



INSTALLATION MANUAL

Version: 1307-UK

PC-21

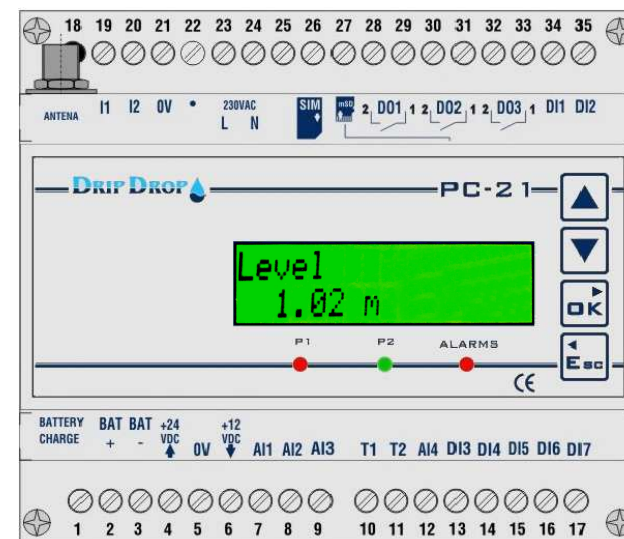


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8 Electromagnetic compability (EMC)

Electromagnetic compability (EMC)					
Description	Standard	Class	Level	Notes	Test
Electrostatic discharge immunity	CEI 61131-2:2008	4	± 8kV	Air discharge	B
			± 4kV	Cont. discharge	B
Radiated emission	CEI 61131-2:2008	A		30MHz-1GHz	A
Conducted emission	CEI 61131-2:2008			0.15MHz-30MHz	A
Conducted Susceptibility	CEI 61131-2:2008			0.15MHz-30MHz	A
Radiated Susceptibility	CEI 61131-2:2008		10V/m	80MHz-1GHz	A
Power Frequency Magnetic Field	CEI 61131-2:2008		30A/m		A
Electrical Fast Transient/Burst	CEI 61131-2:2008		2kV		B
Overvoltage/surge	CEI 61131-2:2008		1kV	Commun mode	B
			0.5 kV	Differential mode	

9 Accessories

Description	Art. nr	Comments
PC-21/GSM/GPRS/RS-232/FT	201-03-170	Pump controller
Level sensor SP-25 (0-1m H2O)	40101-06-103	4-20mA
Level sensor SP-25 (0-4m H2O)	40101-06-102	4-20mA
Level sensor SP-25 (0-5m H2O)	40101-06-106	4-20mA
Level sensor SP-25 (0-10m H2O)	40101-06-108	4-20mA
Current transformer 50/5A Class 1	40101-54-105	0-5A
Current transformer module MTC400.2.20A – for two pumps		0-5A
Current transformer module MTC400.1.20A – for one pump		0-5A
Antenna with cable (GSM/GPRS)		
Battery 1,2 Ah 12 VDC	50101-127-101	1,2 Ah/12 VDC
24 VDC external power supply DR-15-24	50101-03-110	
RS-232 cable with RJ-45 connector, 2m.	30501-20-100	
PC-COM Configuration tool	20101-00-100	

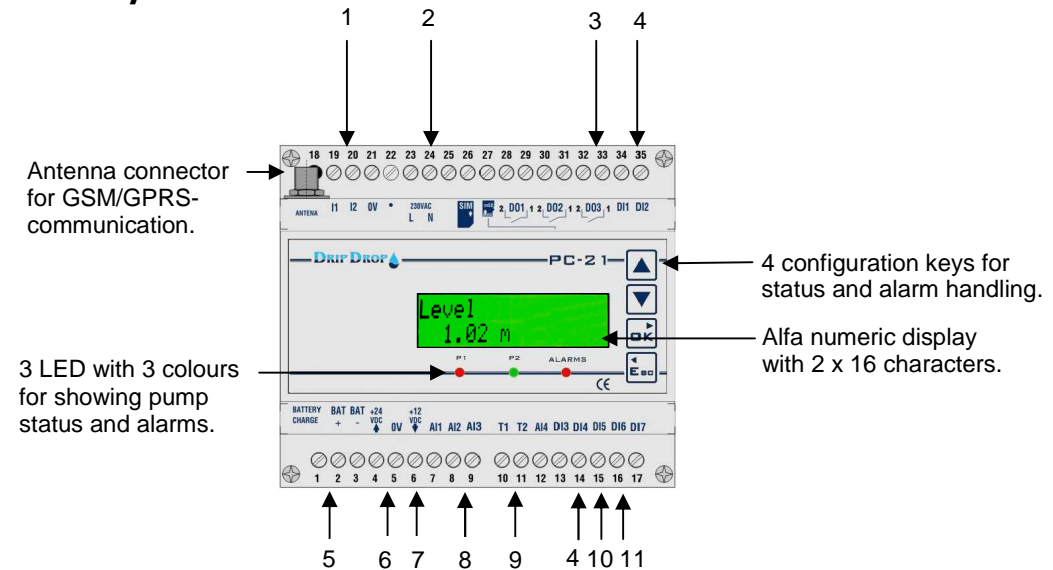
7 Technical specification.

