

CONDENSATION SPEED ADJUSTMENT



ADR 230



ADR 80 DP



Display (D-LCD)



PMT



PMK



NTC sensor

Pressure transducer PMT

FAN SPEED REGULATOR

Pressure- or temperature controlled
for three phase and single phase
Induction motors

SERIES ADR 80-230

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1.0 ADR REGULATOR – WORKING SPECIFICATIONS

The regulator controls one fan, or a group of fans, driven by a 50/60 Hz three-/single-phase motor, via an algorithm that adjusts the fan speed in accordance with a set of adjustable parameters and pressure or temperature measurements made in real time by the card.

2.0 OPERATION AND DISPLAY WINDOWS

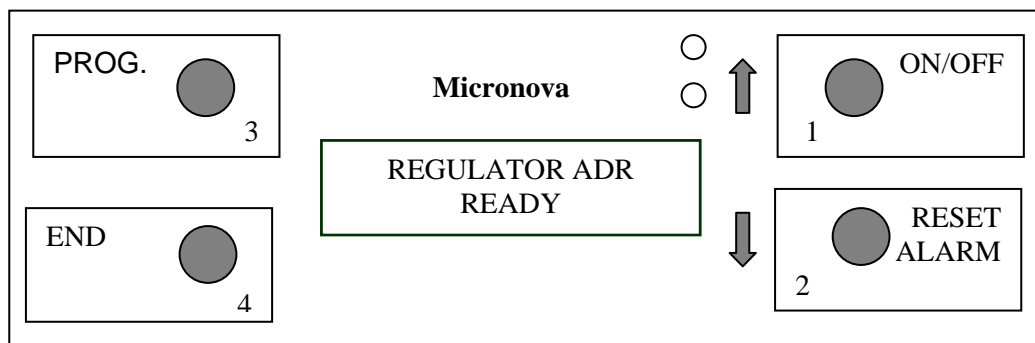
The ADR regulator is operated and programmed through the display panel keys and is normally mounted on the control panel. If it is not necessary to have the display of values, the card can operate without the display panel.

With the panel assembled it is possible to display the following data:

- All the programming steps
- Pressure/temperature for each circuit of connected sensors or transducers
- Indication of which circuit controls the fans
- The SET values
- Supply voltage percentage at the fans



3.0 DISPLAY AND FUNCTION OF CONTROL PANEL KEYS



Key 1	Function description	Note
ON/OFF	ON/OFF of card and therefore of OUTPUT CONTROL FUNCTION	ON – running = adjusted output, voltage changed OFF – stop of voltage change function
↑	1° function when selected allows the increase of the value, or moves the menus towards the top. 2° function with the card ON pressing key 3 modifies the SET towards the top.	The 1° function is activated even if the set is in ON position, or in the SET mode. Modifies the SET towards the top.

Key 2	Function description	Remarks and state of the adjustment
RESET ALARM	Manual reset of alarms.	In case of error alarm must be reset, after removal of reason. The red LED remains ON as a warning, until manual reset.

↓	1° special function: in set mode allows a decrease of the value, or moves the menus towards the bottom. 2° function Key 3 decreases the SET value.	The 1° special function is activated even if the adjustment is in the ON position and in the SET adjustment mode. Decreases the SET value.
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Key 2	Function description	Remarks and state of the adjustment
FUNC MANUAL	Manual set of the connected output.	The function is active only if the regulator is in the OFF position.

Key 3	Function description	Remarks and state of the adjustment
PROG Key3	1° Access at programming of SET parameters 2° Access at set parameters 3° Modifies the SET of adjustment	1° - only if adjustment is OFF 2° - also during the operation of the regulator 3° - also during the operation of the regulator

Key 4	Function description	Remarks and state of the adjustment
END	1° Confirms any change of the programming, and exits. 2° Sensor values display	Valid for any mode of the regulator – either in the OFF position or for changes during operation. Also during the working of the adjustment

3.1 The function of cursor an arrow

→	The cursor indicates the position to be reached, pushing the PROG key again
↑1	The arrow on the right position of display indicates that the UP key returns to the preceding position
↓2	The arrow on the right position of display indicates that the DOWN key goes to the next position
⇅	The double arrow indicates that it is possible to modify the SET or the function with keys 1 or 2

 Green LED – Voltage
  Red LED - Alarm

4.0 SETUP PARAMETERS AND ADJUSTMENT FUNCTIONAL PARAMETERS

Programming of the device is made by two systems of parameters, the Set-up and the programming. SETUP parameters do not require programming during normal operation of the adjustment, but determines how the regulator works.

Programming parameters determine the real response of the system during adjustment. Listed below are parameters followed by the default settings.

4.1 SETUP PARAMETERS

Programming of the SETUP is possible only when the regulator is off. In this position pushing the 3 PROG key displays the main MENU as follows:

→ S E T U P R E G U L A T I O N L A N G U A G E	SETUP parameters Adjustment parameters Language field
---	---

Pushing again the key 3 PROG the display shows the frame to modify the first Set-up parameter

→ P O W E R S U P P L Y S I N G L E P H A S E ⇅	Selects the card supply voltage (230V or 400V).
--	---

With the arrow keys it is possible to display the next windows for parameters set, as described below

→ R E G U L A T I O N I N P R E S S U R E ⇅	Selects the adjustment system with: TEMPERATURE, PRESSURE, VOLT
--	--

WORKING IN TEMPERATURE

Working in TEMPERATURE requires the use of NTC10K type sensors.

This mode automatically stops the display of windows related to pressure or volt adjustment.

