

SC10 Single Pump Controller Installation and User Manual



1. Safety



SAFETY WARNINGS:

- Always isolate the power supply before performing any installation work.
- Always isolate the power supply before attempting to trace a fault as the pump connected may start without warning.
- The installation shall be performed by an authorised electrician according to local safety regulations.
- The SC10 must only be used on pumping equipment that is capable of running dry for short durations.
- The SC10 is not to be used in Hazardous Areas or Locations (such as areas with Explosive or Flammable Gas or Dust Environments).
- There are no operator serviceable parts inside. Modification may negatively impact safety and may void warranty.

2. Unpacking, Inspection and Recycling

The delivery comprises of:

- 1 x SC10 Pump Control Unit
- 1 x SC10 Installation and Operations Manual. (This document.)
- 1 x SC10 Quick Reference Guide

If any of these items are missing or damaged at the time of delivery, please contact 2iB Pty Ltd. Please retain the product packaging and return the product for inspection if damaged.

A 4-20mA CT is required for snore control operation. This can be purchased separately from 2iB.

3. Installation

3.1 Important Installation Requirements

- **To avoid damage: If the Power Supply is to be earthed then terminal no. 2 (-) may be earthed, but not terminal no. 1 (+).**
- Check that the rated voltage of SC10 corresponds with the supply line voltage. The SC10 is mounted on a standard 35 mm DIN rail. Ensure that you use the SC10 within its Technical Specifications – see section 8 Specifications.
- To ensure accuracy and reliability screened twisted-pair cable is to be used for connection of the Current Transducer for measuring the pump motor current.

3.2 Remote Snoring Setup Controls for Operator Safety

The Stop Current Setpoint can be set and adjusted using pushbuttons on the front of the pump starter / control panel. This enables the pump setup, commissioning and setpoint adjustment to be performed without the electrical hazards entailed in opening the pump starter / control panel doors.

As shown in section 9 *SC10 Connections* the pushbuttons can be connected to digital inputs on the SC10. It is recommended to connect / provide pushbuttons for:

- Up (Setpoint Adjustment)
- Down (Setpoint Adjustment)
- Set (Set the Stop Current Setpoint)
- Start (Pump Start – needed for commissioning)

If you wish to prevent unauthorised personnel making adjustments then you can install these pushbuttons behind a lockable door or cover.

3.3 Front-Mounting of SC10 to View Operating Current and Access Pushbuttons

In addition to the standard mounting of the SC10 on a DIN Rail inside the cabinet, two alternative mounting options can be considered:

- A window can be built into the starter cabinet door and the SC10 can be mounted forward of the back-plate / gear-tray (or on the rear of the door) so that the current display is visible from outside of the panel.
- The SC10 can be mounted so that the front of the SC10 protrudes through the door (similar to circuit breakers) thus providing access to the current display as well as the buttons. Note that the SC10 is neither dust, nor water resistant so an outer door or cover will be required. (WARNING: Please take into account local and site electrical safety requirements.)

4. SC10 Operation

Snore or Snooze Control. The SC10 Snore Controller monitors the electrical motor current via a 4-20mA output current transformer (CT). By monitoring the centrifugal pump current the SC10 detects the low current when no or little fluid is being discharged (called *snoring*) and stops the pump from running dry for extended periods. When low current is detected the unit stops the pump. Note that Snore Control can work on both three-phase and single-phase motors.

The SC10 then pauses the pump operation for a time. The length of pause time before the next pump cycle is automatically calculated. This pause time increases and decreases automatically to adjust to inflow based upon the time required for the last pump run. The target duration of the pump run time is set via dip switches. The adaptive control algorithm will automatically adjust the pump pause time to try to achieve the target run time.

Float Switch Support. The SC10 can operate the pump with no level sensors. Or, it can utilise external level (float) switches either as the primary means of control or in combination with the snore control. Options Include:

- Timer start, Snore stop
- High level start, Snore stop
- High Level start, Low Level stop
- Push button start, Snore stop
- Push button start, Low Level stop
- Push button stop, Timer start
- Push button stop, High level start

The start button will start the pump anytime that it is pushed and it will continue to run until the pump is again snoring or the low level switch activates.

The SC10 also has a **pump cleaning feature**. The pump will stop periodically to allow a backflush as water runs back down the discharge hose. This helps clear the impellor and the suction strainer of debris reducing the chance of blockage and cavitation, as well as increasing the flow rate and efficiency.

Start-up of the SC10. The SC10 will normally start the pump 30 Seconds after start-up. The pump will run until a stop condition is reach – snoring is detected or the stop/low float is activated. This pump start will not occur if the stop/low float is active.

4.1 Snoring Detection Explained

What is Snoring?

When the pump starts sucking air (called snoring) the pump flowrate and the pump current drop. This drop in current can be detected by the SC10. This effect is shown in the graph below.

The Stop Current Setpoint

The *Stop Current Setpoint* is the current below which the SC10 considers the pump to be snoring.

As shown in this graph, the pump runs at a Normal Running Current until it begins snoring – indicated in the graph with *Pump starts snoring here*. At this point the current drops to a lower level.

If this lower Snoring Current is less than the *Stop Current Setpoint* then the SC10 stops the pump.