Power supply (with modem and battery)	230 VCA/50Hz – max. 0.02A 24 VDC (18-36 VDC) – max.0.18 A 12 VDC (10-18 VDC) 0,275 A
Power consumption	4.5 VA
Mounting	Omega DIN 35 rail mounting
Dimensions	105 x 90 x 70 mm (W x H x D)
Weight	0,20 kg
Temp. Range (operation)	-20 to +50 degrees °C
Housing	IP 20
Display	2 x 16 signs alfa numeric
Indication diods	3 two colour LED
Digital relay outputs (DO)	(3) Potential free output relays. Maximum load 6 A 250VAC/30VDC
Digital inputs (DI1-4 and DI7)	(5) 12 VDC Type 1 CEI 61131-2
Digital/Counter input (DI5)	(1) 12 VDC Max. frequency 500 Hz
Digital/Counter input (DI6)	(1) 12 VDC Max. frequency 10 Hz
Current inputs (I)	(2) max 5A (Motor current)
Analogue inputs (AI)	(2) 0/4-20 mA 12 VDC / 10 bits accuracy (2) 0/4-20 mA 12 VDC / 16 bits accuracy
Temp. protection inputs (T)	(2) Pump thermo contacts , 12VDC
RS-232 Serial port	(1) RS 232 with RJ-45 connector
Internal sensor power supply	12 VDC, max 90 mA, (12,8 – 14,2 VDC)
Internal battery charger	12 VDC output-max 40 mA (12,8 - 14,2 VDC)
Battery charger cut-off voltage	10,7 VDC (below this voltage battery is cut off)
GSM / GPRS internal modem	Quad band GSM/GPRS module working on 850/900/1800/1900MHz frequency;
Modem power consumption	230 VAC/24 VDC Average: 2,06/19,8 mA, Peak GPRS surge: 0,033/0,317A. Idle : 0,33/3,1 mA
- features GPRS multi-slot class 10/class 8; - supports the GPRS coding scheme CS-1, CS-2, CS-3, CS-4; - can exchange data to pairs over GPRS using TCP/IP; - along with PC21, it can send and recieve data over each TCP/IP ports using well known protocols like MODBUS-RTU, MODBUS-TCP, COMLI;	

1 Description of PC-21

PC-21 is a small and powerful pump controller for 2 pumps and 1 mixer for the application filling or emptying. The unit is made for omega DIN 35 rail mounting in a control cabinet. The operator interface has an LCD display with 2x16 characters, 3 separate diodes for alarm indication and 4 keys for menu handling and status control. All electrical connections are made via built in screw connectors. PC-21 has two power options, 230VAC or 24VDC supply and generates a 12 VDC supply voltage for transducers and sensors used.

Front panel



1. Current inputs (2) (motor currents) 0-5 A
2. Power supply 230 VAC
3. Digital relay outputs (3) max 6A / 250 VAC/30VDC
4. Digital inputs (5) 12 VDC
5. Battery charger output (12 VDC)
6. Power supply 24 VDC
7. +12 VDC Output source for digital and analogue inputs (sensors)
8. Analogue inputs (4) 0/4-20 mA
9. Pump temperature protection inputs (2) 12 VDC
10. Digital input 5 / pulse input (1) 12 VDC, Max 500 Hz
11. Digital input 6 / pulse input (1) 12 VDC, Max 10 Hz

2 Dimensions and mounting.

The pump controller PC-21 is mounted on a DIN rail in the bottom of the control cabinet or for mounting in a norm enclosure where the front interface will be accessible from the front of the enclosure. All power and signal cables are connected directly to the unit on the fixed screw terminals.

