

EL-FI DCM

DRAINAGE CONTROL MONITOR

**MONITORS AND CONTROLS DRAINAGE PUMPS (SINGLE OR
DUAL PUMP SYSTEM) WITH DRY RUNNING PROTECTION**

INSTRUCTION MANUAL



Patent

DCM is based on technology for which patent is pending.

NOTE! EI-FI DCM does not contain any user-serviceable parts. Breaking the seal over the front panel and housing will invalidate the warranty.

Valid for the following model:
El-Fi DCM

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QUICK SET-UP

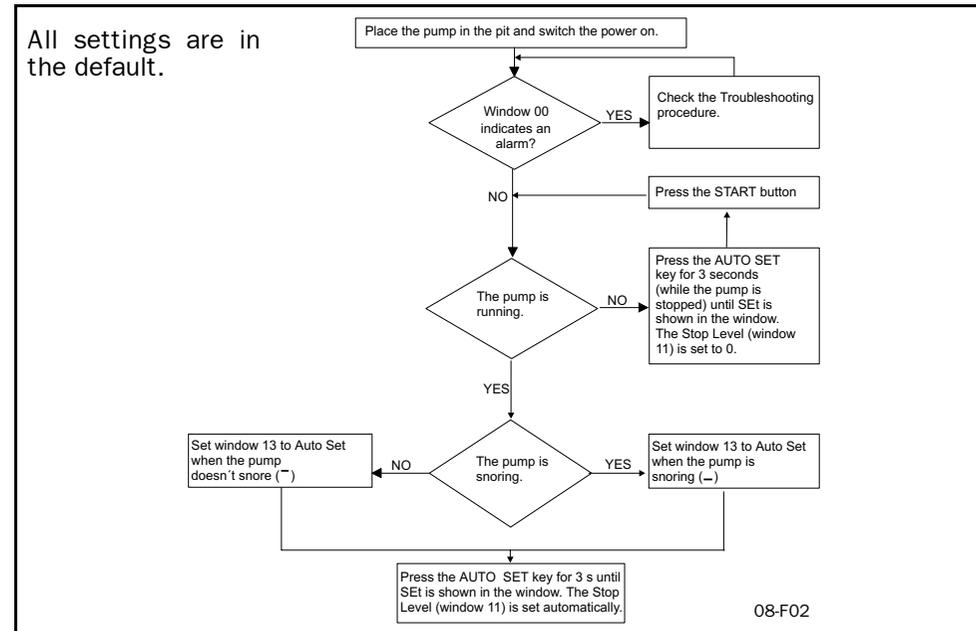


Fig. 1 Quick set-up for single-pump system (the pump will start and stop during the set-up).

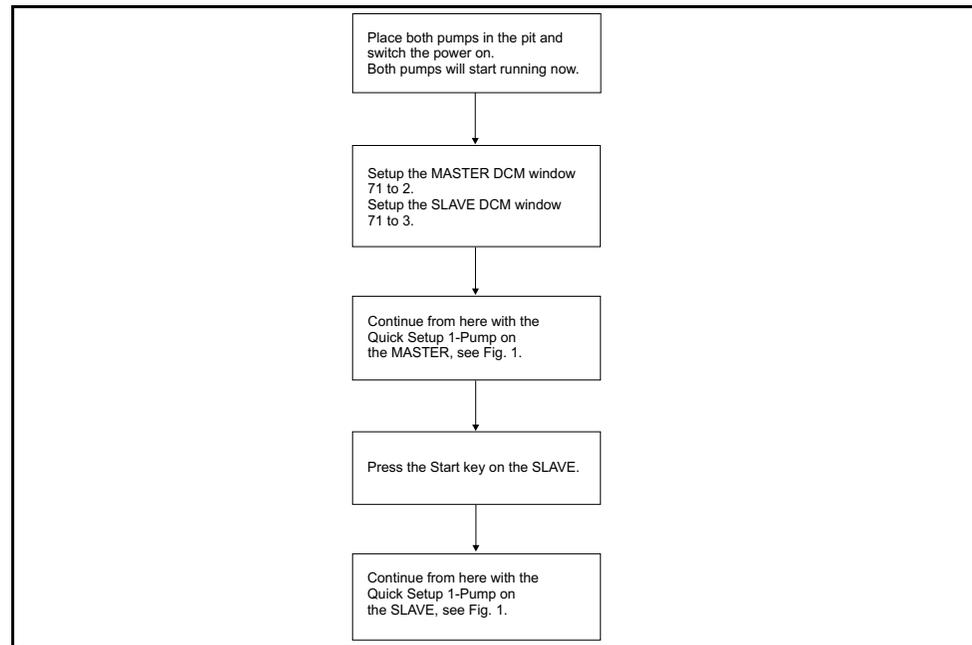


Fig. 2 Quick set-up for dual-pump system (the pumps will start and stop during the set-up).

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1. INTRODUCTION

EL-Fi DCM is a Drainage Control Monitor from Emotron that remotely controls submersible pump equipment. The pump stops when it begins to snore (draw air) when the pit has been pumped free from water. During a pumping operation, the monitor measures the length of the run period and uses this to determine the length of the rest period. The longer the run period, the shorter the rest period. As a result the run and the rest periods are continuously adapted to the rate of flow.

Two EL-Fi DCM Drainage Control Monitors can be connected in parallel to control two submersible pumps and allow independent operation and display of monitored values. This instruction manual contains complete instructions for the installation and use of the monitor. Please read the entire manual before installing or using the monitor.

1.1 Inspection and unpacking

The delivery comprises:

- EL-Fi DCM Drainage Control Monitor
- Instruction Manual
- EL-Fi current transformer

All products from Emotron are carefully controlled and packed. However damage may occasionally occur during transport.

When you receive the package, check all items against the packing list. If anything is missing or is damaged, contact the supplier and the forwarding agent. Keep the packaging for possible inspection by the forwarding agent, or to return the delivery.

1.2 General description

El-Fi DCM measures the input power by measuring voltage and current. This gives a reliable measurement of pump motor load over the total load range.

The monitor is connected to the pump motor supply cable with a standard El-Fi current transformer. The same monitor is suitable for small and large induction motors and the only accessory needed is a current transformer.

El-Fi DCM is enclosed in a recyclable PC/ABS plastic housing. At the front is the operator's panel which comprises a LCD-display and a set of six keys. The connection terminals are at the top and the bottom of the monitor front panel. The monitor should be mounted on a standard DIN-rail.

El-Fi DCM is very easy to use. The AUTO SET function makes it possible to adjust the monitor automatically by pressing just one key individually for each pump. El-Fi DCM always stops the pump at when it starts to snore and restarts it after a calculated pause time or in response to a high-level switch-over.

El-Fi DCM is able to check;

- Phase sequence.
- Phase asymmetry.
- Current transformer (Primary windings).
- Temperature monitoring on pump motor.
- Under-voltage and Overvoltage.

