

LDC SEQUENCER FOR DEDUSTING PLANTS

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1.1 DESCRIPTION

Sequencer for dedusting plant cleaning cycle control with digital dP control by internal transducer.

2.1 STANDARD FEATURES

- A1a Minimum and maximum dP alarms on same relay (K2)
- C7c1 Minimum dP alarm. Contact open with alarm. Automatic reset.
- C7d1 Maximum dP alarm. Contact open with alarm. Automatic reset.
- C1 Digital differential pressure control (STOP at cycle end)
- C8 dP zero readout regulation
- C13_10 dP full range 10.00 kPa = 100.0 mbar = 1012 mmH2O.
- D1b1 Additional post-cleaning cycles from dP readout. Activation at STOP.
- C4 Cleaning cycle
- C4a Automatic operation mode
- C4b Manual operation mode
- B2x Activation time from 0.05 to 5.00 sec.
- B3x Interval time from 1 to 999 sec.
- B3c Interval time between ev. during post-cleaning
- A2a Relay Voltage ON (K1)
- D5a Consent from external compressed air pressure switch
- D6a ON/OFF cleaning cycle from external contact
- AL1 Alarm relay contacts open
- B1b Select Number of outputs
- B8b Short-circuit protection of every single output
- D14a Operation hours-counter
- B10 Manual activation of every single output from keyboard
- G1 Maximum load power 25W per output
- SL Multi language display
- HVB Input and output voltage selection

S/N: - - -

Date: 29 / 05 / 2020

Ver. 18.9.2

Code: LDC16LU0+A1c+AL2+C7c2+C7d2+FP50+LC2

2.2 STANDARD FEATURES

| Code | Description |
|---------------|---|
| A1a | Minimum and maximum dP alarms on same relay (K2) Minimum and maximum dP alarms act on the same relay. The display will specify the type of alarm. |
| C7c1 | Minimum dP alarm. Contact open with alarm. Automatic reset. If the dP readout is below the threshold in Set up, the minimum dP alarm is activated. The display shows the alarm condition code E8 (see the alarm description) or the dP readout and letter L alternatively, according to the model. The corresponding alarm relay will signal its condition. The alarm is automatically reset when the dP readout is above the threshold again. If set to 'OFF' or 'E' (according to the model), the function is excluded. NOTE: the minimum dP alarm is delayed by 60 seconds by default after the activation of the first cleaning cycle. |
| C7d1 | Maximum dP alarm. Contact open with alarm. Automatic reset. If the dP readout is above the threshold in Set up, the maximum dP alarm is activated. The display shows the alarm condition code E7 (see the alarm description) or the dP readout and letter H alternatively, according to the model. The corresponding alarm relay will signal its condition. The alarm is automatically reset when the dP readout is below the alarm threshold again. The activation of this alarm is delayed by 20 seconds by default. |
| C1 | Digital differential pressure control (STOP at cycle end) In automatic running mode (C4a), the cleaning cycle is activated and deactivated according to the dP readout. C1a Set the cleaning STOP threshold: if dP is below this threshold, the cleaning cycle stops and the display shows 'CYCLE STOP FOR LOW dP' or the letter 'P' according to the model. The cleaning cycle stops at the end of the cycle (Set 13). C1b Set the cleaning START threshold: if dP is above this threshold, the cleaning cycle is activated (Set 14) |
| C8 | dP zero readout regulation In this set up code it is possible to adjust the zero reading of differential pressure. In this function the display shows the dP reading and, with plant stops or air pipes not connected if the dP reading is not 0.00 kPa it is possible to adjust it by key A and C. |
| C13_10 | dP full range 10.00 kPa = 100.0 mbar = 1012 mmH2O. Maximum differential pressure value measurable by the device 10.00 kPa = 100.0 mbar = 1012 mmH2O. With dP reading over 10 kPa the display shows 'E' instead of the numeric value of dP. |
| D1b1 | Additional post-cleaning cycles from dP readout. Activation at STOP. In automatic operation mode, you can add a pre-set number of cleaning cycles after the fan stop. Their number can be set from 0 to 99 by keyboard. The sequencer will automatically recognise the fan state by comparing the dP readout with the threshold in set code 11: dP > set 11 = fan on, dP < set 11 = fan off. Post-cleaning cycles are activated even if dP = 0. When the fan is off or dP < set 11, the display shows 'FAN STOP'. The display shows 'POST-CLEANING ACT' during additional cycles and if there is no alarm. Post-cleaning cycles are activated only if the dP readout should reach the threshold value of cycle STOP in normal operation mode. |
| C4 | Cleaning cycle If all the requirements for the start-up of the cleaning cycle are fulfilled when supply is powered on (e.g. fan on, external consents C6 or D5, dP readout above the start threshold), the sequencer will automatically activate the EV outputs sequentially according to the times set by keyboard. |
| C4a | Automatic operation mode By keyboard in Setup it is possible to select the operation mode. In automatic mode, the controls of the fan, the dP, C6 and D5 are active and the activation of the cleaning cycle will depend on such functions. |
| C4b | Manual operation mode By keyboard in Setup it is possible to select the operation mode. In manual mode, the control of the fan, the dP, C6 and D5 are not active. |
| B2x | Activation time from 0.05 to 5.00 sec. |
| B3x | Interval time from 1 to 999 sec. If the pulse time is lower than 1 sec. it is possible to set any interval time value in the range indicated. If the activation time is higher than 1 sec. the minimum settable interval time is: Minimum interval time = 5 times pulse time (B2x) |
| B3c | Interval time between ev. during post-cleaning Interval time between two activations settable by keyboard when post-cleaning cycles are active and during the forced cycles of option C2x if available. The selection range is the same as the interval time in standard operation mode (B3x). |