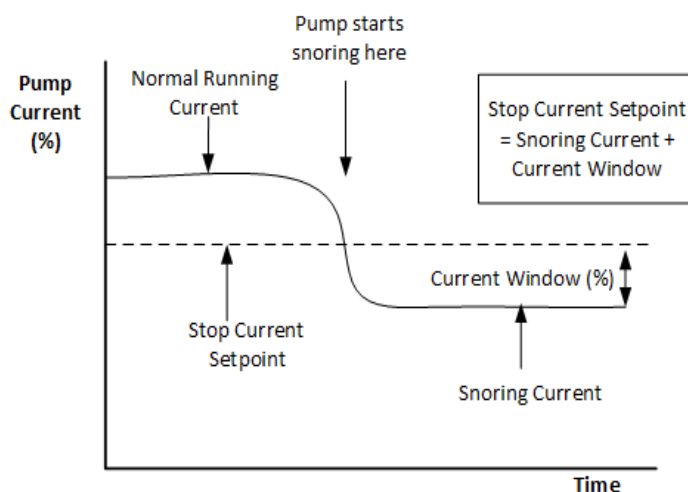
What is the Current Window?

The normal way of setting the *Stop Current Setpoint* is to press the *Set* button when the pump is snoring (see section 5.6). When the *Set* button is pressed, the *Stop Current Setpoint* is set to the measured pump current plus the *Current Window*. (Stop Current Setpoint = Measured Current + Current Window.) This is done so that the SC10 can reliably detect the snoring condition.

An Example

The operator is commissioning the pump which has a 0-100 Amp CT. They press *Start*. The pump runs normal at a current of 70% (70 Amps), then the pump snores and the measured current drops to 50% (50 Amps). The operator hears the pump snoring and presses the *Set* button combination.

If the *Current Window* DIP switches are set for a 10% current window then the *Stop Current Setpoint* is loaded with 60%.



Measured current when pump is snoring = 50% (50 Amps)

Current Window = 10% (10 Amps)

So, the *Stop Current Setpoint* is loaded with 50% + 10% = 60% (60 Amps)

The *Current Window* should be set to enable a *Stop Current Setpoint* to be set in between the Normal Running Current and the Snoring Current.

If on the next pump run the measured snoring current is 55% (55Amps) then this will still be detected as snoring and the pump will be stopped.

Single Phase Motors

Snore detection works identically on single-phase motors as it does on three-phase motors. Note however that on smaller motors (single- or three-phase) the variation of current with load will be smaller which may make the setup more critical. In particular, the *Current Window* setting may need to be smaller. Take a note of the current reading displayed on the SC10 and compare that for normal operation and snoring and use this as a guide.

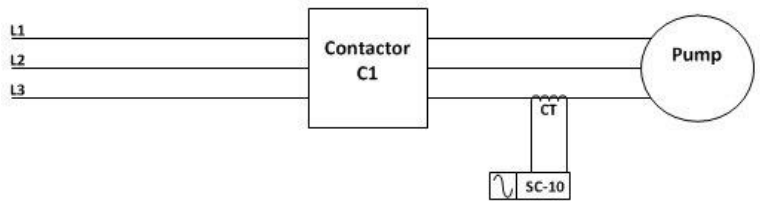
5. SC10 Set Up

The initial set up of the relay is done by setting these parameters:

1. CT Current Range
2. Pump Cycle Time
3. Alarm Relay Activation Conditions
4. Float Switch Contact Status
5. Current Window %
6. Stop Current Setpoint

5.1 Current Range & Current Transformer Selection

The SC10 uses a 4-20mA Current Transformer (CT) to measure the motor current. The selected current transformer rated primary current should be close to the full load current of the connected load for optimal accuracy but should not exceed it. Multiple turns of the motor phase wire could be made through the CT to better match the motor rated current to the CT.



In the circumstance that this isn't achievable there are four current range dip switch selections available 100%, 50%, 25% and 12.5% that increases the current percentage display providing full scale set point ranging setting

i.e. if you have a 0-100 CT with a 50 Amp full load current the output is only 4mA to 12mA and the percentage of current displayed will only be 50% by switching dip switch 2 (50%) on it increases the display range resolution to 100% providing full range selection.

Tip: For best accuracy, use (1) Multiple turns through the CT or (2) Selectable range on the CT in preference to (3) Setting a lower range on the SC10.

See also section 11 *Examples of CT Range and Setup for Starter Panels.*

Single Phase Motors. See also the note about single-phase motors in section 4.1 *Snoring Detection Explained.*

5.2 Pump Run Time Target

When the SC10 is first commissioned a pump run time target should be set, the run time selection should reflect the time the sump or container is currently taking to empty by the installed pump. The stop or pause time duration is controlled by the SC10 controller and will vary based on run and stop history and programmed adaptive control algorithm to attempt to achieve the target run time. Setting a pump cycle time target via DIP switches.

Tip: If the level in the sump rises too high then select a shorter Cycle Time. Conversely if you want the level to rise higher before the pump starts then select a longer Cycle Time.

Current Range			
SW	1	2	Setting
	Off	Off	100% (default)
	Off	On	50%
	On	Off	25%
	On	On	12.5%

Pump Run Time Target				
SW	3	4	5	Setting
	Off	Off	Off	3 min
	Off	Off	On	5 min (default)
	Off	On	Off	8 min
	Off	On	On	15 min
	On	Off	Off	30 min
	On	Off	On	1 h
	On	On	Off	2 h
	On	On	On	4 h

Tip: Generally it is better to have the pump start at a lower than a higher level, so select a Target Run Time which is lower or equal to what you expect to need.