El-Fi DCM gives information about;

- Delay before restarting after the pump has stopped.
- Pumping time since the latest pump start.
- High-level pumping time since the pump started as a result of high-level switch.
- Measured power as percentage of the monitor's measurement range.
- Measured voltage.
- Measured peak power as percentage of the monitor's measurement range.
- Time counter for total pumping time.
- Start counter - total number of times pump has started.

El-Fi DCM can be connected in parallel for dual-pump system.

- Adjustment
- MASTER/SLAVE function
- If there is a breakdown in one of the pumps the other pump starts to operate.

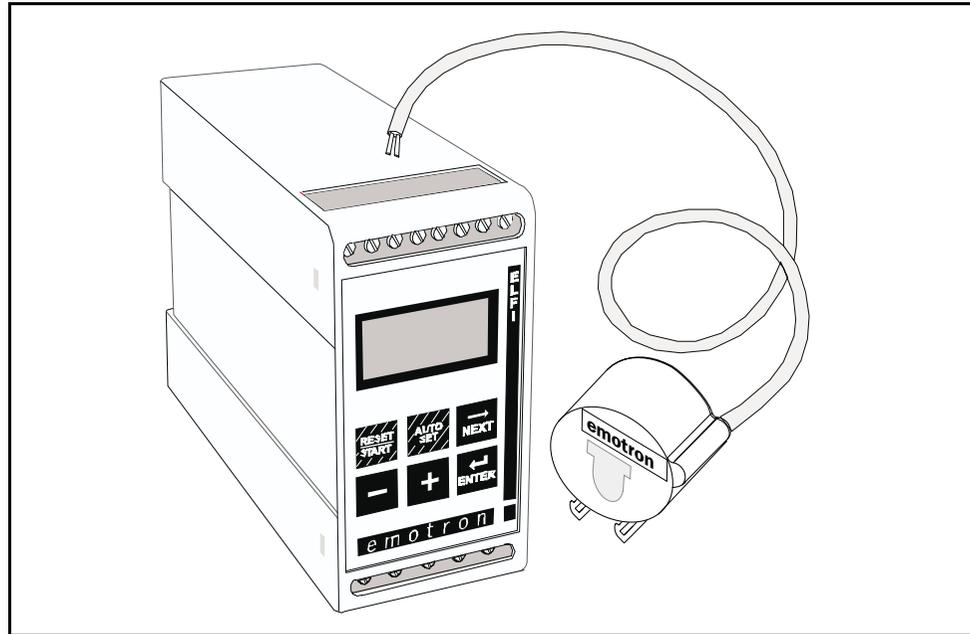


Fig. 3 The front panel of El-Fi DCM with an El-Fi CTM current transformer.

2. SAFETY

- Read the “Technical Data” chapter of this manual thoroughly before installing and using the monitor.
- The monitor should be installed only by a qualified technician.
- Always disconnect supply circuits prior to installing, connecting or disconnecting the monitor.
- The installation must comply with general and local regulations.

2.1 Dismantling and Disposal

The housing of the El-Fi DCM is made of recyclable PC/ABS plastic, and the circuit boards contain small amounts of tin and lead. When disposed of, all parts must be handled and recycled in accordance with local regulations.

3. INSTALLATION

El-Fi DCM must be installed and commissioned only by an authorized person according to the local safety regulations.

The monitor is mounted on a standard DIN-rail 46277, 35 mm. See “Technical Data” for maximum operating temperature range, monitor dimensions etc. Before installing, make sure that no voltage is applied to the equipment and that the voltage rating of the monitor, as shown on the rating plate on the side of the monitor, corresponds to the line voltage.

3.1 Choice of current transformer

Depending on the motor size, El-Fi DCM should be used with one or two current transformers. For pump motors with a rated current up to 100 A, use a single El-Fi current transformer. The possible combinations of current transformers and number of primary windings are listed in Table 1, page 14 and Table 2, page 15.

Table 1 Table for selection of current transformer for motors with a rated current up to 100 A

Rated motor current	Choice of current transformer and number of primary windings for different pump motor size.			
	CTM010	CTM025	CTM050	CTM0100
0.40 to 1.00 A	10			
1.01 to 2.00 A	5			
2.01 to 3.0 A	3			
3.1 to 5.0 A	2			
5.1 to 10 A	1			
10.1 to 12.5 A		2	4	
12.6 to 25 A		1	2	
26 to 50 A			1	
51 to 100 A				1

For larger motors (rated current > 100 A), use two current transformers - one outer, standard transformer and one El-Fi CTM010 with two primary windings. Table 2, page 15 shows the choice of transformers and number of windings for currents exceeding 100 A.

Table 2 Table for selection of current transformers for motors with a rated current greater than 100 A.

Rated motor current	Current transformers Number of primary windings
101 to 150 A	150:5 + CTM010 1 + 2
151 to 250 A	250:5 + CTM010 1 + 2
251 to 500 A	500:5 + CTM010 1 + 2
501 to 999 A	1000:5 + CTM010 1 + 2

The following examples illustrate the choice of current transformer(s):

- **Example A.** Pump motor has a rated current of 6.9 A. According to Table 1, page 14, choose El-Fi CTM010 with one (1) primary winding.
- **Example B.** Pump motor has a rated current of 108 A. Choose a standard current transformer 150:5 with one (1) primary winding and an El-Fi CTM010 with two (2) primary windings.

NOTE! The current transformer(s) must be used according to Table 1, page 14 and Table 2, page 15. Make sure to wind the transformer(s) with the correct number of windings.

3.2 The operator's panel

The operator's panel comprises a LCD-display and a set of six keys (Fig. 3, page 11) on the front panel of the El-Fi DCM. The display provides five digits and eight symbols, see Fig. 4, page 16. The symbols are explained in Table 3, page 17.

The two smaller digits on the left of the display show the window number. Each window (e.g. 00, 01, 02) contains a parameter (e.g. 125, 0.99, on, OFF) whose value is shown by the three larger digits or characters to the right. When the value is greater than 999 all five digits are used to display the parameter value, alternating with the window number. For example, the window number 21 is displayed for 2 seconds and then the value 12345 is displayed for 2 seconds. The functions of the keys are explained in Table 4, page 18.

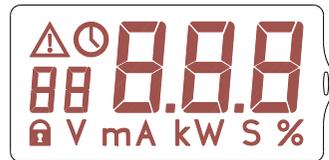


Fig. 4 The display

Table 3 Symbols on the LCD display.

Symbol	Meaning
	Flashing when alarm triggered.
	Indicates when the value is time.
	Parameter settings are locked.
V	Volts
mA	Milliamperes
m	Minutes
S	Seconds
%	Percent

Table 4 Function of the keys.