2.2 STANDARD FEATURES

| Code | Description |
|-------------|---|
| A2a | Relay Voltage ON (K1) If the device is supplied, relay K1 is activated and the terminal board contact is closed. In case of power failure, this contact is open. |
| D5a | Consent from external compressed air pressure switch If the operation mode is automatic and contact D5a is open, the cleaning cycle stops, relay K2 indicates the alarm situation. Close D5a to restart the washing cycle from the point where it had stopped. If contact D5a is open, the display shows alarm code E6. NOTE: Link D5a clamps if it is not used with inputs from external contact active (See Setup 5.1). |
| D6a | ON/OFF cleaning cycle from external contact If contact D6a is open, the cleaning cycle is not enabled and the display shows 'START CONTACT D6a OPEN'. Close D6a to start cleaning cycle from the first electrovalve. NOTE D6a: Jump D6a if it is not used with inputs from external contact active (See Setup 5.1). |
| AL1 | Alarm relay contacts open The relay contacts signaling the presence of alarm are open if there is no supply or in presence of alarm condition. With power supply on and in the absence of an alarm, the contact is closed. Relay contacts: 42 VAC - 5 A Max / 42VDC - 3A Max |
| B1b | Select Number of outputs The selection of the number of outputs to be control led is connected by keyboard in SET MODE. If you set 0 or AUTO in this function the sequencer will automatically select the connected loads by skipping the non connected ones. Minimum load 5W ÷ 12 W depending on the output voltage. If the load is below of the minimum, the autoselection does not work correctly, set the number of outputs in set up. |
| B8b | Short-circuit protection of every single output In case of short-circuit, the corresponding output is automatically skipped. Relay K2 will signal the alarm condition and display will show the alarm situation code E1 (See the alarm description). Press key E to reset the alarm. |
| D14a | Operation hours-counter In Setup it is possible to visualize an hours counter. This counter is active when the cleaning cycle in On. In case of fan stop, consent D6 not present or with the device in Setup the counter stops. |
| B10 | Manual activation of every single output from keyboard By keyboard, it is possible to activate manually and individually every single output for an operation test. Press key A to select the desired output to be activated. Press key C to activate the output. The output is holded active for all the time that key C is pressed. It allows to measure the output voltage by using a tester. In case of anomalous operating, do this test with electrovalves disconnected. |
| G1 | Maximum load power 25W per output |
| SL | Multi language display In Set up it is possible to select the language of all the descriptions showed by the display: Italian, English, French, German, Spanish. |
| HVB | Input and output voltage selection Use the jumpers on the board to select the supply voltage and the output voltage for the electrovalves. (See the drawing of the printed circuit layout). JP1: Select the supply voltage between 115VAC and 230VAC. JP2: Select the output voltage between 24, 115, 230 V (Only when the power supply is 115VAC or 230VAC). JP3: Select the output voltage between AC and DC only when JP2 is set to 24V. ATTENTION: set the same output voltage you have selected by means of the jumpers to adjust the trip threshold of the short-circuit. Otherwise, the sequencer might malfunction or be damaged. |


