

# Atlas Copco Elektronikon Systems

ES100

## Installation and operating instructions - Parts list

This instruction book meets the requirements for instructions specified by the machinery directive 89/392/EEC and is valid for CE as well as non-CE labelled machines

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**Atlas Copco**

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# 1 LEADING PARTICULARS

## 1.1 General description

The sequence selector ES100 is a pressure band controller which regulates the air net pressure within programmable limits by starting, loading, unloading and stopping the compressors connected according to a sequence.

The sequence selector distributes the running time among 2 up to 7 compressors connected to a common air net. These compressors may be equipped with a relay-controlled regulator or with the Atlas Copco Elektronikon regulator.

The ES100 is available in three versions:

- ES100 with a communication module (COM3-Fig. 1.1), allows a combination of maximum 4 Elektronikon-regulated compressors and 3 relay-regulated compressors (Product number 8104 0114 01)
- ES100 with a communication module (COM3) and a digital input/output module (DIOE-Fig. 1.2), allows 7 relay-regulated compressors or a combination with maximum 4 Elektronikon-regulated compressors (Product number 8104 0114 35)
- ES100 with two communication modules (COM3-Fig. 1.3), allows 7 Elektronikon-regulated compressors or a combination with maximum 3 relay-regulated compressors (Product number 8104 0114 27)

The sequence selector comprises (Figs. 1.1, 1.2 and 1.3):

1. A cubicle containing:
  - control module (MKIII)
  - net filter (NF)
  - voltage transformer (T1)
  - circuit breakers (F1 up to F4)
  - depending on the version:
    - one or two communication modules (COM3)
    - digital input/output module (DIOE)
    - three or seven relays (K2', K4', K5', K6', K7', K8' and K10')
    - one or two universal current limiters (UCL1 and UCL2)

An optional communication module (COM1) is available to connect the sequence selector to an ES400 remote compressor monitoring system. Consult section 21 for installation directives of the COM1 module.

2. Following parts are delivered loose with the ES100
  - A (0 to 17 bar) pressure sensor for sensing the net pressure and converting it into a variable voltage. The sequence selector is regulated through information received from this sensor.
  - A cable (15 m) with connector to connect the pressure sensor to the sequence selector.
3. Parts to be provided locally
  - Cable of the proper length of  $2 \times 1.5 + 1.5 \text{ mm}^2$  to connect the sequence selector to the power supply

### For Elektronikon-regulated GA5 up to GA45 compressors (with regulator as shown in Fig. 2.2)

- Cables of the proper length (max. 1000 m)  $3 \times 1.5 \text{ mm}^2$  with screening to connect the compressors to the sequence selector (2 cables per compressor).
- Relay with a normal open contact (1 relay per compressor)

#### Note:

A voltage-free contact of the line contactor (usually K21) is needed to connect the feed-back signal for motor running. If no such contact should be available, an auxiliary relay must be installed.

### For Elektronikon-regulated GA5 up to GA75 compressors (with regulator as shown in Figs. 2.2 and 2.5)

- A key switch which can be ordered from Atlas Copco with the following ordering number:
  - 1089 9082 21 for GA55/75
  - 1089 9082 21 for GA5 up to GA45 with a cubicle as specified in fig 2.8
  - 1089 9082 28 for GA5 up to GA45 with a cubicle as specified in fig 2.9

### For Elektronikon-regulated compressors (with regulator as shown in Figs. 2.3, 2.4 and 2.5)

- Cable(s) of the proper length (max. 1000 m) of  $4 \times 0.5 \text{ mm}^2$  with screening (2 x twisted pair + screening) to connect the compressors to the sequence selector.
- Connectors to connect the cable(s) to the Elektronikon regulator of the compressors. For compressors with Elektronikon regulators as shown in Fig. 2.3 use 25 pin Sub-D male connectors, for compressors with an Elektronikon regulator as shown in Figs. 2.4 and 2.5 use 9 pin Sub-D male connectors

The Sub-D connectors can be ordered from Atlas Copco:

| Connector                     | Ordering number |
|-------------------------------|-----------------|
| 9-pin Sub-D male connector    | 1088 0017 21    |
| 9-pin Sub-D female connector  | 1088 0017 22    |
| 25-pin Sub-D male connector   | 1088 0017 25    |
| 25-pin Sub-D female connector | 1088 0017 26    |

#### Note:

Compressors with an Elektronikon regulator as shown in Figs. 2.4 and 2.5 must be equipped with an optional communication module (COM1), consult section 21 for installation directives of the COM1 module.

### For relay-regulated compressors

- Cable(s) of the proper length (max. 1000 m)  $2 \times 1.5 \text{ mm}^2$  with screening to connect the compressors to the sequence selector (4 cables per compressor).

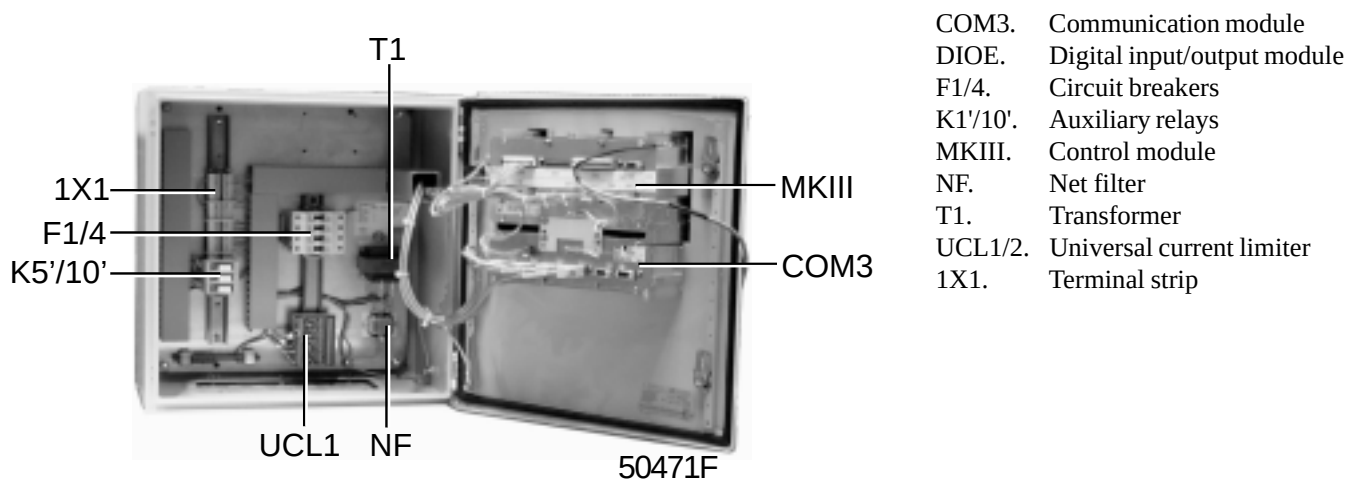


Fig. 1.1. ES100 with communication module (COM3)

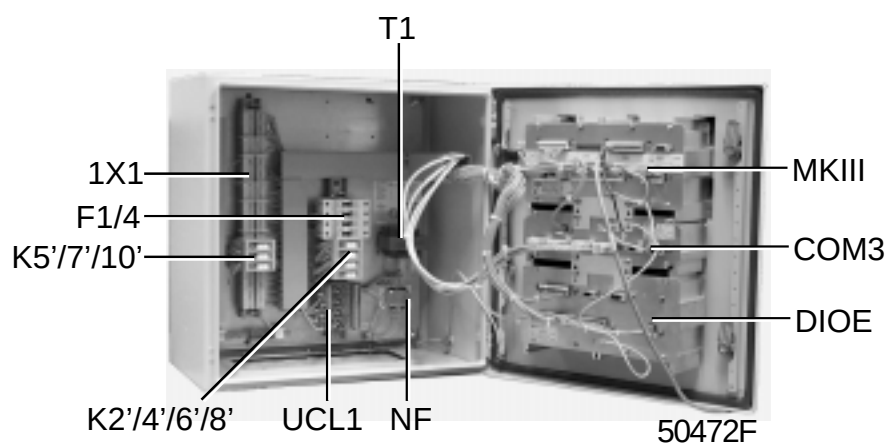


Fig. 1.2. ES100 with communication module (COM3) and digital input/output module

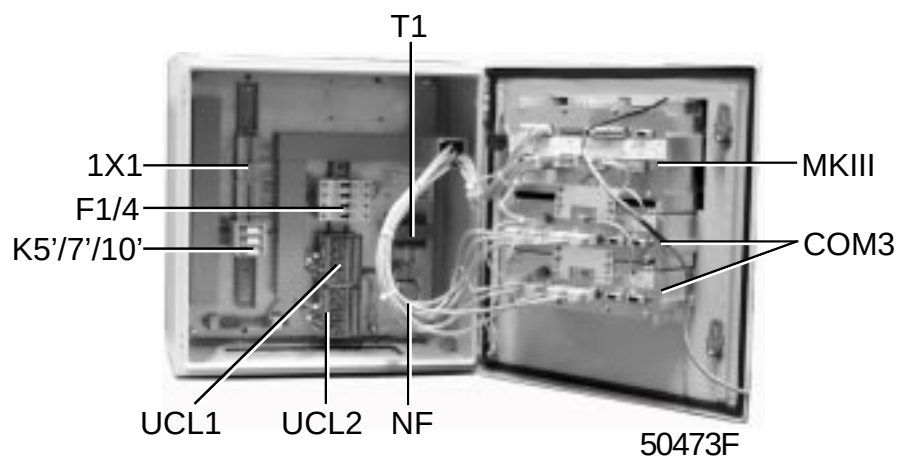


Fig. 1.3. ES100 with two communication modules (COM3)

**Note:**

A voltage-free contact of the line contactor (usually K21) is needed to connect the feed-back signal for motor running, a voltage-free contact of the auxiliary relay for loading (usually K14) is needed to connect the feed-back signal for compressor loaded. If no voltage-free contacts should be available, auxiliary relays must be installed.

## 1.2 Sequences

The ES100 allows three different ways of shifting a sequence:

- Manual sequence shift: a new sequence has to be programmed manually (see section 15)
- Time-based sequence shift: the sequence shifts automatically according to a programmed list (e.g. Monday 07:00 sequence 1; Tuesday 08:00 sequence 2). Consult section 10 to create or modify the list and section 18 to make this list active.
- Hour-based sequence shift: the sequence shifts according to a programmed number of running hours of the ES100. Consult section 11 to program the number of hours, consult section 18 to activate this function.

## 1.3 Prevention of simultaneous starts

The ES100 prevents simultaneous starting of compressors.

When more than one compressor has to be started, the ES100 takes into account the start lag time (programmable) to avoid simultaneous starting of compressors.

## 1.4 Minimum unload time

All compressors connected can be stopped from the sequence selector by pushing stop button (9-Fig. 3.1). The ES100 immediately unloads all compressors. Relay-regulated compressors and compressors with an Elektronikon regulator as shown in Fig. 2.2 will stop after running the idling time set in the compressor regulator. Compressors with an Elektronikon regulator as shown in Figs. 2.3, 2.4 and 2.5 will run unloaded during the minimum unload time and stop, one after the other, respecting the stop time (Tstop).

## 1.5 Load/unload

A programmable time Tunload will be respected between the unloading of compressors during regulation. A programmable time Tload will be respected between the loading of compressors during regulation.

## 1.6 Automatic restart after voltage failure

The ES100 has a function for automatic restart after voltage failure. Ex-factory, this function is inactive. To activate, consult Atlas Copco.

For proper operation the automatic restart after voltage failure function on the compressor regulator must be:

- activated for compressors equipped with an Elektronikon regulator as shown in Fig. 2.2 (GA5 up to GA45)
- inactive for compressors equipped with an Elektronikon regulator as shown in Figs. 2.3, 2.4 and 2.5
- Relay-regulated compressors must be started manually after the voltage failure

After power restoring, the ES100 restarts the regulation and returns to the condition as before the power failure. Programmed delay times and simultaneous start prevention will be taken into account.

## 1.7 Central control

After pushing the start button (8-Fig. 3.1) all local automatic stop functions are disabled for all integrated compressors, the ES100 takes over the regulation.

The ES100 starts sequencing the compressors, hereby adding or deleting compressors as needed. The automatic operation LED (1-Fig. 3.1) immediately lights up steadily.

When less than two compressors are integrated it is impossible to switch from ready-to-start to central control.

On later production units (with MKIII module 1900 0701 04 or 05), relay K02 can be used to indicate the local or central control status (contact closed = central control)

## 1.8 Disabling of the ES100

The ES100 can be disabled by switching key-switch (S5-Fig. 3.1) to position 1. The ES100 stops regulating and commands the compressor regulators to take over.

## 1.9 Isolation of compressor(s)

It is possible to isolate one or more compressors from the regulation (see section 16).

The ES100 ignores the isolated compressors for the pressure regulation. They can run under local control until they are integrated again.

## Compressor shut-down control

The ES100 has no shut-down functions.

The ES100 will replace a loaded compressor when it is shut down by one of its safety functions. This will also be done when a "system error" of a compressor regulator occurs.

## 1.10 System check

An auto-check is executed when starting up.

When internal communication is lost in the ES100 system, all compressors will be put in local control after one minute.

## 1.11 Compressor functions taken over by the sequence selector

After installing and programming the sequence selector, the control of the compressors connected is taken over by the sequence selector.

### 1.11.1 Elektronikon®-regulated compressors

#### Compressors with an Elektronikon regulator as shown in Fig. 2.2

The loading/unloading commands from the control module of each compressor are inactivated. As a result the LOAD and UNLOAD buttons on the control module of each compressor are inactive and the AUTOMATIC OPERATION LEDs light up continuously. The start and stop buttons on the compressor regulator are made inactive, the emergency stop button on the compressor remains active. The compressors will be loaded and unloaded by the sequence selector. The idling time functions of the compressors remain active.

#### Compressors with an Elektronikon regulator as shown in Fig. 2.3

The loading/unloading commands from the control module of each compressor as well as the automatic stop function (DSS function) are inactivated. As a result the LOAD and UNLOAD buttons on the control module of each compressor are inactive and the AUTOMATIC OPERATION LEDs and the REMOTE CONTROL LEDs light up continuously.

The compressors will be started, loaded, unloaded and stopped only by the sequence selector.

**Warning:** *The compressors can also be stopped by pressing the PROGRAMMED STOP button on the compressor control modules, but, in this case, they may be restarted by the sequence selector.*

## Compressors with an Elektronikon regulator as shown in Figs. 2.4 and 2.5

The loading/unloading commands from the control module of each compressor as well as the automatic stop function (DSS function) are inactivated. As a result the LOAD and UNLOAD buttons on the control module of each compressor are inactive and the AUTOMATIC OPERATION LEDs light up continuously. The start and stop buttons on the compressor regulator are made inactive, the emergency stop button on the compressor remains active.

The compressors will be started, loaded, unloaded and stopped only by the sequence selector.

### 1.11.2 Relay-regulated compressors

Two relays of the ES100 are used to control a compressor:

- Local/remote control relay (K4-Fig. 2.7 for compressor 1): the relay is in the normal (de-energized) position for the local control mode (loaded/unloaded by the pressure switch of the compressor). It is energized for the remote control mode (loaded/unloaded by the sequence selector).
- Load/unload relay (K5'-Fig. 2.14 for compressor 1): this relay takes over the function of the air pressure switch of the compressor. In load position (relay de-energized), the relay makes the circuit to the loading solenoid valve of the compressor. In unload position (relay energized), the relay makes the circuit to the unloading time relay of the compressor.

Before changing over from local control to central control, the sequence selector will check the status of the compressor (loaded or unloaded). If the compressor is running loaded, the sequence selector will switch the relay in load position, if the compressor is running unloaded, the sequence selector will switch the relay in unload position.