Key	Function
RESET/START	Resets a latched alarm/Starts the pump motor.
AUTO SET	The stop level is automatically set when the button is held for 3s.
NEXT	Proceed to the next window.
-	Decrease the displayed value.
+	Increase the displayed value.
ENTER	Confirm the adjustments made.

3.3 Description of functions

The windows are represented in a menu structure of only one level, as shown in Fig. 5, page 20 (single-pump version) and Fig. 6, page 21 (dual-pump version). The windows, their functions, and possible values are presented in Table 8, page 51.

When delivered, El-Fi DCM is pre-programmed with the default settings shown in Table 8, page 51.

One minute after any of the front panel keys is pressed, the El-Fi DCM returns to:

- window 00 if an alarm has been triggered
- window 01 if the pump is pausing. When DCM is SLAVE it displays ---.
- window 02 if the pump is pumping. When DCM is MASTER and the DCM SLAVE is pumping it displays ---.
- window 03 if the pump is pumping and it started as a result of a high-level switch-over.

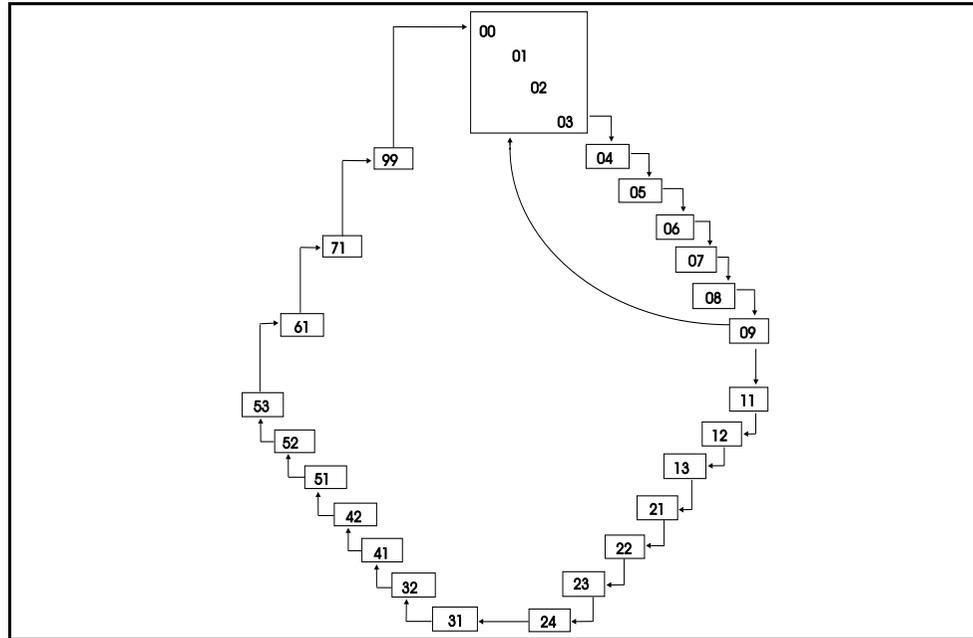


Fig. 5 Menu structure of the El-Fi DCM single-pump (see also Table 8, page 51).

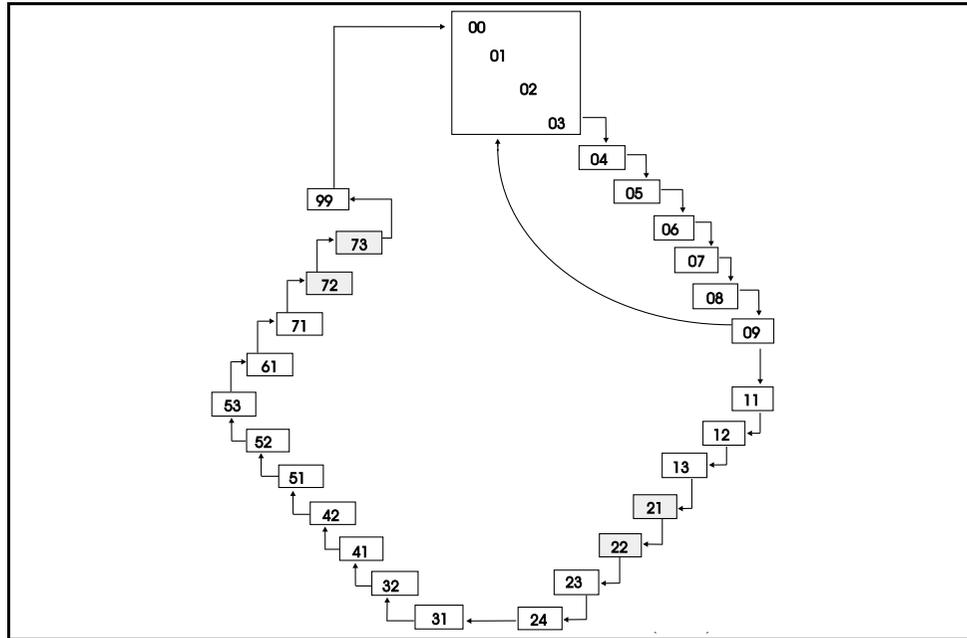


Fig. 6 Menu structure of the El-Fi DCM dual-pump (see also Table 8, page 51).

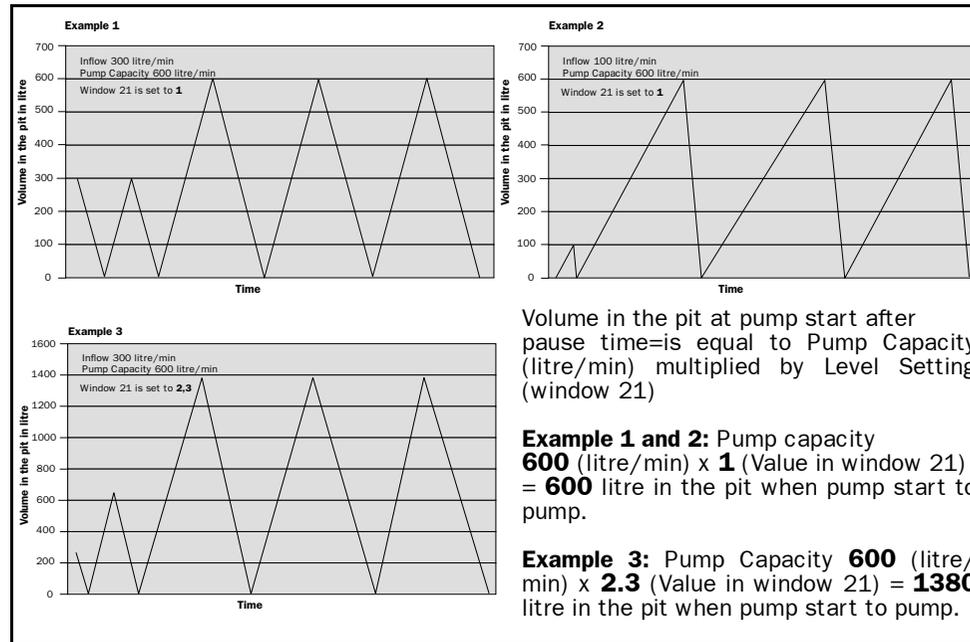


Fig. 7 Pump cycle example with different level settings in window 21.

