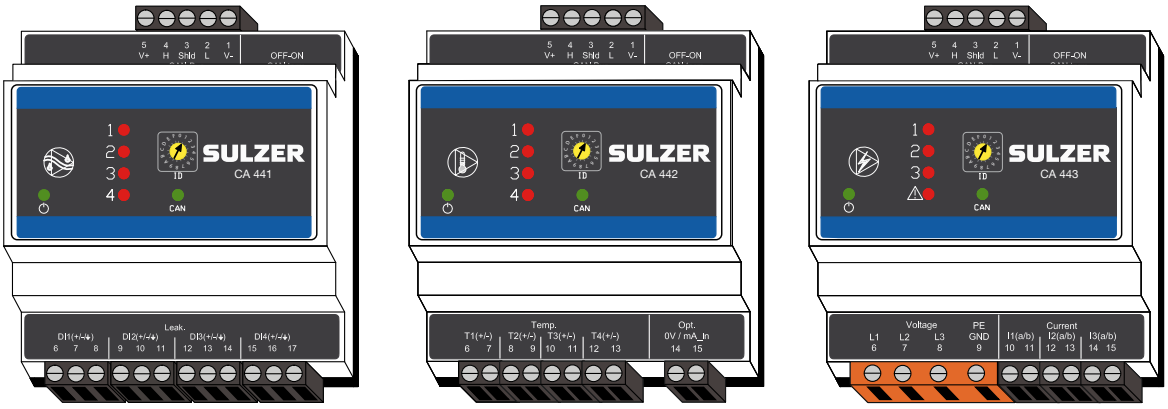
Control accessory type ABS
CA 441, CA 442, CA 443



81307058N (083/2023)

EN

Installation guide

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81307058N

1 INSTALLATION

CA 441, CA 442 and CA 443 are extension modules to PC 441 and do not work stand alone.

1.1 *Mount the controller*

Mount the unit on a 35 mm DIN rail. The physical dimensions of the device is: 86 x 70 x 58 mm (3.39 x 2.76 x 2.28 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*

The terminals should be connected to power and sensors. See table for each device:

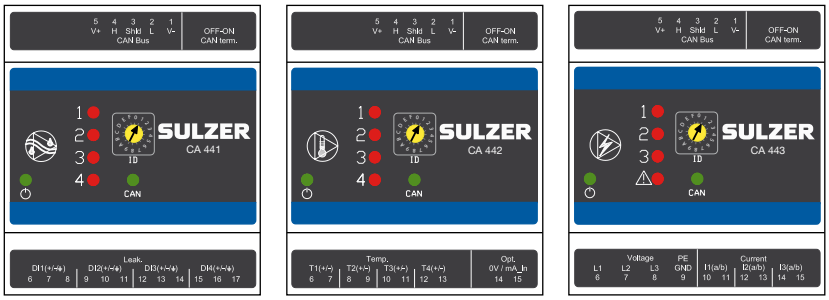


Figure 1 Outer terminals for the CA 44X series.

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

The power must be DC between 9 and 34 volts. Figure 3 shows how to connect power and how to connect a battery pack for uninterrupted operation.

For cables longer than 30 m extra surge protection should be mounted where needed.

1.3 *Common for CA 44X*

This part of the guide is common for all three units, CA 441, CA 442 and CA 443. Later chapters will explain the differences between the units. The expression CA 44x is used when referring to an unspecified unit of the devices specified above.

Power LED When unit is powered up and running the green power LED will be lit.

CAN LED See chapter about CAN.

Alarm LED's These four LED's are controlled from the supervising controller e.g. PC 441 and can indicate different type of errors or malfunction.

1.4 *CAN*

1.4.1 *CAN ID*

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

On the CA 44x series one part of the address is set default depending on type of device, the other part of the address is set by a hexadecimal switch, marked “ID”. Choose address by pump number as in table below. If the device has a unique address and contact with the network master, the CAN LED is still fixed green. For error codes of the CAN LED see PC 441 User guide.

Use the following addresses to achieve correct functions.