## 2 INSTALLATION

1. Mount the ES100 to a wall (Fig. 2.1) in the room taking into account the maximum cable length of 15 m to the pressure sensor and 1000 m to each compressor regulator.
2. The pressure sensor should preferably be connected:
  - to an air receiver to avoid pressure pulsations (vibrations should also be avoided).
  - via valves, allowing the pressure sensor to be removed after isolating and depressurizing it.
  - in vertical position to avoid influence of condensate.
3. **Isolate and depressurize that part of the air net to which the pressure sensor will be connected.**
4. Provide a hole with thread ISO R 1/4 in the depressurized part of the air net.
5. Screw the pressure sensor into place.
6. Wire the pressure sensor cable to the module of the sequence selector.  
Respect the pin numbers as indicated on (Fig. 2.6).

Make sure that:

- "V+" (pin number 1) of connector 2 x 5 of the sequence selector is connected to "V+" (red wire) of the pressure sensor
- "signal" (pin number 2) of connector 2 x 5 of the sequence selector is connected to "signal" (green wire) of the pressure sensor
- "gnd" (pin number 3) of connector 2 x 5 of the sequence selector is connected to "gnd" (black wire) of the pressure sensor
- the screening is connected to the earth terminal inside the cubicle of the sequence selector

### 2.1 Elektronikon-regulated compressors with an Elektronikon regulator as shown in:

#### 2.1.1 Fig. 2.2 (GA5 up to GA45)

- Stop the compressors and switch off the voltage.
- Install a relay in the compressor cubicle (Kh-Fig. 2.11). Connect terminal A2 to terminal 2 of terminal strip 1x1. Connect terminal A1 to terminal 9 of terminal strip 2x2.
- Install the key switch near the Elektronikon regulator. Connect the key switch to the regulator as indicated in Figs. 2.8 or 2.9 (check the partnumber of the cubicle to determine the diagram to be used).
- Provide for each compressor two cables of the proper length, of 3 wires of 1.5 mm<sup>2</sup> with screening. The maximum cable length is 1000 m.
- Provide the cable ends with labels indicating the number of the compressor.
- Connect the cables as shown in the table below (the connection of compressor No. 1 is shown in Fig. 2.11).
- Connect the screening of all cables to the earth terminal of the sequence selector. **Do not connect the screening to the earth terminal of the compressor regulator.**
- These compressors must be programmed to the sequence selector as a digital input/output link (see sections 2.3 and 13)

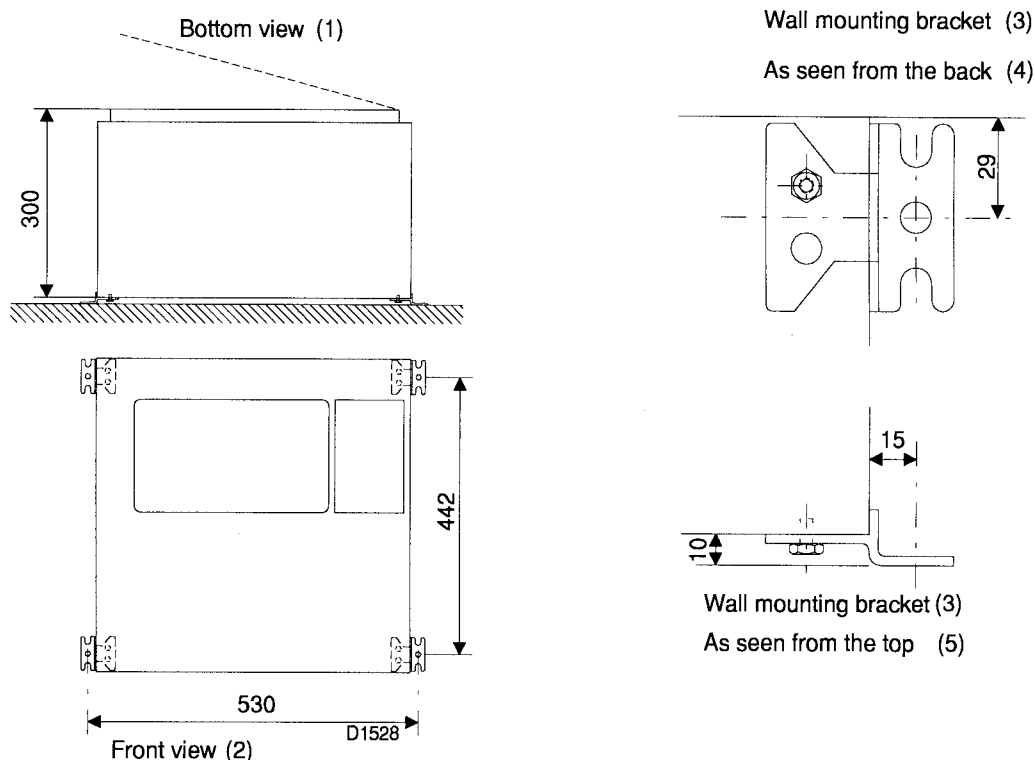


Fig. 2.1. Dimension drawing

| Cable/wire | ES100                                                                 |            | Compressor                                      |            |
|------------|-----------------------------------------------------------------------|------------|-------------------------------------------------|------------|
|            | Terminal                                                              | Connect to | Terminal                                        | Connect to |
| A/1        | 1                                                                     | 1X1        | C3                                              | Kh         |
| A/2        | 11                                                                    | 1X1        | C2                                              | K21 1)     |
| A/3        | 12                                                                    | 1X1        | C4                                              | Kh         |
| B/1        | 19                                                                    | 1X1        | 1                                               | 2X4        |
| B/2        | 20                                                                    | 1X1        | 7                                               | 2X4        |
| B/3        | 12                                                                    | K5'        | 6                                               | 2X4        |
| Bridge     | between terminal 19 of terminal strip 1X1 and contact 11 of relay K5' |            | between contacts C1 and C3                      |            |
| Bridge     |                                                                       |            | between terminals 1 and 3 of terminal strip 2X4 |            |

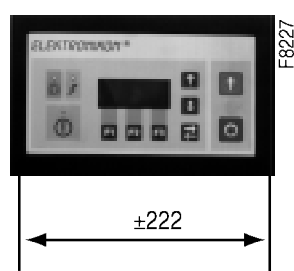
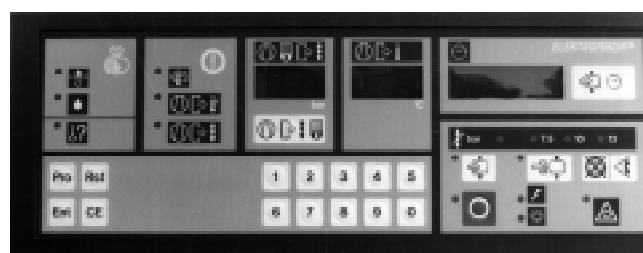


Fig. 2.2. Elektronikon MK III LR regulator



F8224

Fig. 2.3. Elektronikon MK I and MK II regulators

## 2.1.2 Fig. 2.3

- Provide for each compressor the proper length of screened cable of 4 x 0.5 mm<sup>2</sup> (2 x twisted pair + screening). The maximum cable length is 1000 m.
- Provide the cable ends with labels indicating the number of the compressor.

### For compressor No. 1 (Figs. 1.1, 1.2 and 1.3)

1. Connect the cable ends of the screened cable to terminals 1, 2, 3 and 4 of Universal Current Limiter (UCL1) of the sequence selector. For sequence selectors with two communication modules, check Fig. 1.3 for the correct position of UCL1.
2. Connect the screening of the cable to the earth terminal of the sequence selector. **Do not connect the screening to the earth terminal of the compressor regulator.**
3. Connect the cable ends on the other end of the screened cable to pins 24, 25, 11 and 12 respectively of the 25-pin Sub-D connector. Install a bridge between terminals 4 and 5, 6 and 20, 13 and 23 of the 25 pin Sub-D connector (Fig. 2.12).
4. Stop the compressor and switch off the voltage to the compressor. Plug the cable in the connector of the Elektronikon module of the compressor.

### For compressors No. 2 up to 7 (Figs. 1.1, 1.2 and 1.3)

5. Connect the cable ends of the screened cable to terminals:
  - 5, 6, 7 and 8 of (UCL1) for compressor 2
  - 9, 10, 11 and 12 of (UCL1) for compressor 3
  - 13, 14, 15 and 16 of (UCL1) for compressor 4

- 1, 2, 3 and 4 of (UCL2) for compressor 5
  - 5, 6, 7 and 8 of (UCL2) for compressor 6
  - 9, 10, 11 and 12 of (UCL2) for compressor 7
6. Proceed for each compressor as described in steps 2, 3 and 4
  7. These compressors must be programmed to the sequence selector as a communication link (see sections 2.3 and 13)

### 2.1.3 Figs. 2.4 and 2.5

**Note:**

The compressors must be provided with an optional communication module (COM1), consult section 21 for the installation directives of the COM1 module.

- Provide for each compressor the proper length of screened cable of 4 x 0.5 mm<sup>2</sup> (2 x twisted pair + screening). The maximum cable length is 1000 m.
- Provide the cable ends with labels indicating the number of the compressor.
- On compressors with an Elektronikon regulator as shown in Fig. 2.5, disconnect the control mode switches CMS1 and CMS2. Connect the key-switch to the regulator as shown in Fig. 2.10.

**For compressor No. 1** (Figs. 1.1, 1.2 and 1.3)

1. Connect the cable ends of the screened cable to terminals 1, 2, 3 and 4 of Universal Current Limiter (UCL1) of the sequence selector. For sequence selectors with two communication modules, check Fig. 1.3 for the correct position of UCL1.
2. Connect the screening of the cable to the earth terminal of the sequence selector. **Do not connect the screening to the earth terminal of the compressor regulator.**
3. Connect the cable ends on the other end of the screened cable to pins 7, 8, 1 and 2 respectively of the 9-pin Sub-D connector (Fig. 2.13).
4. Stop the compressor and switch off the voltage to the

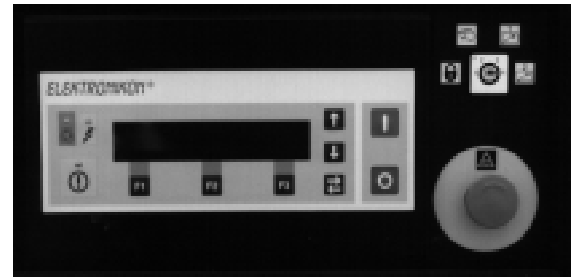


Fig. 2.4. Elektronikon MK III HR regulators 4x40 display

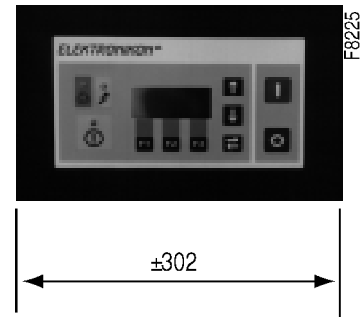


Fig. 2.5. Elektronikon MK III HR regulators 4x16 display

compressor. Plug in the cable in connector 5X10 of the COM1 module of the compressor.

**For compressors No. 2 up to 7** (Figs. 1.1, 1.2 and 1.3)

5. Connect the cable ends of the screened cables to terminals:
  - 5, 6, 7 and 8 of (UCL1) for compressor 2
  - 9, 10, 11 and 12 of (UCL1) for compressor 3
  - 13, 14, 15 and 16 of (UCL1) for compressor 4
  - 1, 2, 3 and 4 of (UCL2) for compressor 5
  - 5, 6, 7 and 8 of (UCL2) for compressor 6
  - 9, 10, 11 and 12 of (UCL2) for compressor 7
6. Proceed for each compressor as described in steps 2, 3 and 4
7. These compressors must be programmed to the sequence selector as a communication link (see sections 2.3 and 13)