5.3 Start and Stop Modes

The standard operating mode of the SC10 starts the pump based on the timer or the high float switch and stops when either the pump snores or the low float switch activates.

Stop on Low Float Only / Disable Snore Stop: Using DIP Switch 15 you can disable the pump stop based on the pump snoring so that the pump will only stop when the low float switch is reached. This can be useful if you need the pump to stop at a specific level (that of the low float switch).

Start on High Float Only / Disable the Timer Start: Using DIP Switch 16 you can disable pump start based on the timer. This means that the pump will only start based on the float switch. This may be useful if you want the pump to start at a specific level (that of the high float switch). This can be useful in hoppers or tanks.

Float Switch Only Operation: By switching both DIP Switches 15 and 16 ON the pump will start on the high float switch and stop on the low float switch. (Timer start and Snore Stop will be disabled.) This mode can be useful in hoppers or tanks. This same operating mode can be used to start and stop the pump only on Start and Stop Pushbuttons.

Modes

SW	Setting
15	On: Disable Snore Stop
16	On: Disable Timer Start

Default = Off, Off.

5.4 Alarm Relay Activation

The SC10 has a single alarm output can be set to any combination of four functions and displayed externally with a fault lamp if desired. Ref DIP Switches (6, 7, 8, 9) on front of SC10.

- CT Fault (diagnostic monitoring of CT)
- Sump Low
- Sump High
- Failed to Run (pump called to run no current detected)

Alarm Relay Activates for ...

SW	Setting
6	AIN (CT) Fault
7	Stop / Low Float
8	Start / High Float
9	Fail to Run (Low Current)

On = Activates for this condition.

Default= Off, Off, Off, Off

5.5 Stop / Low Level Switch Invert

If a low level switch is used then the switch contact status needs to be set to normally open or closed. Ref DIP Switch (10) on front of SC10.

Tip: If both the High and Low Level Switches are the same and their contacts close when the float switch is covered then you will need to set SW 10 to ON.

Stop / Low Float Invert

SW	10	Setting
	Off	Closed = Low (default)
	On	Open = Low

5.6 Setting the Stop Current Setpoint

Pressing the Set button combination (↑+↓ simultaneously) sets the Stop Current to Measured Current + Window Current

To Set the Stop Current Setpoint perform the following steps:

1. Ensure that there is enough fluid in the sump or container so the pump doesn't immediately draw in air
2. Press the Start button on the relay or on the front of the panel to start pump.
3. When the pump running and is snoring (drawing air), press the ↑Up and ↓Down buttons simultaneously. The stop current setpoint is now set to the displayed percentage.
4. Allow water to fill above pump suction and start the pump again to ensure it stops when snoring. If it doesn't stop adjust setting or expand window current.



Note: This settings is non-volatile. It is stored through power-cycles of the SC10.

Single Phase Motors. See also the note about single-phase motors in section 4.1 *Snoring Detection Explained*.

5.7 Current Window Setting

See section 4.1 Snoring Detection Explained for an explanation of the *Current Window*.

The current window setting has 4 dip switches +2%, +4%, +8% and +16%, by selecting a current window it adds the percentage to the stop current setpoint.

As an example if the stop current threshold is set to 20% of CT range and the window current is set to +4% via dip switch 13 the stop current threshold = 20% + 4% = 24 % of CT range.

Single Phase Motors. See also the note about single-phase motors in section 4.1 *Snoring Detection Explained*.

5.8 Current Setpoint Adjustment

An additional adjustment method is by using the up (↑) and down (↓) buttons independently. By pushing the up or down button it will adjust the stop current threshold to the user's desired value as a percentage of CT current.

Note: This settings is non-volatile. It is stored through power-cycles of the SC10.

5.9 Pump Cleaning Cycle

Centrifugal dewatering pumps frequently experience clogging in the flow path. Causes include buildup of materials on the suction strainer (some floating, some underwater), buildup in the cooling jacket and fibrous materials caught on or around the impeller.

This results in reduction of flow rate and efficiency and can even result in cavitation causing pump failure.

Stopping the pump periodically on long pump runs helps to alleviate these problems. It provides an opportunity for the material to drop or float away from the suction strainer and results in a backflush of water running back through the pump which can help to clear the cooling jacket and impeller as well. The amount of backflush depends on the position of the non-return (check) valve. The SC10 will stop the pump for 30 seconds every 30 minutes **of continuous pump runtime**. Thus this feature only operates for long runtimes.

This feature can improve pump performance and reduce operation and maintenance costs.

This feature may be disabled by activating Digital Input DIN7. See section 12 Reference.



6. Display and LED Indication

6.1 Current % Display

PA = PAUSING. Pump is Pausing.

CL = CLEANING. Pumps is Stopped for a Cleaning flush.

Number = the measured current as a percentage of the measured range. (Taking into account the Current Transformer range configured using the DIP switches as per section 5.1.)