Table 1. CA 441 Leakage monitor

CAN SUB ID	Monitoring function
0	*Not used with PC 441*
1	Pump 1 or pumps 1-4
2	Pump 2
3	Pump 3
4	Pump 4
5 - > F	*Not used with PC 441*

Table 2. CA 442 Temperature monitor

CAN SUB ID	Monitoring function
0	*Not used with PC 441*
1	Pump 1 or pumps 1-4
2	Pump 2
3	Pump 3
4	Pump 4
5	Pump 1 & Pump 2
6	Pump 3 & Pump 4
7 - > F	*Not used with PC 441*

Table 3. CA 443 Power monitor

CAN SUB ID	Monitoring function
0	Main power monitor
1	Pump 1
2	Pump 2
3	Pump 3
4	Pump 4
5 - > F	*Not used with PC 441*

1.4.2 *CAN TERM*

The CAN bus shall be terminated at both cable ends.
If used, PC 441 is bus master and has a built-in termination that is always active and should therefore always be placed at one of the endpoints of the cable.
For other devices you can activate the selectable termination with a switch, marked “CAN term”.
Activate termination for the device placed on the other endpoint of the cable.
All other devices between should have their termination switch in “OFF” position.

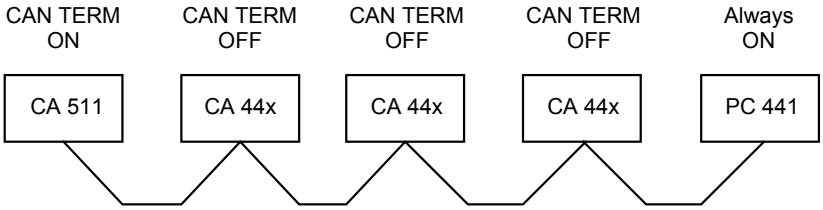
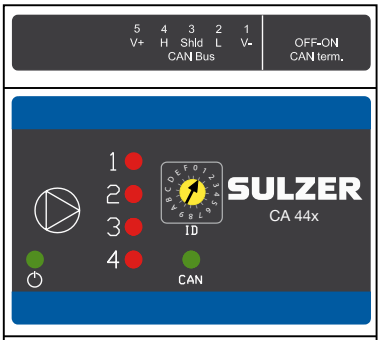


Figure 2 CAN network with connection

1.4.3 *CAN connections*



The CAN cable uses 5 wires. Two wires are used for communication CAN_L and CAN_H. One wired is shield CAN_SHLD and two wires are used as bus power V+ and 0V. Bus power allow devices to get power directly from the bus.

The connections is prepared to be done by screw plug in connectors.

Table 4. Top side connections

#			Usage
1	⊘	0V	Voltage supply neg. terminal
2	⊘	← →	CAN_L low signal line
3	⊘	←	CAN_SHLD cable shield
4	⊘	← →	CAN_H high signal line
5	⊘	V+	Voltage supply pos. terminal

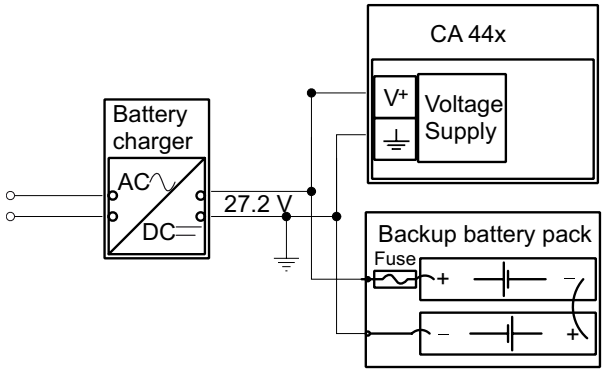


Figure 3 The power must be between 9 and 34 volts DC. For uninterrupted operation in case of power failure, connect a battery pack according to the figure.

1.5 *The units*

1.5.1 *CA 441*

The product is for measuring leakage of water into non water areas of pumps.

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.

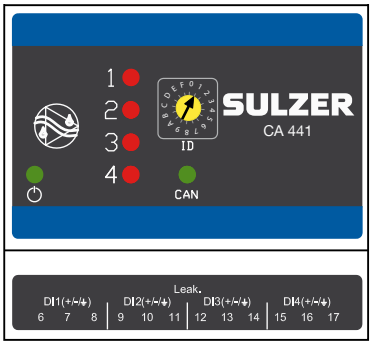
Table 5. CA 441 ratings

Input	Range
ABS mode	0 - 220 kohm
Xylem mode	0 - 10 kohm

If one module of CA 441 is used for all pumps, *Sensor 1* = Pump 1, *Sensor 2* = Pump 2 etc. In case of one CA 441 module for each pump, follow the table 6 below.