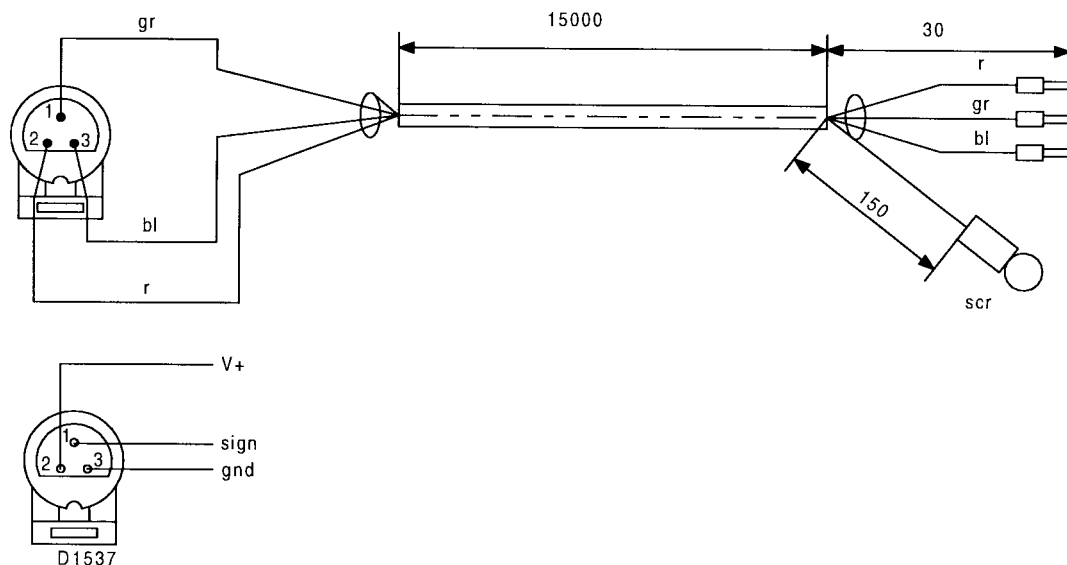
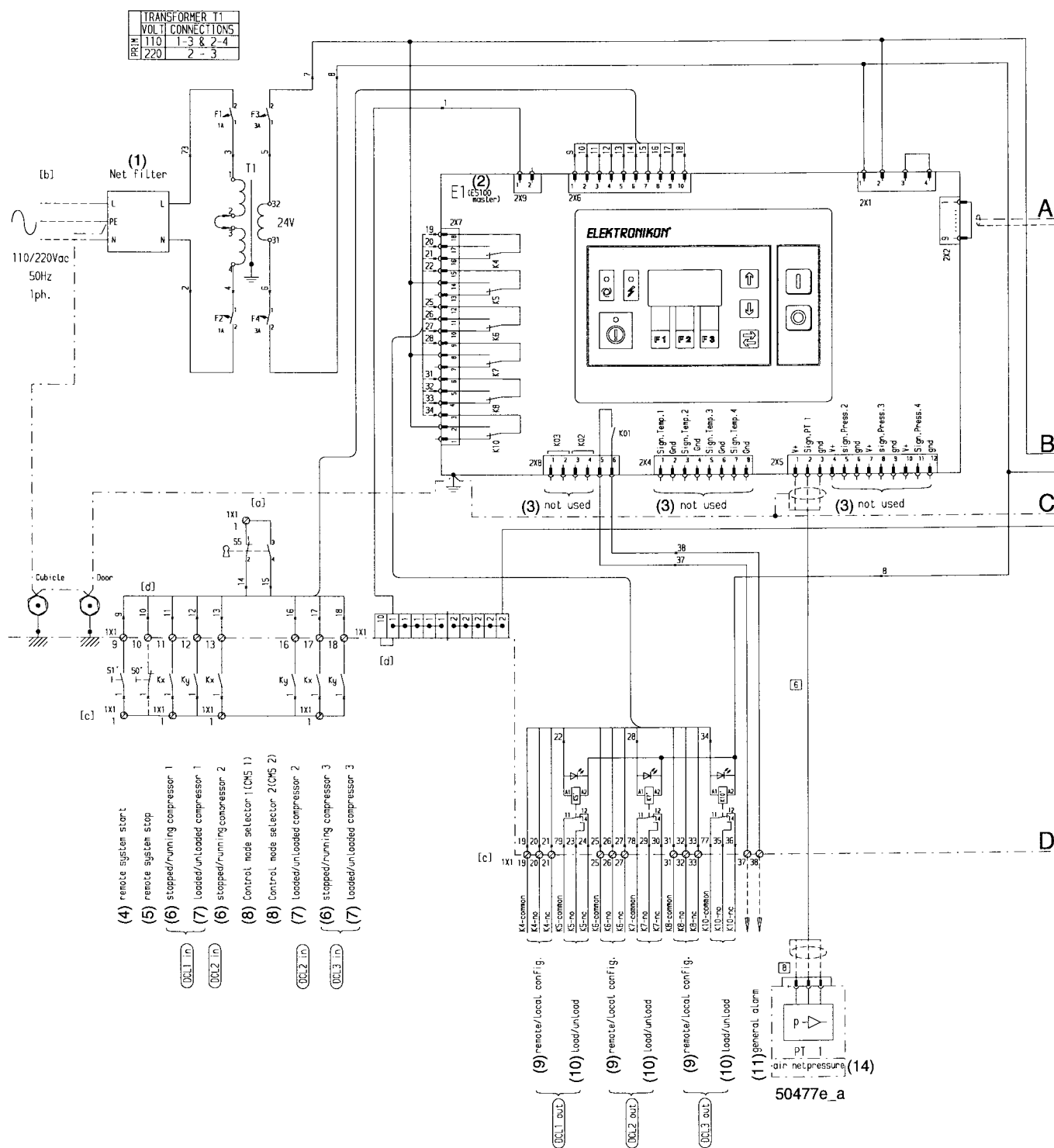
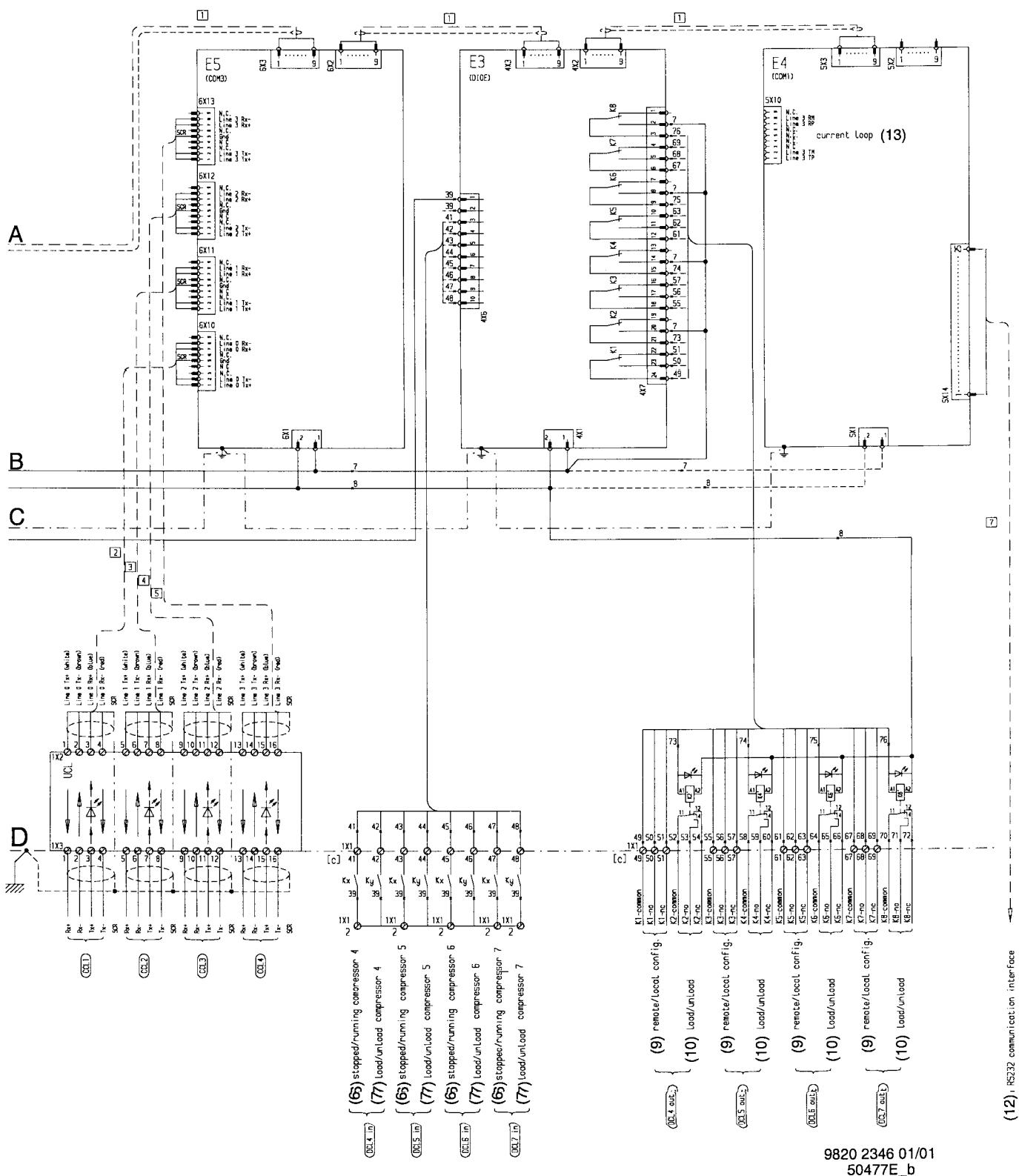


Fig. 2.6. Cable, pressure sensor





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50477E\_b

Fig. 2.7. Service diagram ES100

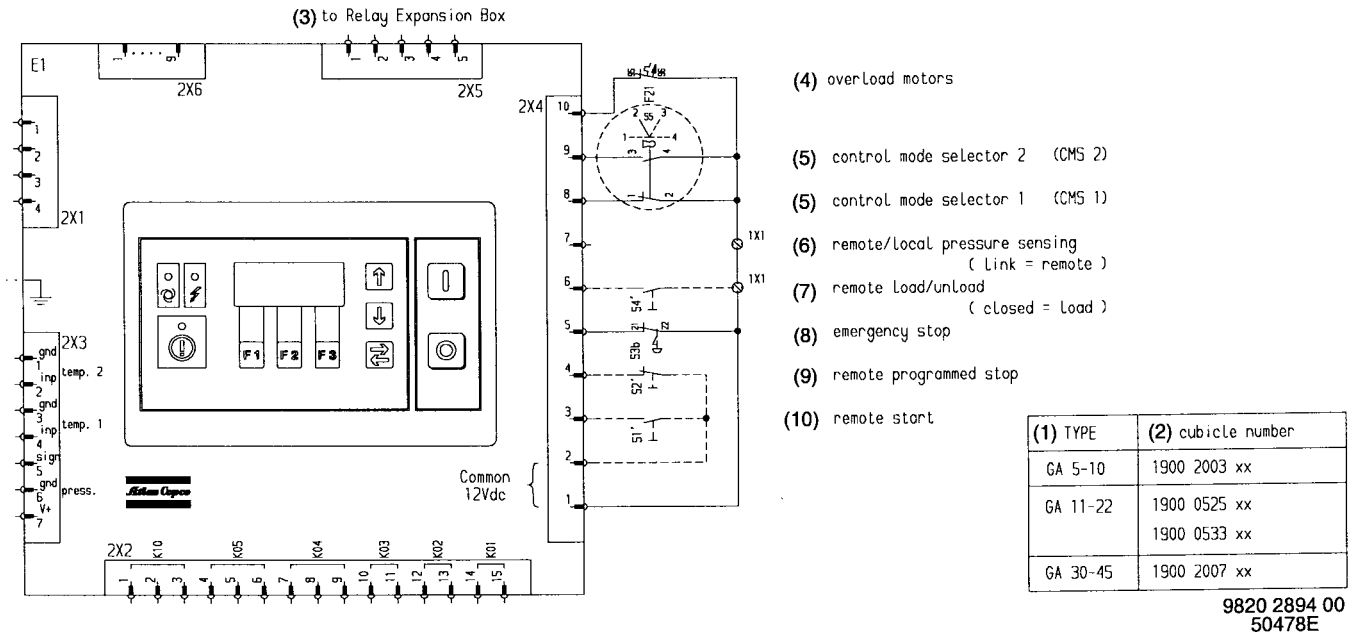


Fig. 2.8. Electrical connection of key-switch to MK III LR regulator (Earlier production units)

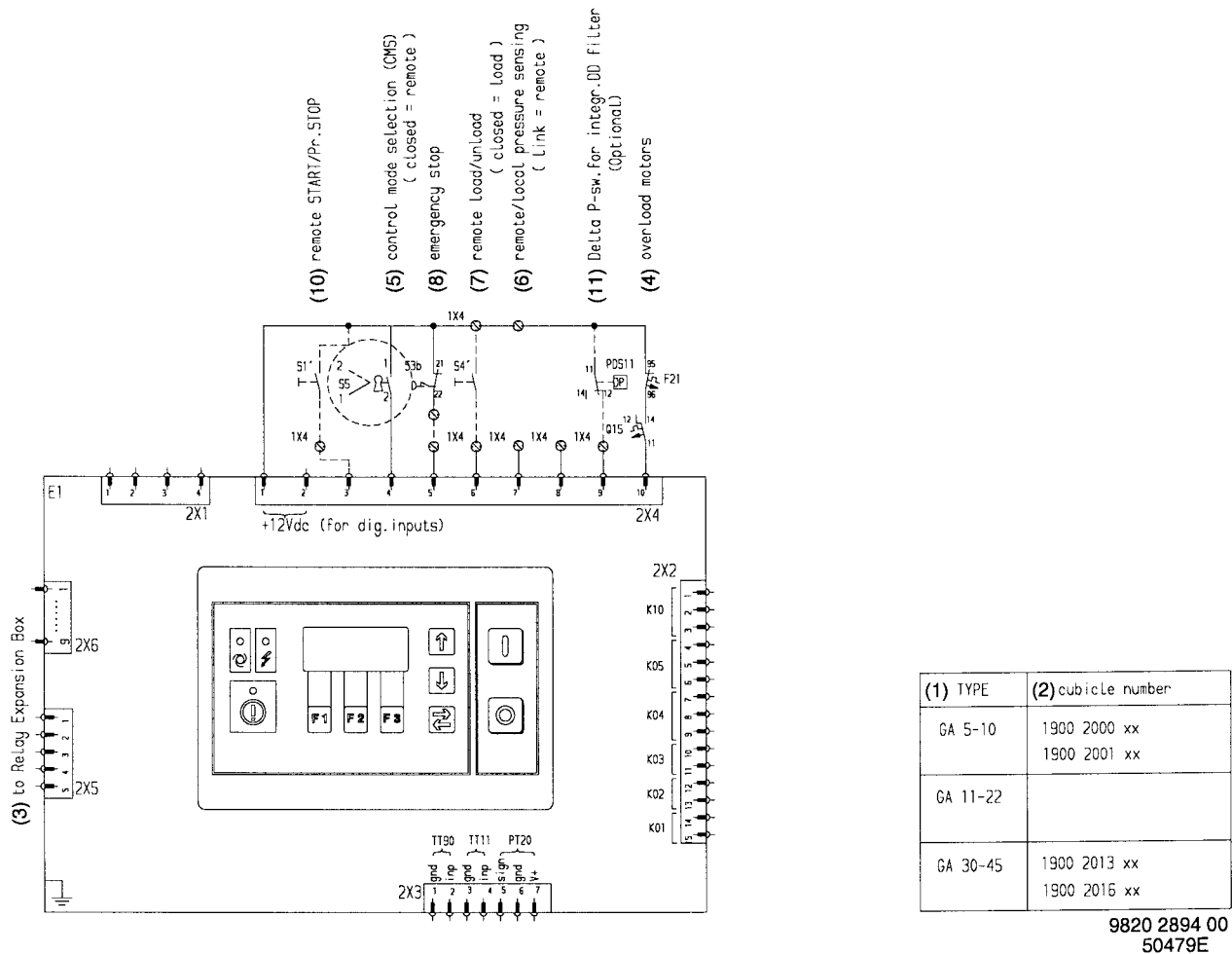


Fig. 2.9. Electrical connection of key-switch to MK III LR regulator (Later production units)

