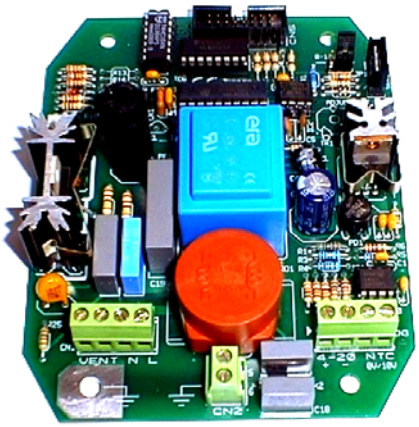
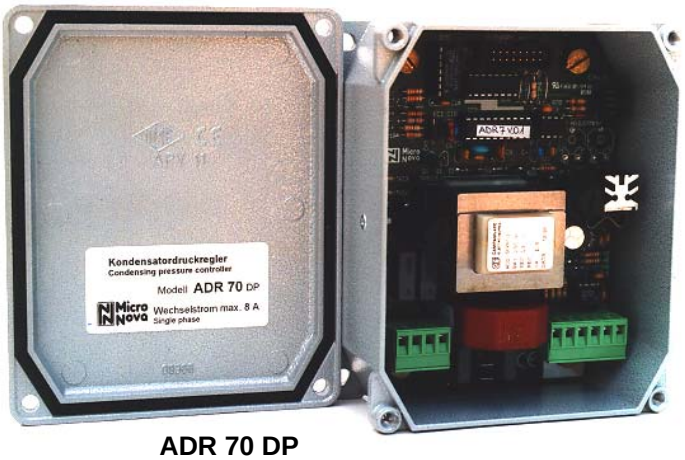
# SPEED REGULATION CONDENSATION ADJUSTMENT



ADR 70




ADR 70 DP


D-LCD

## Pressure- and temperature controlled speed regulator for AC Fan motors

# Series ADR 70

## DESCRIPTION – OPERATION - INSTALLATION

# Contents



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## 1.0 Introductions

This regulator equipment enables direct drive axial fan motors, working on 50 Hz or 60 Hz current to be controlled by an algorithm facility, which will alter the revolution speed of the fans on the basis of a pre- set-point parameter value on the basis of monitored pressures and temperatures. As the result of newly introduced techniques and optimised software, the settings for the regulation of the pressure can be entered in temperatures. The regulator comprises two parts and is available in two different versions dependent on the equipment required:

**Exterior installation with the ADR 70 DP (IP 54) mounted in a metal box (DP Housing (DP Version)**

- The operating panel and the communications' display is removed after programming routines have been completed.

**Interior installation** e.g.: inside a cabinet

- The operating panel and the communications' display are mounted in the cabinet door;
  The electronics and the microprocessor, together with the power circuit board are installed in the cabinet itself.

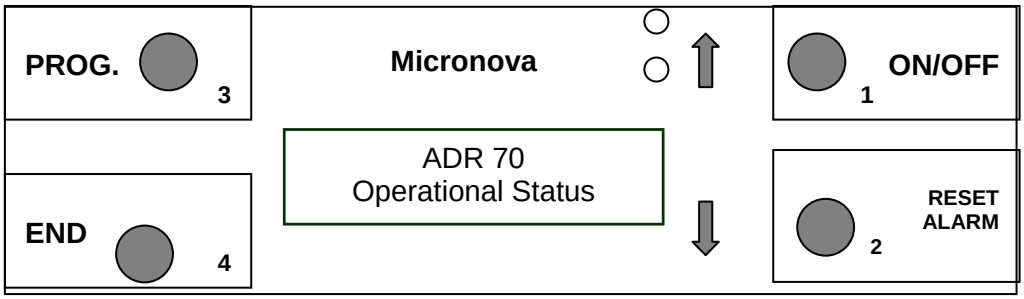
## 2.0 Operating and report messages on operating panel and display monitor

The operating and programming functions of the Regulator is conducted exclusively via the operator level illustrated in this Section. All data entries are explained in text form on the display. At the same time, the precise operating status of the Regulator is given via the display. The Regulator can also be operated WITHOUT the use of the operating panel (D-LCD).