Table 6. Configuration of the analogue input on CA 441 ID 1-4

#		Dir.	Signal	Description
6	⊘	←	Sensor 1	Leakage sensor 1: **Oil chamber**
7	⊘	←	Ref 1*	
8	⊘	←	GND	
9	⊘	←	Sensor 2	Leakage sensor 2: **Connect chamber**
10	⊘	←	Ref 2*	
11	⊘	←	GND	
12	⊘	←	Sensor 3	Leakage sensor 3: **Motor housing**
13	⊘	←	Ref 3*	
14	⊘	←	GND	
15	⊘	←	Sensor 4	Leakage sensor 4: **Not used**
16	⊘	←	Ref 4*	
17	⊘	←	GND	



* Ref is the negative reference point - it shall be connected to ground directly, or at pump if problems with 50 Hz / 60 Hz interference signal.

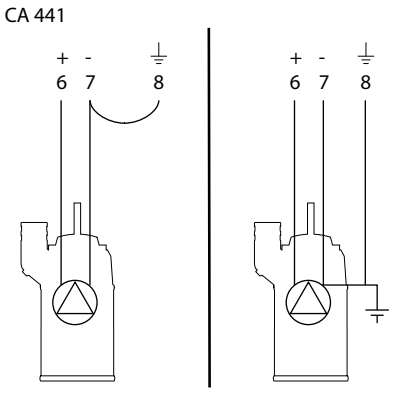


Figure 4 Connection of leakage sensor

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1.5.2 *CA 442*

The product is for indicating temperature and prevent overheating of pumps.

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.

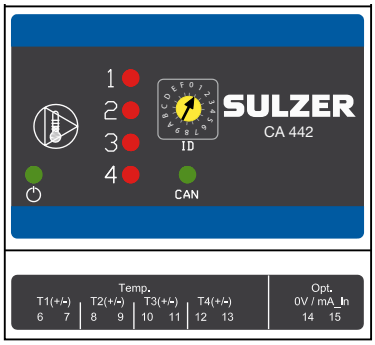
Table 7. CA 442 ratings

Input	Range	Comment
Opt mA in	4.0 - 20.0 mA	± 0.5 mA
Pt100	-20 - +180°C (-4 - +356°F)	± 2°C / ± 4°F
PTC	0 - 10 kohm	

If one module of CA 442 is used for all pumps, *Sensor 1* = Pump 1, *Sensor 2* = Pump 2 etc. In case of one CA 442 module for each pump, follow the table 8 below.

Table 8a. Configuration of the temperature input on CA 442 ID 1-4

#		Dir.	Signal	Description
6	⊘	←	Sensor 1	Temp. sensor 1: **T1 Stator***
7	⊘	←	GND	
8	⊘	←	Sensor 2	Temp. sensor 2: **T2 Upper bearing**
9	⊘	←	GND	
10	⊘	←	Sensor 3	Temp. sensor 3: **T3 Lower bearing**
11	⊘	←	GND	
12	⊘	←	Sensor 4	Temp. sensor 4: **T4 Stator***
13	⊘	←	GND	
14	⊘	←	0 V	Reference vibration sensor
15	⊘	←	Analogue mA in	Analogue input (4 - 20 mA) Vibration sensor

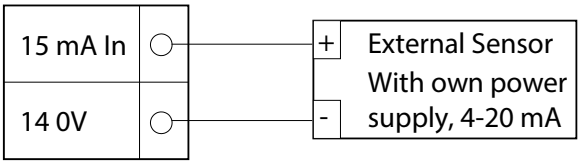


* The properties of the inputs of T1 and T4 are shared. T1 and T4 are using same alarm number (see Modbus register manual for more information) and T1 and T4 can have separate type of sensors (T1 can be connected to PTC and T4 Pt100 or vv.).