6.2 LED Indicators

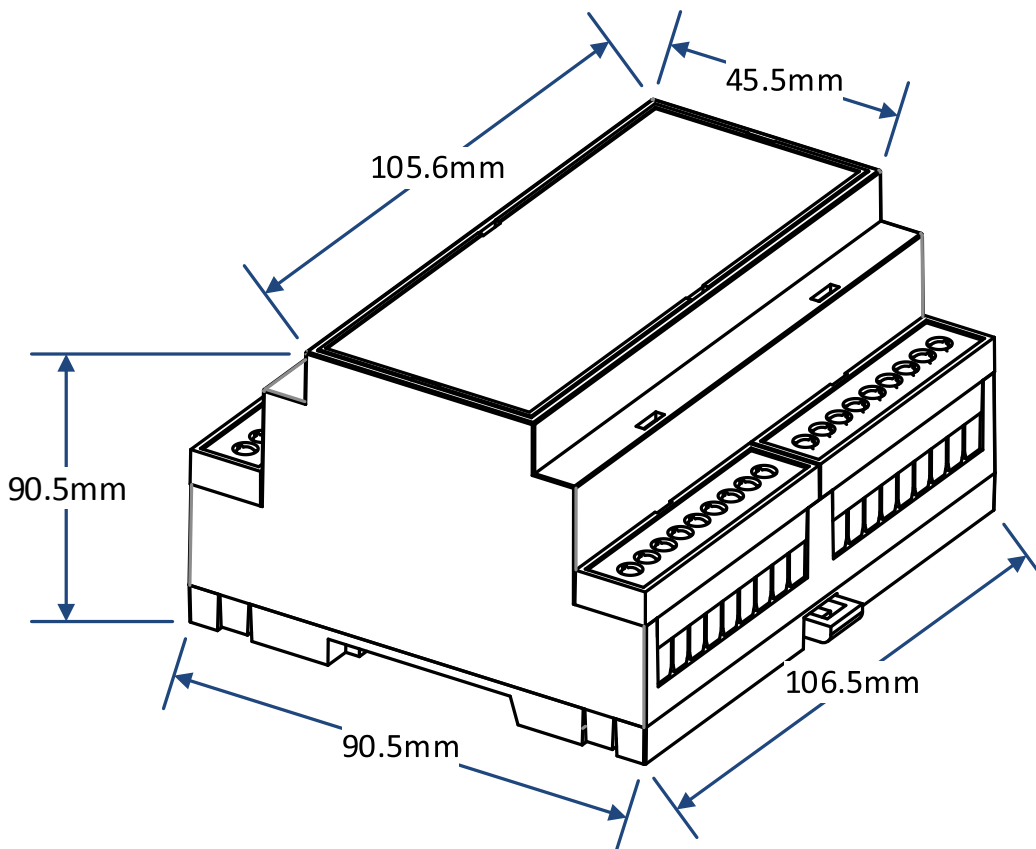
See section 12 Reference for details of the LED indicators.

7. Troubleshooting

Question / Problem	Answer
<ul style="list-style-type: none"> Pump Starts too early / often. Level does not rise high enough before the pump starts. 	<ul style="list-style-type: none"> Increase the Pump Cycle Time. The controller will wait longer before starting the pump. See section 5.2.
<ul style="list-style-type: none"> Pump Starts too late. Level does rises too high before the pump starts. 	<ul style="list-style-type: none"> Decrease the Pump Cycle Time. The controller will not wait as long before starting the pump. See section 5.2. If you need the pump to start at a specific level then consider using a High Level (Float) Switch.
<ul style="list-style-type: none"> Current display percentage is always zero. Lo Current LED is lit. 	<ul style="list-style-type: none"> Ensure installed 4-20mA CT correctly installed and connected to terminals 9 and 8. Ensure installed 4-20mA CT is correct range for installed load.
<ul style="list-style-type: none"> The pump stops although it is not snoring. 	<ul style="list-style-type: none"> Ensure the inhibit/low float input is not activated Stop current setpoint requires adjustment as it is set too high. Adjust the stop current setpoint to a lower value. If using the <i>Set</i> functionality during commissioning then adjust the <i>Current Window</i> to a lower value. A pump Cleaning cycle is occurring. The SC10 stops the pump as a cleaning cycle for 30 seconds after a continuous pump run of 30 minutes. See section 5.9 Pump Cleaning Cycle.
<ul style="list-style-type: none"> The pump doesn't stop when snoring. 	<ul style="list-style-type: none"> Ensure the start/high float input is not activated The stop current setpoint is set too low. Adjust the stop current setpoint to a higher value. If using the <i>Set</i> functionality during commissioning then adjust the <i>Current Window</i> to a higher value.
<ul style="list-style-type: none"> Power on but no lights are illuminated on unit. 	<ul style="list-style-type: none"> Check power supply to unit across terminal 1 & 2. Unit is faulty or damaged and requires change out.

8. Specifications

Supply Voltage	24VAC, 12-24VDC
Frequency	45–65 Hz
Power Consumption	<10VA
Motor Current Sensor	4-20mA input CT. Range to suit attached load. SC10 provides 24VDC drive for CT.
Operating Temp	0-55 degrees Celsius
Run Relay Contact Rating	5 A, 48 VAC Resistive, 1.5 A 48 VAC Pilot duty / AC12
Alarm Contact Rating	5 A, 48 VAC Resistive, 1.5 A 48 VAC Pilot duty / AC12
Dimensions	W 106.5mm x H 90.50 mm x D 59mm
Material	PC/ABS
Mounting	35mm Din rail mounted
Weight	300 g
Certification	EN 61000-6-3:2007+A1+AC FCC Part 15B



9. SC10 Connections

See section 12 Reference for terminal identification.