WORKING IN VOLT

When working in VOLT a signal coming from an external adjustment source must be already present.

The input signal is 0 – 10 V.

Modify SET - Point **impossible**

Set SET - Adjustment **impossible**

Display: display of the measured value given in VOLT.

WORKING IN PRESSURE (window visible only with this selection)

Working in PRESSURE allows the control of the condensation, evaporation pressure circuit. Working in the pressure mode requires the input of other SETUP parameters, for a correct match with the characteristics of the plant, from the equipment manufacturer.

→ PROBE TYPE : CURR . 4 2 0 m A ⇅	Selects the type of sensors/transducers (Current. 4-20 mA, Current. 0-20 mA, Voltage 0-10V)
→ PRESSURE MAX . IN BAR 3 0 . 0 ⇅	Sets the max value, in bar, for the sensor (for instance could be 8 bar only when it working in low pressure).
→ INPUT VALUES REGULAT . IN ° C ⇅	Defines how the data is exchanged with the software that controls the SET of adjustment parameters: Pressure in BAR or temperature corresponding to pressure in °C
→ FREON F TYPE : FREON 2 2 ⇅	Defines the refrigerant type: R 22, R 134A, R 407C, R 507 R 404A and R410A. The software contains the graphs and curves of refrigerants and automatically changes BAR into °C.

WINDOWS FOR ANY ADJUSTMENT

→ AUTOSTART NO MAINS YES ⇅	If YES is set, in case of main power interruption the regulator starts automatically.
→ SENSORS NR TRANSDUCERS 1 ⇅	Defines the number of sensors/transducers connected. It could be 1 or 2
→ OUTPUT PHASE MINIMUM 0 % ⇅	Defines the minimum supply voltage in % for the fan. A minimum supply voltage, for all the fans, of about 15% of the total voltage is available.
→ OUTPUT PHASE MAXIMUM 1 0 0 % ⇅	Defines the maximum supply voltage of the fan in the regulated zone. Once the set point has been adjusted the fan will operate at 100% voltage.
→ START 1 0 0 % VOLT PER 0 S . ⇅	Defines for each start of the fan the time between 0 – 10" during which the fan operates at 100% supply voltage. (Attention: 0" can create problems at fan starting).

THE "END" KEY confirms the SETUP values.

→ SETUP - PARAMET . REGULATION LANGUAGE	SETUP parameters Adjustment parameters Language field
---	---

4.2 SETTING OF 'ADJUSTMENT' PARAMETERS

To modify the values, use the same procedure as per SET-UP parameters.

→ REGULATION START BAR ⇅	Starting point of the fan. Value in BAR or °C – This is the starting point of the fan with the MINIMUM SET VOLTAGE
→ REGULATION END BAR ⇅	END of the working zone (point of MAXIMUM VOLTAGE). Beyond this value the supply voltage to the fan is 100% of the available voltage.
→ REGULATION SET BAR ⇅	Ideal working point in Bar or °C. The adjustment in PID will try to maintain this value.

→ R A N G E R E G U L A T . P R O P B A R ⬆⬇⬆	Defines the proportional range in which the adjustment is made – range between the MIN and MAX regulated voltage.
---	---

- The initials B (bar) are modified according to the selection made in SETUP

WITH THE KEY END confirm the selection made for the ADJUSTMENT.

NOTE:

If necessary, it is possible to change the ADJUSTMENT parameters during operation. Push the PROG key twice; enter in “SET – ADJUSTMENT” and make the necessary changes.

S E T U P - P A R A M E T . R E G U L A T I O N → L A N G U A G E	SETUP parameters field Adjustment parameters field Language field
---	---

5.0 MODIFY THE LANGUAGE

Starting with Version 5.0 in which the Memory of the EEPROM has been enlarged the ADR 80 and 230 can be accessed in 5 languages: German, English, Italian, French and Spanish

S E T U P - P A R A M E T . → R E G U L A T I O N L A N G U A G E	Place the cursor on the line “Language” and confirm the selection with the PROG key.
---	--

→ E N G L I S H	Place the cursor on the selected language and confirm the selection with the PROG key. The language is automatically changed. Push END and the program returns to the main menu for the SET parameters.
-----------------	---

CONFIRM THE SELECTION WITH THE END KEY
PRESS END AGAIN to return to the standard display

6.0 CHANGE OF SET AND ADJUSTMENT VALUES DURING OPERATION

6.1 SET - POINT – REFERENCE SET FOR THE ADJUSTMENT

Push the PROG (3) key once and the cursor moves to the decimals of the SET value. To modify use keys 1 or 2.

6.2 ADJUSTING SET

Pushing the PROG (3) key twice, the “ADJUSTING” menu is automatically displayed and the value can be modified directly.

TO CONFIRM THE CHANGES PRESS THE ' END ' KEY

6.3 Example for setup speed controller (R 407C – 400V)

Setup in ADR	Min 10 %	Max 85 %	Start at 12.5 bar	End at 20.0 Bar	SET 17 bar	Prop.-band 2.5 bar
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Note: Do not use a small proportional band otherwise you may expect hunting

Based on the setup above following control will be in function

	Band in which you find a definite speed regulation						Full Speed
	Start	Start of prop.-band	Proportional-band	SET	Proportional-band	End of Prop.-Band	
Pressure bar	12.5	14.5	2.5	17.0	2.5	19.5	20.0
Temperature °C	>35.0	40°	40° - 46°	46°	46° - 52°	52°	53°
Voltage (output) in %	10	10				= 85%	100 %

6.4.0 To control two different Set points and how to define = DUO SET

The firmware in the EEPROM allows the usage of two different Set points. This with one sensor, with two of a kind or different sensors (i.e. Temperature sensor and pressure transducer).