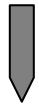

**The advantages in using the operating panel, D-LCD, are:**

**- the display of all programming procedures in clear text form;**
**- the direct display of the pressure conditions/relationships in the refrigeration cycle in °C value or the related value in °C;**
**- the display of the set-point values entered (SET);**
**- the display of the power supply to the fans in % value**

## 3.0 Function of control panel keys




| Key No. 1 | Description of functions | Remarks and Equipment operating mode |
|---|---|---|
| **ON/OFF** | **ON/OFF**: of the control facility and thus also the function of output settings to the consumer electronic facilities | **ON** - Operating mode = output settings, variable power supply.<br>**OFF** – no power supply to the outlets. |
| | **1st Function:** in the programming mode – to move back to previous menu mode or to increase parameter values.<br>**2nd Function:** to Increase set-point values - in conjunction with altering set-point values during the operating mode. | **1st Function:** – activated when the Equipment is in the ON mode, or;<br>when the SETUP programming facility is available for use.<br>**2nd Function:** – Key 3 to be depressed once – Equipment is in the ON mode – for altering set-point values during the operating mode. |

| Key No. 2 | Description of functions | Remarks and Equipment operating mode |
|---|---|---|
| **RESET ALARM** | Re-set facility following faults. | Re-setting is required after fault occurrences and rectification. The red LED lamp continues to burn until RESETTING has been completed. |
|  | **1st Function:** in the programming mode – to move on to next menu mode or to decrease parameter values.<br>**2nd Function:** to decrease set-point values - in conjunction with altering set-point values during the operating mode. | **1st Function:** – activated when the Equipment is in the ON mode, or;<br>when the SETUP programming facility is available for use.<br>**2nd Function:** - Key 3 to be depressed once – Equipment is in the ON mode – for altering set-point values during the operating mode. |

| Key No. 2 | Description of functions | Remarks and Equipment operating mode |
|---|---|---|
| **MANUAL OPERATIONS** | Manual switching ON and OFF of the connected up ventilating fan motors | Function only activated when the Equipment mode is OFF, i.e. is in the switched OFF mode. |

| Key No. 3 | Description of functions | Remarks and Equipment operating mode |
|---|---|---|
| **PROG** | **1.** Programming mode - SETUP<br>**2.1** to alter the parameter settings during the operating mode;<br>**2.2** to alter set-points during the operating mode. | 1. The function is only activated when the Equipment is in the OFF mode.<br>**2.1** Key 3 is to be depressed twice – during the Equipment operating mode.<br>**2.2** Key 3 is to be depressed once – during the Equipment operating mode. |

| Key No. 4 | Description of functions | Remarks and Equipment operating mode |
|---|---|---|
| **END** | **1.** terminating/acknowledging the programming;<br>**2.** Status display of connected up sensors. | 1. Requisite after any completed alteration ( in OFF/ON);<br>2. Also activated during the Equipment operating mode. |

## *3.1 What Functions are served by the various cursor arrows?*

Movement within the program is simplified by means of the cursor arrows. The individual function of the various arrows is to be precisely observed and appropriate action taken as follows:

| | |
|---|---|
| ➔ | When the cursor is highlighted grey, this indicates the section being processed and can be reached by depressing the PROG Key. |
| ⇳ | A double arrow indicates, that that particular parameter value can be altered as required.. |

| | |
|---|---|
| | LED green: power available. |

| | |
|---|---|
| | LED red: alarm - a fault has occurred. |

## *4.0 "SETUP" operating parameters and parameter settings*

The Regulator possesses three different programming levels.

### 4.1 SETUP – parameters and also configuration procedure

Parameters represent those values, which in normal cases only require entering once and are not alterable during the Equipment operating mode. These have no reference to the settings' procedures as such, but define functions. Entry of the settings is only possible when the Equipment is in the OFF mode. The sections being processed can be reached by depressing the PROG Key once.

### 4.2 Regulating parameter settings

Regulating parameters are values to which the regulating process reacts during real time and are the basis for the electric power output to the ventilating fans.
The process can be accessed in the OFF mode by means of the cursor; otherwise by depressing the PROG Key twice during the operating mode.

### 4.3 Language

Entries are to be made in all sections in the same manner.
In case your language is not shown in display please ask your supplier for an equivalent Eprom. Not all versions are equipped with the English language.