Figure 1 – SC10 Front Panel

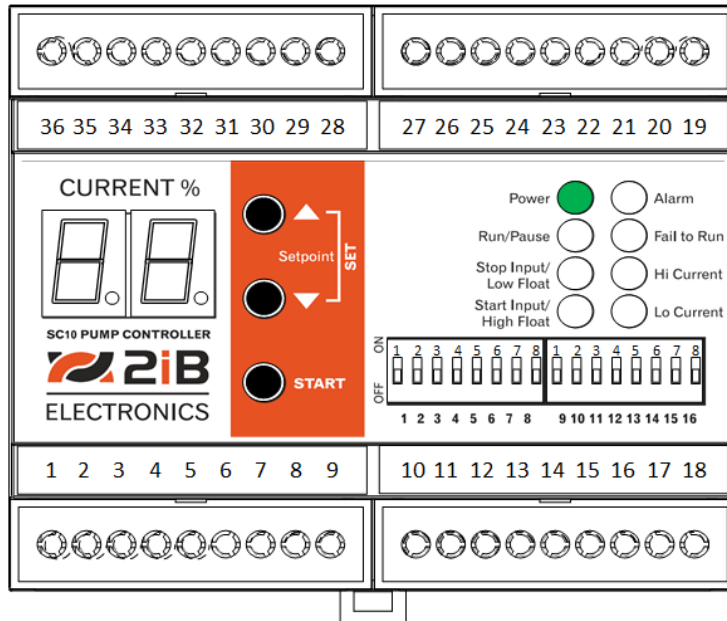
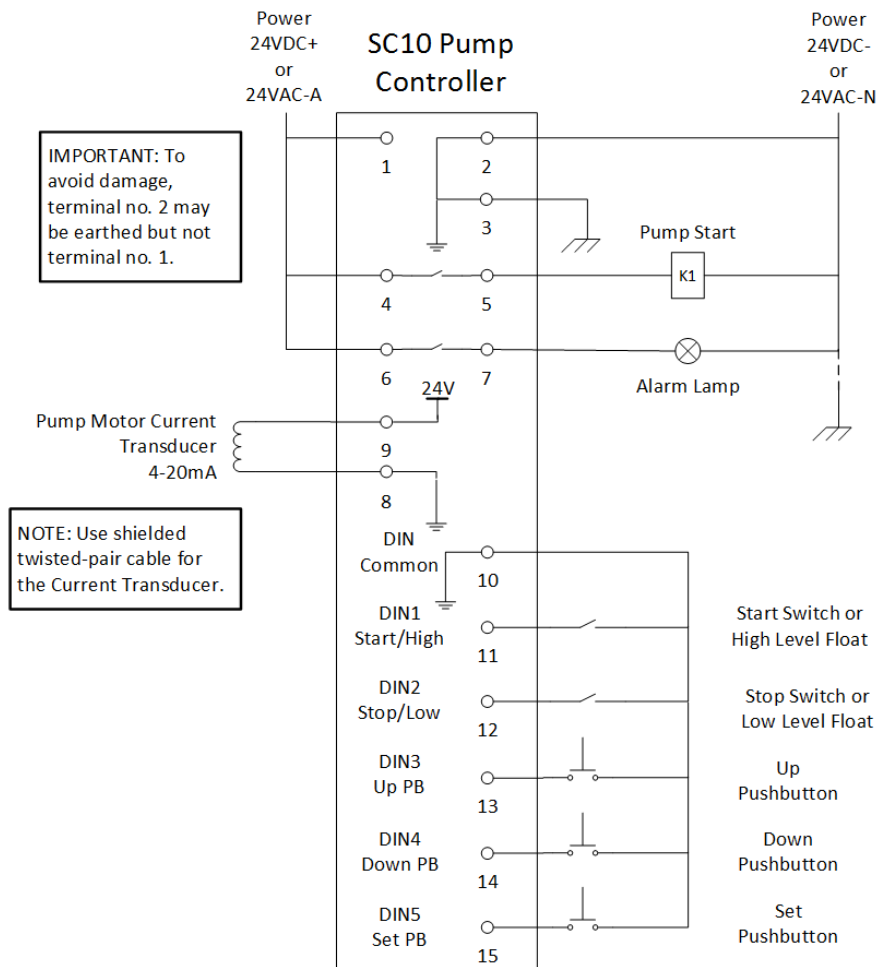
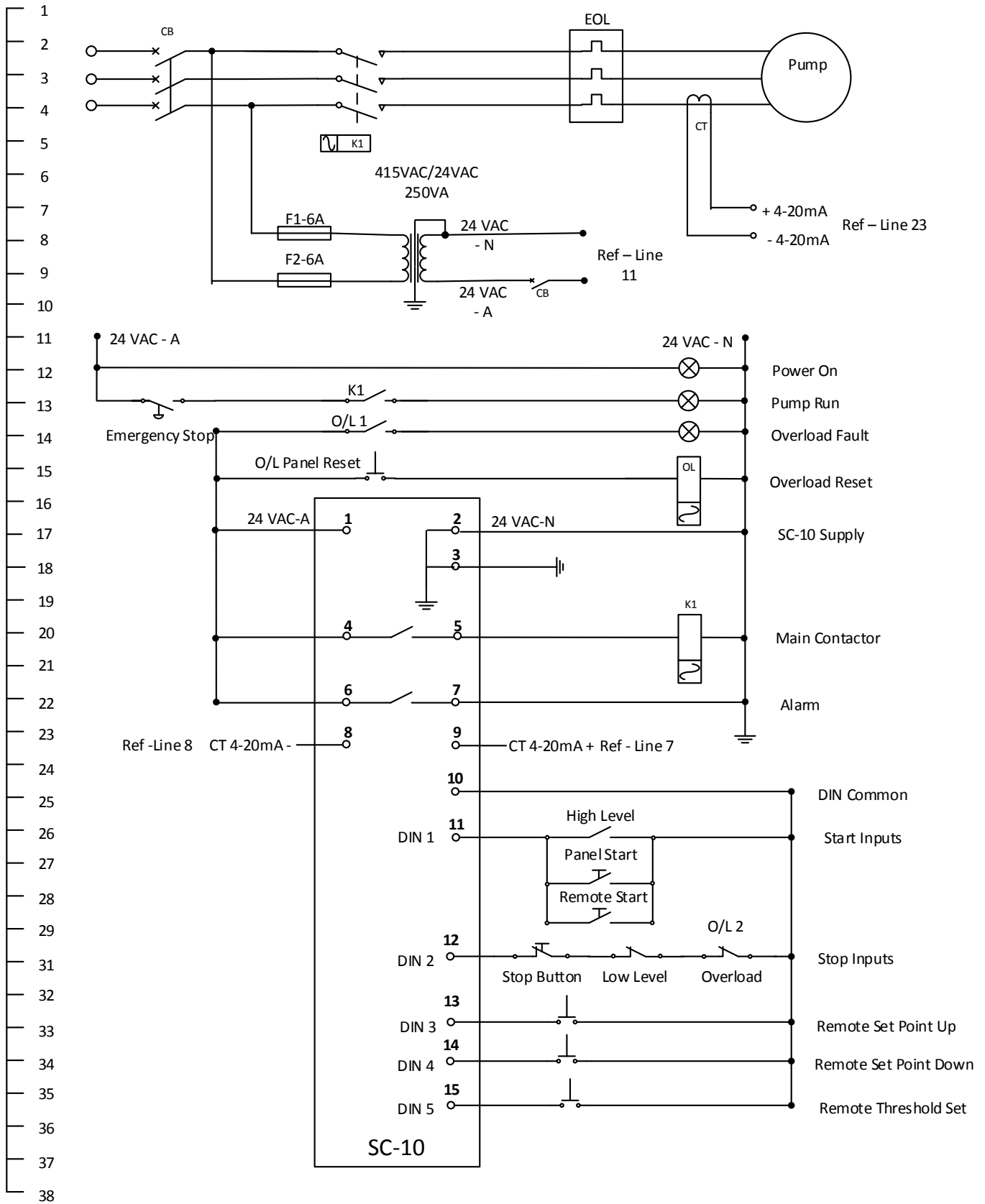