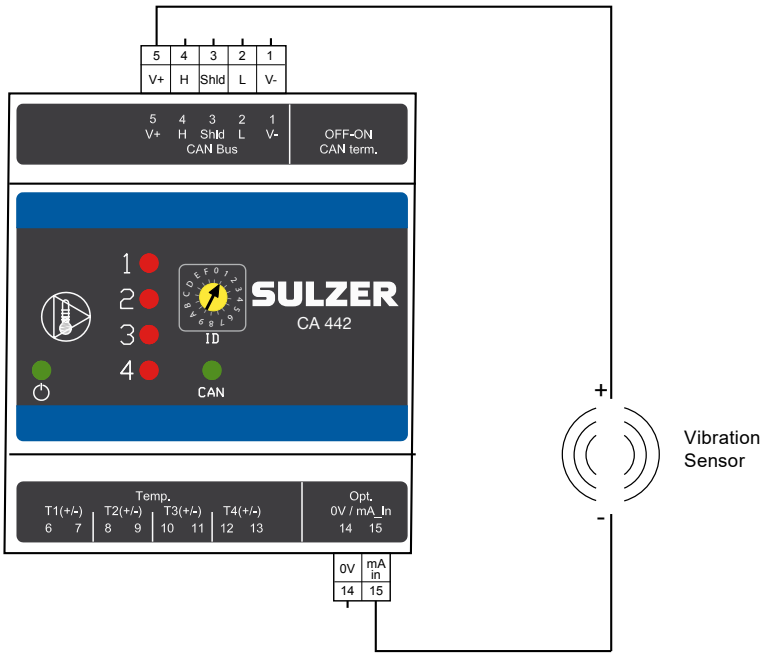
1.5.2.1 *Vibration*

Terminal 14 and 15 are a 4-20 mA analogue input for vibration sensor. The input is only active in CA 442 ID 1-4.

If the sensor has own power supply:



If the sensor is loop powered:



If additional temperature module, CA 442 ID 5 and CA 442 ID 6 are used.

Table 8b. Configuration of the temperature input on CA 442 ID 5

#		Dir.	Signal	Description
6	⊘	←	Sensor 1	Temp. sensor 1: **T1 Stator L2, Pump 1**
7	⊘	←	GND	
8	⊘	←	Sensor 2	Temp. sensor 2: **T2 Stator L3, Pump 1**
9	⊘	←	GND	
10	⊘	←	Sensor 3	Temp. sensor 3: **T1 Stator L2, Pump 2**
11	⊘	←	GND	
12	⊘	←	Sensor 4	Temp. sensor 4: **T2 Stator L3, Pump 2**
13	⊘	←	GND	
14	⊘	←	0 V	N/A in CA 442 ID 5
15	⊘	←	Analogue mA in	

Table 8c. Configuration of the temperature input on CA 442 ID 6

#		Dir.	Signal	Description
6	⊘	←	Sensor 1	Temp. sensor 1: **T1 Stator L2, Pump 3**
7	⊘	←	GND	
8	⊘	←	Sensor 2	Temp. sensor 2: **T2 Stator L3, Pump 3**
9	⊘	←	GND	
10	⊘	←	Sensor 3	Temp. sensor 3: **T1 Stator L2, Pump 4**
11	⊘	←	GND	
12	⊘	←	Sensor 4	Temp. sensor 4: **T2 Stator L3, Pump 4**
13	⊘	←	GND	
14	⊘	←	0 V	N/A in CA 442 ID 6
15	⊘	←	Analogue mA in	

1.5.3 *CA 443*

The product is for measuring current consumption, phase deviation and voltage input for a pump or a complete station.

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

The high electric noise level can distort electrical readings, especially phase timing readings are sensitive to switch transients from frequency converter.
Turn off all phase related alarms and dry run detection in PC 441 and ensure PC 441 firmware version is V.1.42 or later
Normal current transformers operate from 45-60 Hz and must be placed on mains line input to frequency converter.
Use only mains phase (voltage) missing alarm for pump protection (blocking).
To avoid conducted electrical noise in cabinet, follow best practices and manufacturer EMC compliance recommendation when installing frequency converters. Use shielded cables. Ensure mains and motor cables are separated from signal cables in cabinet.

General precautions:
If CA 443 for P1 also is used for mains monitoring, L1, L2 and L3 voltage inputs must be connected before pump circuit breaker.