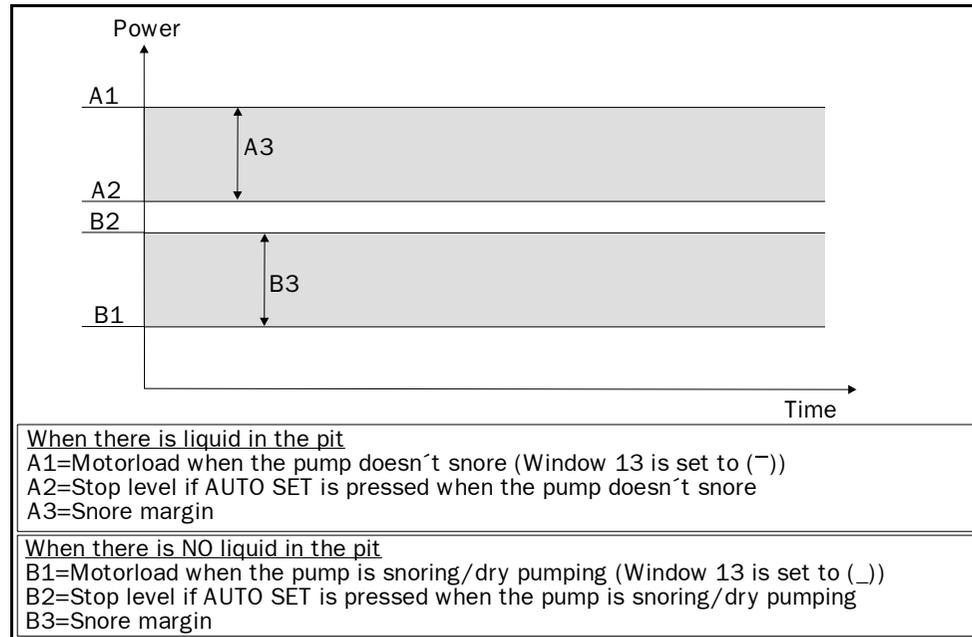


Fig. 8 Type of Auto Set

3.4 Connection terminals

There are 13 labelled connection terminals on the front panel of the El-Fi DCM.

Table 5 Labelling and functions of connection terminals.

Terminal	Label	Function
1	S1	Current transformer input.
2	S2	Current transformer input.
3	DIG	Digital input for closing contact. High-level switch or external Reset/Auto Set. In dual-pump applications the terminal 3 is also used for communication between the two DCM.
4	SGND	Signal ground.
5	TEMP	Input for motor thermistor PTC, thermocontact or motor protection relay.
6	ALARM	Alarm relay. (On the DCM MASTER use this terminal in series with the high-level switch.
7	C	Relay common.
8	PUMP	Operation of relay pump motor (control signals for start and stop equipment).
9	L1	Motor voltage.
10	(not used)	
11	L2	Motor voltage.
12	(not used)	
13	L3	Motor voltage.

4. SINGLE-PUMP SYSTEM INSTALLATION

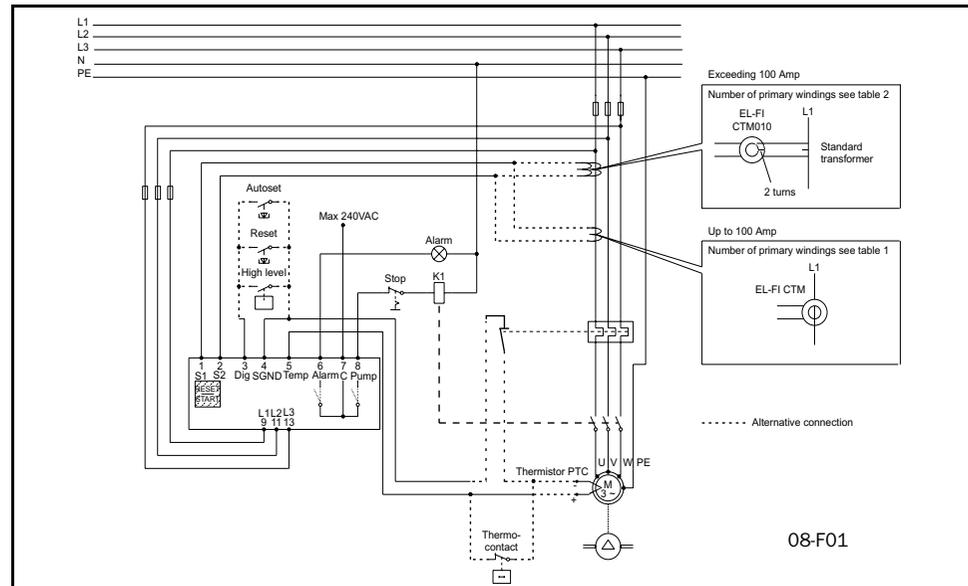


Fig. 9 Single-pump example.

4.1 Single-pump system connection

4.1.1 Supply voltage connection (L1, L2 & L3)

Connect El-Fi DCM (3-phase installation) directly to the pump motor supply cable via terminals 9 (L1), 11 (L2), and 13 (L3). Make the connection before the contactor of the motor, to ensure that the monitor also receives power when the motor is not in use. When motor fuses larger than 10 A are used, the monitor (power consumption 6 VA) must be fused independently, see Fig. 9, page 25.

4.1.2 Current transformer connection (S1 & S2)

Connect the current transformer to terminal 1 (S1) and terminal 2 (S2). The transformer **MUST** be linked to the phase connected to terminal 9 (L1), see Fig. 9, page 25.

When two current transformers are used (for motors with a rated current greater than 100 A), always connect the El-Fi CTM010 to the monitor and one other standard current transformer with 2 primary windings through the El-Fi CTM010, see Fig. 9, page 25.

NOTE! Before connecting the current transformer(s), study chapter 3.1, page 13 carefully to determine the correct number of windings.

4.1.3 Alarm relay connection (ALARM & C)

Terminals 6 and 7 are the alarm relay connections. Terminal 6 (ALARM) is the alarm relay output. Terminal 7 (C) is the common input for the alarm relay, see Fig. 9, page 25.

When powered off, the alarm relay is **nc** (normally closed). When powered on, **nc** or **no** (normally open) can be selected, see Table 8, on page 51, window 51.

4.1.4 Operation relay connection (PUMP & C)

Terminals 7 and 8 are the operating relay connections that control the start and stop equipment for the pump motor.