6.4.1 Window to set „DUO SET“

After your decision to use 2 sensors (Probes) follow option are open to be set.

→ PROBES FUNCTION
NORMAL ⇕
 → PROBES FUNCTION
INDEPENDANT ⇕

NORMAL

A „normal“ control between both sensors will take place. In function “Chiller” the highest value of both sensor will control the output of the ADR. In function “Heatpump” the lowest value of both sensors controls the output.

INDEPENDANT

The firmware offers for each sensor a window for an individual programming of each probe. No matter if it is for temperature, pressure, external voltage or chiller and heatpump

Example: Pressure

→ P1 REGULATION
PRESSURE ⇕

→ P1 PROBE TYPE:
CURR 4 20 mA ⇕

→ P1 MAX PRESSURE
IN BAR 30.0 ⇕

→ P1 INPUT REG
IN BAR ⇕

→ P1 FREON TYPE
FREON R22

→ P1 WORKING IN
CHILLER ⇕

Same windows also available for Sensor (Probes)2
 P1 = Sensor 1, P2 = Snesor 2

Example input control parameter for DUO - SET

As before you can configure the control parameter for each Sensor in the subdirectory “REGULATION”

→ P1 REGULATION
START 9.5 BAR ⇕

→ P1 REGULATION
STOP 20.0 BAR ⇕

→ P1 REGULATION
SET 17.0 BAR ⇕

→ P1 REGULATION
BAND 2.0 BAR ⇕

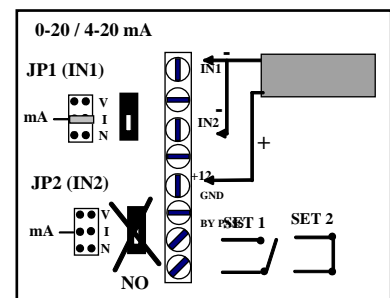
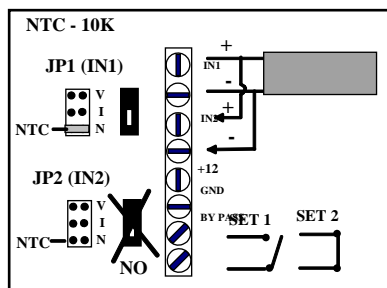
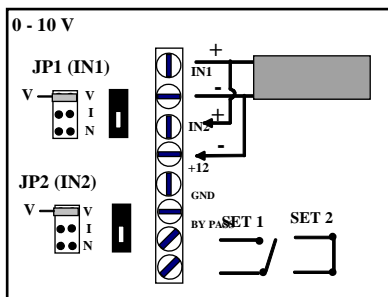
6.4.2 Sensors/Pressure transducer 1 or 2 Set points (DUO-SET)

Each sensor input can be defined separate according to the different Probes (Example)

Sensor 1 (P1) or (S1): Pressure via pressure transmitter, Sensor 2 (P2) or (S2): Temperature via temperature sensors NTC

Attention: Do not forget to place the correct jumper according to the sensor

6.4.3 Wiring and placing jumpers for 2 set point but one sensor only

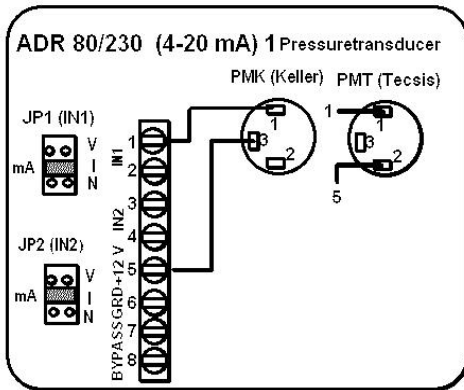


Attention: Bypass connection has to be made potential free (no voltage)

Depending to the sensor input Jumper have to be placed. Please consider for 1 sensor with 2 set points with open Bypass (SET1) control is fixed by set point S1.

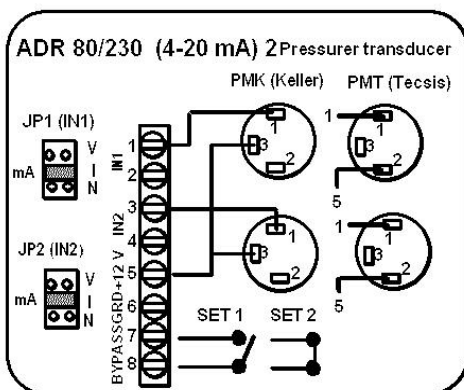
With closed Bypass (SET2) control is taken over by set point 2

6.4.4 Connections and Setup of ADR 80 and 230 with 1 or 2 Sensors



ADR 80 / 230 with 1 Sensor

- For one circuit
- Single or three phase motors
- By use of pressure transmitter after setting to a refrigerant Control and Display in bar or °C.
- With temperature sensors Setup and Display in °C



ADR 80 / 230 with two Sensors

- For two circuits
- Single or three phase motors
- By use of pressure transmitter after setting to a refrigerant Control and Display in bar or °C.
- With temperature sensors Setup and Display in °C

• **Control with 1 Set point**

Setting in 2 Sensors
 "SETUP": 1 Set point

Both refrigeration circuits are controlled by the highest pressure or temperature of circuit 1 or 2 Bypass (SET 1) remains open.