## *5.0 Resetting the Controller*

**Monitor No. 1 is displayed as soon as electric power is supplied and the Equipment is in the OFF mode:**

| |
|---|
| - ADR 70 -<br>Operational |

**The standard Menu is displayed upon depressing the PROG Key:**

| | |
|---|---|
| ➔ SETUP-PARAMETER<br>SETTING<br>LANGUAGE | Section: operating mode parameters;<br>Section: regulating mode parameters;<br>Section: communication language. |

**When initially switching on the Equipment (new programming), it may be necessary to alter the communication language setting.**

### 5.1 Altering the communication language:

| | |
|---|---|
| SETUP-PARAMETER<br>SETTING<br>➔ LANGUAGE ⇳ | Move the cursor to the LANGUAGE column by means of Key No. 2 and acknowledge by depressing the PROG Key. |

| | |
|---|---|
| Language<br>ENGLISH ⇳ | Select the language with Key Nos. 1 or 2 – depress the END Key and depress the PROG Key to return to the programming mode. |

### 5.2 Entering the "SETUP" operating parameter setting

| | |
|---|---|
| ➔ SETUP-PARAMETER<br>REGELUNG<br>SPRACHE ⇳ | Move the cursor to SETUP PARAMETERS and depress the PROG Key. |

### 5.2.1 Selecting the operating mode – depress the PROG Key and select with Key No. 1

| | |
|---|---|
| OpeRating mode<br>in Bar pressure ⇳ | Valid for **4-20 mA** pressure transducer. Refrigerant and display monitor for selecting the refrigerant is automatically activated |

| | |
|---|---|
| OpeRating mode<br>in TemPerture ⇳ | Valid for NTC sensors, connection terminals 1 and 2.<br>**- Refrigerant table and display monitor not activated.** |

| | |
|---|---|
| OpeRating mode<br>in VotS 0-10V ⇳ | Valid for **0–10 V pressure** transducer and display monitor for selecting the refrigerant is automatically activated.<br>**- Programming for connection to CB/CE – circuit boards.** |

| | |
|---|---|
| FreOn:<br>R22 ⇳ | Only activated when pressure is selected. The refrigerant tables are:<br>R 134a, R404A, R 407C – depress the PROG Key. |

### 5.2.2 General operating parameters

| | |
|---|---|
| AutO start after<br>powEr failureS ⇳ | The Regulator Equipment will start up automatically after power failures. The ON/OFF Key switch is employed for normal on and off switching operations. |

| | |
|---|---|
| InitiaL startup<br>staGE: min. 020% ⇳ | Low current power supply. Please be aware, that a minimum current is often required to maintain operations. |

| | |
|---|---|
| InitialstartupE<br>staGE: max. 090% ⇳ | Initial current at the end of the regulator range. Should this be exceeded, then power supply 100%. Depress the PROG Key. |

| | |
|---|---|
| InitiaL runup<br>100% for 5 secs. ⇳ | The fan will initially runup for x secs. at 230V. Thereafter the regulation facility cuts in. Adjustment range 0 – 10 seconds. |

**After completion, the standard display will appear –the PROG Key should again be depressed.**

### 5.3 Entering the Controller parameter settings – N.B.: Celsius degree settings are to be entered for the pressure settings.

| | |
|---|---|
| **S E T U P - P A R A M E T .E S**<br>**➔ S E T T I N G S** | Parameter values can be altered with the Key Nos. 1 or 2. Movement through the Menu with the PROG Key. |

.

| | |
|---|---|
| **R e g U l a t i o n:**<br>**S t a R t a t 4 3 ° C ⇳** | Commencement of the regulating range of functions. Starting up of the ventilating fan with the minimum initial stage. |

| | |
|---|---|
| **R e g U l a t i o n:**<br>**E n d l n g a t 5 5 ° C ⇳** | Termination of the regulating range in °C. The point corresponds with the max. initial starting stage. A current of 230V is supplied as from a temperature of 56 °C. |

| | |
|---|---|
| **R e g U l a t i o n:**<br>**F a n b e l t 0 5 ° C ⇳** | The fan speed varies within a range of 45° – 55 °C by means of a 20% and 90% proportional current. |

| | |
|---|---|
| **R e g U l a t i o n:**<br>**S e t - p o i n t ° C ⇳** | Ideal working parameter °C . The regulating facility attempts to maintain this parameter value. |

**THE PARAMETER VALUES ENTERED ARE TO BE ACKNOWLEDGED BY DEPRESSING THE END KEY!**

## *6.0 Regulator quantity alterations*

### 6.1 Alterations in the SET-point and the Regulator quantities during the operating mode

**SET - point:** Depress the PROG Key once. The cursor is then on the decimal point..
The parameter value can now be altered with Key Nos. 1 and 2.

**REGULATOR QUANTITIES:** Depress the PROG Key twice. The cursor will automatically move to the Menu item “REGELUNG“ (Regulation). The parameter values can then be altered as above described.