Terminal 8 (PUMP) is an operating relay output. Terminal 7 (C) is the common input for the operation relay, see Fig. 9, page 25.

When powered off, the operating relay is **no**. When powered on, **nc** or **no** can be selected (**nc** means that the relay contact is closed when the pump is running), see Table 8, on page 51 window 52.

4.1.5 Digital input connection (DIG & SGND)

Terminals 3 (DIG) and 4 (SGND) are connections for a closing contact between DIG and SGND. The terminals are galvanically isolated. Pull-up resistor to internal supply (15-30V). The impedance is more than 1kohm.

The three functions that can be initiated by the digital input are:

1. High-Level Switch.
2. External reset.
3. External Auto Set.

See Fig. 9, page 25 and Table 8, on page 51, Window 53.

4.1.6 Temperature measuring input connection (TEMP & SGND)

Terminals 4 and 5 are the temperature measuring input and/or motor protection contact connections. The motor protection relay can be connected in series with the temperature sensor. The terminals are galvanically isolated. Terminal 5 (TEMP) is for a PTC-type thermistor or thermocontact. The sensor must have a resistance of less than 800ohm under normal operation and more than 3kohm at high temperature. Internal supply 12 V. Short-circuit current 2 to 2.5 mA. Terminal 4 (SGND) is the signal ground for the temperature measuring input. See Fig. 9, page 25 and Table 8, page 51, Windows 31 and 32.

4.2 Detailed set-up for single-pump system



WARNING! The pump starts and stops during set-up.

NOTE! Disconnect the wire on terminal 18 to prevent involuntary starting and stopping of the pump during set-up steps 1 to 13.

Setting up of the EI-Fi DCM

The steps below illustrate examples of how to program the monitor. When the power is turned on, press NEXT to proceed to the next window, press + or - to increase or decrease the value and press ENTER to confirm the new value in each window. For quick set-up, see Fig. 1, page 4.

1. Place the pump in the pit and switch the power on.
2. Check window 71 if the value is 1 (single-pump system).
3. In window 13 select type of Auto Set. Set the window to (⌊) if the pump is pumping without snoring (there is liquid in the pit). Set the window to (⌋) if the pump is snoring (no liquid in the pit) set, see Fig. 8, page 23.
4. In window 22 set the maximum pause time between 0-720 minutes.
5. In window 23 set the required start-up delay between 1-170 s. Start-up delay time is the time between the pump starting and the time when snoring is detected.

6. In window 24 set the required Stop delay between 1-90 seconds. The stop delay is the time between the pump starting to snore and the time when the pump motor stops.
7. In window 31, if the pump has a temperature sensor and/or motor protection, set the temperature monitoring to (on). If not, set the window to (OFF). See chapter 6.5, page 42 and Fig. 9, page 25.
8. In window 32 if window 31 is set to (on). Choose temperature alarm latched (on) or temperature alarm not latched (OFF). See chapter 6.5, page 42.
9. In window 41 the permitted phase asymmetry is set between 5% and 50%. Phase asymmetry monitoring is turned off by pressing -, when the window shows 5%. To turn the monitoring on again press + and select a value, chapter 6.2, page 41.
10. In window 42, if the window 41 value is between 5% and 50%, choose phase asymmetry alarm latched (on) or phase asymmetry alarm not latched (OFF). See chapter 6.2, page 41.
11. In window 51 set the alarm relay contact function to **no** (normally open) or **nc** (normally closed), see chapter 4.1.3, page 27.
12. In window 52 set the operating relay contact function, see chapter 4.1.4, page 27.
13. In window 53 set the required function for the digital input (DIG), Value: (1) high-level switch, (2) external reset, (3) external Auto Set, chapter 4.1.5, page 27.
14. Connect the start and stop equipment to terminal 8.

15. Check that the pump is pumping in accordance to the setting in window 13 (set the stop level in window 11 to 0 (default) if the pump stops before or during the Auto Set). Press the AUTO SET button and hold for 3 seconds until SEt appears in the window. The stop level (window 11) becomes measured power (window 04) minus snore margin (window 12) if window 13 is set to (¯). The stop level (window 11) becomes measured power (window 04) plus snore margin (window 12) if window 13 is set to (¸), see Fig. 8, page 23.
16. Change the level setting in window 21 between 1-10 for shorter or longer pump cycles and levels in the pit. A low value gives shorter pump cycles and lower level in the pit. See Fig. 7, page 22.
17. It is possible to avoid unintentional changes of set parameters. Set window 09 to 369 and confirm with ENTER. A padlock is shown in the window. If the value 369 is re-entered in window 09, confirmed by ENTER the settings are unlocked.

4.3 Returning to the default settings

1. To return to the default settings go to window 99.
2. If any value differs from the default values (see Table 8, page 51), “U_{sr}” (set by the user) is displayed in the window.
3. Press + to return to the default settings. “dEF” (default setting) is shown in the window. Confirm by pressing ENTER.

NOTE! Windows 6, 7 and 8 are set to 0.

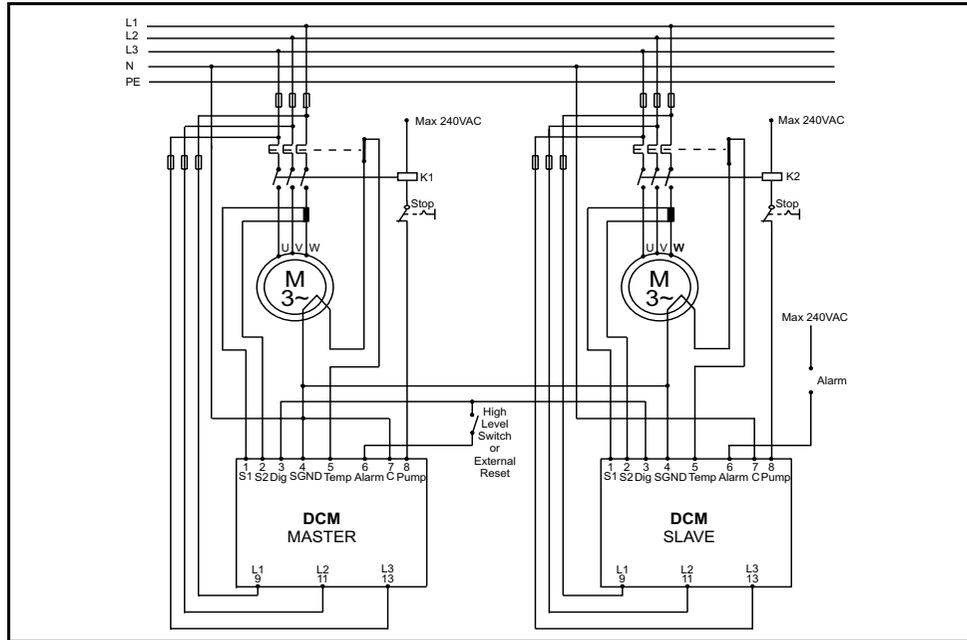


Fig. 11 Dual-pump example.