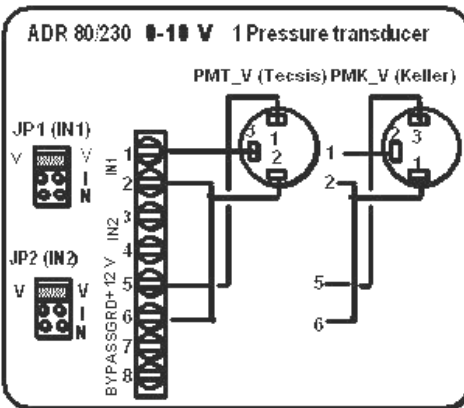
• **Control with 2 Set points**

Setting in 2 Sensors
 "SETUP": 2 Set point

Signals of circuit 1 and 2 will be used in accordance if Bypass is open or closed. Bypass can be opened or closed by timer, switch, Thermostat or any other device (potential free).

Bypass open (SET 1): Circuit 1 takes over control
 Bypass closed (SET2): Circuit 2 takes over control

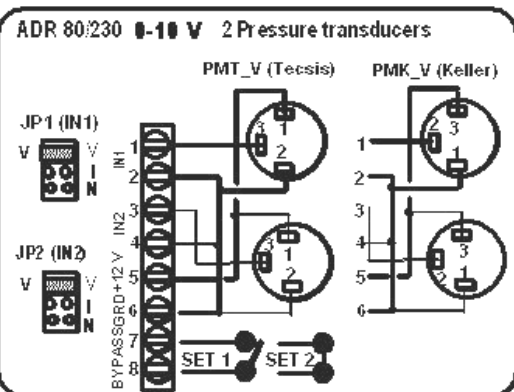
Attention: By using one or two pressure transducer the control has to be set to Pressure despite that setup and display is set to temperature °C



Setup in Temperature will be made when one or two NTC Sensors are connected to ADR

By using pressure transducer with 0-10 volts output in mode "SETUP" "PRESSURE" Probe-Type 0-10V has to be chosen.

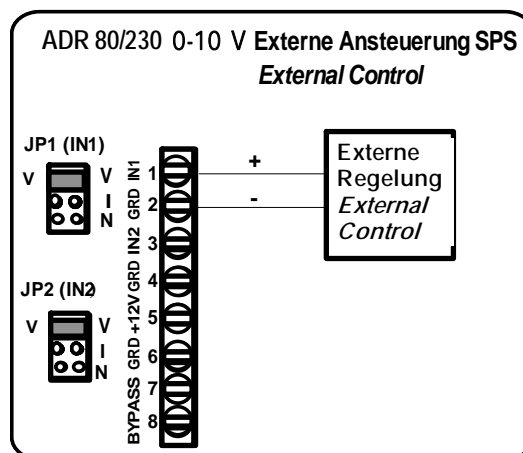
Setup for REGULATION in mode "VOLTAGE" has to be chosen for external controls 0 – 10 Volts. In that case ADR is acting as slave according to the commands of an external SPS Control.



6.5. ADR 80/230 with external Control (SPS)

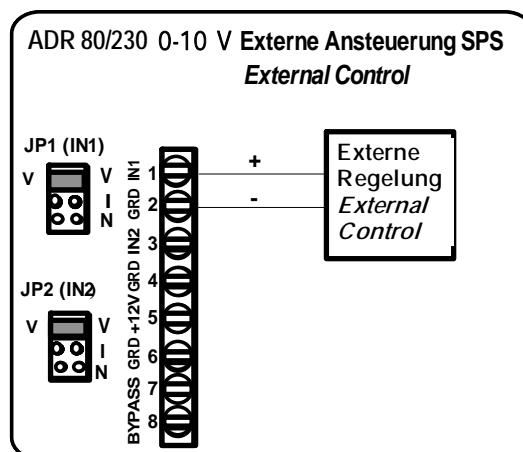
6.5.1 ADR 80/230 with external Control and 0-10 Volt signal

- Both jumpers placed to V (Voltage)
- Setting in mode "SETUP" "REGULATION" to VOLTAGE by using remote control D-LCD
- Connection of external control with signal 0-10V to
IN1 (+) = Terminal 1
Ground (-) = Terminal 2



6.5.2 ADR 80/230 with external control and signal 0-20mA

- Both jumpers placed to V (Voltage)
- Setting in mode "SETUP" "REGULATION" to VOLTAGE by using remote control D-LCD
- Display of remote control indicating (0-10 volts)
- Despite the signal of 0-20 mA
- Connection of external control with signal 0-10V to
IN1 (+) = Terminal 1
Ground (-) = Terminal 2
- Input of a 4-20 mA signal presently not possible



6.5.3 Minimum Speed

Even with an external Signal of 0-10V or 0-20 mA it is possible to set a Minimum and Maximum speed. This is done via remote control D-LCD. When the Minimum speed of the Setup falls below the setting the connected Motor will be cut off. This happens even when the external control still calls for speed.

6.5.4 Maximum Speed

By using an external control for ADR with 0-10 V and 0-20 mA signals it is possible to limit the maximum speed, too. When the maximum speed is reached the internal control of the ADR 80 /230 limits the speed to the set point "MAX Speed" despite that the external control is asking for an higher speed

In contrary by connecting pressure transducer or temperature sensors to the ADR80/230. Here the maximum speed of 100% always will be reached when the setting of the Maximum pressure is exceeded.