2.3 OPTION ON REQUEST

| Code | Description |
|------------|---|
| A1c | Minimum (K3) and maximum (K2) dP alarms on separate relays Minimum and maximum dP alarms act on 2 different relays: relay K3 for minimum dP-alarm, relay K2 for maximum dP-alarm |
| AL2 | Alarm relay contacts closed The relay contacts signaling the presence of alarms are closed if there is an alarm situation. With power supply on and in the absence of an alarm, the contact is open. Relay contacts: 42 VAC - 5 A Max / 42VDC - 3A Max |

2.3 OPTION ON REQUEST

| Code | Description |
|-------------|--|
| C7c2 | Minimum dP alarm. Contact close with alarm. Automatic reset If the dP readout is below the threshold in Set up, the minimum dP alarm is activated. The display shows the alarm condition code E8 (see the alarm description) or the dP readout and letter L alternatively, according to the model. The corresponding alarm relay will signal its condition. The alarm is automatically reset when the dP readout is above the threshold again. If set to 'OFF' or 'E' (according to the model), the function is excluded. NOTE: the minimum dP alarm is delayed by 60 seconds by default after the activation of the first washing cycle. |
| C7d2 | Maximum dP alarm. Contact close with alarm. Automatic reset If the dP readout is above the threshold in Set up, the maximum dP alarm is activated. The display shows the alarm condition code E7 (see the alarm description) or the dP readout and letter H alternatively, according to the model. The corresponding alarm relay will signal its condition. The alarm is automatically reset when the dP readout is below the alarm threshold again. The activation of this alarm is delayed by 20 seconds by default. |
| FP50 | Front panel with 50 cm. flat cable Device front panel with keys and display in aluminium socket 92x92x20mm for front door installation with flat cable for the connection to main board of 50 cm. length. |
| LC2 | Transparent membrane for keyboard IP65 Transparent PVC membrane to put on the device to protect the keypad. The degree protection of this membrane is IP65. |

3.1 INSTALLATION RULES AND SECURITY

- 3.2 Protect the device against the direct exposure to the sun.
- 3.3 Avoid arranging the device in the proximity of or in direct contact with any source of heat and electromagnetic field. Connect the device on supply lines different from those used for motor drives or other devices that may cause some noise on the net.
Not security equipment.
- 3.4 Fix the device on the wall at minimum 60 cm from the floor.
- 3.5 The access to the device to adjust operating parameters have to be done by person with appropriate skills.
- 3.6 Before acting on the device for any operation, check for safe conditions. For electrical operations never forget to disconnect the power supply, wait for 30 seconds for the internal capacitors discharge before opening. At the end of the operations close the device to restore the protection degree before powering again.
- 3.7 In case of faulty that does not depend only the fuse, switch off immediately the supply voltage and contact the supplier.
- 3.8 One time in a month or more frequently if necessary verify if there is dust on the enclosure of the device and remove it if it is present by using wet cloth.
- 3.9 For supply voltages, cabling and voltages applicable to the relay contacts, follow the current rules
- 3.10 For all input control signals to the Timer (D1a, D5, D6,...) use anti-flame wires with a minimum section of 0.5 mm².
- 3.11 For the electrical connection of the supply voltage and filter cleaning electrovalves use anti-flame wires with a minimum section of 0.75 mm². For output relay contacts use anti-flame wires with a minimum section of 1.5 mm².
- 3.12 For the output signal 4÷20 mA use anti-flame shielded wire with minimum section of 0,5 mm². (Option on request. Code: C11a)
- 3.13  Do not connect to earth the common of the electrovalves (see electrical wiring diagram).
- 3.14 The lack of application of existing rules and standards of installation and safety exonerate the manufacturer of responsibility.
- 3.16 Put in a housing with IP5x minimum protection degree.