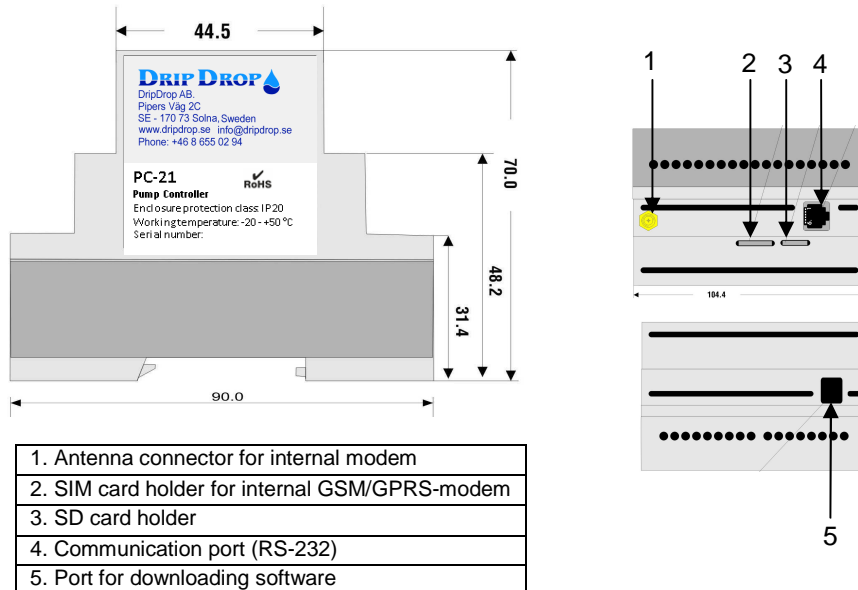


Figure 2 shows the units side view with main dimensions. It also shows the unit from above with the SIM and SD cards slot, the RS 232 port and antenna connector. The lower view of the device shows the lower row of connecting terminals as well as the programming port.

2.1 Mounting on DIN-Rail

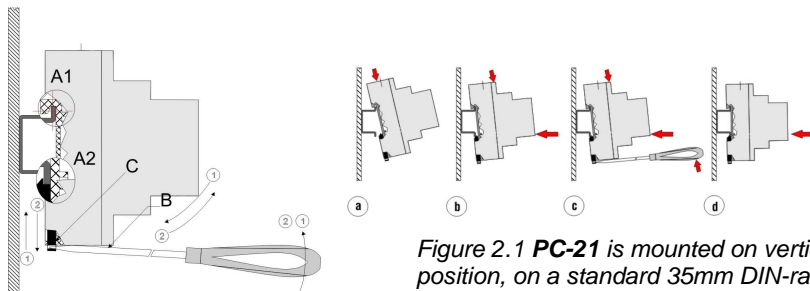
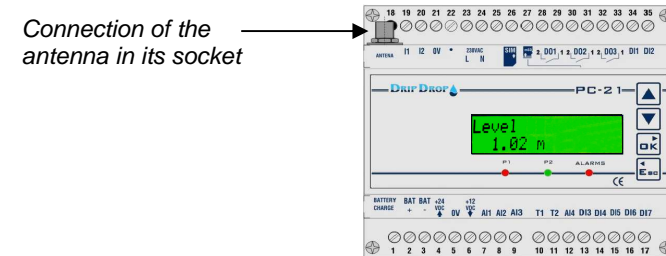


Figure 2.1 **PC-21** is mounted on vertical position, on a standard 35mm DIN-rail in the control cabinet.

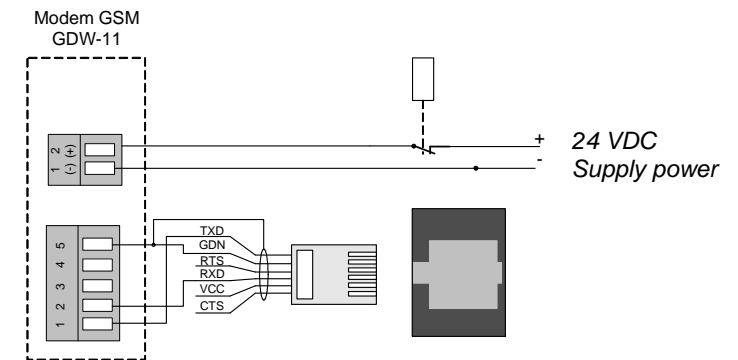
6.3 Antenna

The unit is delivered with a GSM/GPRS (850/900/1800/1900MHz) antenna equipped with 2,5m. cable length and a magnetic foot for easy installation on metallic surfaces. For a proper function of the modem the connection of the antenna is required.



6.4 RS-232 Communication (external modem, radio or cable)

The unit has a RS-232 Communication port for connection of external GSM, PSTN or Radio modems as well as direct communication. As external GSM modem we recommend the Westermo GDW-11 GSM-modem. The communication is possible through our RS-232 port with a RJ-45 6-pin connector.