**IMPORTANT: ALL ALTERATIONS ARE TO BE ACKNOWLEDGED WITH THE 'END' KEY.**

## *7.0 Displays*

### 7.1 Standard display during the operating mode

| | | |
|---|---|---|
| **A D R 7 0 D V 1 0 0 %** | S> = nominal parameter value | |
| **S > 5 0 ° C S : 5 0 ° C** | DV = speed in % | S : = SET-point parameter value |

## *8.0 Special functions and their display*

### 8.1 Manual operating mode

The RESET Key activates a MANUAL OPERATING mode, i.e. with 100% current input. This is however only possible when the regulating facility is switched to OFF and no faults occur ( ( LED = burns Red = OFF). This is indicated by the display:

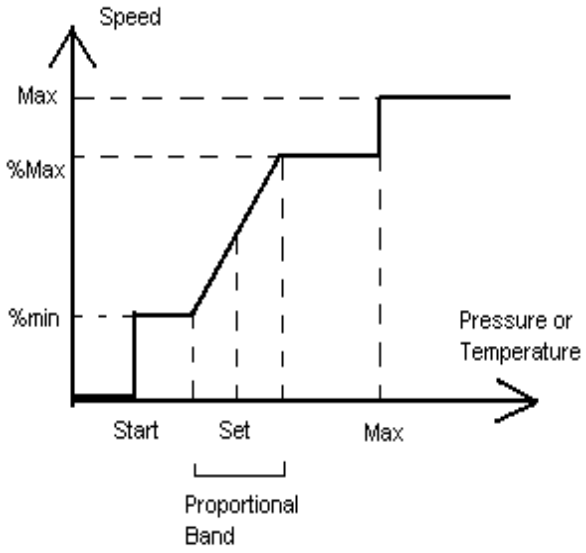
| |
|---|
| **A C H T U N G**<br>**H A N D B E T R I E B** |

(Caution. Manual operating mode)

## *9.0 Schematic illustration of the regulating process*

**The following represents a schematic illustration of the regulating process, after all regulating parameter values have been entered, as to pressure and temperature:**

The current supply to the fan is given in the vertical. This are the pressure and temperature readings. The pre-selected regulating parameter values are indicated in 5 individual sections, which can be defined as follows:




- **Section 1:** *pressure or temperature and the initiation of the regulating process* => no supply of current to the ventilating fan.
- **Section 2:** *pressure or temperature between the begin of the regulating process and the Set minus- proportional range* => supply of current to the Regulators = smallest current voltage as per parameter value settings.
- **Section 3:** *pressure or temperature between the SET minus- proportional range and the Set plus+ proportional range* => the current voltage remains linear between minimum and maximum.
- **Section:** *pressure or temperature between Set + proportional range and regulating section END* => current voltage supply to the fan corresponds with selected parameter value under max. %.
- **Section 5:** *pressure or temperature greater than the end of the regulating section* => maximum current voltage supply at the fan.

### 9.1 Example of Controller settings (R 22 – 230 V Standard operations)

Caution:: A too narrow proportional range will lead to an unbalanced regulating control of the fan. It is therefore recommendable to select this range as wide as possible. The parameter values to be selected should be above and below the set-point parameter value.

| Entries in ADR | Mini-mum 10 % | Maxi-mum 85 % | Start at 12.5 bar | End At 20.0 Bar | Set-point value 17 bar | Prop.-range 2.5 bar |
|---|---|---|---|---|---|---|

**And the result of it will be:**

| | | Actual range regulated by means of effecting alterations in revolutions | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Start | Start Prop.-range | Proportional-Range | Set-point SET | Proportional-range | End of prop.-range | End point regulation | Complete revolutions |
| **Pressure bar*** | 12.5 | 14.5 | 2.5 | 17.0 | 2.5 | 19.5 | 20.0 | 20.1 |
| **Temperature °C** | >35.0 | 40° | 40°- 46° | 46° | 46° - 52° | 52° | 53° | >53° |
| **Current voltage approx.** | 23 | | 30 – 120 | | 120 - 195 | 195 | 195 | 230 |
| **Current in %** | 10 | 10 % | | | | 85 % | 85 % | 100 % |

Please make sure, that the entries for pressure transducer on the ADR 70 (4-20 mA) are to be given in temperature parameter values.