4.1 TECHNICAL FEATURES

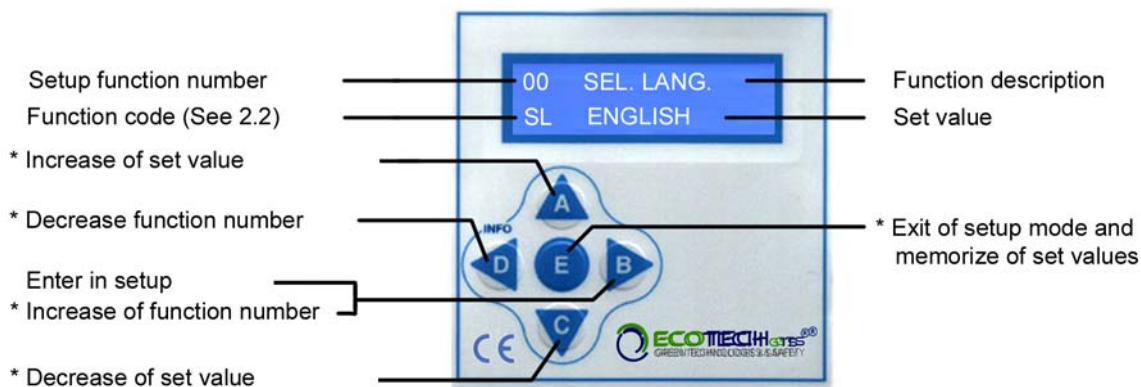
| | |
|--|--------------------------------------|
| Supply Voltage | 115 VAC ± 10 % - 50/60 Hz |
| Solenoid valves voltage | 24 VDC |
| Fuse | 250 V / 1 A F (5x20) |
| Power requirement | 10 VA (Stand-by) - 30 VA Max ev ON |
| Operating temperature | - 10 °C ÷ + 50 °C |
| No. Outputs | 16 |
| dP Control | With internal trasducer |
| Pneumatic connection | Rilsan 3 x 5 |
| Dimensions / Protection degree | See 10.1 Electronic board / IP00 |
| Terminals | 2,5 mm ² - 250 VAC / 12 A |
| Voltage applicable to the relay contacts | 42 VAC - 5 A Max / 42VDC - 3A Max |



A wrong supply voltage connection might cause irreparable damages to the device.
The fuse wire protect only from any short circuit and not necessarily from wrong supply voltage.

5.1 ENTER DATA IN SET MODE

If no button is pressed for 5 minutes, the device leaves the setup mode, restarting normal operation



* This function is operating only after entering in sestup (Button B)

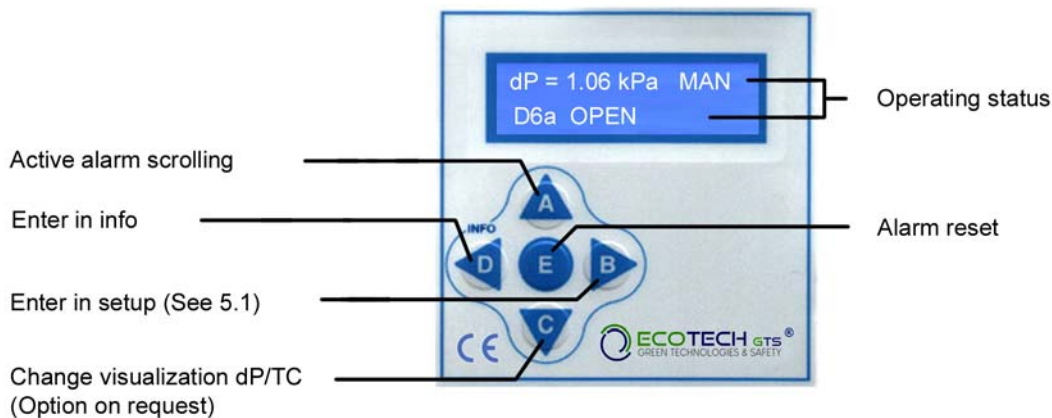
| SETUP / DISPLAY | DESCRIPTION | Range | Code | Default |
|--------------------------------------|---|-----------|------|----------|
| 00 LANGUAGE SEL. SL ENGLISH | Display language selection | | SL | |
| 01 DIGITAL INPUTS C0 DISABLE | ENABLE / DISABLE inputs from external contacts | | C0 | |
| 02 OPERATION C4b MANUAL | Operation Mode selection AUTOMATIC / MANUAL | | C4b | |
| 03 PULSE TIME B2x 0.50 sec. | Pulse time from 0.05 to 5.00 sec. | 0.01÷5.00 | B2x | 0.50 sec |
| 04 INTERVAL TIME B3x 005 sec. | Interval time between ev. from 1 to 999 sec. | 001÷999 | B3x | 5 sec |
| 05 POSTCL INT. B3c 005 sec. | Interval time between ev. during post-cleaning from 1 to 999 sec. | 001÷999 | B3c | 5 sec |
| 06 POST CYCLES D1x 002 cycles | Number additional cycles after fan stop | 00÷99 | D1x | 5 |
| 07 ELECTROVAL.N. B1b 016 ev. | Selection Number of electrovalves | | B1b | |
| 08 EV TEST B10 001 OFF | TEST Manual activation of every single ev. from keyboard | | B10 | |
| 09 HOURS COUNTER D14a 00000 Hours | Operation hours-counter | 0÷65535 | D14a | |
| 10 ZERO dP ADJ. C8 0.00 kPa | dP zero readout regulation | | C8 | 0.00 |
| 11 FAN THRESHOLD D1bx 0.10 kPa | dP threshold for cycle activation after fan stop | 0.01÷0.99 | D1bx | 0.10 |
| 12 MIN dP ALARM C7c1 OFF | Minimum dP alarm threshold | 0.01÷9.99 | C7c1 | OFF |
| 13 dP STOP CYCLE C1a 1.00 kPa | 1st dP threshold, STOP cleaning since dP low | 0.01÷9.99 | C1a | 1.00 |
| 14 dP START CYCLE C1d 2.00 kPa | 2nd dP threshold, START cleaning since dP high | 0.01÷9.99 | C1b | 2.00 |