Terminal	Cable colour *	Signal	Description
Nr 1	Blue	In	TXD
Nr 2	Red	Out	RXD
Nr 5	Yellow	-	Signal earth (GND)

Figure 6.4 connecting the Westermo GSM-modem GDW-11with DripDrop standard connection cable. We recommend the use of a timer pulse relay for automatic periodic reset/restart of the modem.*

6 Communication, modem connection

6.1 GSM/GPRS internal modem.

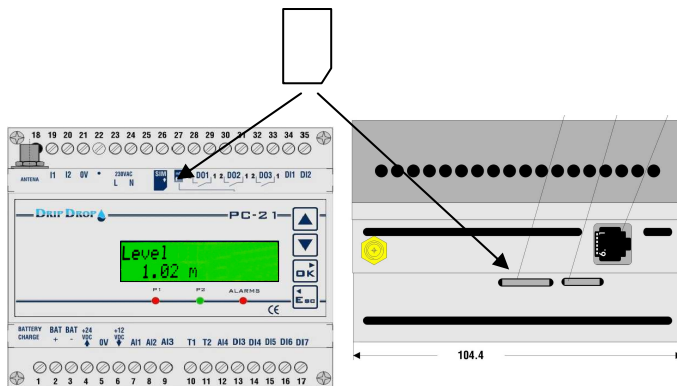
For sending alarms via SMS or communicate to control and supervision SCADA programs, this device holds an internal Quad band GSM/GPRS modem (850/900/1800/1900MHz), that requires a SIM card. Once being connected over GPRS, it can exchange data using SMS, sending alarms and data voluntary or on demand. The modem is provided with an internal reset function that automatically restarts the modem if there is no traffic on the modem.

In order to make the modem operative you are required to insert an operating SIM card for GSM or GPRS communication and set up the communication settings in the communication menu. Also for first time start-up of the modem you need to connect the antenna to the antenna socket. Without the antenna the signal strength of the modem will be very low and it might not connect to the network.

6.2 SIM-Card

The SIM card can be of GSM-data type to transmit and receive data over the GSM network, a plain SMS able SIM card or a GPRS type card with fixed IP address for continuous on-line communication over the GPRS network. Both card types can send simple SMS text messages.

The SIM card is inserted directly into the unit in the SIM card slot on the upper part of the unit with the connector part inwards.



3 I/O-signals

The PC-21 has a number of in- and outputs which can be activated or deactivated depending on how the unit is going to be used. Below you will find an overview of all in- and output signals which can be configured.

I/O No.	Type	Signal	Comments
AI 1	Level/(Free text)	0/4-20 mA	(Free text, max 12 characters) 10 Bits
AI 2	Flow/(Free text)	0/4-20 mA	(Free text, max 12 characters) 10 Bits
AI 3	Pressure/(Free text)	0/4-20 mA	(Free text, max 12 characters) 16 Bits
AI 4	Free text	0/4-20 mA	(Free text, max 12 characters) 16 Bits

I 1	Motor current Pump 1	0-5A	Good for pump supervision
I 2	Motor current Pump 2	0-5A	Good for pump supervision

DI 1	P1 Not in Auto (M-0-A)	NC	Option general input with free text
DI 2	P1 Motor protection	NO	Option general input with free text
DI 3	P2 Not in Auto (M-0-A)	NC	Option general input with free text
DI 4	P2 Motor protection	NO	Option general input with free text
DI 5	Overflow/Counter input	NO	Option general input with free text Max 500 Hz for the counter input
DI 6	High float/Overflow /Counter input	NO	Option general input with free text Max 10 Hz for the counter input
DI 7	Low level float/Block station	NC	Option general input with free text

T 1	P1 Temperature protection	NC	Pump thermo contacts (digital signal)
T 2	P2 Temperature protection	NC	Pump thermo contacts (digital signal)

DO 1	Pump 1 (Start/Stop)	NO	Relay output
DO 2	Pump 2 (Start/Stop) / Mixer Start/Stop	NO	Relay output
DO 3	Active alarms / Mixer Start/Stop	NO	Relay output

- 1) All inputs on the unit come configured with default signal names/functions. However, all inputs have the option to freely edit the signal names as well as the corresponding alarm texts.
- 2) All Digital Inputs has the option to be used as general purpose inputs with possibility to emit alarms and block pumps.
- 3) All analogue inputs have high and low set points that can generate alarms and/or block pumps.