Table 9. CA 443 ratings

Input	Range	Comment
Voltage	30 - 300 V ac ± 5.0 V ac	At higher voltages use voltage transformer
Current	0 - 5 A ± 0.1 A ac phase shift 0 - 90 deg ± 1.5 deg	Always use current transformer

Table 10. Bottom side connections

#		Dir.	Signal	Description
6	⊘	←	Sensor 1	AC voltage input L1
7	⊘	←	Sensor 2	AC voltage input L2
8	⊘	←	Sensor 3	AC voltage input L3
9	⊘	←	GND	Voltage reference input
10	⊘	←	a Sensor 4	Current transformer input 1
11	⊘	←	b GND	
12	⊘	←	a Sensor 5	Current transformer input 2
13	⊘	←	b GND	
14	⊘	←	a Sensor 6	Current transformer input 3
15	⊘	←	b GND	

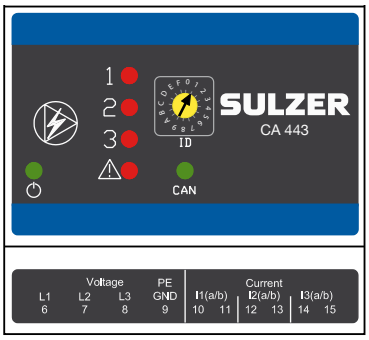


Table 11. CA 443 LED indicators from PC 441 firmware 1.42

LED	Indication	Mains monitor (0 or 1)	Pump monitor (1-4)
1	Phase 1	Voltage missing	Voltage missing
2	Phase 2	Voltage missing	Voltage missing
3	Phase 3	Voltage missing	Voltage missing
4	Warning	Alarm wrong phase order Alarm phase missing Pending high voltage Pending low voltage Pending unbalanced voltage Pending high freq. Pending low freq.	Alarm phase current missing

CA 443

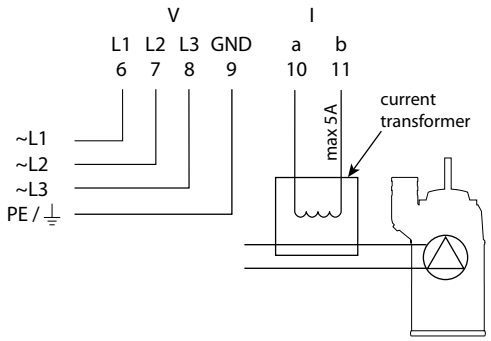


Figure 5 Simple connection of CA 443

2 CLEANING

How to clean the unit

Power off the unit and on CA 443 disconnect the connector for the phases. Only outside/front shall be cleaned by using a dry, soft cloth. A good choice would be the microfiber type of cloth and gently wipe the CA 44x unit on 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.

3 TECHNICAL DATA

3.1 *Technical data CA 44x*

Device	CA 441		CA 442			CA 443	
Ambient operation temperature	-20 to +50°C (-4 to +122°F)						
Ambient storage temperature	-30 to +80°C (-22 to +176°F)						
Degree of protection	IP 20, NEMA: Type 1						
Housing material	PPO and PC						
Mounting	DIN Rail 35 mm						
Installation category	CAT II						
Pollution degree	2						
Flame rate	V0 (E45329)						
Power rating current Transformers CA443						1.0 - 5.0 VA Class 1	
Dimension HxWxD	86 x 70 x 58 mm (3.39 x 2.76 x 2.28 inch) Plug in connectors will add 2x 9.5 mm (0.375 inch) to 'H'						
Humidity	0-95 % RH non condensing						
Power supply	9-34 VDC SELV or Class 2						
Power consumption	< 2.0 W						
Inputs	4 channels 4 leakage		5 channels 4 temp, 1 low dc current			6 channels 3 voltage, 3 ac current	
Modes	ABS mode	Xylem mode	PTC mode	Pt100 mode	0/4-20 mA Int. res 136 Ω. PTC protected	Voltage	Current
Approx range	0-220 kΩ	0-10 kΩ	0-10 kΩ	-20 - +180ºC (-4ºF - + 356 ºF)	0-20 mA	30-300 VAC	0-5A AC
Note	Input mode can be set individually for each channel.		Input mode can be set individually for each channel.				All current measuring is done through current trans-formers
Outputs	None						
Communication ports Field Bus	1 CAN port					1 galvanic isolated CAN port	
Max altitude	2000 m						
Approval	CE SP C US						

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