5.1 Dual-pump system connection

(Parallel connection of 2 EL-FI DCM)

5.1.1 Dual-pumps supply connection (L1, L2 & L3)

Connect the main voltage from each pump to the respective EL-FI DCM as described in chapter 4.1.1, page 26. See Fig. 11, page 33.

5.1.2 Dual-pumps current transformer connection (S1 & S2)

Connect the current transformers from each pump to the respective EL-FI DCM as described in chapter 4.1.2, page 26. See Fig. 11, page 33.

5.1.3 Dual-pumps alarm relay connection (ALARM & C)

Terminal 6 and 7 on the DCM SLAVE are the alarm relay connections. These terminals indicates an alarm if a fault is detected by DCM MASTER or DCM SLAVE. See Fig. 11, page 33. When powered off the alarm relay is **nc** (normally closed). When powered on, **nc** or **no** (normally open) can be selected. See Table 8, on page 51, window 51.

5.1.4 Dual-pumps communication and digital input connection (DIG & SGND)

Terminals 3 (DIG) and 4 (SGND) are connections for closing contacts and for communicating between DCM MASTER and DCM SLAVE. The digital Input can be used for high-level switch or external reset. The high-level switch must be connected in serial with DCM MASTER terminal 6 (ALARM) and terminal 7 (C). When external reset is chosen use pulse signal. Connect terminal 3 (DIG) on the DCM MASTER to terminal 3 (DIG) on the DCM SLAVE. Connect terminal 4 (SGND) on the DCM MASTER to terminal 4 (SGND) on the DCM SLAVE. See Fig. 11, page 33 and Table 8, on page 51, window 53.

5.1.5 Dual-pump operation relay connection (PUMP)

Connect the control signals for the start and stop equipment for each pump to the respective EL-FI DCM as described in chapter 4.1.4, page 27, see Fig. 11, page 33.

5.1.6 Dual-pumps temperature measuring input connection (TEMP & SGND)

Connect temperature sensor and/or motor protection for each pump to the respective EL-FI DCM as described in chapter 4.1.6, page 28. See Fig. 11, page 33.

5.2 Detailed set-up for dual-pump system

(always use two EI-Fi DCMs)



WARNING! The pumps start and stop during the set-up.

NOTE! Disconnect the wire on terminal 8 on both DCMs to prevent starting and stopping the pump unintentionally during set-up, steps 1-14.

Setting up of the EI-Fi DCM

The steps below illustrate examples of how to program the monitor. When the power is turned on, press NEXT to proceed to the next window, press + or - to increase or decrease the value and press ENTER to confirm the new value in each window. For quick set-up, see Fig. 2, page 5.

1. In window 71 set the required monitor function. Dual-pump control MASTER (2) for one of the EL-Fi DCMs and for the other EL-Fi DCM dual-pump control SLAVE (3). The DCM MASTER must be the DCM that is wired for MASTER, see Fig. 11, page 33.

2. In window 72 on the MASTER DCM, set the condition for alternating the pumps. Alternate by each pump cycle (on). The SLAVE DCM starts only when the DCM MASTER shows fault codes (OFF).
3. In window 73 on the MASTER DCM, set the condition for pump start-up on high-level switch. Both pumps start (on). One pump starts (OFF).
4. In window 13 select type of Auto Set. Set the window to (⌊) if the pump is pumping without snoring (there is liquid in the pit). Set the window to (⌋) if the pump is snoring (no liquid in the pit), see Fig. 8, page 23.
5. In window 22 on the MASTER DCM, set the maximum pause time between 0 - 720 minutes.
6. In window 23 on both DCMs, set the required start-up delay between 1-170 seconds. Start-up delay time is the time between the pump starting and the time when snoring is detected.
7. In window 24 on both DCMs, set the required stop delay between 1-90 seconds. Stop delay time is the time between the pump starting to snore and the time when the pump motor stops.
8. In window 31 on both DCMs. If the pump has temperature sensor and/or motor protection set temperature monitoring to (on). If not set the window to (OFF). See chapter 6.5, page 42.
9. In window 32 on both DCMs if window 31 is set to on. Temperature alarm latched (on). Temperature alarm not latched (OFF). See chapter 6.5, page 42.

10. In window 41 on both DCMs, set the permitted phase asymmetry to between 5% and 50%. Phase asymmetry is turned off by pressing -, when the window shows then show 5%. To turn the monitoring on again, press + and select a value. See chapter 6.2, page 41.
11. In window 42 on both DCMs if window 41 value is between 5 and 50% choose phase asymmetry alarm latched (on) or phase asymmetry alarm not latched (OFF) See chapter 6.2, page 41.
12. In window 51 on the SLAVE DCM. Set the alarm relay contact function to **no** (normally open) or **nc** (normally closed), see chapter 5.1.3, page 34.
13. In window 52 on both DCMs. Set the operating relay contact function. See chapter 5.1.5, page 35.
14. In window 53 on both DCMs. Set the required function for the digital input (DIG), value (1) high-level switch, (2) external reset, see chapter 5.1.4, page 35.
15. Connect the start and stop equipment to terminal 8.
16. Check that one of the pumps is running according to the setting in window 13 and that the other pump is not running (set the stop level in window 11 to 0 (default) if the pump stops before or during the Auto Set). Press the AUTO SET button for 3 seconds until SEt is shown in the window. Press the START button on the other DCM. Wait until the start delay has elapsed. Press the AUTO SET button for 3 seconds until SEt is shown in the window. The stop level becomes measured power (window 04) minus snore margin (window 12) if window 13 is

- set to (⌘). The stop level becomes measured power (window 04) plus snore margin (window 12) if window 13 is set to (⌘). See Fig. 8, page 23.
17. Change the level setting in window 21 on the MASTER DCM between 1 - 10 for shorter or longer pump cycles and level in the pit. A low value gives shorter pump cycles and lower level in the pit, see Fig. 7, page 22.
 18. It is possible to avoid unintentional changes of set parameters. Set window 09 to 369 in each DCM and confirm with ENTER. A padlock is shown in the window. If the value 369 is re-entered in window 09 and confirmed by ENTER the settings are unlocked.

5.3 Returning to the default settings

1. To return to the default settings go to window 99.
2. If any value differs from the default values (see Table 8, page 51), “Usr” (set by the user) is displayed in the window.
3. Press + to return to the default settings. “DEF” (default setting) is shown in the window. Confirm by pressing ENTER.

NOTE! Window 6, 7 and 8 are set to 0.

6. PROTECTION AND ALARM

When an error occurs, the triangular alarm sign starts to flash and the alarm relay is activated.