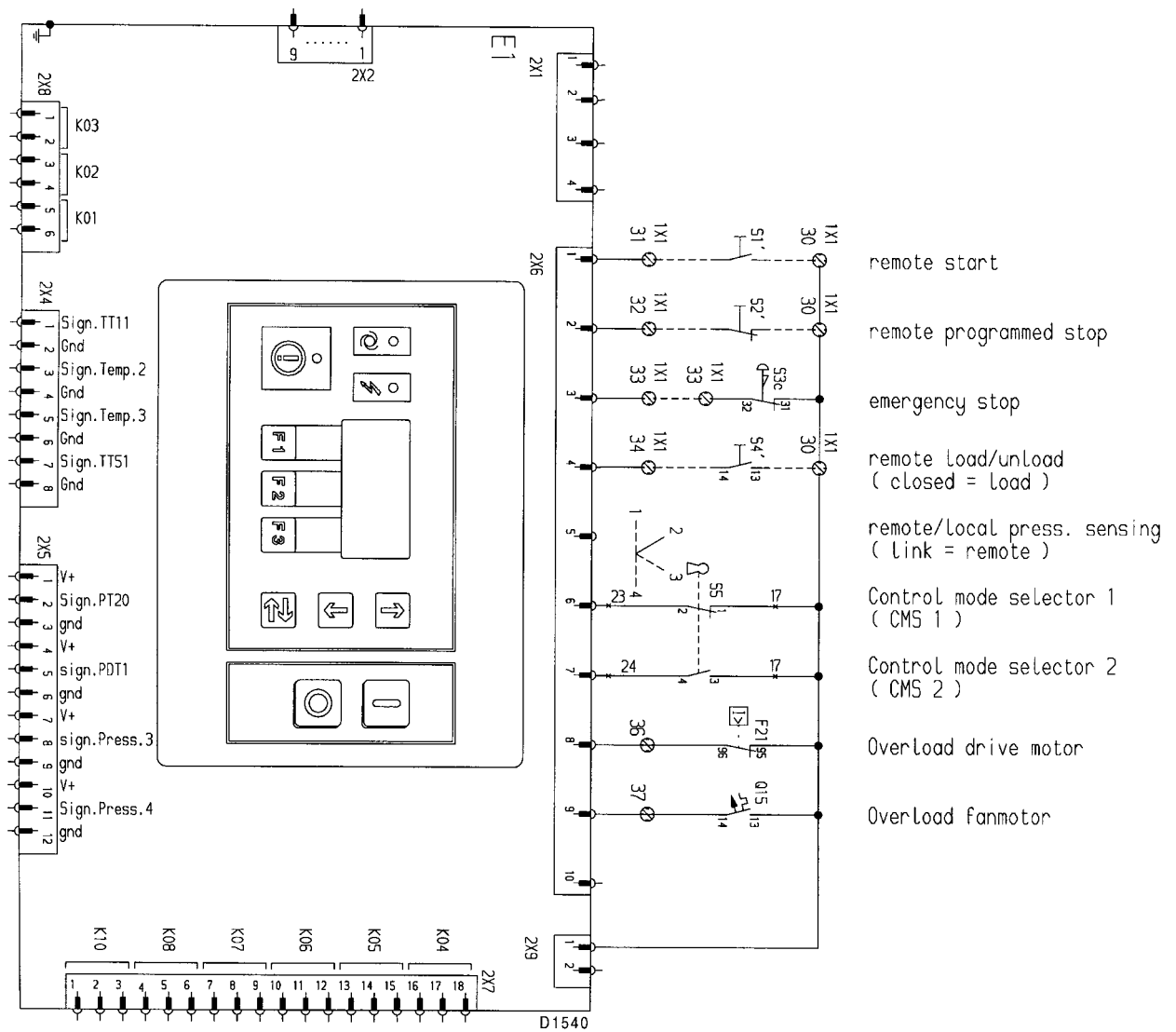
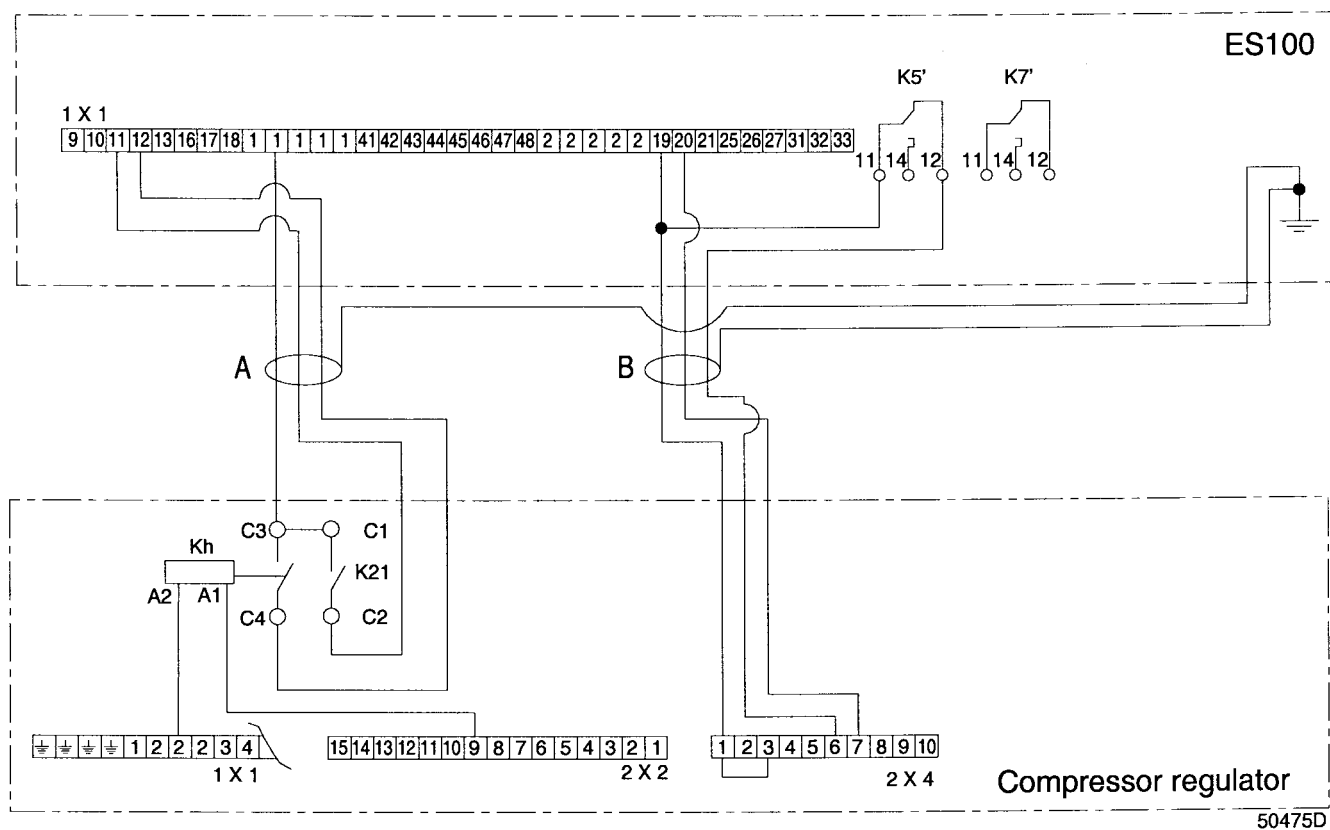


Fig. 2.10. Electrical connection of key-switch to MK III HR regulator



Kh to be provided locally

Fig. 2.11. Electrical connections of MK III LR regulator to ES100

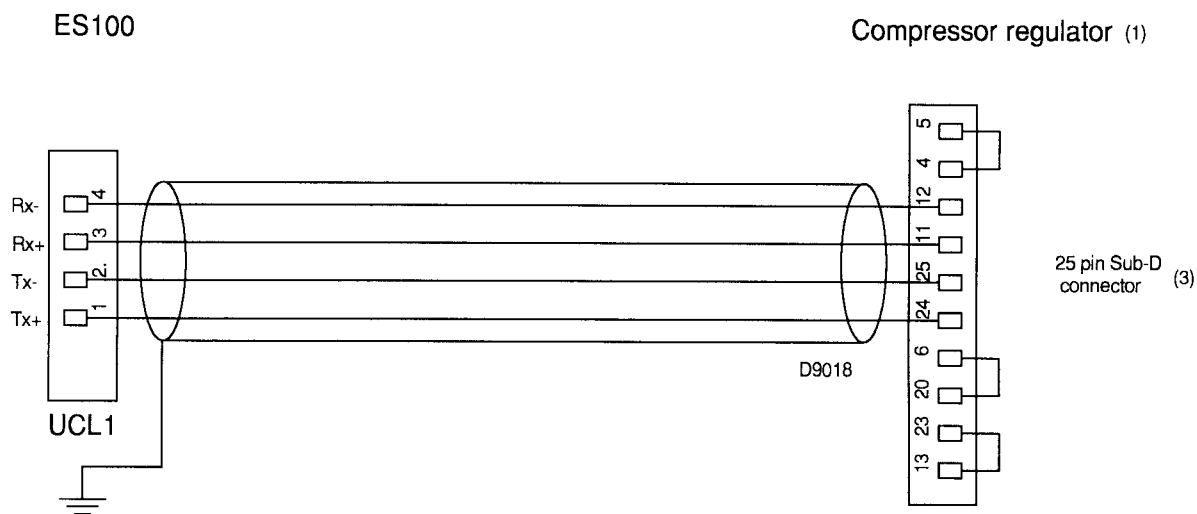


Fig. 2.12. Electrical connections of MK I or MK II regulator to ES100

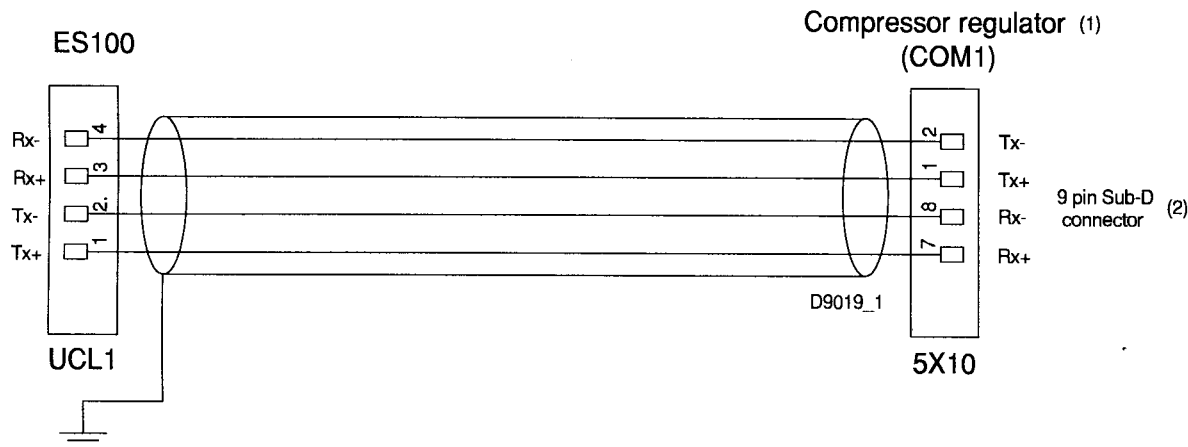


Fig. 2.13. Electrical connections of MK III HR regulator to ES100

## 2.2 Relay-regulated compressors (Fig. 2.14)

- Provide for each compressor four two-lead cables (2 x 1.5 mm<sup>2</sup> + screening) of the proper length.
- Provide the cable ends with labels indicating the number of the compressor.
- Voltage-free normal open contacts are required to connect the feed back signal for motor running and compressor loaded. If no such contacts are available, auxiliary relays need to be installed in the compressor cubicle locally.
- Connect the cables as shown in the table below
- Connect the screening of all cables to the earth terminal of the sequence selector. **Do not connect the screening to the earth terminal of the compressor regulator.**
- Stop the compressors and switch off the voltage before connecting the cables to the compressor.
- These compressors must be programmed to the sequence selector as a digital input/output link (see sections 2.3 and 13)

| ES100      |                                                  | Compressor                                                             |            |
|------------|--------------------------------------------------|------------------------------------------------------------------------|------------|
| Cable/wire | Terminal                                         | Terminal                                                               | Connect to |
| A/1        | 11                                               | C7                                                                     | 2)         |
| A/2        | 12                                               | C8                                                                     | 2)         |
| B/1        | 1                                                | C5                                                                     | 2)         |
| B/2        | 1                                                | C6                                                                     | 2)         |
| C/1        | 19                                               | C1                                                                     | 2)         |
| C/2        | 21                                               | C2                                                                     | 2)         |
| D/1        | 14                                               | C3                                                                     | 2)         |
| D/2        | 12                                               | C4                                                                     | 2)         |
| Bridge     | between terminal 20 of 1X1 and contact 11 of K5' | Remove (br) (if provided) installed in series with pressure switch (P) |            |

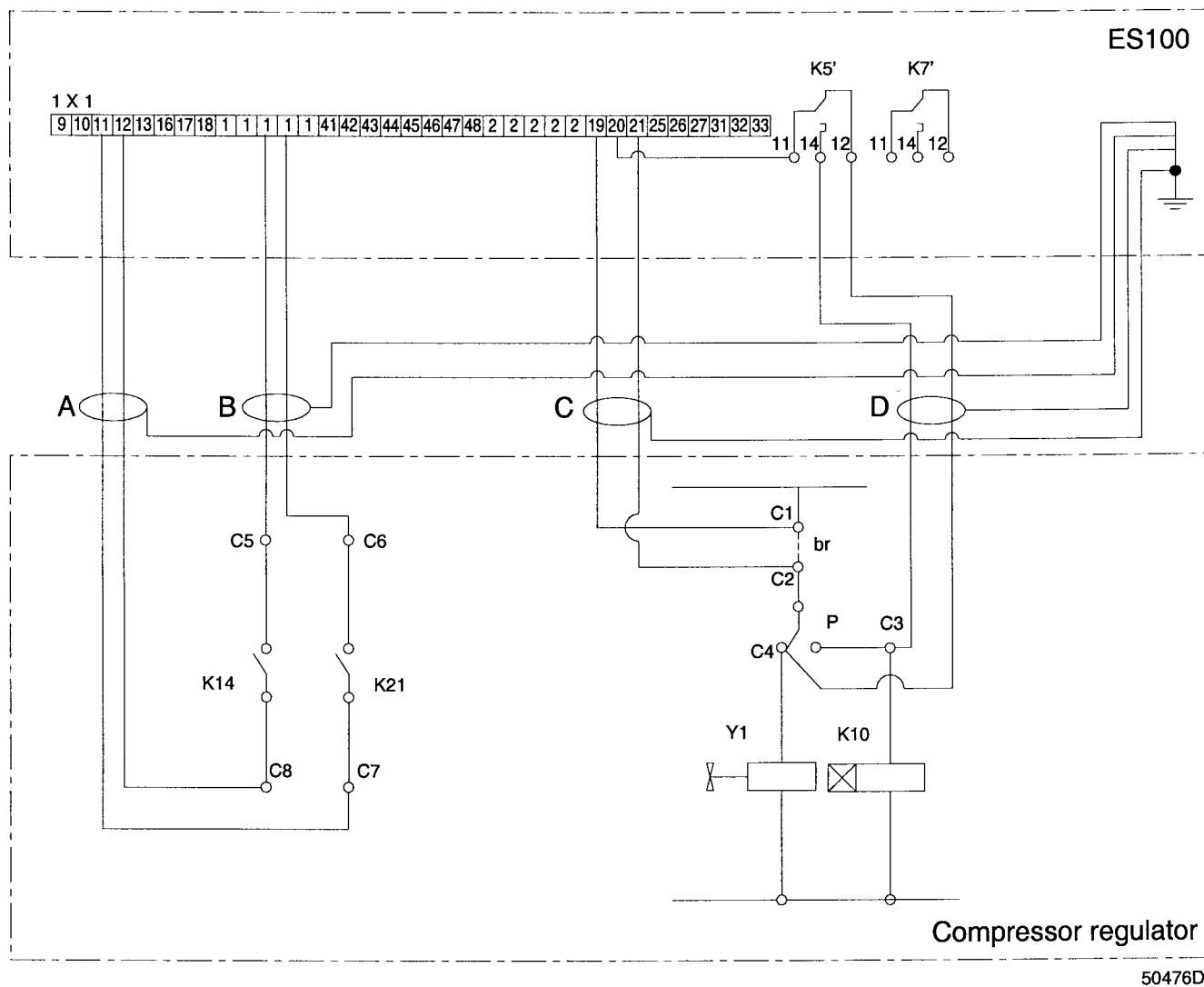


Fig. 2.14. Electrical connections of relay-controlled regulator to ES100

## 2.3 Preparation for initial start-up (Figs. 1.1, 1.2 and 1.3)

1. Stick labels on the control panels of the compressors connected to the sequence selector as well as on an obvious place inside these compressors warning the operator that the compressor is remotely started and stopped by a separate controller.  
These labels must warn the operator that, after voltage failure, the sequence selector will remotely start and stop the compressors, depending on the air demand and programmed values.
2. Provide a power supply cable. Connect one side of the power supply cable to terminals (L and N) of net filter (NF) and the PE-line (earthing) to terminal PE of the net filter **(not to the earthing bolt of the sequence selector module)**.
3. Check the input voltage and frequency of transformer (T1). Connect the other side of the power supply cable to an appropriate single-phase voltage.
4. Switch on the voltage to the compressors.
5. Switch on the voltage to the sequence selector. LED (2-Fig. 3.1) lights up.
6. Program the compressor connection mode (digital input/output link or communication link) to the ES100, consult section 13.
7. Program the sequence selector (see sections 3 up to 20).

## 2.4 Starting (Fig. 3.1)

1. Switch the control mode switch of the sequence selector (S5) to local control (position 2).
2. On compressors with an Elektronikon regulator as shown in Fig. 2.2, start the compressor using the start button on the control panel of the compressor and switch its key switch to remote control 1.  
On relay regulated compressors, start the compressor using the start button on the control panel of the compressor.  
On compressors with an Elektronikon regulator as shown in Figs. 2.4 and 2.5, switch the key switch of the compressor to remote control mode 2, the compressor will be started by the ES100.
3. Press start button (8) of the sequence selector.
4. The sequence selector will shift the sequence according to the programmed parameters (see sections 10, 11, 15 and 18), thereby distributing the running time between the connected compressors.