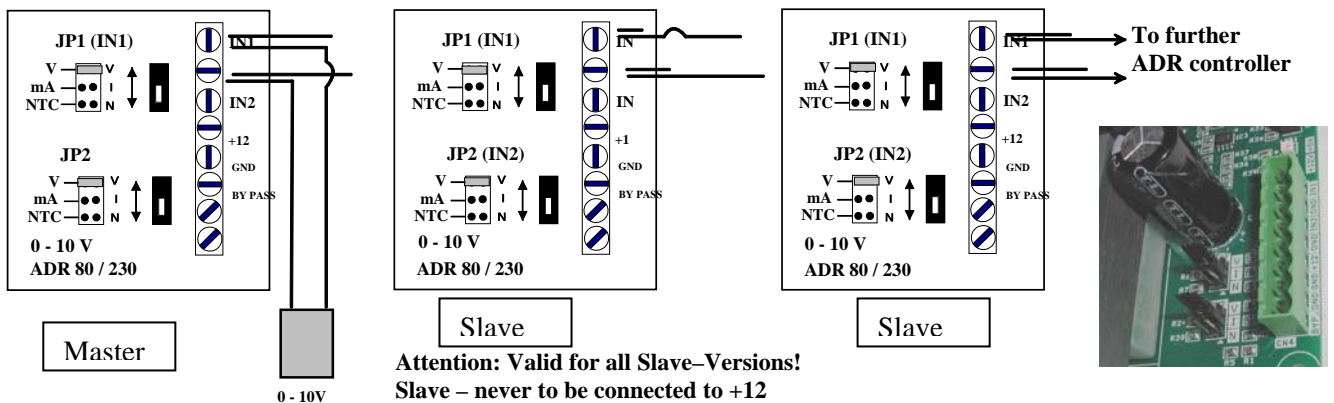
7.0 System " MASTER and SLAVE "

If the maximum current of a system exceeds the current of ADR 80 or ADR 230 a Master and Slave system can be used as extension to the current required. Here one or two pressure or temperature signals can be connected to the Master and carried to the necessary Slaves.

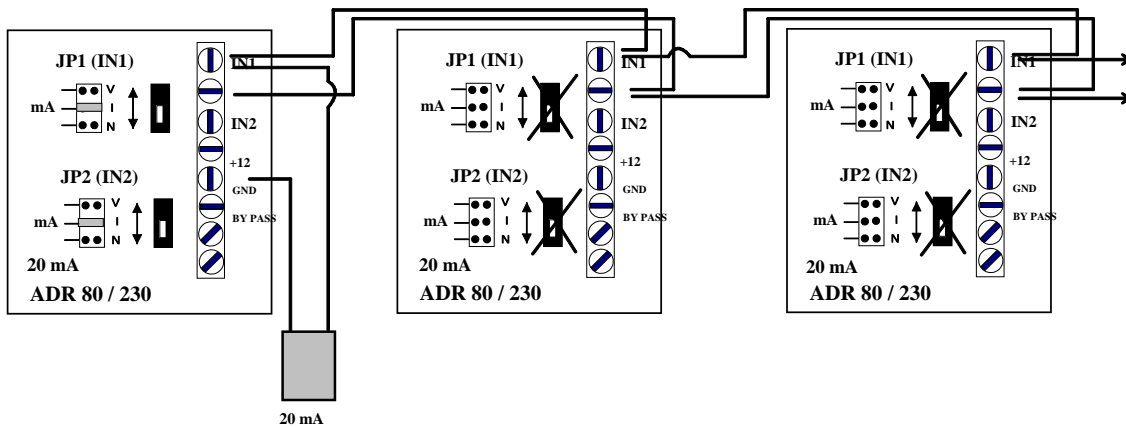
Basics which have to be noticed:

- 1) All ADR do have to have the same setup configuration
- 2) The speed controller which receives the signals of the sensors has to be defined as "MASTER"
- 3) The Speed controller which are following take over the "SLAVE" function
- 4) In DUO-SET applications (2 different Set points) the connections for SET1 and SET 2 have to be in line.
- 5) In accordance to the input signal of pressure transducer or temperature sensor jumpers have to be placed (see drawings below)

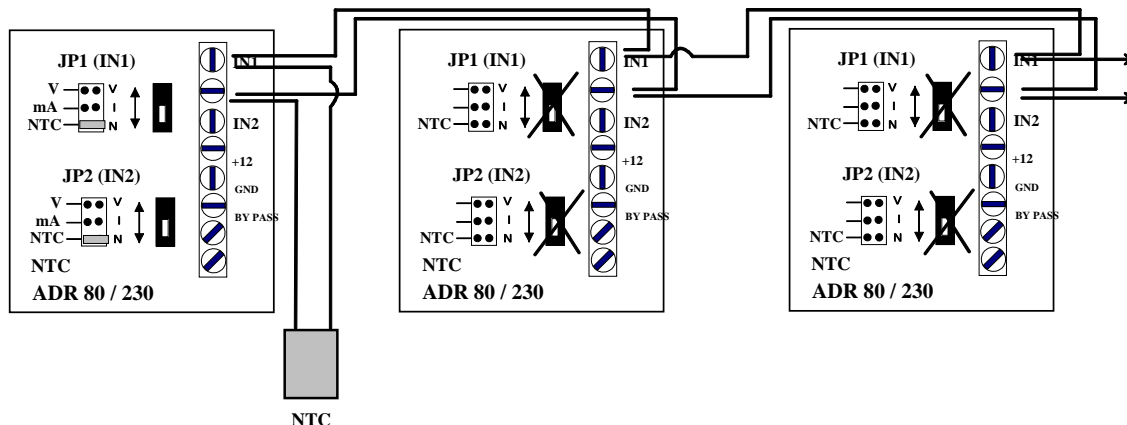
7.1. Signal 0 – 10 V - Slave with jumpers