Figure 2 - Connections



10. Pump starter wiring example



11. Examples of CT Range and Setup for Starter Panels

11.1 22kW Starter for 8kW & 20kW Flygt Pumps (1kV)

Pump Model	Rated Current
Flygt 8kW 2125	6.2 A
Flygt 20kW 2151	14A

CT Set to 20A

CT is Dwyer CCT40 with selectable ranges of 10A, 20A, 50A. Set to 20A.



Set Current Range DIP Switches to 100%

Current Range			
SW	1	2	Setting
	Off	Off	100% (default)

11.2 37kW Starter for 20kW & 37kW Flygt Pumps (1kV)

Pump Model	Rated Current
Flygt 20kW 2151	14A
Flygt 37kW 2201	26 A

CT Set to 50A

CT is Dwyer CCT40 with selectable ranges of 10A, 20A, 50A. Set to 50A.



Set Current Range DIP Switches to 100%

Current Range			
SW	1	2	Setting
	Off	Off	100% (default)

To use with an 8kW & 20kW Pumps it would be best to set the CT to Mid (20A) Range.

11.3 Other Options

You can scale the current measurements in a few different ways

	Rated Current (FLC) Amps	CT Rating Amps	SC10 Current Range				At Rated Current SC10 will Display
			Range	DIP Switches			
				SW 1	SW 2		
An Example: Optimal setup for an 8kW Pump. (Based on 11.1 above.)							
Option 1: As above.	8	6	20	100%	off	off	30%
30% of the range really is a bit low. It would be best to adjust the range to increase the measurement.							
Option 2: Change the Range Setting on the SC10	8	6	20	50%	off	on	60%
This gives a range of 10A and at FLC this shows 60%. (If you mount the SC10 so that its front panel is accessible then this change could be done safely without opening the starter panel.)							
Option 3: Change the Range setting on the CT to 10A.	8	6	10	100%	off	off	60%
Results are the same as option 2. (This requires disconnection of power and adjustment by an electrician inside the starter panel.)							
Option 4: Put another turn through the CT	8	6	10	100%	off	off	60%
Results are the same as options 2 & 3, but this requires an electrician to change the wiring.							