## 2.5 Stopping (Fig. 3.1)

- Press stop button (9), the ES100 immediately unloads all compressors. Compressors equipped with an Elektronikon regulator as shown in Figs. 2.3, 2.4 and 2.5 will be stopped by the ES100, respecting the minimum unload time and the stop time (Tstop) programmed in the ES100.  
Relay-regulated compressors and compressors equipped with an Elektronikon regulator as shown in Fig. 2.2 will stop after running the idling time set in the compressor regulator.
- The ES100 can be stopped by switching the key switch (S5) to position 1 (locked). The ES100 stops regulating and commands the compressor regulators to take over.

### Footnotes chapter 2

- 1) **A voltage-free contact is required** to connect the feed back signal for motor running. **If no such contact is available, an auxiliary contact needs to be installed in the compressor cubicle.**
- 2) The terminal numbers to be used in the compressor cubicle differ depending on the compressor type. Therefore, in Fig. 2.14, these terminals are numbered from C1 up to C8. Consult the electrical diagram in the compressor cubicle to determine the correct terminal numbers.

### 3 CONTROL PANEL (Fig. 3.1)

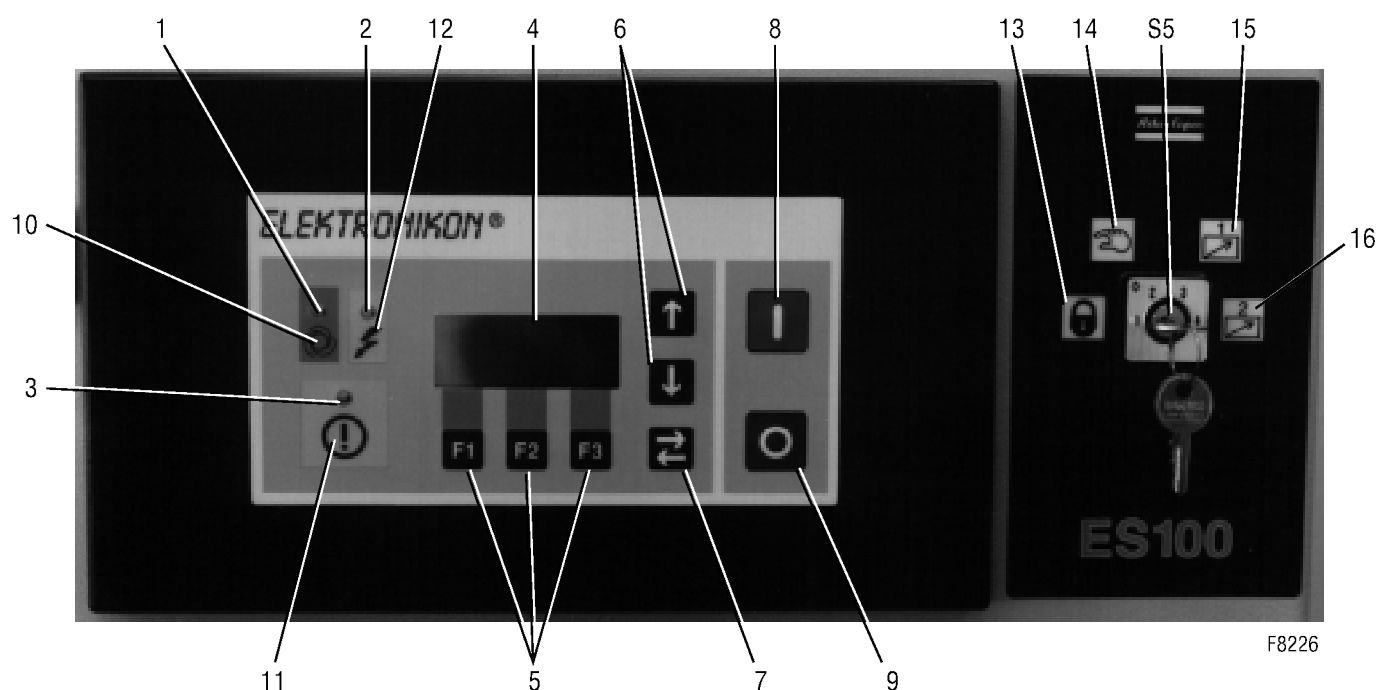


Fig. 3.1. Control panel ES100

#### Indicators, keys and buttons

|    |                                                        |                                                                                                                                                                                                                                      |
|----|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | Automatic operation LED                                | Indicates that the sequence selector is automatically controlling the air net: the compressors are loaded, unloaded, stopped and restarted depending on the air consumption and the limitations programmed in the sequence selector. |
| 2  | Voltage on LED                                         | Indicates that the voltage is switched on.                                                                                                                                                                                           |
| 3  | General alarm LED                                      | Lights up if internal communication is lost. The sequence selector has no other alarm or shut-down functions                                                                                                                         |
| 4  | Display                                                | Indicates messages concerning the compressor operating condition. See section 4.1.                                                                                                                                                   |
| 5  | Function keys                                          | Keys to control and program the sequence selector. See section 4.4.                                                                                                                                                                  |
| 6  | Scroll keys                                            | Keys to scroll through the display. See section 4.2.                                                                                                                                                                                 |
| 7  | Tabulator key                                          | Key to go to the next field of the display. See section 4.3.                                                                                                                                                                         |
| 8  | Start button                                           | Push button to start the sequence selector. LED (1) lights up indicating that the sequence selector is operative (in automatic operation).                                                                                           |
| 9  | Stop button                                            | Push button to stop the sequence selector. LED (1) goes out. The sequence selector is disabled and performs no regulation. All compressors will be stopped but remain in central control.                                            |
| S5 | Operation mode switch                                  | Key switch to select the control mode. See section 4.5.                                                                                                                                                                              |
| 10 | Pictograph, automatic operation                        |                                                                                                                                                                                                                                      |
| 11 | Pictograph, general alarm                              |                                                                                                                                                                                                                                      |
| 12 | Pictograph, voltage on                                 |                                                                                                                                                                                                                                      |
| 13 | Pictograph, sequence selector locked (in off position) |                                                                                                                                                                                                                                      |
| 14 | Pictograph, local control                              |                                                                                                                                                                                                                                      |
| 15 | Pictograph, remote control 1 (by external switches)    |                                                                                                                                                                                                                                      |
| 16 | Pictograph, remote control 2 (by ES400 or computer)    |                                                                                                                                                                                                                                      |

## 4 DISPLAY - KEYS

### 4.1 Display (4-Fig. 3.1)

The display has four lines of 16 characters. A typical display is shown in Fig. 6.1. It indicates:

- On the first three lines:
  - the name of the sensor(s) of which the actual reading is displayed
  - the unit and actual reading of the sensor(s)
  - messages regarding the operating condition (e.g. <<Central Control>>)
- On the fourth line, just above the three function keys (F1/F2/F3), the actual functions of these keys.

### 4.2 Scroll keys (6-Fig. 3.1)

These keys, labelled with vertical arrows, allow to scroll through the display.

As long as a downwards pointing arrow is shown on the display, key (6) with the same symbol can be used to see the next item.

As long as an upwards pointing arrow is shown on the display, key (6) with the same symbol can be used to see the previous item.

### 4.3 Tabulator key (7-Fig. 3.1)

This key, labelled with two horizontal arrows, allows the operator to go to the next field of the display, e.g. during modifying of programmable parameters.

### 4.4 Function keys (5-Fig. 3.1)

The function keys allow selection from a menu. The functions of the keys vary depending on the displayed menu. The actual function is indicated on the bottom line of the display just above the relevant key. Only the active and relevant functions at a moment are shown.

The most common functions are:

| Designation | Function                                                                                                    |
|-------------|-------------------------------------------------------------------------------------------------------------|
| add         | To add start/stop commands or sequence shift commands (day/hour) or to add a compressor to the ES100 system |
| abrt        | To cancel a programmed setting when programming parameters                                                  |
| chnng       | To change programmable settings                                                                             |

#### Designation Function

|      |                                                                                 |
|------|---------------------------------------------------------------------------------|
| del  | To delete start/stop commands or sequence shift commands                        |
| exec | To change from the main or sequence display to the execute menu                 |
| intg | To integrate a compressor into the regulation                                   |
| isol | To isolate a compressor from the regulation                                     |
| lim  | To show limits for a programmable setting                                       |
| list | To list programmed start/stop commands or sequence shift commands (day/hour)    |
| main | To return from the sequence display or a menu to the main display (Fig. 6.1)    |
| menu | To return to the modify or execute menu                                         |
| mod  | To change from the main or sequence display to the modify menu                  |
| seq  | To change from the main display to the sequence display                         |
| prog | To program modified settings                                                    |
| slct | To select a submenu or to read more details of a selection shown on the display |

### 4.5 Operation mode switch (S5-Fig. 3.1)

The switch allows the operator to select four control modes.

| Key position | Control mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1            | <b>ES100 off.</b> All compressors connected are in local control. The sequence selector can not be switched over to central control mode by start button (8).                                                                                                                                                                                                                                                                                                                                                                       |
| 2            | <b>Local control mode.</b> The ES100 will only react on commands entered by means of the buttons on the control panel. After pressing start button (8), the sequence selector will switch into Central Control Mode and all compressors connected will be started, loaded, unloaded and stopped by the sequence selector according to the actual sequence and depending on the air consumption and the status of the compressor (loaded/unloaded). After pressing stop button (9), the sequence selector will stop all compressors. |
| 3            | <b>Remote control mode 1.</b> The sequence selector will only react on start/stop commands generated by external switches. Start/stop commands via function <b>Timer</b> (see section 9) are still possible, if programmed and activated. It also remains possible to program the sequence selector. Consult Atlas Copco before connecting external equipment to the sequence selector. <b>Maintained-action buttons must not be used for the remote start and stop functions.</b>                                                  |

| Key position | Control mode                                                                                                                                         |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4            | <b>Remote control mode 2.</b> The sequence selector will only react on start/stop commands generated by an ES400 or a computer. Consult Atlas Copco. |

### Important

- To avoid unauthorized switching over to another control mode, take out the key after selecting the mode.
- The sequence selector will only react to a new control mode if the new position of the key switch is maintained for 3 seconds.

## 5 MENU-DRIVEN CONTROL PROGRAMS

To facilitate programming, menu-driven control programs have been implemented in the sequence selector.

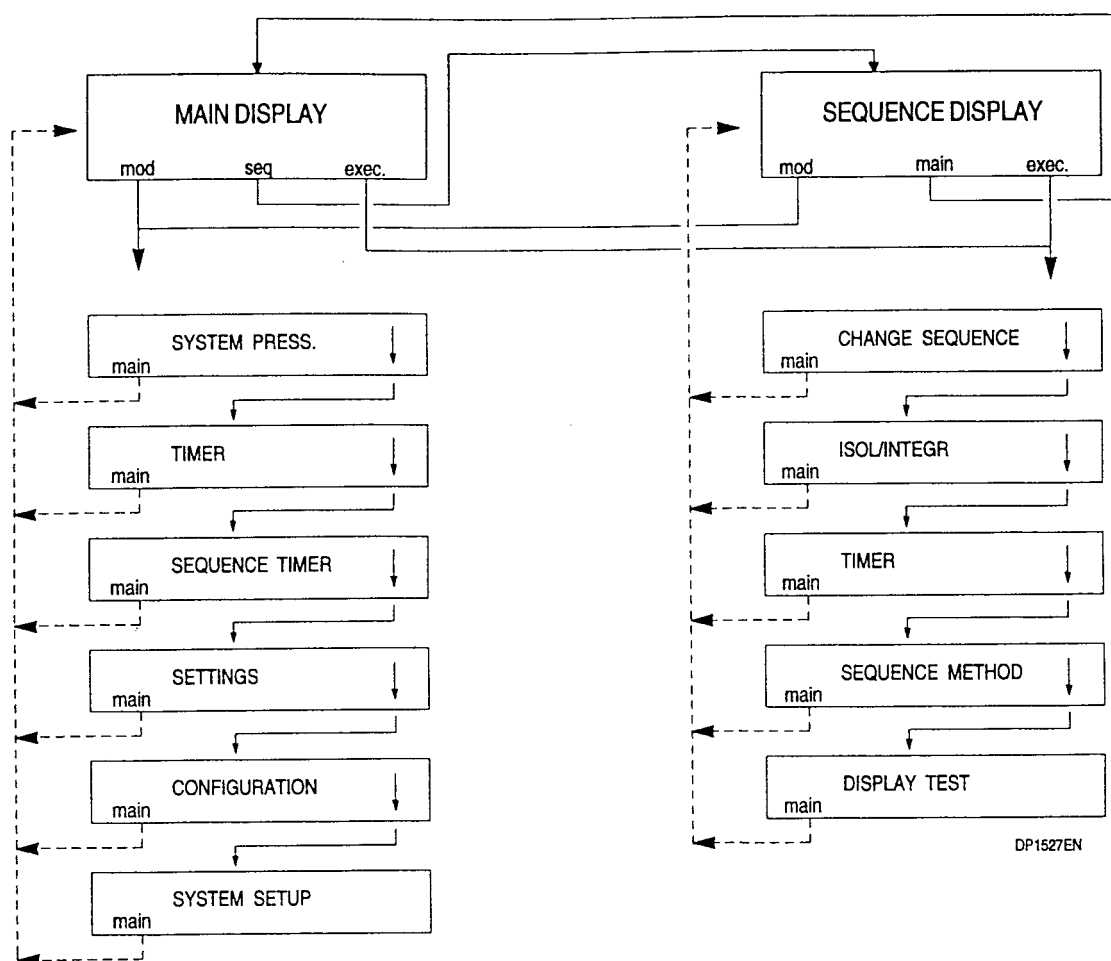


Fig. 5.1. General menu flow

## 5.1 Function of control programs (Figs. 5.1 and 5.2)

| Program                 | See section | Function                                                                                                                                         |
|-------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| MAIN DISPLAY            | 6           | Shows in short the operation status. Is the gateway to all functions.                                                                            |
| SEQUENCE DISPLAY        | 6           | Shows the status of the compressors connected: off, running or loaded                                                                            |
| MODIFY MENU             | 7           | Is the gateway to submenus to change settings (e.g. maximum net pressure, minimum net pressure).                                                 |
| Submenu System Pressure | 8           | Calling up the actual settings of the net pressure band. The function <<chng>> allows to change these settings                                   |
| Submenu Timer           | 9           | Calling up time-based start/stop commands of the sequence selector. The function <<chng>> allows to program these commands                       |
| Submenu Sequence Timer  | 10          | Calling up time-based sequence shifts. The function <<chng>> allows to program these sequence shift commands                                     |
| Submenu Settings        | 11          | Calling up programmable settings (e.g. Sequence period). The function <<chng>> allows to change settings                                         |
| Submenu Configuration   | 12          | Programming the time, date, display language, units and date format.                                                                             |
| Submenu System Setup    | 13          | Programming the compressor connection mode (digital input-output link or communication link).                                                    |
| EXECUTE MENU            | 14          | Is the gateway to submenus to change the method of controlling the compressors connected (e.g. manual, time-based or hour-based sequence shift). |

| Program         | See section | Function                                                                          |
|-----------------|-------------|-----------------------------------------------------------------------------------|
| Change sequence | 15          | Allows a manual sequence shift                                                    |
| Isol/integr     | 16          | Allows to integrate/isolate a compressor into/from the sequence                   |
| Timer           | 17          | Allows to make the timer active or not.                                           |
| Sequence method | 18          | Allows to select the method of sequence shift (manual, time-based or hour-based). |
| Display Test    | 19          | Allows to perform a display test.                                                 |

## 5.2 Selecting a menu (Fig. 5.1)

### 5.2.1 Main display

When the voltage is switched on, the MAIN DISPLAY (Fig. 6.1) is shown automatically, showing the net pressure and the status of the sequence selector (local control, ready to start or central control). The sequence screen or the other menus are selected by pressing one of the function keys.

