ctrl	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						
Reverse control	X	X	X	X	X				X	X	X	X	X	X		X	X	X						
Speed control	X	X	X		X				X	X	X	X	X	X		X	X	X						
Monitor:																								
Run	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X						
Fault	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X						
Frequency Hz	X	X	X		X				X	X	X	X	X	X		X	X	X	X	X	X	X	X	X
Speed RPM		X	X		X				X		X	X	X	X		X	X	X						
Torque %	X	X	X		X				X		X	X	X		X		X	X						
Torque Nm					X				X															
Motor voltage	X	X	X		X				X		X	X	X	X		X	X	X						
Motor current	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X						
Motor power	X	X	X	X	X		X	X	X	X	X	X	X	X		X	X	X						
Power factor				X			X				X				X				X	X	X	X	X	X
Input power				X														X	X	X	X	X	X	X
L1 Volt																			X	X	X	X	X	X
L2 Volt																			X	X	X	X	X	X
L3 Volt																			X	X	X	X	X	X
LN Average volt								X											X	X	X	X	X	X
L1-L2 Volt								X											X	X	X	X	X	X
L2-L3 Volt								X											X	X	X	X	X	X
L3-L1 Volt								X											X	X	X	X	X	X
L-L Average volt				X														X	X	X	X	X	X	X
L1 Current A				X			X	X											X	X	X	X	X	X
L2 Current A				X			X	X											X	X	X	X	X	X
L3 Current A				X			X	X											X	X	X	X	X	X
Average current A																			X	X	X	X		

5 TECHNICAL DATA EC 531


Electrical	
Installation category	CAT II
Power consumption	< 5.0 W (without output load)
Power supply	9–34 VDC SELV or Class 2

Environmental	
Ambient operation temperature	-20 to +50 °C (-4 to +122 °F)
Ambient storage temperature	-30 to +80 °C (-22 to +176 °F)
Humidity	0–95% RH non condensing
Max altitude	2000 m
Pollution degree	2

Physical	
Dimension	HxWxD: 86 x 160 x 60 mm (3.39 x 6.30 x 2.36 inch)
Mounting	DIN Rail 35 mm (1.378" W)
Degree of protection	IP 20, NEMA: Type 1
Flame rated	UL 94 V-0
Housing material	PPO and PC

Ports		
Analog inputs (AI) mA	Number of: Range: Input resistance: Resolution:	4 4–20 mA (DC) 136 ohm. PTC protected AI1: 15 bits, AI2–4: 10 bits
Analog inputs (AI) Pt100	Number of: Range: Connection setup: Resolution: Alternative functions:	4, less if alternative functions are used -20 to +200 °C (-4 to +392 °F) 2 wire 0.1 degree Leakage or PTC / Bi-metallic switch surveillance see below
Leakage	Number of: Trig level:	2 (Alternative function to Pt100) <100 kohm
PTC / Bi-metallic switch	Number of: Trig level:	2 (Alternative function to Pt100) >3.3 kohm
Analog outputs (AO)	Number of: Range: Max load: Resolution:	2 4–20 mA, Sourcing from power supply 500 ohm@12 VDC, 1100 ohm@24 VDC 15 bits 0.5 uA
Digital inputs (DI)	Number of: Input resistance: Input voltage: Max pulse rate:	14 Configurable logic 10 kohm 0–34 VDC, Trig level ~ 4 VDC. 1 kHz (pulse channels)
Digital outputs (DO)	Number of: Max load:	8 Configurable logic. < 34 VDC (sourcing from power supply) 1A / output. Max total current for all 8 outputs together is 4 A. Only sourcing, no drain
Communication		1 USB Service port (USB mini-b) 1 RS 232 Service port (9p D-SUB) 1 RS 232 port for telemetry interface (screw term.) (modem) 1 RS 485 2-wire (screw term.) (Galvanic Isolated) 1 Ethernet (RJ45)

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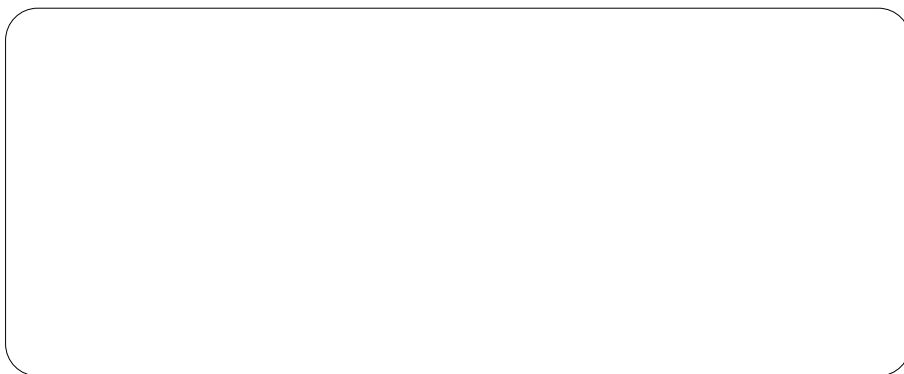
Ports	
User interface	2,2" TFT Color display, Animated front screen and menus for settings and status 6 menu maneuver buttons, 4 pump maneuver buttons Alarm, Power On and Pump mode indication LEDs
Approvals	

5.1 *Cleaning*

How to clean the unit

Power off the unit. Only outside / front shall be cleaned by using a dry, soft cloth.

A good choice would be the microfiber type of cloth. Gently wipe the EC 531 front in order not to scratch the overlay. If the dry cloth did not completely remove the dirt, do not press harder in an attempt to scrub it off. If necessary, moisten the cloth by adding a small amount of water with thin solution of mild detergent and try again. Never use detergent with polish or solvent which can have an impact of the plastic surface.



SULZER

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