5.1 ENTER DATA IN SET MODE

| SETUP / DISPLAY | DESCRIPTION | Range | Code | Default |
|----------------------------------|---|-----------|------|---------|
| 15 MAX dP ALARM C7d1 3.00 kPa | Maximum dP alarm threshold. | 0.01÷9.99 | C7d1 | 3.00 |
| 18 EV. VOLTAGE HV Vout = 24 V | Output voltage setup for ev. (see HVB) (Necessary for right operating of B8b) | | HV | |

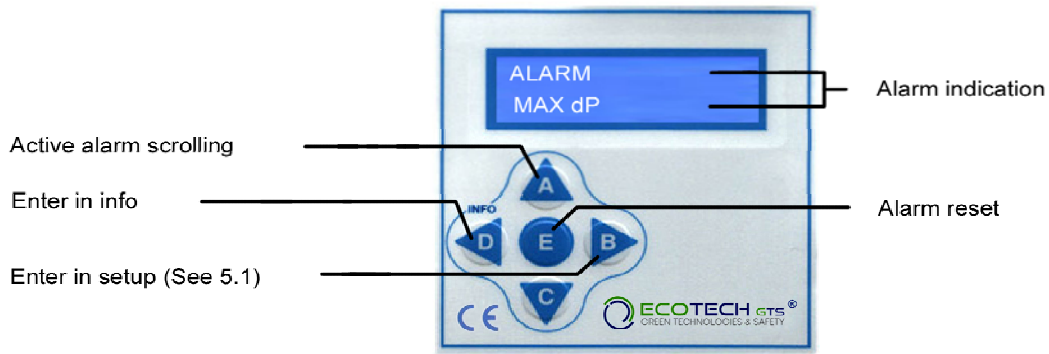
6.1 DISPLAY INDICATIONS IN OPERATION

When supply voltage switch on the cleaning cycle starts if all the necessary conditions for running are present.



| DISPLAY | DESCRIPTION | Code |
|----------------------------------|--|------|
| dP = 1.06 kPa MAN | Differential pressure reading (dP = xxx) and manual running mode (MAN) | C3 |
| TC = 010 mg/mm ³ AUTO | TC Probe reading (xx mg/m ³) and automatic running mode (AUTO). TC Probe reading is option on request. | D11 |
| START CONTACT D6a OPEN | Cycle stop since no remote start | D6a |
| VENTILATOR STOP | Cycle stops waiting for fan start or dP under set fan threshold (See SET 11 section 5.1) | D1x |
| ACTIVAT EV. 003 | Activation output solenoid valve 3 | |
| WAITING=005 sec | Waiting time before activation of the next ev. | |
| CYCLE STOP FOR dP LOW | Cycle stop because differential pressure below SET 13 (See section 5.1) | C1a |
| POSTCLEANING ACT | Additional cycles after fan stop active | D1x |