Window 00 becomes active and gives the information about the alarm according to the alarm list, see Table 6, page 43.

Alarm in a dual-pump application

The fault code is shown in window 00 of the respective DCM, the alarm relay is only set on terminal 6 of the DCM SLAVE when an error occurs. If a latched alarm occurs it must be reset on the respective DCM by pressing the RESET button or - if specified as digital input - by an external reset.

6.1 Phase sequence (F1)

When El-Fi DCM is first switched on, phases L1, L2 and L3 are checked for correct phase sequence.

If the wrong phase sequence is detected, an F1 alarm is generated and the ALARM relay on terminal 6 is activated. The pump will not start. Switch the power off and shift phase L2 and L3.

NOTE! Do not change L1.

6.2 Phase asymmetry (F2)

The permitted phase asymmetry is set in window 41, see Table 8, page 51. Any failure shorter than 5 seconds is ignored. When phase asymmetry is detected an F2 alarm is generated and the ALARM relay on terminal 6 is activated. The pump will be stopped.

If window 42 is set to **on** the alarm can be reset by pressing the RESET button or by using the external reset signal.

6.3 Checking the current transformer (F3)

When AUTO SET is pressed the El-Fi DCM checks that the current transformer has the correct number of primary windings for the rated motor current, see Table 1, page 14 or Table 2, page 15.

The measured current at terminals S1 and S2 is displayed in window 61. If the measured current is below 10 mA or above 60 mA, an F3 alarm is generated and the alarm relay is activated. The pump will be stopped.

6.4 Operating fault (F4)

If the pump is snoring and the high-level switch gives the signal to pump, this is a fault situation and an F4 alarm is generated and the ALARM relay is activated. If communication between the DCM MASTER and the DCM SLAVE is interrupted an F4 alarm is generated and the ALARM relay is activated. See Fig. 11, page 33, chapter 5.1.4, page 35.

6.5 Fault terminal 5 (F5)

Temperature monitoring on pump motor.

El-Fi DCM can use either an input thermistor (PTC) signal or thermocontact. To activate temperature monitoring, set window 31 to on.

When the pump motor gets hot, the excess temperature generates an F5 alarm and activates the ALARM relay and the pump will be stopped.

It is also possible to connect a motor protection relay to generate an F5 alarm. See Fig. 9, page 25 and Fig. 11, page 33.

If window 32 is set to **on**, the alarm can be reset by pressing the RESET button or by using the external reset signal.

6.6 Under-voltage (LU)/Overvoltage (OU) alarm

When El-Fi DCM is first switched on, the voltages on phases L1, L2 and L3 are checked.

If a wrong phase voltage is detected, an LU (under-voltage) or OU (overvoltage) alarm is generated and the ALARM relay is activated. The pump will not start. Switch the power off. Check that the line voltage corresponds to the voltage range of the DCM according to the rating plate on the side of the monitor.

Table 6 Alarm indications.

Indication	Function	Remark
F1	Phase sequence	chapter 6.1, page 40
F2	Phase asymmetry	chapter 6.2, page 41
F3	Current transformer	chapter 6.3, page 41
F4	Operation fault	chapter 6.4, page 42
F5	Fault terminal 5	chapter 6.5, page 42
LU	Under-voltage	chapter 6.6, page 43
OU	Overvoltage	chapter 6.6, page 43
oor	Out of range	chapter 7., page 44

7. TROUBLESHOOTING

- Window 00 shows F1 Phase sequence alarm, see chapter 6.1, page 40.
- Window 00 shows F2 Phase asymmetry alarm, see chapter 6.2, page 41.
- Window 00 shows F3 Current transformer alarm, see chapter 6.3, page 41
- Window 00 shows F4 Operation fault, see chapter 6.4, page 42.
- Window 00 shows F5 Fault terminal 5, see chapter 6.5, page 42.
- Window 00 shows LU Under-voltage or OU Overvoltage alarm, see chapter 6.6, page 43.

Check that the line voltage corresponds to the voltage range of the monitor according to the rating plate on the side of the monitor.



WARNING! Switch off the main supply!

- If oor (out of range) is shown in the window it means that the value is too big.
- Impossible to do Auto Set. It is impossible to do Auto Set during the start-up delay period, if an alarm indication is present or both pumps are running.
- The pump starts and stops too often or the level in the pit is too low or high. Change the setting in window 21, level setting, see Fig. 7, page 22 or change the maximum pause time (window 22).

- The pump stops although it is pumping without snoring. Check the Stop level value in window 11. This value is probably too high in relation to measured power in window 04, see Fig. 1, page 4 for single-pump system or Fig. 2, page 5 for dual-pump system.
- The pump doesn't stop when snoring. Check the Stop level value in window 11. This value is probably too low in relation to measured power in window 04, see Fig. 1, page 4 for single-pump system or Fig. 2, page 5 for dual-pump system.
- The value in window 04 increases when the pump starts to snore. Check that the current transformer(s) is/are linked to the phase connected to terminal 9 (L1), see chapter 4.1.2, page 26 and Fig. 9, page 25 or chapter 5.1.2, page 34.

8. TECHNICAL DATA

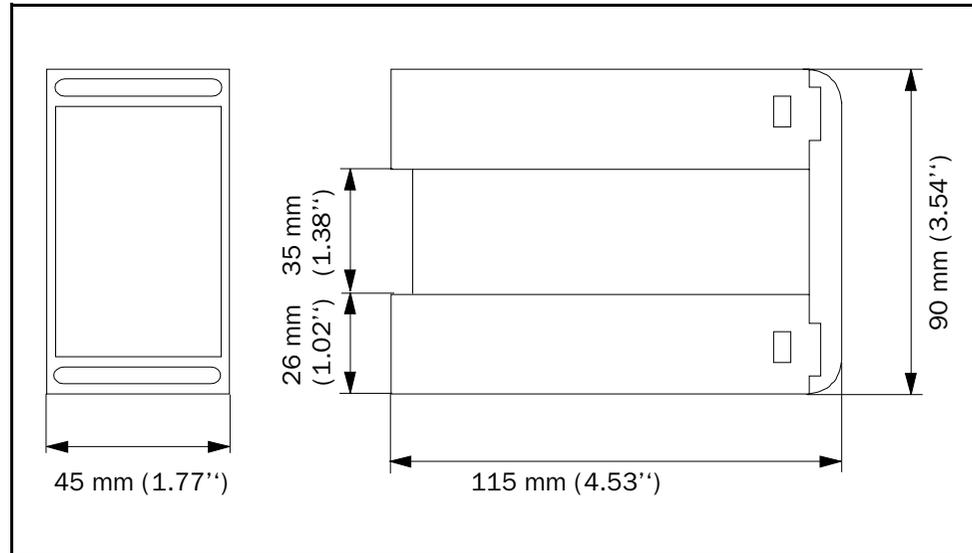


Fig. 12 Dimensions El-Fi DCM.