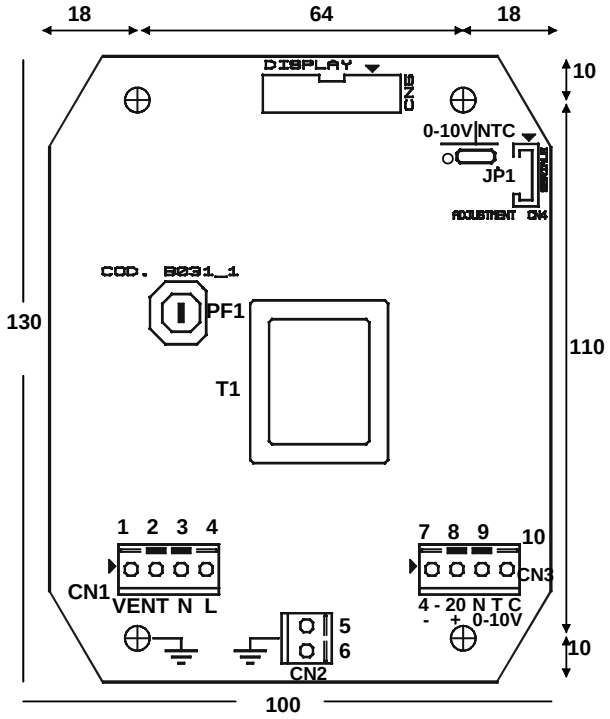
## *10.0 Error messages on the display*

Some faults are processed via the program and relative messages will appear on the display. Dependent on the fault occurrence, an appropriately defined reaction is generated by the program. The following table provides an example of possible faults, their causes, the form of fault message and the reactive rectification on the part of the Regulator thereto:

| Type of fault | Fault message | Cause | Reactive rectification |
|---|---|---|---|
| Sensor fault | Sensor 1 alarm<br>Display message - LL or HH | • Operationally measured pressure value. Messages:<br>LL = below 15°C<br>HH = above 90°C | Temporary maximum current voltage supply to the ventilating fan.<br>Subsequent automatic Resetting to previous status. |

## 11.0 ADR 70 Wiring diagram - Max. current : 8 amps

**- ADR 70 - dimensions for cabinet installation in mm -**



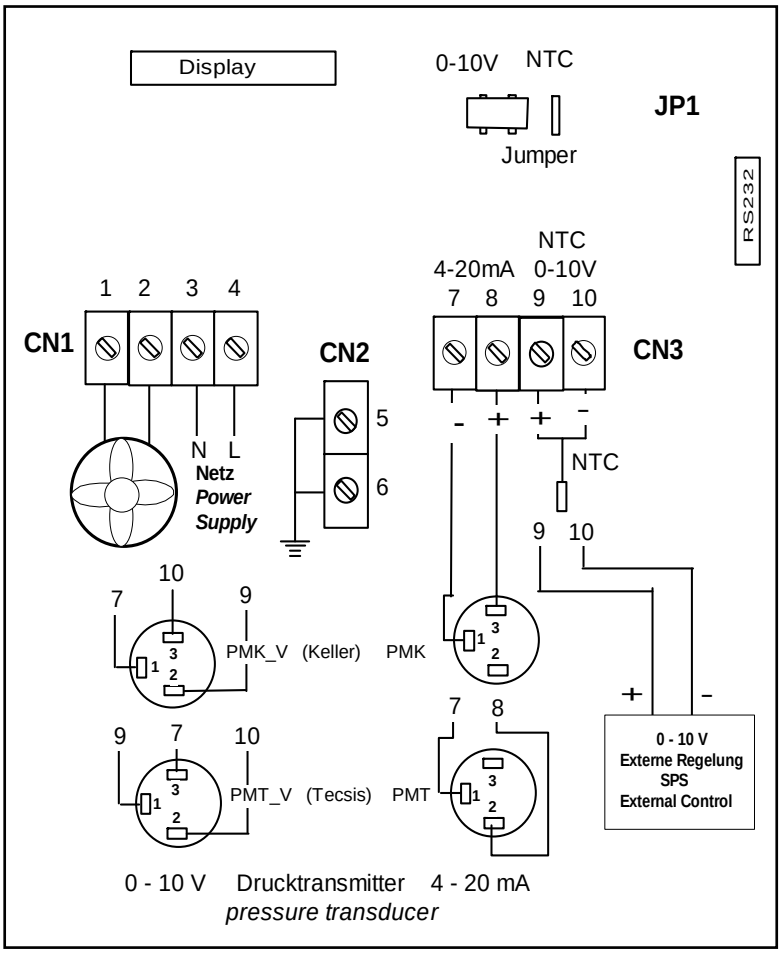

**Terminals 1 and 2:**
Output fan
**Terminals 3 and 4:**
Voltage input 230V
**Terminals 5 and 6:**
Earth connection
**Terminals 7 and 8:**
Pressure transducer 4-20mA
**Terminals 9 and 10:**
Pressure transducer 0-10V
or sensors NTC
**JP1:**
Bridge plug for analog inputs 9/10.
Definition of the sensor input