7.2 Signal 4-20 mA -Slave without jumpers

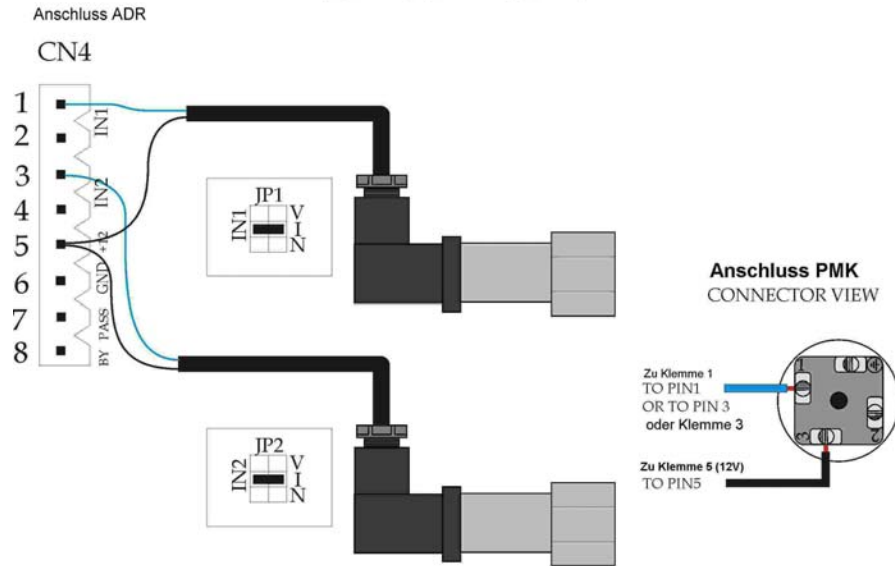


7.3 Signal NTC – Slave without jumpers



8.0 Wiring Diagram

ADR 80/230
with pressure
Transducer PMK



9.0 Display

9.1 Display if ADR is in OFF – position

R E G U L A T O R A D R R E A D Y
--

9.2 Display if ADR is working

P 1 > 1 8 . 4 S 2 1 0 . 0 B	P1= SENSOR 1	P2 = SENSOR 2
G V 1 0 0 % S 1 5 . 0 B	GV= Voltage in %	S = SET POINT
	> = adjusting value	B = bar
the SET can be modified during operation.		

9.3 Sensor value display

During operation it is possible to check the values measured by the sensors. This function works as a manometer and gives the pressure/temperature values of each connected circuit.

S E N S O R N : 1 R 2 2 3 9 . 6 ° C 1 5 . 2 B A R
--

9.4 By-Pass adjustment

On the board there is one input available which excludes adjustment. In this case the fans will work without adjustment, and therefore with the maximum allowed supply voltage. The display shows:

B Y P A S S A D J U S T M E N T

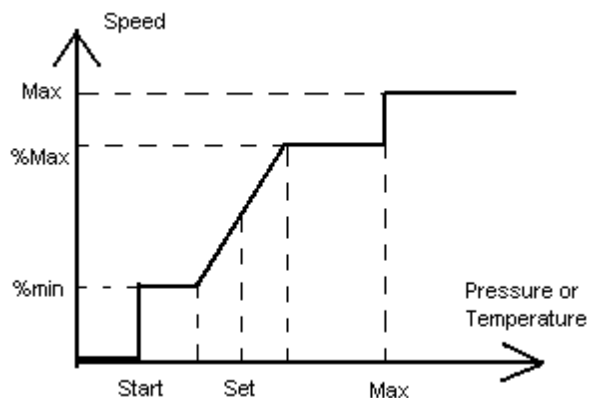
9.5 Manual function of fan

In OFF – position with key 2 (reset) the fan will be in manual function

A T T E N T I O N M A N U A L W O R K S
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10.0 SCHEMATIC WORKING DIAGRAM OF ADR REGULATOR

Working principle of the device (in pressure or temperature)



In hand of the temperatures or the pressures and the supply voltage of fan, the graph can be divided into 5 sectors.

Sector 1:

Temperature or Pressure before Start => Supply voltage to fan is zero.

Sector 2:

Temperature or Pressure between Start and Set – Proportional Range => Minimum supply voltage to the fan.

Sector 3:

Temperature or Pressure between Set – Proportional Range and Set + Proportional Range => Supply voltage increases proportional between the minimum and the maximum.

Sector 4:

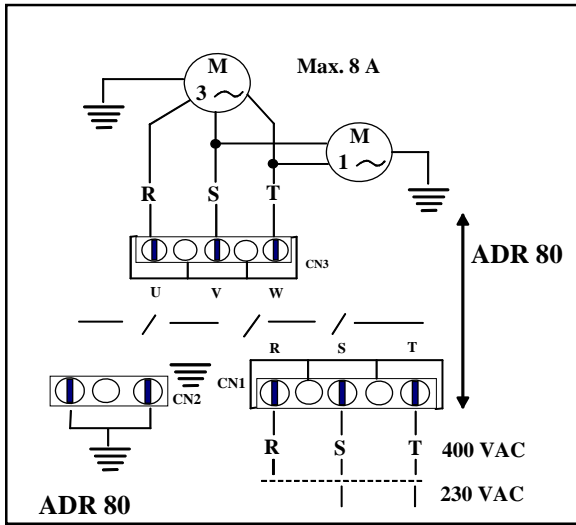
Temperature or Pressure between Set + Proportional Range and Max => Fan supply voltage equal to the maximum set voltage