Table 7 Technical data.

Dimension (WxHxD)	45 x 90 x 115 mm (1.77" x 3.54" x 4.53")
Weight	0.3 kg (10.5 oz)
Supply voltage (VAC)	3 x 100 to 240, 3 x 380 to 500, 3 x 525 to 600, 3 x 600 to 690* ($\pm 10\%$)
Frequency	45 to 65 Hz
Current input	EI-Fi current transformer CTM010, 025, 050 or 100. (If rated current >100 A CTM010 and a standard transformer)
Power consumption	Max 6 VA
Start-up delay	1 to 170 s
Stop delay	1 to 90 s
Digital input terminal 3	For closing contact Internal supply 15-30VDC, short-circuit current 10-20mA
Temperature input terminal 5	Internal supply 15-30VDC, short-circuit current 2mA-2.5mA
Relay output	5 A 240 VAC Resistive. 1.5 A 240 VAC Pilot duty/AC12

* only CE marked.

Table 7 Technical data. (continued)

Fuse	Max. 10 A
Terminal wire size	Use 75°C copper (CU) wire only. 0.2 to 4.0 mm ² single core, 0.2 to 2.5 mm ² flexible core, stripped length 8 mm.
The terminal tightening torque	5-7 lb-in (0.56 - 0.79Nm)
Repeatability	
Power measurement	±1 unit 24 h; +20°C
Temperature tolerance	< 0.1% / °C
Operating temperature range	-20°C to +50°C
Storage temperature range	-30°C to +80°C
Protection class	IP20
Approved to	CE, UL and cUL

8.1 EU (European Union) specifications

EMC	EN50081-1, EN50082-2
Electrical safety	IEC 947-5-1:1990 + A1:1994
Rated insulated voltage	690 V
Rated impulse withstand voltage	4000 V
Pollution degree	2
Terminals 3, 4 and 5 are basic insulated from the line and relay terminals.	

8.2 US specifications

FCC (Federal Communications Commission)

This equipment has been tested and found to comply with the limits for a class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference, in which case, the user will be required to correct the interference at their own expense.

8.3 Canada specifications

DOC (Department of communications)

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the Canadian Interference-causing Equipment Regulations.

8.4 Window Parameters

Table 8 Window parameters and defaults.

Window	Function	Value	Default	Custom setting	
				Master	Slave
00	Alarm indication. Flashes when alarm present. Symbol  flashing.	See Table 6, page 43			
01	Remaining time to next pump start. Standard window during pause. When DCM is SLAVE --- appears. Symbol  flashing and m or s.	720 - 15 min. 900 to 0 s			
02	Pumping Time (PT) since the last pump start. Displayed when pumping. When DCM is MASTER and the DCM SLAVE is pumping --- appears. Symbol  flashing and m or s.	0 to 90 sec. 15 - 720 min. 12 to 999 h			
03	Pumping Time (PT) after the last pump start when the pump is started on high-level switch. Displayed when pumping after high-level switch. Symbol  flashing and m or s.	0 to 900 s 15 - 720 min. 12 to 999 h			

Table 8 Window parameters and defaults. (continued)

Window	Function	Value	Default	Custom setting	
				Master	Slave
04	Measured power as percentage of the monitor's measurement range. Symbol %.	0 to 125%			
05	Measured line voltage. Symbol V.	0 to 999 V			
06	Measured peak power as percentage of the monitor's measurement range. Press - and + (in this window) simultaneously for 3 seconds to reset the value. Symbol %.	0 to 125%	0%		
07	Total pumping time in hours. Press - and + (in this window) simultaneously for 3 seconds to set the value to 0. Symbol  .	0-99999	0		
08	Total number of pump starts. Press - and + (in this window) simultaneously for 3 seconds to set the value to 0.	0-99999	0		

Table 8 Window parameters and defaults. (continued)

Window	Function	Value	Default	Custom setting	
				Master	Slave
09	Parameter lock. Symbol  . Is displayed when parameter is locked.	0 to 999			
11	Stop level. Symbol %.	0 to 125%	0%		
12	Snore margin. Symbol %.	0 to 125%	4%		
13	Type of Auto Set Auto Set when the pump is snoring (⌵) (No liquid in the pit). Auto Set when the pump doesn't snore (⌶) (Liquid in the pit).	- or _	-		
21	Level setting (use at pause time calculation). See Fig. 7, page 22. NOTE! The window isn't shown when DCM is SLAVE.	1.0 to 10.0	1.0		
22	Maximum pause time. NOTE! The window isn't shown when DCM is SLAVE. Symbol  .	0 to 900 s 15 - 720 min.	600 s		

Table 8 Window parameters and defaults. (continued)

Window	Function	Value	Default	Custom setting	
				Master	Slave
23	Start-up delay. Symbol ⏱.	1 to 170 s	5 s		
24	Stop delay. Symbol ⏱.	1 to 90 s	2 s		
31	Fault terminal 5. High temperature monitoring on pump motor or motor protection (on). Turn off (OFF).	on / OFF	OFF		
32	Fault terminal 5 latched (on). Fault terminal 5 not latched (OFF). Can only be used when window 31 is (on).	on / OFF	OFF		
41	Phase asymmetry permitted.	OFF/ 5 to 50%	10%		
42	Phase asymmetry alarm latched (on). Phase asymmetry alarm not latched. (OFF) Can be used when window 41 is set between 5-50%.	on / OFF	OFF		
51	Alarm relay (terminal 6 ALARM). nc : normally closed, no : normally open. The window isn't shown when DCM MASTER is	nc/no	no		

Table 8 Window parameters and defaults. (continued)

Window	Function	Value	Default	Custom setting	
				Master	Slave
52	Operating relay to controlling the pump motors contactor/soft starter (terminal 8 PUMP). nc: Relay contact is closed when pump is pumping. no: Relay contact is open when pump is pumping.	nc/no	nc		
53	Digital input for closing contact. 1 High-level switch, 2 External reset, 3 External Auto Set (not used in dual-pump system).	1, 2, 3	1		
61	Measured current on the terminals S1 and S2	0-70mA			
71	Desired DCM function 1 Single-pump system 2 Dual-pump system MASTER 3 Dual-pump system SLAVE	1, 2, 3	1		
72	Pump alternating (on) Alternate by each pump cycle. (OFF) The SLAVE DCM only starts when the DCM MASTER show fault code. NOTE! The window isn't shown when DCM is SLAVE.	on/OFF	off		

Table 8 Window parameters and defaults. (continued)

Window	Function	Value	Default	Custom setting	
				Master	Slave
73	Pump start with High-Level switch. (on) Both pumps start. (OFF) one pump starts. NOTE! Window isn't shown when DCM is SLAVE.	on/OFF	off		
99	Defaults/user adjustments.	dEF/USr	dEF		

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