7.1 DISPLAY INDICATIONS WITH ALARM

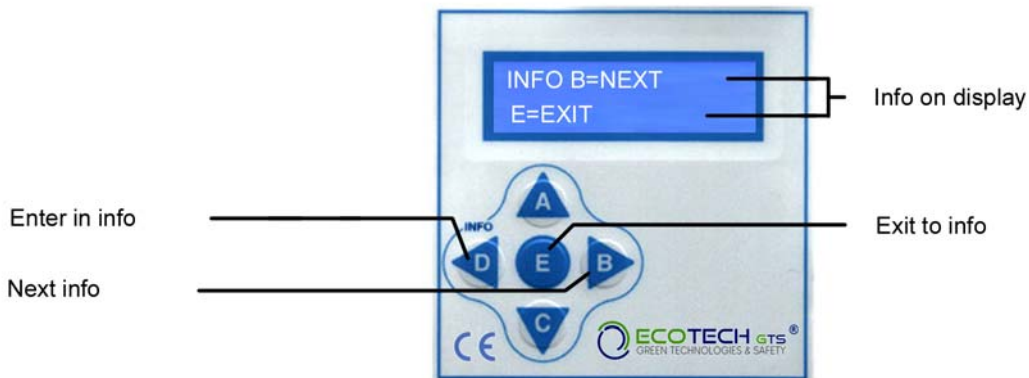


The alarm visualization got the priority on the other visualization

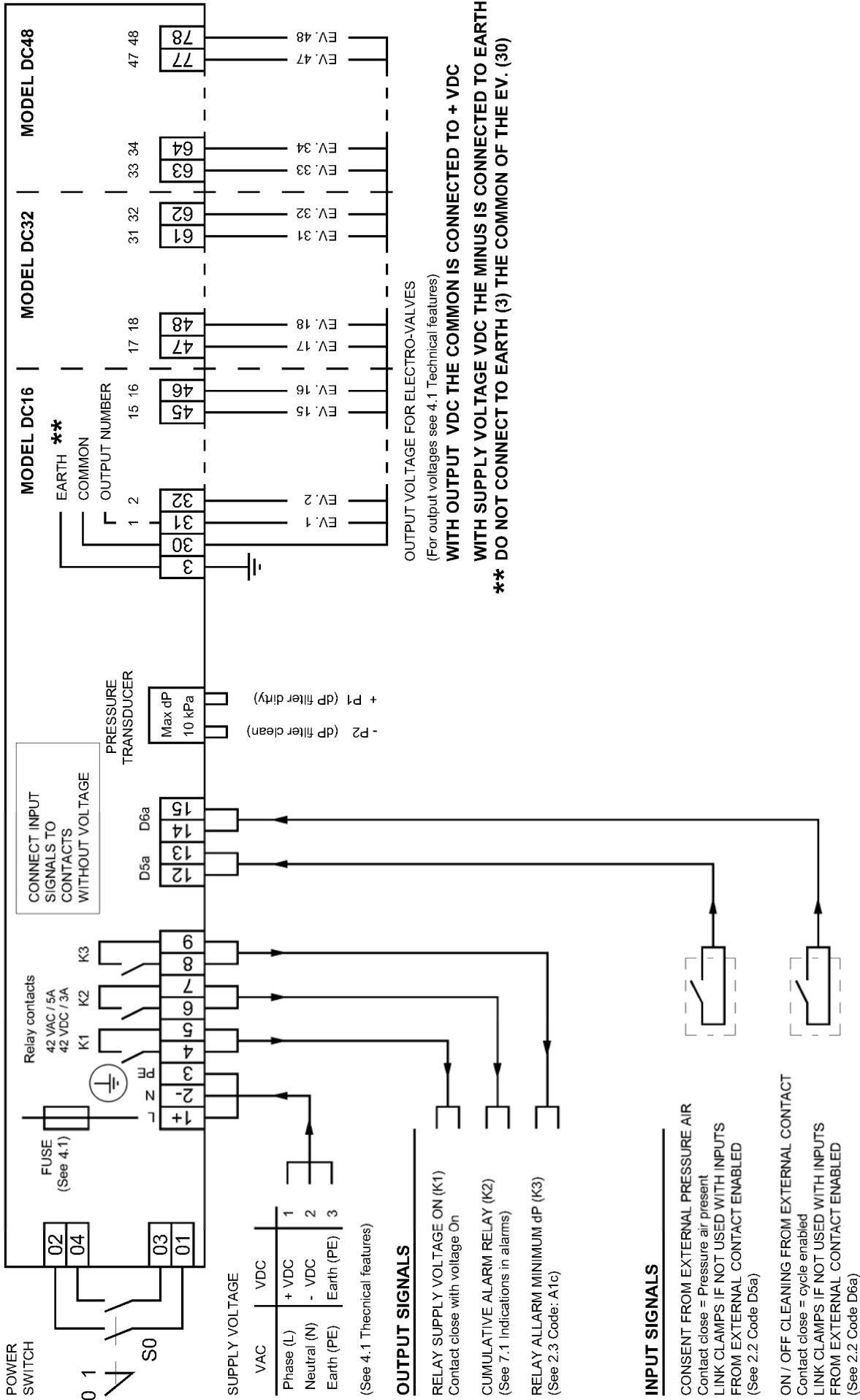
| DISPLAY | DESCRIPTION | Code |
|---------------------------------|---|---------|
| E1 OVERLOAD ELECTROVALVE 003 | Overload alarm solenoid valves 3 | B8b |
| E2 ACT. FAILED ELECTROVALVE 003 | Solenoid valve not activated - Solenoid valves 03 (option on request) | B9x/B6x |
| E6 COMPR. AIR LACK D5a OPEN | Cycle stop since no consent from compressed air pressure switch | D5a |
| E7 MAXIMUM dP ALARM | Maximum dP alarm active. dP reading over SET 15 (See section 5.1) | C7d |
| E8 MINIMUM dP ALARM | Minimum dP alarm active dP reading under SET 12. (See section 5.1) | C7c |