4 Electrical connections

The PC-21 supply can be either 230 VAC, 24 VDC or 12 VDC from a stabilized power supply unit, as well as from a 12 VDC solar panel system with charger/regulator.

4.1 Power supply 230 VAC

When the power supply comes from 230 VAC, all inputs and sensors of the unit are supplied by an internal +12 VDC voltage output. Also the unit has an integrated automatic 12 VDC battery charger for rechargeable Lead Acid Batteries.

The maximum power consumption at 230 VAC is 0,02A.

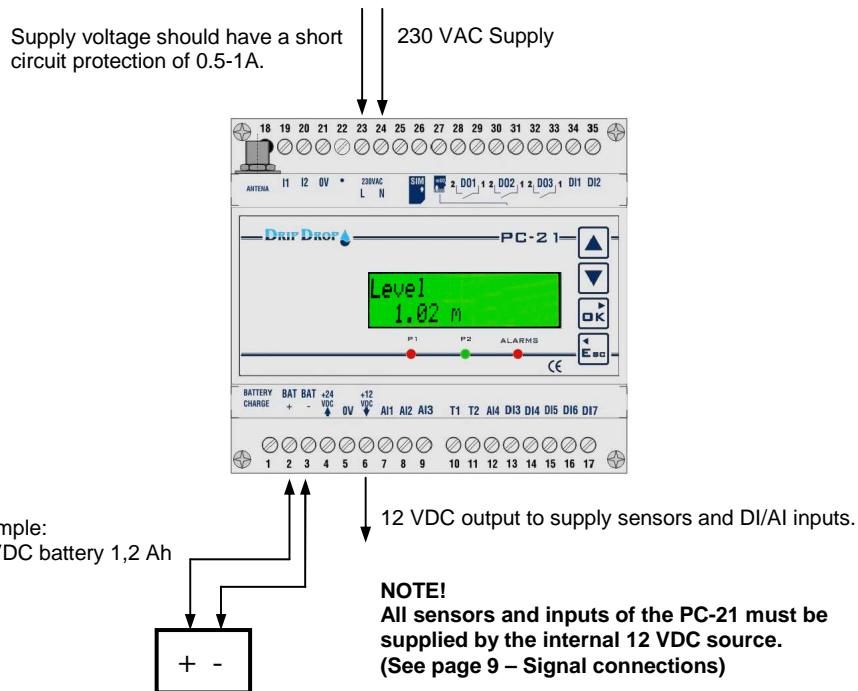


Figure 4.1 shows a typical connection of a 230 VAC power supply with battery back-up. The unit supplies all inputs and sensors via the internal 12 VDC sensor supply output (terminal 6, +12VDC). Also the unit has an internal automatic 12 VDC battery charger to maintain a back-up battery.

5 Current measurement

For motor current measurements, usually current transformers 0-5 Ampere range on the secondary coil, are used. Due to difficulties to get current transformers with less than 50/5 Amp for pumps with lower nominal current than 50A, it is necessary to twist one phase one or several turns around the transformer coil as shown in drawing below.

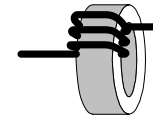


Figure 4.1 shows how one of the phases is fed around the transformer coil.

For a 50/5 A transformer following applies:

1 turn for pump currents up to 25A

2 turns for pump currents up to 12,5A

3 turns for pump currents up to 6,25A

The factor $F = \text{transformer ratio} / (n \text{ turns} + 1)$

You need to take the transformer rate for (example 10) and divide it by (the number of turns around the coil +1).

Example 1.

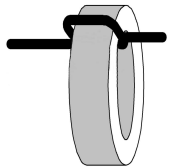
Measuring a 20 Amps pump.

We use a 50/5 A. transformer where the transformer ratio is 10.

In order to increase the accuracy of the measuring range we need to wind the power cable one turn around the transformer coil.

$$F = 10 / (1 + 1) = 5$$

Set the transformation factor in the PC 21 to 5.



Example 2.

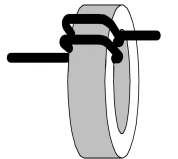
Measuring a 10 Amps pump.

We use a 50/5 A. transformer where the transformer ratio is 10.

In order to increase the accuracy of the measuring range we need to wind the power cable 2 turns around the transformer coil.

$$F = 10 / (2 + 1) = 3.33$$

Set the transformation factor in the PC 21 to 3.33.



Example 3.

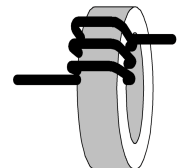
Measuring a 5 Amps pump.

We use a 50/5 A. transformer where the transformer ratio is 10.