### 5.2.2 Calling up other menus

#### MODIFY MENU

Pushing the key <<mod>> initiates the MODIFY MENU (Fig. 7.1), giving access to submenus to modify settings; the submenus can be selected by pressing the key <<slct>>; see section 7.

#### EXECUTE MENU

Pushing the key <<exec>> initiates the EXECUTE MENU (Fig. 14.1), giving access to submenus to change the method of controlling the compressors connected; the submenus can be selected by pressing the key <<slct>>; see section 14.

### 5.2.3 Returning to the modify or execute menu or main display

#### MODIFY OR EXECUTE MENU

Whenever displayed on the bottom line of the screen, press the key <<menu>> to return from a submenu to the MODIFY or EXECUTE MENU (Figs. 7.1 and 14.1).

#### MAIN DISPLAY

Whenever displayed, press the key <<main>> to return from a menu to the MAIN DISPLAY (Fig. 6.1).

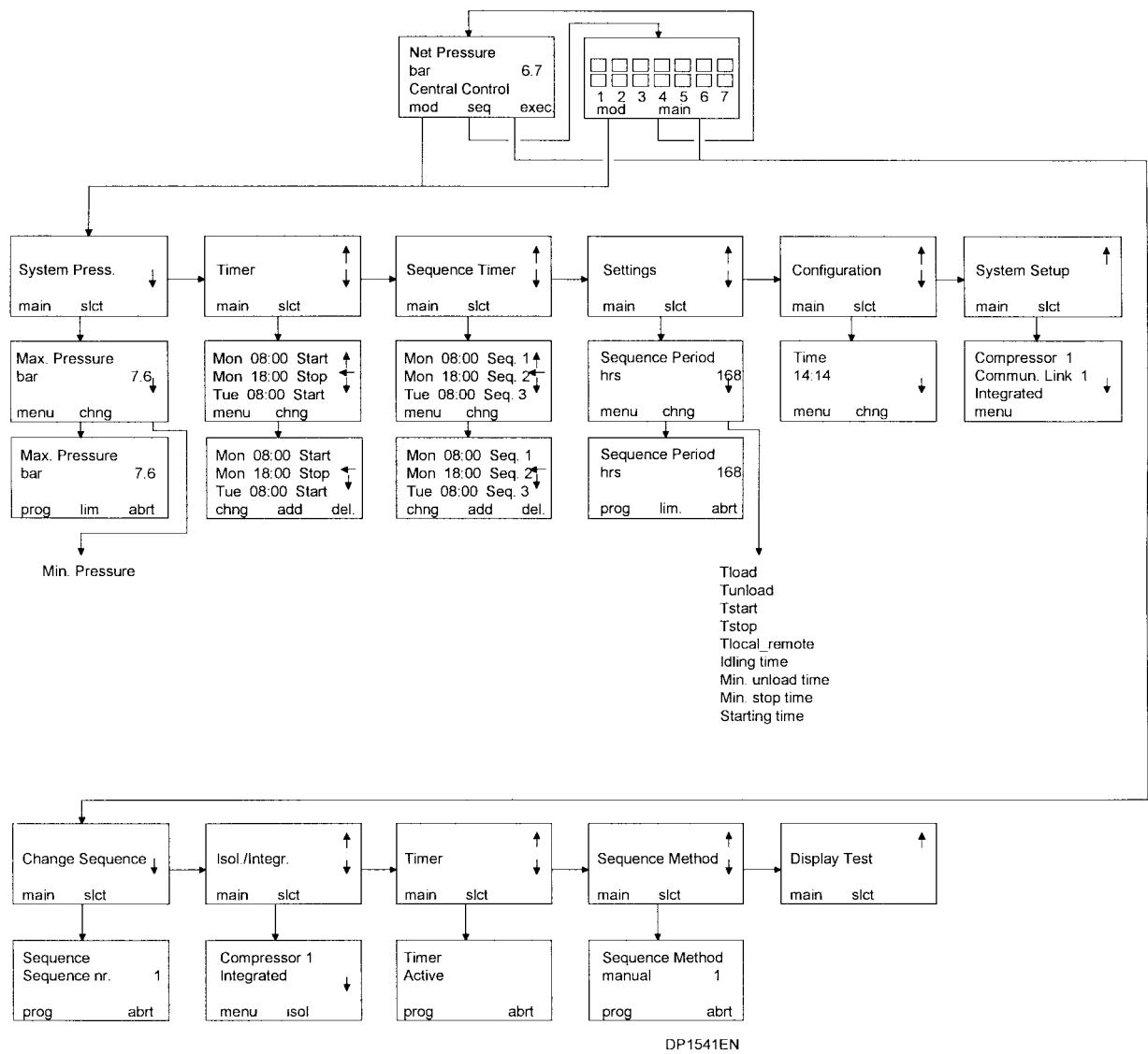


Fig. 5.2. Detailed menu flow (the screens shown are typical examples)

## 6 MAIN DISPLAY: status in short/ gateway to all other functions

### 6.1 Function

The main display (Fig. 6.1) shows in short the operation status of the ES100 and is the gateway to all functions implemented in the sequence selector.

|                 |     |      |
|-----------------|-----|------|
| Net Pressure    |     |      |
| bar             |     | 7.0  |
| Central Control |     |      |
| mod             | seq | exec |
| F1              | F2  | F3   |

Fig. 6.1. Example of the main display

### 6.2 Procedure

The main display is shown automatically when the power is switched on.

If the function keys or arrow keys are not used for 4 minutes, the main display will be shown automatically.

Exception is made, when the screen is left untouched when modifying data in the sequence selector. In this case, the screen will remain unchanged, since the sequence selector does not take a decision whether to accept or refuse the new data.

The display shows:

On line 1, the name of the pressure sensor.

On line 2, the unit and the actual pressure displayed in this unit (the units for pressure can be selected, see section 12).

On line 3, the operation status (<<Local Control>>, <<Ready for start>> or <<Central control>>).

## 6.3 Sequence display

The sequence display is shown after pressing the key <<seq>> and shows the status of every compressor connected (Integrated, running, loaded).

### Symbols

- Compressor runs unloaded
- Compressor runs loaded
- ? Compressor is shut-down or has no communication with the ES100
- ! Compressor is not responding to the commands of the ES100
  - Check the setting of the key switch of the compressor
  - Check the setting of the pressure band of the ES100 in relation to the maximum allowable working pressure of the compressor
- 1 ....7 Compressor number
  - If lit steady: the compressor is integrated and controlled by the ES100
  - if flashing: The compressor is isolated.

## 7 MODIFY MENU

### 7.1 Function

The modify menu (Fig. 7.1) gives the operator access to programmable settings via submenus.

|               |      |    |
|---------------|------|----|
| System Press. |      |    |
| main          | slct | ↓  |
| F1            | F2   | F3 |

Fig. 7.1. Example of a modify menu

### 7.2 Procedure

The modify menu is activated by pressing the key <<mod>> on the main display (Fig. 6.1)

The display indicates the name of the submenu which can be selected (only one name is shown, use the scroll keys to see the other names).

In this example, the display shows:

- that the <<System Press.>> submenu can be selected

- that other submenus are available using the scroll key ↓
- that the key <<main>> can be used to return to the main display
- that the key <<slct>> can be used to select the submenu <<System Press.>> to get more detailed information or to change the settings

## 8 Submenu SYSTEM PRESSURE

### 8.1 Function

The System Pressure submenu gives information regarding the settings of the minimum and maximum net pressure (pressure band) and allows to modify these settings.

#### Note:

As the pressure sensor is not necessarily fitted near the compressors, the pressure measured by the sensor may be less than the compressor pressure. Take this pressure difference into account when programming the pressure limits into the ES100.

### 8.2 Procedure

1. Activate the modify menu by pressing key <<mod>>
2. The first option shown on the second line of the display is <<System Press.>>.
3. Press key <<slct>>.

A submenu is started, allowing the operator to select between following options

- Max. pressure
  - Min. pressure
2. Scroll through the options using the scroll keys until the desired option is shown on the display. A display similar to that shown in Fig. 8.1 will appear

|               |      |    |
|---------------|------|----|
| Max. Pressure |      |    |
| bar           | 7.6  | ↓  |
| menu          | chng |    |
| F1            | F2   | F3 |

Fig. 8.1. Example of a System Pressure screen

5. To modify this setting, press the key <<chng>>, the value of the parameter starts blinking and the functions of the function keys change into:

F1 <<prog>>  
F2 <<lim>>  
F3 <<abrt>>

6. Modify the value by means of the scroll keys
7. Press the key <<prog>> to program the new value or the

key <<abrt>> to abort the modification operation (the original value will be retained).

## 9 Submenu TIMER: programming start/stop commands

### 9.1 Function

To program time-based start/stop commands for the sequence selector.

### 9.2 Procedure

1. Activate the modify menu by pressing key <<mod>>.
2. Scroll through the available options using the scroll keys until the option <<Timer>> is shown.
3. Press key <<slct>>.
4. Initially, the list with start/stop commands is empty. Following screen appears:

No items

| menu | chng  |
|------|-------|
| F1   | F2 F3 |

Fig. 9.1. Example of Timer screen

#### 9.2.1 To program start/stop commands

1. Press the key <<chng>>. The display will show a message that the list is empty (<<List is empty>>). The bottom line will now include the key <<add>>.
2. Press the key <<add>>. The command <<Monday 00:00 Stop>> will be shown.
3. Using the scroll keys, modify this command as required, as described in section 9.2.3. Add and delete commands as required, as described in sections 9.2.4 and 9.2.5.
4. Activate the timer as described in section 17.

#### 9.2.2 To display the list of commands

1. Press the key <<slct>> on the timer submenu screen. A typical display is shown in Fig. 9.2.

|         |             |    |
|---------|-------------|----|
| Monday  | 06:00 Start | ↑  |
| Monday  | 17:00 Stop  | ←  |
| Tuesday | 07:00 Start | ↓  |
| menu    | chng        |    |
| F1      | F2          | F3 |

Fig. 9.2. Example of start/stop modify screen

The vertical arrows at the right-hand side indicate to use the vertical scroll keys to select the next and previous start/stop commands. The horizontal arrow indicates the command which is accessible at that moment.

2. Use the key <<menu>> to return to the submenu or the key <<chng>> to modify start/stop commands.
3. After pressing the key <<chng>>, three selections are shown on the bottom line of the display (Fig. 9.3):

|         |             |     |
|---------|-------------|-----|
| Monday  | 06:00 Start | ↑   |
| Monday  | 17:00 Stop  | ←   |
| Tuesday | 07:00 Start | ↓   |
| chng    | add         | del |
| F1      | F2          | F3  |

Fig. 9.3. Example of start/stop modify screen

4. Use:
  - <<chng>> to modify the command indicated by the horizontal arrow
  - <<add>> to add a new command after the one indicated by the horizontal arrow
  - <<del>> to delete start/stop commands

#### 9.2.3 To modify a command

1. Suppose the command <<Monday 17:00 Stop>> is to be modified, i.e. stopping at 18 o'clock instead of 17 o'clock.
2. Starting from the Timer submenu, press the key <<slct>>. Scroll through the start/stop commands until the command to be modified is indicated by the horizontal arrow on the screen.
3. Press the key <<chng>>. Press the key <<chng>> again **1**). The day indication will blink. If desired, the day can be modified using the scroll keys.
4. Press the tabulator key to go to the next field to be modified (the hour indication). Modify using the scroll keys; in the example above, use the keys to change "17" into "18".
5. Proceed in the same way to modify, if desired, the minutes indication and the start/stop indication.
6. Press the key <<prog>> to program the new command or the key <<abrt>> to quit without reprogramming.
7. The sequence selector will ask if it is desired to change more commands.

#### Important:

1. It is necessary to program the start/stop commands in successive order timewise. Program the commands from Monday till Sunday, e.g.:

Monday 07.30 start  
Monday 18.00 stop  
Tuesday 08.00 start  
Tuesday 17.00 stop  
etc.

2. The sequence selector does not accept a new start/stop command unless it is situated between the next and previous start/stop command timewise. If not, the new command is not accepted and the command line remains blinking. In this case, either modify the command or use the key <<abrt>> to quit the modification operation.
3. Make sure that the timer function is activated (<<Timer active>>), see section 17. If not, the programmed start/stop commands will not be executed.

### 9.2.4 To add a command

1. Starting from the Timer submenu, press the key <<slct>> and scroll through the commands until the command after which a new command is to be added appears, followed by a horizontal arrow.
2. Press the keys <<chng>> and <<add>>. 1) The command which was indicated by the horizontal arrow will be copied and the day indication of the copied command will blink.
3. The way of modifying this command is similar to the description in section 9.2.3.
4. The sequence selector will ask if it is desired to change more commands.

### 9.2.5 To delete a command

1. Starting from the Timer submenu, press the key <<chng>> and scroll through the commands until the command to be deleted appears, followed by a horizontal arrow.
2. Press the keys <<chng>> and <<del>>. 1) The bottom line of the screen shows following selections:  
<<all>> to delete all commands  
<<this>> to delete the command indicated by the horizontal arrow  
<<abrt>> if the delete selection must not be carried out
3. When selecting <<all>>, the sequence selector will ask <<Are you sure to delete all commands?>>. By pressing the key <<Yes>> all commands are deleted.
4. The sequence selector will ask if it is desired to change more commands.

## 10 Submenu SEQUENCETIMER: programming time-based sequence shift commands

### 10.1 Function

To program time-based sequence shift commands for the sequence selector. Two methods can be used, at a programmed time and date the sequence selector will shift to either the next sequence or the programmed sequence.

### 10.2 Procedure

1. Activate the modify menu by pressing the key <<mod>>.
2. Scroll through the available options using the scroll keys until the option <<Sequence Timer>> is shown.
3. Press the key <<slct>>.
4. Initially, the list with sequence shift commands is empty, hence the timer function is switched off. Following screen appears:

No items

| menu | chng |    |
|------|------|----|
| F1   | F2   | F3 |

Fig. 10.1. Example of Sequence Timer screen

#### 10.2.1 To program time-based sequence shift commands

1. Press the key <<chng>>. The display will show a message that the list is empty (<<List is empty>>). The bottom line will now include the key <<add>>.
2. Press the key <<add>>. The command <<Monday 00:00 Seq. 1>> will be shown.
3. Using the scroll keys, modify this command as required, as described in section 10.2.3. Add and delete commands as required, as described in sections 10.2.4 and 10.2.5.
4. Activate the timer as described in section 18.

#### 10.2.2 To display the list of commands

1. Press the key <<slct>> on the sequence timer submenu screen. A typical display is shown in Fig. 10.2.

Footnote chapter 9

- 1) If the key <<Yes>> was pressed at the question <<Do you want to change another command>>, the display will include the options <<add>> and <<del>>. In this case, one of these keys can be pressed without using the key <<chng>> first.

|         |              |   |
|---------|--------------|---|
| Monday  | 06:00 Seq. 1 | ↑ |
| Monday  | 17:00 Seq. 2 | ← |
| Tuesday | 07:00 Seq. 3 | ↓ |
| menu    | chng         |   |

F1 F2 F3

Fig. 10.2. Example of time-based sequence shift screen

The vertical arrows at the right-hand side indicate to use the vertical scroll keys to select the next and previous sequence shift command. The horizontal arrow indicates the command which is accessible at that moment.