8.1 INFORMATION AND GUIDE ON THE DISPLAY

If no button is pressed for 5 minutes, the device leaves the info mode, restaring normal operation

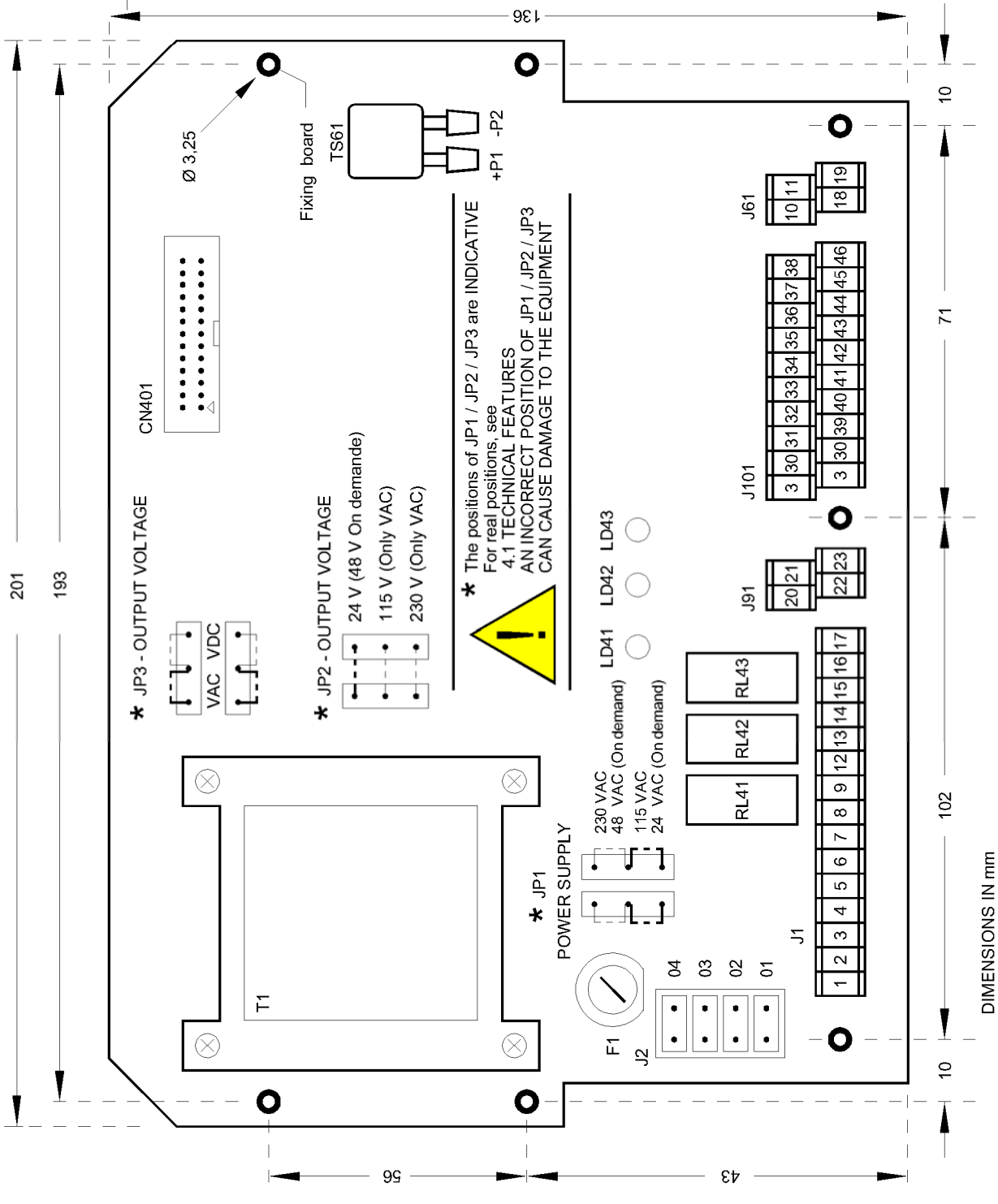


9.1 WIRING DIAGRAM



10.1 ELECTRONIC BOARD SIZE AND VOLTAGE SETTINGS

| LEGEND | |
|--------|--|
| CN401 | Front panel flat cable connector |
| F1 | 5x20 Line protection fuse |
| J1 | Supply voltage and I/O connection clamps |
| J2 | Power switch connection clamps |
| J61 | Analog signal connection clamps (option) |
| J91 | TC probe connection clamps (option) |
| J101 | Ev. connection clamps. |
| JP1 | Supply voltage selection jumper |
| JP2 | Output voltage selection jumper |
| JP3 | Output voltage AC/DC selection |
| LD41 | Green led relay K1 On indication |
| LD42 | Green led relay K2 On indication |
| LD43 | Green led relay K3 On indication |
| RL41 | Output relay K1 |
| RL42 | Output relay K2 |
| RL43 | Output relay K3 |
| T1 | Input transformer |
| TS61 | Differential pressure transducer |
| +P1 | dP pressure side dirty |
| -P2 | dP pressure side clean |



12.1 PROBLEM SOLUTION

| DEFECT | POSSIBLE CAUSE | SOLUTION |
|--|--|--|
| Display OFF | Fuse burnt. Supply voltage. Jumper for input voltage selection | Check the protection fuse on supply line. Check if supply voltage is present and if it agrees with supply voltage needed by the device (clamps 1 and 2). Check jumper JP1. |
| No output activation | Output voltage. Connection to the electrovalves. Jumper for output voltage selection | Check that sequencer output voltage and electrovalve coils have the same voltage. Check the connection between sequencer and electrovalves and do manual test of the outputs (See B10). Check jumper JP2 and JP3. |
| Wrong differential pressure reading. | Pneumatic connection not free. Pipe damaged | Disconnect the 2 pipe to the device and verify that dP reading is 0.00 kPa. If it is OK check the pipe for air connection from the device to the filter. |