Sector 5:

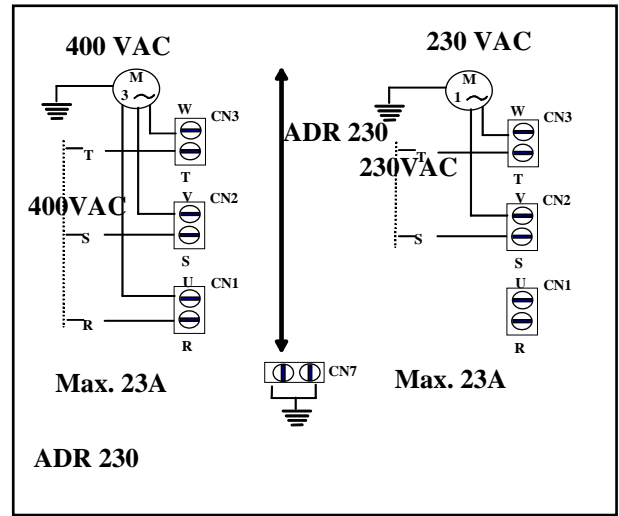
Temperature or Pressure higher then Max => Max fan supply voltage (400V, 230V, 460)

Note: The transition from sector 5 to sector 4 has a certain dead band to avoid unwanted hunting between the two working speeds. Same situation occurs for transition from sector 2 to sector 1. In this case the adjustment will use an adapted dead band to perform better in accordance to the dynamic characteristics of the cooling system.