**Connection of**

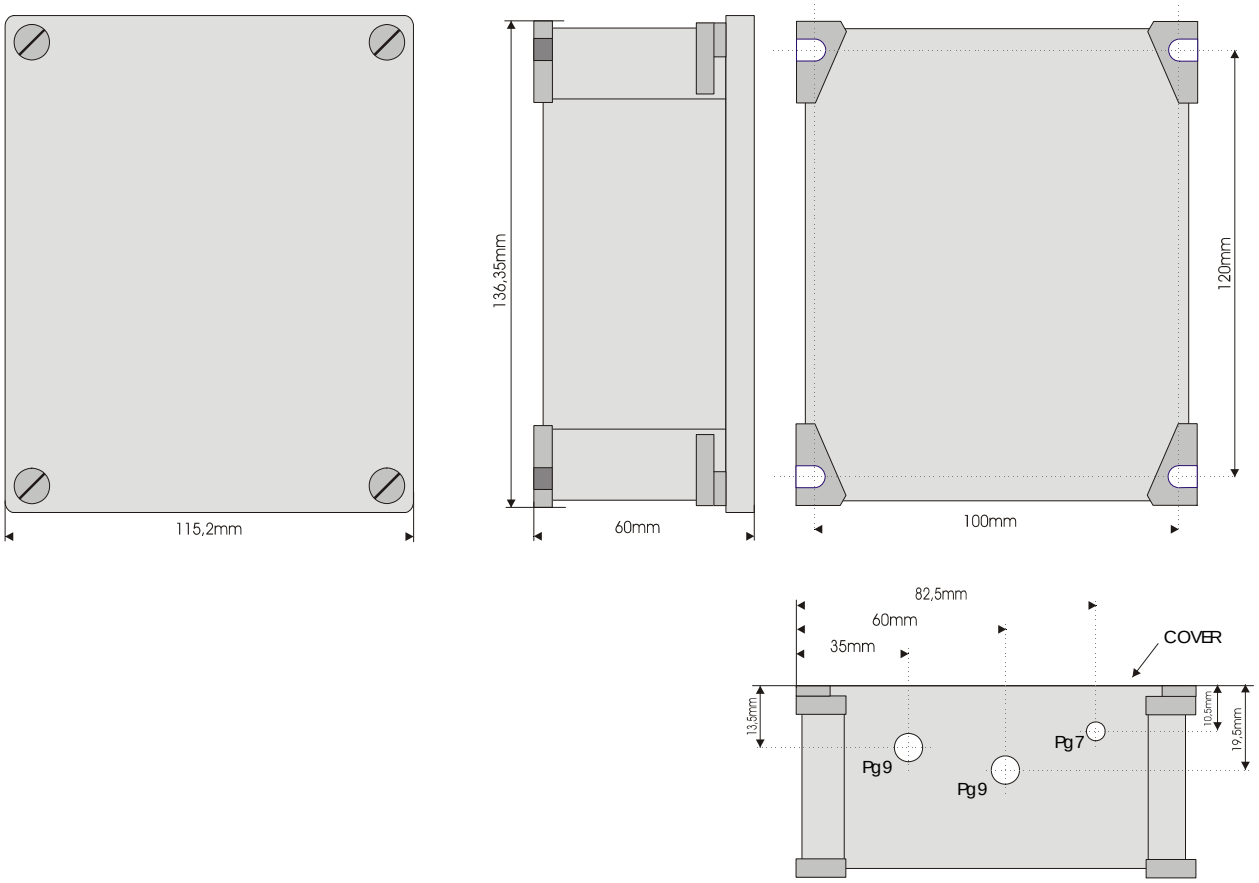
**Pressure transducer**
4 - 20 mA,
0 – 10 volts

**Temp.Sensors (NTC)**

**External control**
0 – 10 volts



## *12.0 ADR 70 installation dimensions IP 54 housing*




## *13.0 Installation dimensions - operating panel, with display (D-LCD)*