| The cleaning cycle do not run in according to the set value. | The memory of the microprocessor could be modified by external factor. | Switch Off the supply voltage of the sequencer. Hold down key A and switch on the supply voltage. By means of this operation the default data are loaded in set up. Adjust the zero dP reading and the other parameters according to the filter's needs. |



We reserve the right to make any change without notice.

13.1 WARRANTY

The warranty lasts 4 years. The company will replace any defective electronic component, exclusively at our laboratory, unless otherwise agreed, upon the Company's prior consent.

WARRANTY EXCLUSION

The warranty is not valid in case of:

- 1) Tampering or unauthorized repairs.
- 2) Wrong use of the device, not in compliance with technical data.
- 3) Wrong electrical wiring.
- 4) Inobservance of the installation rules.
- 5) Use of the device, not in compliance with CE rules.
- 6) Atmospheric events (Lightning, electrostatic discharge), Overvoltage.

EU Declaration of Conformity (DoC)

Dichiarazione di conformità UE

Company name / Nome del fabbricante:

ECOTECH GTS S.R.L.

Postal address / Indirizzo postale:

Via Del Plan Del Sant, 24

Postcode and City / CAP e Città:

38012

Predaia Frazione Mollaro (TN)

Telephone / Telefono:

+39 0463 46 10 49

E-Mail address / Indirizzo Posta elettronica:

info@ecotechgts.com

declare that the DoC is issued under our sole responsibility and belongs to the following product:

Apparatus model / Apparecchio modello:

LDC

Product Type / Tipo di prodotto:

Sequencer / Sequenziatore

Serial number / Numero serie:

Object of the declaration / Oggetto della dichiarazione:

LDC16LU0

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation

L'oggetto della dichiarazione di cui sopra è conforme alla pertinente normativa di armonizzazione dell'Unione

Directives 2014/30/UE, 2014/35/UE and 2011/65/UE

Direttiva 2014/30/UE, 2014/35/UE e 2011/65/UE

The following harmonised standards and technical specifications have been applied:

Riferimento alle pertinenti norme armonizzate utilizzate

Title / Titolo

Date of standard / Data di pubblicazione

EN 60730-1

2011

EN 50581

2012

Amministratore

Signed for and on behalf of / Firmato a nome e per conto di



Alessandro Corazzolla

Mesero, 29 / 05 / 2020