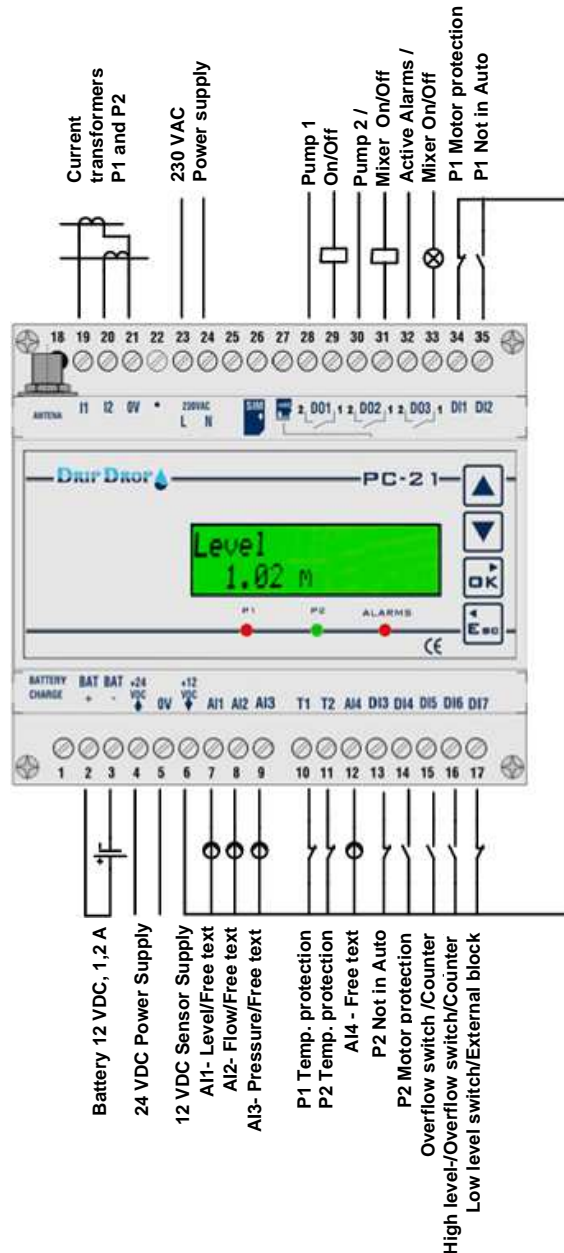
In order to increase the accuracy of the measuring range we need to wind the power cable 3 turns around the transformer coil.

$$F = 10 / (3 + 1) = 2.5$$

Set the transformation factor in the PC-21 to 2.5.



4.6 Signal connections



The output relays should be supplied with separate power supply of max 250 VAC with a maximum load of 6A.

Sensors, digital inputs, counters and analogue inputs use the +12 VDC output for their supply.

Level sensors are supplied with internal +12 VDC to the positive + side of the sensor the negative side of the sensor is connected to analogue inputs AI 1-4.

We recommend separate 25 mA fuses on all analogue inputs and one common 250 mA fuse for all digital inputs.

It is also recommended to use a 100 mA fuse to protect the pumps thermo contact circuits.

4.2 Power supply 24 VDC

PC-21 with 24 VDC from an external stabilized power supply unit.

When supplying with 24 VDC from an external power supply unit, all inputs and sensors of PC-21 are supplied by the assigned +12 VDC voltage output. Also with the 24 VDC supply, the unit has an integrated automatic 12 VDC battery charger for a 1,2 Ah battery.

The maximum power consumption at 24 VDC is 0,18A.