12. Reference

DIP Switches

Current Range			
SW	1	2	Setting
	Off	Off	100% (default)
	Off	On	50%
	On	Off	25%
	On	On	12.5%

Pump Run Time Target

SW	3	4	5	Setting
	Off	Off	Off	3 min
	Off	Off	On	5 min (default)
	Off	On	Off	8 min
	Off	On	On	15 min
	On	Off	Off	30 min
	On	Off	On	1 h
	On	On	Off	2 h
	On	On	On	4 h

Alarm Relay Activates for ...

SW	Setting
6	AIN (CT) Fault
7	Stop / Low Float
8	Start / High Float
9	Fail to Run (Low Current)

On = Activates for this condition. Default= Off,Off,Off,Off

Stop / Low Float Invert

SW	10	Setting
	Off	Closed = Low (default)
	On	Open = Low

Current Window (%)

SW	Setting
11	On: +16%
12	On: +8%
13	On: +4%
14	On: +2%

Default = Off,Off,Off,On.

Modes

Default = Off,Off

SW	Setting
15	On: Disable Snore Stop
16	On: Disable Timer Start

Current % Display

PA = PAUSING. Pump is Pausing.

CL = CLEANING. Pumps is Stopped for a Cleaning flush.

Number = The measured current as a percentage of the measured range (taking into account the Current Transformer range configured using the DIP switches as per section 5.1).

Terminals

Power	DC+ / AC	1
24VAC	DC- / AC (Earth)	2
12-24VDC	Earth	3
Pump Run Relay		4
		5
Alarm Relay		6
		7
Pump Current CT (4-20mA)	-	8
	+	9
Digital Inputs	DIN Common	10
	DIN 1: Start / High Float	11
	DIN 2: Stop / Low Float	12
	DIN 3: Up Pushbutton	13
	DIN 4: Down Pushbutton	14
	DIN 5: Set Pushbutton	15
	DIN 7: Disable Cleaning Cycle	17
	DIN 8: Remote Config. Mode	18
No Connection		19-27
Do not use (AIN+ Loop Power)		28
Modbus RTU (RS485)	A	29
	B	30
	Earth	31
No Connection		32-36

LED Indicators

Power	On	Power is Present
	Flash	Unit starting up.
Run / Pause	On	Pump is Running
	Pulse Flash	Pump is Pausing and will start when pause timer completes or high float or start signal activates.
	Fast Flash	Pump Snoring. Pump will stop after 10 seconds of snoring
	Slow Flash	Pump Starting or running a cleaning cycle.
Stop Input / Low Float	On	Stop Input / Lo Float Active
Start Input / High Float	On	Start Input / Hi Float Active
Alarm	Flash	Alarm Present & Alarm Relay Active
Fail to Run	On	Pump previously failed to run. (Current Not detected when the pump run relay is active.)
	Fast Flash	Pump is failing to run.
Hi Current	Fast Flash	CT input too high
	Pulse Flash	CT input is above 100% of range. Consider adjusting CT measuring range or using a larger CT.
Lo Current	Fast Flash	CT input too low.

Pulse Flash = Active for 0.25 secs every second.

Slow Flash = 1Hz Flash. Fast Flash = 2 Hz Flash.

13. Modbus and HMI

13.1 Remote / Local Configuration Mode (for Use with HMI)

Normally, when used standalone, the SC10 is configured using the DIP switches.

When used with a HMI, the SC10 has a remote configuration mode to enable configuration from the HMI (via the Modbus interface).

To enable Remote Configuration Mode, activate Digital Input DIN8 by connecting terminal 18 (DIN 8) to terminal 10 (DIN Common).

Configuration Mode	Configured using	Purpose	Notes
Local	DIP switches on SC10	For use of SC10 standalone.	Modbus RTU configuration is completely ignored.
Remote	HMI via Modbus RTU Interface	For use with HMI on Modbus port.	Designed to be used with the SC10 HMI. DIP Switches are completely ignored.

13.2 Modbus RTU Interface – RS485

The SC10 has an RS485 port which supports the Modbus RTU protocol for use of a HMI, SCADA or PLC communications.

Serial Parameters

Baud Rate	9600 bps
Data Bits	8
Parity	None
Stop bits	1

Important Note: The default Modbus slave address is 10.

13.2.1 Changing the Address

1. Press the button combination \downarrow + START simultaneously.
2. Use the up (\uparrow) and down (\downarrow) buttons to change the address.
3. Once the display stops flashing the change will be saved.
4. Power the SC10 off and on so the new address will apply. This only applies to the Modbus address and not to other settings. **Important:** Wait until the display stops flashing before removing power otherwise your change will not be saved.

The Modbus address may be set to a value from 1 to 99.

This feature to set the address applies only to SC10 serial numbers > 20180900000.

13.3 Modbus Points List

Registers may be read as Input or Holding Registers.

Coils and Discrete Inputs may be read as registers.

Coils may be read as Discrete Inputs.

No Modbus errors or exceptions will be generated. Reads from invalid addresses will return 0. Writes to invalid addresses will be ignored.