2. Use the key <<menu>> to return to the submenu or the key <<chng>> to modify sequence shift commands.
3. After pressing the key <<chng>>, three selections are shown on the bottom line of the display (Fig. 10.3):

|         |              |     |
|---------|--------------|-----|
| Monday  | 06:00 Seq. 1 | ↑   |
| Monday  | 17:00 Seq. 2 | ←   |
| Tuesday | 07:00 Seq. 3 | ↓   |
| chng    | add          | del |

F1 F2 F3

Fig. 10.3. Example of sequence shift modify screen

4. Use:
  - <<chng>> to modify the command indicated by the horizontal arrow
  - <<add>> to add a new command after the one indicated by the horizontal arrow
  - <<del>> to delete sequence shift commands

### 10.2.3 To modify a command

1. Suppose the command <<Monday 17:00 Seq. 2>> is to be modified, i.e. shifting sequence at 18 o'clock instead of 17 o'clock.
2. Starting from the Sequence Timer submenu, press the key <<slct>>. Scroll through the sequence shift commands until the command to be modified is indicated by the horizontal arrow on the screen.
3. Press the key <<chng>>. Press the key <<chng>> again **1)**. The day indication will blink. If desired, the day can be modified using the scroll keys.
4. Press the tabulator key to go to the next field to be modified (the hour indication). Modify using the scroll keys; in the example above, use the keys to change "17" into "18".
5. Proceed in the same way to modify, if desired, the minutes indication and the sequence number.
6. Press the key <<prog>> to program the new command or the key <<abrt>> to quit without reprogramming.
7. The sequence selector will ask if it is desired to change more commands.

### Important:

1. It is necessary to program the sequence shift commands in successive order timewise. Program the commands from Monday till Sunday, e.g.:

Monday 07.30 Seq. 1  
Monday 18.00 Seq. 2  
Tuesday 08.00 Seq. 3  
Tuesday 17.00 Seq. 4 etc.

2. The sequence selector does not accept a new sequence shift command unless it is situated between the next and previous sequence shift command timewise. If not, the new command is not accepted and the command line remains blinking. In this case, either modify the command or use the key <<abrt>> to quit the modification operation.
3. Make sure that the sequence timer function is activated (<<Sequence Timer active>>), see section 18. If not, the programmed sequence shift commands will not be executed.

### 10.2.4 To add a command

1. Starting from the Sequence Timer submenu, press the key <<slct>> and scroll through the commands until the command after which a new command is to be added appears, followed by a horizontal arrow.
2. Press the keys <<chng>> and <<add>>. **1)** The command which was indicated by the horizontal arrow will be copied and the day indication of the copied command will blink.
3. The way of modifying this command is similar as described in section 10.2.3.
4. The sequence selector will ask if it is desired to change more commands.

### 10.2.5 To delete a command

1. Starting from the Sequence Timer submenu, press the key <<chng>> and scroll through the commands until the command to be deleted appears, followed by a horizontal arrow.
2. Press the keys <<chng>> and <<del>>. **1)** The bottom line of the screen shows following selections:  
<<all>> to delete all commands  
<<this>> to delete the command indicated by the horizontal arrow  
<<abrt>> if the delete selection must not be carried out

Footnote chapter 10

- 1)** If the key <<Yes>> was pressed at the question <<Do you want to change another command>>, the display will include the options <<add>> and <<del>>. In this case, one of these keys can be pressed without using the key <<chng>> first.

- When selecting <<all>>, the sequence selector will ask <<Are you sure to delete all commands?>>. By pressing the key <<Yes>> all commands are deleted.
- The sequence selector will ask if it is desired to change more commands.

## 11 Submenu SETTINGS: Modifying programmable settings

### 11.1 Function

To modify a number of programmable parameters, including:

- <<Sequence Period>>: time between two sequence shifts
- <<Tload>>: time between the loading of two compressors
- <<Tunload>>: time between the unloading of two compressors
- <<Tstart>>: time between the starting of two compressors
- <<Tstop>>: time between the stopping of two compressors
- <<Tlocal-remote>>: time between two local/remote changes
- <<Idling time>> (of the ES100): time that a compressor which is connected via a communication link to the sequence selector runs unloaded before stopping. Compressors which are connected via digital input/output contacts will use the idling timer of the compressor regulator
- <<Min. unload time>>: is the time that the compressor runs in unload condition before stopping after a programmed stop command.
- <<Min. stop time>>: the sequence selector prevents the compressor from starting within a programmable time period after stopping this compressor.
- <<Starting time>>: time for starting up a compressor, as a rule of thumb, the <<Starting time>> = Star time + load delay + 3 seconds.
- <<Pow. Rec. time>>: if the automatic restart after voltage failure function is active, the power must be restored within this period.

### 11.2 Procedure

- Activate the modify menu by pressing key <<mod>>.
- Scroll through the options using the scroll keys until the desired option is shown on the display.
- Press the key <<slct>>.
- The first option (i.e. Sequence Period) is shown.
- For each parameter, the modifying procedure is similar to the example below.

### 11.3 Example: Modifying the setting for the sequence period

- Consult section 11.2 for selecting the option <<Sequence Period>>.
- After selecting, a display similar to that shown in Fig. 11.1 will appear:

|                 |     |     |
|-----------------|-----|-----|
| Sequence Period |     |     |
| hrs             |     | 168 |
|                 |     | ↓   |
| menu            | chn |     |
| F1              | F2  | F3  |

Fig. 11.1. Example of a modifying screen (Sequence Period)

- After pressing the key <<chn>> the value of the parameter starts blinking and the functions of the keys change into:

F1 <<prog>>  
F2 <<lim>>  
F3 <<abrt>>

- Modify the value by means of scroll keys.
- Press the key <<prog>> to program the new value or the key <<abrt>> to cancel the modification operation (the original value will be retained).

#### Notes

The sequence selector will not accept new values beyond the limitations. See section 20.

It is possible to check the limitations which are valid for the parameter to be modified by selecting <<lim>>.

## 12 Submenu CONFIGURATION: reprogramming time / date / display configuration

### 12.1 Function

To reprogram a number of parameters. These parameters are:

- time
- date
- language on display (two languages are provided)
- auto restart after voltage failure **1)**
- unit for pressure (bar, psi or kg/cm<sup>2</sup>)
- format of date (day/month/year - DD MM YY or month/day/year - MM DD YY or year/month/day - YY MM DD)

### 12.2 Procedure

- Activate the modify menu by pressing key <<mod>>.

Footnote chapter 12

- 1) To be activated by Atlas Copco only.

2. Scroll through the available options using the scroll keys until the option <<Configuration>> is shown.
3. Press key <<slct>>.
4. The first option shown is <<Time>>. If another option is desired, scroll through the display (using the scroll keys) and select (using key <<slct>>).
5. In case of option <<Time>>, the second line on the screen indicates the actual setting, e.g. 14:30.
6. If it is desired to modify the time, press key <<chng>>. If not, press key <<menu>> to return to the submenu.
7. After pressing the key <<chng>>, the first field (i.e. 14) will blink. Modify the hours using the scroll keys. Then press the tabulator key to go to the next field (i.e. 30). The setting of this field can now be modified with the scroll keys.
8. The bottom line of the display will show two options:
  - <<prog>> to program the new setting
  - <<abrt>> to cancel the new setting
9. Proceed in the same way for the other parameters to be modified. Use the scroll keys to modify the parameter.

#### Note

For most settings only one reprogrammable field is used; in this case the tabulator key to jump from one field to the other one is not needed.

## 13 Submenu SYSTEM SETUP: programming the compressor connection mode

### 13.1 Function

To program the compressor connection mode. Two different connection modes are possible:

- Digital input/output link (Figs. 2.11 and 2.14): the connection to the ES100 is made via digital contacts (from relays or digital contacts of the Elektronikon regulator)
- Communication link (Figs 2.12 and 2.13): the connection to the ES100 is made via a current loop (this connection is only possible for compressors with an Elektronikon regulator as shown in Figs. 2.3, 2.4 and 2.5)

### 13.2 Procedure

1. Activate the modify menu by pressing the key <<mod>>.
2. Scroll through the available options using the scroll keys until the option <<System setup>> is shown.
3. Press key <<slct>>.
4. Initially, the display will show a message that no compressors are programmed (<<Not used>>). The bottom line will now include the key <<Add>>.

#### 13.2.1 To add a compressor

1. Press the key <<add>>. The command <<Digital link 1>> will be shown.
2. Using the scroll keys, modify this command as required (see sections 2.1 and 2.2 for the correct link).
3. Press key <<Prog>> to program the new command or the key <<abrt>> to quit without reprogramming.
4. If another compressor needs to be added, use the scroll key to go to the next compressor and repeat steps 1 up to 3.
5. Integrate the compressors to the sequence (see section 16).

#### 13.2.2 To change the compressor connection mode

1. Isolate the compressor from the sequence (see section 16).
2. Use the scroll keys until the compressor of which the connection mode must be changed is shown on the display.
3. Press the key <<chng>>, the programmed connection mode will blink, use the scroll keys to modify the command as required.
4. Press key <<Prog>> to program the new command or the key <<abrt>> to quit without reprogramming.

#### 13.2.3 To delete the compressor connection mode

**Note:** only the last programmed compressor link can be deleted.

1. Isolate the compressor from the sequence (see section 16).
2. Use the scroll keys until the last programmed compressor is shown on the display.
3. Press the key <<del>>, the programmed connection mode will change into <<Not used>>
4. Press key <<Prog>> to program the new command or the key <<abrt>> to quit without reprogramming.

## 14 EXECUTE MENU

### 14.1 Function

The Execute menu (Fig. 14.1) allows to change the method of controlling the compressors (time-based, hours-based or manual sequence shift), or to isolate or integrate a compressor from/into the sequence.

Change Sequence

| main | slct |    |
|------|------|----|
| F1   | F2   | F3 |

Fig. 14.1. Example of an Execute menu

## 14.2 Procedure

The Execute menu is activated by pressing the key <<exec>> on the main display (Fig. 6.1).

The display indicates the name of the submenu which can be selected (only one name is shown, use the scroll keys to see the other names).

In this example, the display shows:

- that the <<Change Sequence>> submenu can be selected
- that other submenus are available using the scroll key ↓
- that the key <<main>> can be used to return to the main display
- that the key <<slct>> can be used to select the submenu <<Change Sequence>>

## 15 Submenu CHANGE SEQUENCE

### 15.1 Function

To manually change over to another compressor sequence.

### 15.2 Procedure

1. Activate the Execute menu by pressing key <<exec>>.
2. The option <<Change Sequence>> is shown.
3. Press key <<slct>>.

The display will show the actual sequence. By using the scroll keys, the sequence number can be changed. Press the key <<prog>> to program the new sequence or <<abrt>> to cancel the modification operation (the original value will be retained).

## 16 Submenu ISOL/INTEGR.

### 16.1 Function

To isolate or integrate a compressor from/into the sequence.

**Warning:** When isolating a compressor, the compressor is switched from central control to local control and may be started by its own regulator. To prevent the compressor from starting after isolating it, push its emergency stop button first.

### 16.2 Procedure

1. Activate the Execute menu by pressing key <<exec>>.
2. The option <<Change Sequence>> is shown. Press the scroll key until the option <<Isol/Integr.>> shows on the display.

3. Press key <<slct>>.
4. The display will show the status of the first compressor (integrated or isolated). Use the scroll keys to select the compressor of which the status has to be changed.
5. Press the key <<isol>> to isolate the compressor from the sequence, or <<integ>> to integrate the compressor into the sequence.
6. Press the key <<prog>> to program the new sequence or <<abrt>> to cancel the modification operation (the original status will be retained).

## 17 Submenu TIMER: on or off

### 17.1 Function

To activate or deactivate the timer.

### 17.2 Procedure

1. **The timer can only be activated if at least one start/stop command is programmed.**
2. Activate the Execute menu by pressing key <<exec>> (5). Press the scroll key until the option <<Timer>> shows on the display. Press the key <<slct>>, the message <<Not activated>> will blink.
3. Use the scroll keys to change the message into <<Activated>>.
4. Press the key <<prog>> to program the Timer active function or key <<abrt>> to cancel the modification operation. If activated, the sequence selector will execute the programmed commands.
5. **The timer can be deactivated again. In this case, the programmed start/stop commands will not be executed (the start/stop commands will remain in the memory of the sequence selector).**

## 18 Submenu SEQUENCE METHOD

### 18.1 Function

To select the sequence method:

- Manual
- Sequence timer
- System hours

### 18.2 Procedure

1. Activate the Execute menu by pressing the function key <<exec>>. Press the scroll key until the option <<Sequence Method>> shows on the display. Press the key <<slct>>.
2. Use the scroll keys to change the sequence method.

- Press the key <<prog>> to program or key <<abrt>> to cancel the modification operation.

## 19 Submenu TEST: display test

### 19.1 Function

To carry out a display test, i.e. to check whether the display and LEDs are still intact.

### 19.2 Procedure

- Activate the Execute menu by pressing the key <<exec>>.
- Scroll through the options using the scroll keys until the option <<Display Test>> is shown.
- Press key <<slct>>.

During testing, the sequence selector will generate a series of patterns on the display which enable the operator to check that each pixel still functions normally; at the same time the LEDs are lit.

- Press key <<main>> to return to the main screen.

## 20 PROGRAMMABLE SETTINGS

|                         |        | Minimum<br>setting | Factory<br>setting | Maximum<br>setting |
|-------------------------|--------|--------------------|--------------------|--------------------|
| Tload . . . . .         | sec    | 0                  | 10                 | 255                |
| Tunload . . . . .       | sec    | 0                  | 7                  | 255                |
| Tstart . . . . .        | sec    | 0                  | 10                 | 255                |
| Tstop . . . . .         | sec    | 0                  | 5                  | 255                |
| Tlocal-remote . . . . . | sec    | 0                  | 4                  | 255                |
| Power recovery time .   | sec    | 0                  | 0                  | 255                |
| Idling time . . . . .   | min    | 0                  | 6                  | 65535              |
| Minimum unload time     | sec    | 0                  | 30                 | 255                |
| Minimum stop time .     | sec    | 0                  | 20                 | 255                |
| Starting time . . . . . | sec    | 0                  | 28                 | 255                |
| Maximum pressure . .    | bar(e) | 0.5                | 7                  | 17                 |
| Minimum pressure . .    | bar(e) | 0.5                | 6                  | 17                 |
| Sequence period . . . . | hr     | 1                  | 168                | 255                |

## 21 Installation directives for communication module (COM1)

Elektronikon regulators as shown in Figs. 2.4 and 2.5 have no external communication capability, therefore an optional communication module (COM1) needs to be installed:

- in the ES100 cabinet to connect the ES100 sequence selector to an ES400 remote compressor monitoring system or to a computer system.
- in the compressor cabinet to connect a compressor with such an Elektronikon regulator to an Atlas Copco ES system