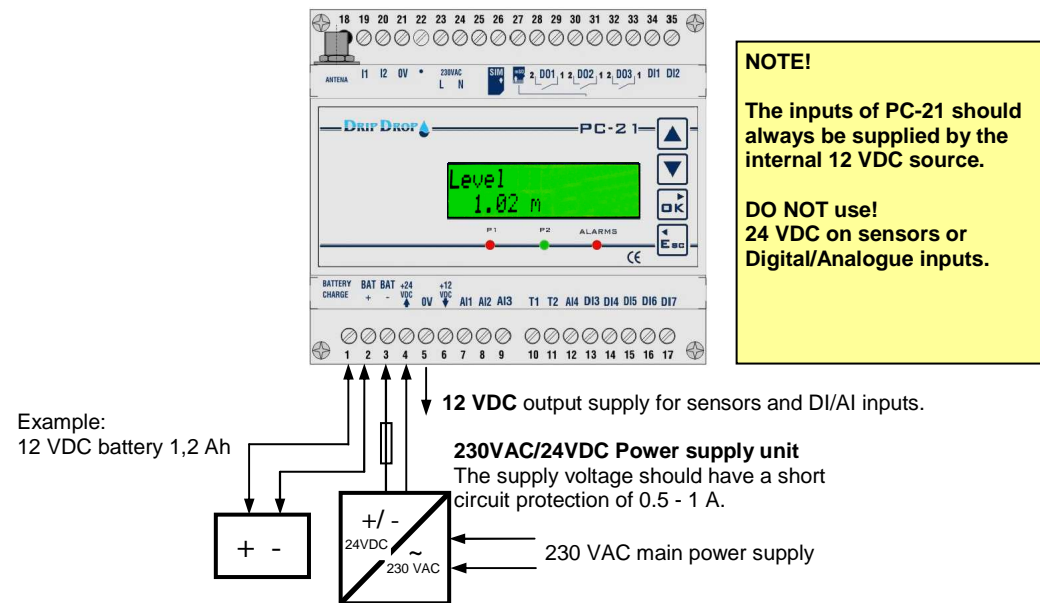


Figure 4.2 shows a typical connection of a 24 VDC supply with internal battery back-up. When supplied by 24 VDC all inputs and sensors of the unit **MUST** be supplied by the internal +12 VDC sensor supply output (terminal 6 , +12 VDC). The unit has an internal automatic 12 VDC battery charger to maintain a back-up battery.

4.3 Battery charger/battery back-up (Only for 230 VAC/24 VDC supply)

The device is equipped with an internal automatic battery 12 VDC charger, max 40 mA. We recommend the use of one 12 VDC/1,2 Ah battery. The internal battery charger will give a 12,8 – 14,2 VDC output depending on battery and load conditions. If the main supply 230VAC or 24VDC for PC-21 disappear the unit will give a low battery voltage alarm at 11V and if the voltage keeps on dropping, the internal charger will automatically cut the connection to the battery at 9,8 V in order to save the battery. When supply power, 230VAC or 24VDC, is restored the charger will start to charge the battery again.

Figure 4.6 Shown signals for the digital inputs and our recommendation for contact use NO or NC, the way the unit come configured from factory.

4.4 Power supply 12 VDC

The unit is prepared to operate with 12 VDC input from an external power source. In this case the +12 VDC terminal works as an input /**output** terminal to supply the sensors and inputs of the PC-21. In this mode the internal battery charger system is not operative. **DO NOT** connect the backup battery to the BAT + and – terminals. The Back-up battery **MUST** be connected to an external charger.

The maximum power consumption at 12 VDC is 0,275 A.