Addressing: Modbus addresses are indexed from 1 in the following table. The address in the Modbus packet is 1 less than that address. (There is inconsistency between Modbus implementations about whether the addresses start from 0 or 1, so if you are not reading the value that you expect then consider reading the previous or next address.)

Register Address	Coil / Discrete Address	Read Only (RO) or Read/Write (RW)	Description
1	-	RW	Action (Command) Coils. An action coil is a request to the device to perform an action. When written to a 1 (set) by the master, these will be cleared by the slave a few seconds later.
LSB	1	RW	Call the pump to start. (This is equivalent to pressing the START button.)
	2	RW	Call to stop the pump.
	3	RW	Call to set the current to the measured current. See section 5.6.

Register Address	Coil / Discrete Address	Read Only (RO) or Read/Write (RW)	Description
	4	RW	Save Settings. Remote Configuration Mode Only. Settings will apply, but will not be saved until the coil is set.
	5	RW	Reset settings to Defaults. Remote Configuration Mode Only.
2	-	-	Settings Coils (Remote Configuration Mode Only)
LSB	17	RW	Alarm relay activates for AIN (CT) fault.
	18	RW	Alarm relay activates for Stop / Low Float active.
	19	RW	Alarm relay activates for Start / High Float active.
	20	RW	Alarm relay activates for Pump Fails to Run (Low current when Pump Run Relay is active).
	21	RW	Invert the Low Float Input.
	22	RW	Disable Snore Stop.
	23	RW	Disable (Pause) Timer Start.
3	-	-	Unused
4	-	-	Unused
5	-	RO	Discrete Status Values
LSB	65	RO	Low Float / Stop Input is active.
	66	RO	High Float / Start Input is active.
	67	RO	Pump Run Relay is On.
	68	RO	Alarm Relay is On. (An alarm is active.)
	69	RO	Remote Configuration Mode is active.
	70	RO	Pump is Snoring.
	71	RO	AIN 1 / CT Input is too high.
	72	RO	AIN 1 / CT Input is too low.
	73	RO	Pump has failed to run.
	74	-	Unused
	75	-	Unused
	76	-	Unused
	77	RO	Active Alarms
			Alarm for Analog Input (CT Input) low is active.
	78	RO	Alarm for Low Float Active.
	79	RO	Alarm for High Float Active.
MSB	80	RO	Alarm for Pump Fails to Run. Pump Run Relay Active, but no current was detected.
6	-	-	Unused
7	-	-	Unused
8	-	-	Unused
9	-	RO	Pump Control State: 0: Initial State 1: Pump Pausing (waiting for Pause Timer to expire) 2: Pump Running 3: Low Level active (Pump Stopped) 4: High Level active (Pump Running) 5: Pump is pausing to flush pump. 6: Pump is starting (Pump not yet running.)
10	-	RO	Pump Current. Percentage with 1 decimal place. e.g. 125 = 12.5%
11	-	RO	Pump Stop Current (Snore Setpoint). . Percentage with 1 decimal place. E.g. 125 = 12.5%. Note: Read Only. See Register 23 for the actual setpoint.
			The Duration of this pump run:
12	-	RO	Hours
13	-	RO	Minutes
14	-	RO	Seconds

Register Address	Coil / Discrete Address	Read Only (RO) or Read/Write (RW)	Description
15	-	RO	The Time remaining of the current Pause Timer: Hours
16	-	RO	Minutes
17	-	RO	Seconds
Settings / Configuration (Remote Configuration Mode Only.)			
IMPORTANT: To save changes to these settings, set coil 4 (see above).			
18	-	RW	The Pump Run Time Target Setting: ... Hours
19	-	RW	... Minutes
20	-	RW	... Seconds
21	-	RW	Window Current. The offset added to the measured current to obtain the stop current setpoint when the Set button is pressed. Percentage with 0 decimal places 2 = 2%.
22	-	RW	CT Current Range 0 = 100%, 1 = 50%, 2 = 25%. 3 = 12.5%
23	-	RW	Pump Stop Current (Snore Setpoint). . Percentage with 1 decimal place. E.g. 125 = 12.5%.
Software Version Number/Date:			
30	-	RO	YY
31	-	RO	MM
32	-	RO	DD

LSB = Least Significant Bit, MSB = Most Significant Bit.

14. Legal

14.1 Product Warranty

See Warranty information at www.2ib.com.au.

14.2 Document Subject to Change

This Document: This document and its contents are subject to change without notice.

14.3 Third Party Software Acknowledgement

FreeModbus Library: A portable Modbus implementation for Modbus ASCII/RTU.

Copyright (c) 2006 Christian Walter wolter@sil.at. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. The name of the author may not be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE AUTHOR "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

A large version of the 2iB logo, consisting of a stylized orange and black graphic followed by the text '2iB'. Below this is a horizontal line, and then the word 'ELECTRONICS' in a bold, black, sans-serif font.

2iB
ELECTRONICS

**2iB Pty Ltd
4 Barkala St,
Wellington Point, QLD
Australia**

**Tel. +61-7-3822 1005
Fax +61-7-3822 1008
support@2ib.com.au**

www.2ib.com.au

© 2018 2iB Pty Ltd. All Rights Reserved. SC10 Installation and User Manual V20181130a