### 21.1 ES100

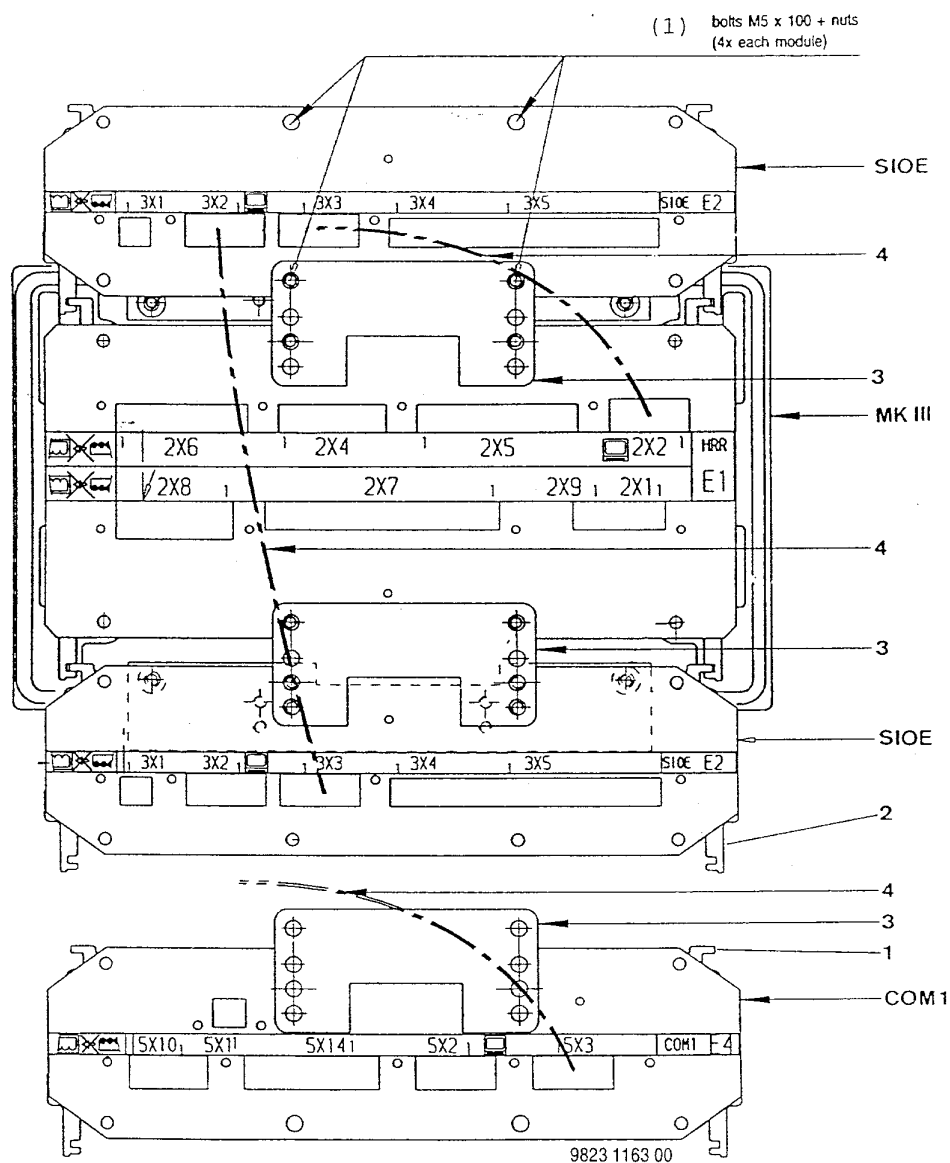
#### 21.1.1 ES100 with one or two communication modules (COM3) (Figs. 1.1 and 1.3)

- Slide the guides (1-Fig. 21.1) of the COM1 module into the slots (2-Fig. 21.1) of the COM3 module
- Fix the COM1 module to the COM3 module using plate (3-Fig. 21.1)
- Connect the 24V power supply from transformer (T1-Figs. 1.1 and 1.3) to connector 5X1 of the COM1 module
- Connect an earth cable between the COM1 and the COM3 modules
- Download the COM1 module
- Connect the cable, delivered with the COM1 module, from connector 5X3 of the COM1 module to connector 6X2 of the COM3 module
- Initiate the auto-configuration by means of the DFM4WIN program to integrate the COM1 module in the system (a defect or power loss of the COM1 module will be indicated on the display).

#### 21.1.2 ES100 with one communication module (COM3) and a digital input/output module (DIOE) (Fig. 1.2)

**Note:** to connect the COM1 module to this version of ES100, a cable with part number 1613 7305 00 must be ordered separately.

- Fix the COM1 module to the threaded holes of the mounting panel of the cabinet.
- Connect the 24V power supply from transformer (T1-Fig. 1.2) to connector 5X1 of the COM1 module
- Connect an earth cable between the COM1 and the MKIII module.
- Download the COM1 module
- Use both cables, the one delivered with the COM1 module and the one ordered separately, to connect connector 5X3 of the COM1 module with connector 4X2 of the DIOE module



- COM1. Communication module
- MK III. Control module
- SIOE. Standard expansion module
- 1. Guide
- 2. Slot
- 3. Plate
- 4. Cable

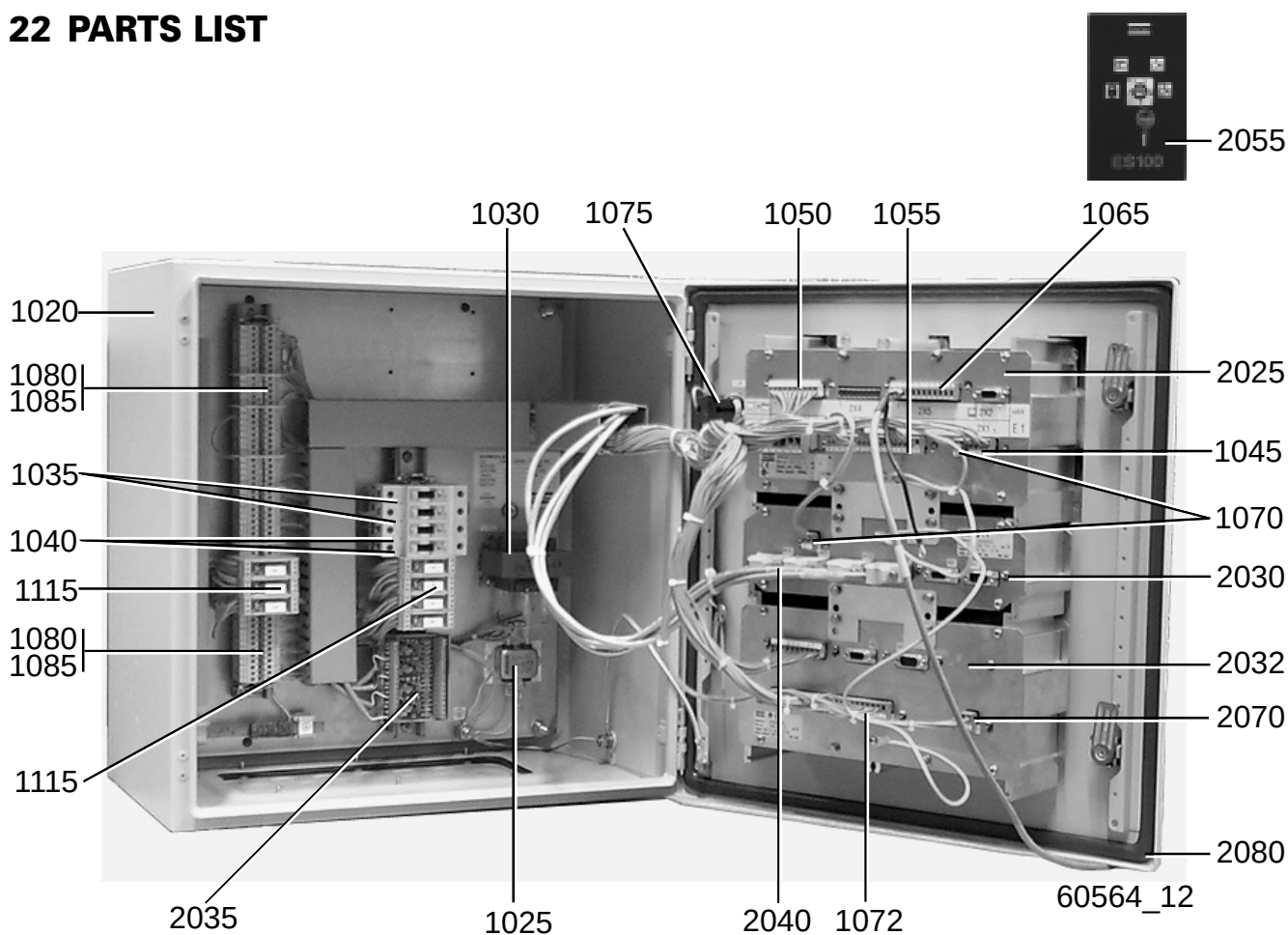
Fig. 21.1. Installation of COM1 module to compressor regulator (typical example)

- Initiate the auto-configuration by means of the DFM4WIN program to integrate the COM1 module in the system (a defect or power loss of the COM1 module will be indicated on the display).

## **21.2 Compressor**

- Slide the guides (1-Fig. 21.1) of the COM1 module into the slots (2-Fig. 21.1) of the module of the compressor regulator
- Fix the COM1 module to that module using plate (3-Fig. 21.1)
- Connect the 24V power supply to connector 5X1 of the COM1 module
- Connect an earth cable between the COM1 module and the module of the compressor regulator
- Download the COM1 module
- Connect the cable, delivered with the COM1 module, from connector 5X3 of the COM1 module to a free ..X2 connector on a module of the compressor regulator
- Initiate the auto-configuration by means of the DFM4WIN program to integrate the COM1 module in the system (a defect or power loss of the COM1 module will be indicated on the display).

## 22 PARTS LIST



| Ref. | Part number         | Qty      | Name            | Remarks      | Ref.                                                        | Part number  | Qty | Name            | Remarks |
|------|---------------------|----------|-----------------|--------------|-------------------------------------------------------------|--------------|-----|-----------------|---------|
|      | <b>1900 0702 01</b> | <b>1</b> | <b>Cubicle</b>  | <b>1) 2)</b> | 2025                                                        | 1900 0701 05 | 1   | Regulator       |         |
|      | <b>1900 0702 02</b> |          |                 | <b>3)</b>    | 2030                                                        |              |     | Com3            | 2)      |
| 1020 | 1613 7716 00        | • 1      | Cubicle         |              |                                                             | 1900 0701 72 | 1   |                 | 1) 3)   |
| 1025 | 1089 9219 02        | • 1      | Net filter      |              |                                                             | 1900 0701 72 | 2   |                 | 2)      |
| 1030 | 1089 9136 19        | • 1      | Transformer     |              | 2032                                                        | 1900 0701 53 | 1   | Dioe            | 3)      |
| 1035 | 1089 9203 10        | • 2      | Circuit breaker |              | 2035                                                        |              |     | Interface       |         |
| 1040 | 1089 9203 11        | • 2      | Circuit breaker |              |                                                             | 1613 7714 00 | 1   |                 | 1) 3)   |
| 1045 | 1088 0024 04        | • 1      | Connector       |              |                                                             | 1613 7714 00 | 2   |                 | 2)      |
| 1050 |                     | •        | Connector       |              | 2040                                                        |              |     | Cable           |         |
|      | 1088 0024 10        | 1        |                 | 1) 2)        |                                                             | 1613 7715 00 | 4   |                 | 1) 3)   |
|      | 1088 0024 10        | 2        |                 | 3)           |                                                             | 1613 7715 00 | 8   |                 | 2)      |
| 1055 | 1088 0024 18        | • 1      | Connector       |              |                                                             | 1089 0575 35 | 1   | Press.transduce |         |
| 1065 | 1088 0024 12        | • 1      | Connector       |              |                                                             | 1614 8789 00 | 1   | Cable           |         |
| 1070 |                     | •        | Connector       |              | 2055                                                        | 1614 8230 00 | 1   | Label           |         |
|      | 1088 0024 02        | 2        |                 | 1) 2)        | 2070                                                        | 1088 0024 02 | 1   | Connector       |         |
|      | 1088 0024 02        | 3        |                 | 3)           | 2080                                                        | 1503 2467 00 | AR  | Seal cord       |         |
| 1072 | 1088 0024 24        | • 1      | Connector       | 3)           |                                                             | 1614 8401 00 | 1   | Data plate      |         |
| 1075 | 1089 9082 21        | • 1      | Switch          |              |                                                             | 2000 0011 98 | 1   | COM1            | 4)      |
| 1080 |                     | •        | Terminal        |              | <b>Footnotes chapter 22</b>                                 |              |     |                 |         |
|      | 1089 0506 62        | 6        |                 | 1) 2)        | 1) ES100 for max. 4 Elektronikon-regulated compressors and  |              |     |                 |         |
|      | 1089 0506 62        | 10       |                 | 3)           | 3 relay-regulated compressors                               |              |     |                 |         |
| 1085 |                     | •        | Terminal        |              | 2) ES100 for max. 7 Elektronikon-regulated compressors or a |              |     |                 |         |
|      | 1089 0506 63        | 6        |                 | 1) 2)        | combination having max. 3 relay-regulated compressors       |              |     |                 |         |
|      | 1089 0506 63        | 13       |                 | 3)           | 3) ES100 for max. 7 relay-regulated compressors or a        |              |     |                 |         |
|      | 1613 6639 00        | • 1      | Data plate      |              | combination having max. 4 Elektronikon-regulated            |              |     |                 |         |
|      | 9820 2346 01        | • 1      | Service diagram |              | compressors                                                 |              |     |                 |         |
| 1105 | 1088 0851 13        | • AR     | Raceway         |              | 4) Optional                                                 |              |     |                 |         |
| 1115 |                     | •        | Relay           |              |                                                             |              |     |                 |         |
|      | 1089 9388 03        | 3        |                 | 1) 2)        |                                                             |              |     |                 |         |
|      | 1089 9388 03        | 7        |                 | 3)           |                                                             |              |     |                 |         |

## 23 Commissioning sheet

|            |  |             |  |
|------------|--|-------------|--|
| Version :  |  | Serial Nr : |  |
| Customer : |  |             |  |

Configuration :

|                                      |           |            |
|--------------------------------------|-----------|------------|
|                                      | Type (PN) | Range      |
| Pressure transducer :                |           |            |
| Auto restart after voltage failure : | O enabled | O disabled |
| Power recovery time out :            | ..... sec |            |

Compressors :

| N<br>o | Type | Serial No. | Link | Hours |      | Capacity | Pressure settings |        | Overload<br>pressure |
|--------|------|------------|------|-------|------|----------|-------------------|--------|----------------------|
|        |      |            |      | Run   | Load |          | Load              | Unload |                      |
| 1      |      |            |      |       |      |          |                   |        |                      |
| 2      |      |            |      |       |      |          |                   |        |                      |
| 3      |      |            |      |       |      |          |                   |        |                      |
| 4      |      |            |      |       |      |          |                   |        |                      |
| 5      |      |            |      |       |      |          |                   |        |                      |
| 6      |      |            |      |       |      |          |                   |        |                      |
| 7      |      |            |      |       |      |          |                   |        |                      |

System settings :

|                         |                |                |
|-------------------------|----------------|----------------|
|                         | Pmax           | Pmin           |
| Pressure band :         |                |                |
| System pressure drop :  | ..... bar      |                |
| Sequence shift method : | O System clock | O System timer |
| Sequence period :       | ..... hours    | See list below |
|                         |                | O Manual       |

Sequence timer list :

| Monday |     | Tuesday |     | Wednesday |     | Thursday |     | Friday |     | Saturday |     | Sunday |     |
|--------|-----|---------|-----|-----------|-----|----------|-----|--------|-----|----------|-----|--------|-----|
| Time   | Seq | Time    | Seq | Time      | Seq | Time     | Seq | Time   | Seq | Time     | Seq | Time   | Seq |
|        |     |         |     |           |     |          |     |        |     |          |     |        |     |
|        |     |         |     |           |     |          |     |        |     |          |     |        |     |

System start/stop timer :                      O Not active                      O Active - see list below

System Start/Stop timer list :

| Monday |        | Tuesday |        | Wednesday |        | Thursday |        | Friday |        | Saturday |        | Sunday |        |
|--------|--------|---------|--------|-----------|--------|----------|--------|--------|--------|----------|--------|--------|--------|
| Time   | Action | Time    | Action | Time      | Action | Time     | Action | Time   | Action | Time     | Action | Time   | Action |
|        |        |         |        |           |        |          |        |        |        |          |        |        |        |
|        |        |         |        |           |        |          |        |        |        |          |        |        |        |

Regulation parameters

| Tload | Tunload | Tstart | Tstop | Tlocal-remote | Min. unload time | Min. stop time | Starting time | Idling time |
|-------|---------|--------|-------|---------------|------------------|----------------|---------------|-------------|
|       |         |        |       |               |                  |                |               |             |