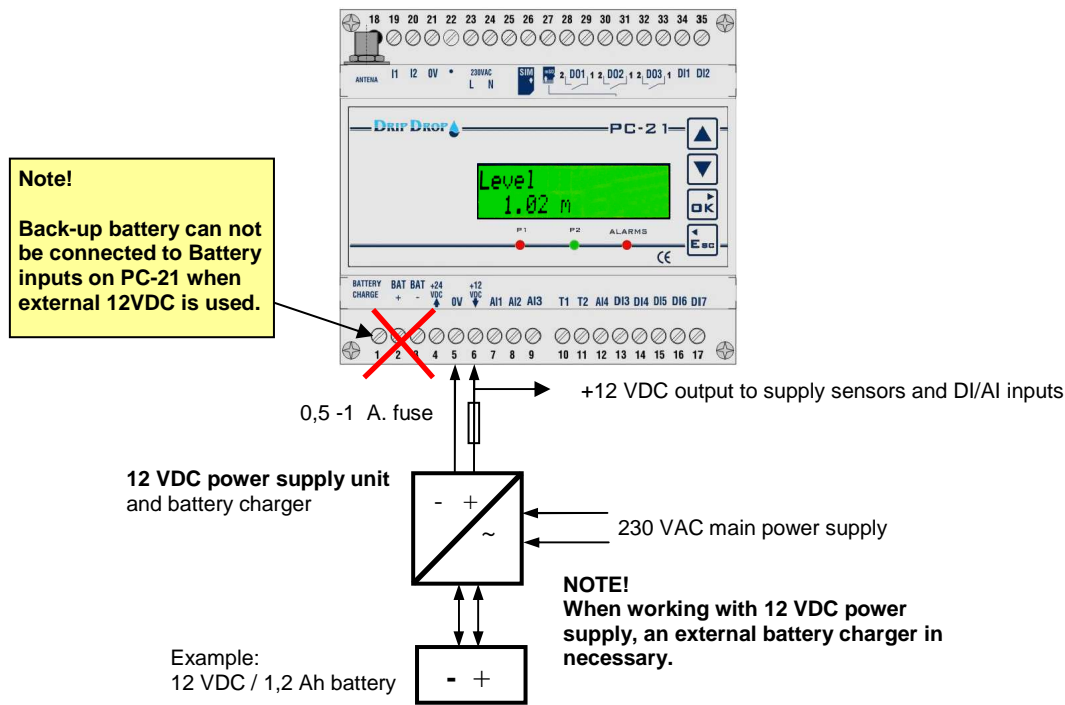


Figure 4.4 shows a typical connection of a 12 VDC power supply. The incoming power is connected to terminal +12 VDC and 0 VDC. The power supply/charger is used to charge the external battery. When using a 12 VDC power supply system, the PC-21 internal battery charger will **NOT** work, and back-up battery will always have to be connected to the power supply/charger.

4.5 Power supply 12 VDC (Solar panel)

The unit is prepared to operate with 12 VDC input from a solar panel through a solar panel charger/regulator. In this case the +12 VDC terminal works as an input /**output** terminal. In this mode the internal battery charger system is not operative. **DO NOT** connect the backup battery to the BAT + and – terminals. Backup battery **MUST** be connected to the solar panel charger/regulator.

The size of the battery and charger depends on solar conditions, power consumption in terms of used inputs, outputs and the use of the internal modem.

The maximum power consumption using all inputs and outputs as well as the modem at 12 VDC is 0,275 A.

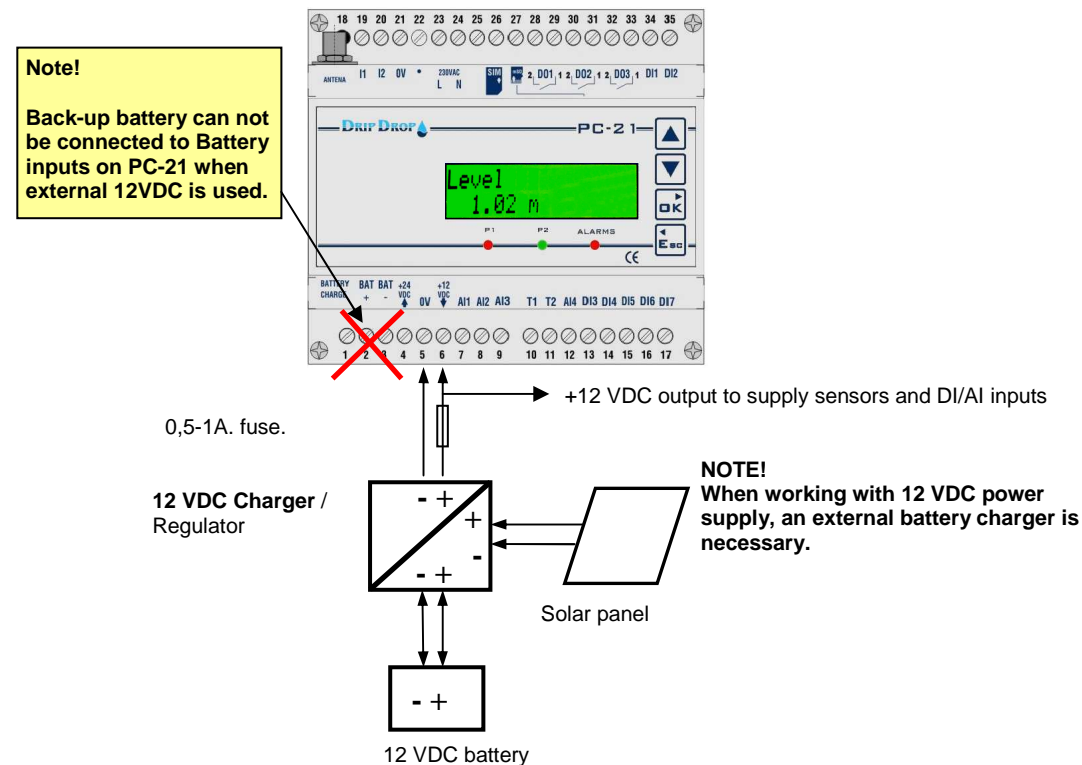


Figure 4.5 shows a typical connection of a solar driven 12 VDC power supply. The incoming power is connected to terminal +12 VDC and 0 VDC. A regulator/charger is used to charge the external battery. When using a 12 VDC solar panel system power supply, PC-21 internal battery charger will **NOT** work, and back-up battery will always have to be connected to the solar system.