11.1 ADR 80 – Wiring diagram

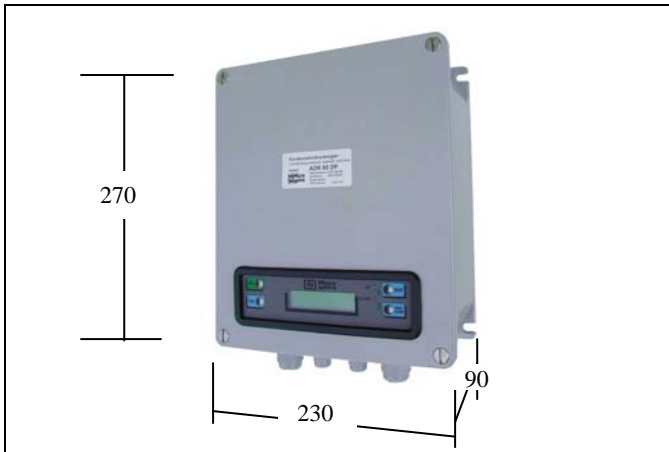


11.2 ADR 230 Wiring diagram



12.0 Dimensions of ADR in Aluminium Box IP 55 (mm)

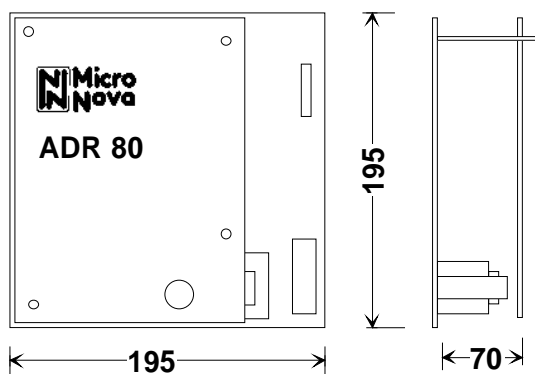
12.1 ADR 80 DP



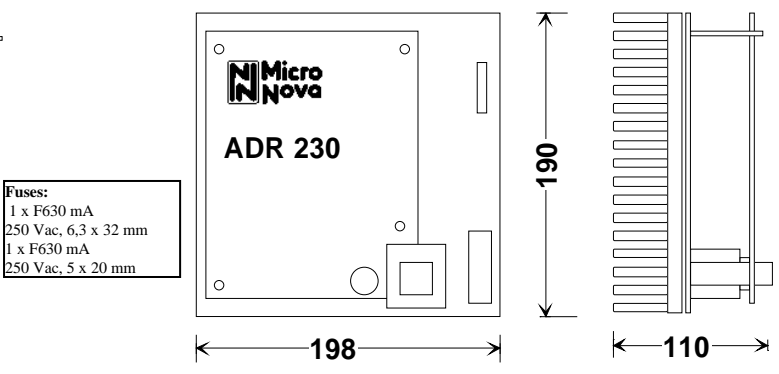
12.2 ADR 230 DP



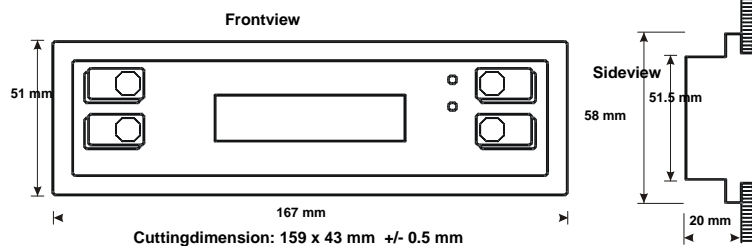
12.3 ADR 80 board for cabinets



12.4 ADR 230 for cabinet installation –(ventilation recommended)



12.5 LCD- Display (D-LCD) Dimensions



13.1 What you should know by rating and designing a speed controller

To be watched	Reason	To do
Higher current in part load operation	In part load operation in relation to the used fan motor higher currents will be measured. These currents are mostly higher than data printed on machine plate of motor	Ask Motor Manufacturer for current when used with TRIAC control. If not possible calculate about 20 % as security on top of the current written on the motor plate By practical experience motors have been found with 30% higher current as written on motor This has to be considered also by rating overload protectors and fuses
Wrong signal and measured data	Close locations of signal lines along power lines or contactors lead to wrong signals to the controller	Signal line should be isolated and/or separately installed away from power lines
To save motor and controller it is recommended to use overload protectors and/or fuses	Since ADR controller do have a wide range of current there is no chance to protect the controller itself against short circuits in power supply or motor	A protection against high current or short circuits is not obligatory. But it protects motor and speed controller in case of power supply problems and short circuits from motor side.
Choosing an ADR speed controller	Watch higher currents in part load operation	By choosing the size of a speed controller take higher currents in part load conditions into your calculation. If you do not have data from the motormanufacturer add 15-20 % on top of the max current mentioned on the motor plate.

13.2 Alarm Management

A number of alarms are displayed. The display shows the type of alarm and gives an indication of the problem. The table below shows the alarms displayed, the action at the fan adjustment and the reason of the fault.

Alarm	Reason	To do
ALARM PHASE POWER SUPPLY	<ul style="list-style-type: none"> Wrong Voltage No funktion of controller 	<ul style="list-style-type: none"> Press OFF Key and with PROG Key correct setting of Voltage
ALARM PROBE 1 / 2 ERROR	<ul style="list-style-type: none"> Signal line broken Over or under Limit Sensor (Probe) defekt, Sensor connections wrongly installed Jumper below the 8 pole (green) Terminal wrongly placed 	<ul style="list-style-type: none"> Change signal line Change settings. Change Sensor Check connections on sensor and controller side Place Jumper correctly
No info in Display of remote control (dark or unreadable signs)	<ul style="list-style-type: none"> Remote control(Display) or ADR controller defect 	<ul style="list-style-type: none"> Change Display or ADR board
Pressure on Display not analog to pressure gauge (Manometer)	<ul style="list-style-type: none"> Wrong max .pressure set in Setup Wrong refrigerant set in Setup 	<ul style="list-style-type: none"> Correct setting of maximum pressure according to the used pressurer transducer or correct refrigerant
ADR switches off despite of demand from system	<ul style="list-style-type: none"> Signal line not isolated and to close install to power lines and Contactors. Tolerance of ADR exceeded Caused by Interference in industrial and commercial areas Close to train and Metro stations and its power supply lines 	<ul style="list-style-type: none"> Seperate signal line from power lines and contactors and isolate signal lines Use Filter (Ferrit) in power supply per line to ADR
Display 0% Motor still running	<ul style="list-style-type: none"> There is a very little current from signal line or external control existing 	<ul style="list-style-type: none"> Minimum speed to be set from 0 % to 5-10 % This extends the lif expectancy of the motor and switches it off when no demand.
Elektro magnetic noise during part load operation	<ul style="list-style-type: none"> Slow motion fan units in particular with large diameters could cause elektro magnetic noise when running at low speed. In addition at low speed a resonance in the surrounding area could occur. 	<ul style="list-style-type: none"> In many cases an increase to a minimum speed of 5-10% will solve the problem The use of a noise filter in connection with capacitors in each line is a final and one of the best solutions
Running- and vibration noise	<ul style="list-style-type: none"> Fan units, even when speed controllable, are mainly balanced and optimised for full speed.. At low speed vibrations could appear which are reinforced by resonance. 	<ul style="list-style-type: none"> Carry out a test to find Minimum speed under which vibration noise stops. Set Minimum speed.. Start fan motor always with full speed for 2-3 seconds. It overrides the critical speed within a short time.

14.1 Technical Data and Limits

Power supply	230/400V (- 15% + 15%) Single and three phase defined in setup by remote control (D-LCD)
Frequenzy:	50 or 60 Hz +/- 2%, automatic recognition trough Software
Cos phi motor	Automatic recognition through Software and adjustment of control characteristics
Installation, Safety class	Model ADR 80 and 230 for cabinet installation, Safety class IP 20 Cabinet ventilation recommended to compensate a heat generation of total ca. 4.5 Watt per Ampere.
Operating conditions	-18°C to +50°C ambient temperature, relative Humidity max. 85% not condensing. Remote control Display LCD: Lowest temperature 0°C, because of visibility in LCD Display.
Overload/Starts per hour	2 x max. amps for 20 seconds, 30 Starts per hour

15.1 ADR EX Remote Control (Accessories)

When using the additional ADR EX board of the serial port in the set up of the ADR board from 2400 or 9600 Baud to I/O O or I/O C

CONFIGURATION
SERIAL PORT: I/O O or I/O C

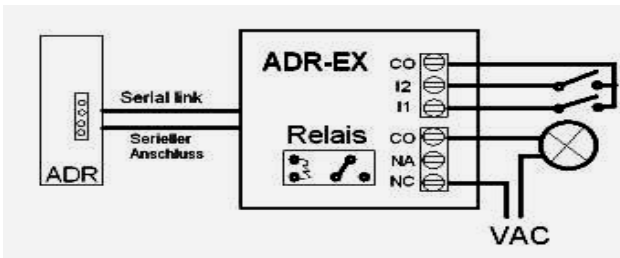
The ADREX-board (order no. ZPK01) allows an external cut off to the ADR controller. It makes sure that all functions of the controller are OFF or ON. The power supply to the controller remains. By using an Relay it is possible to extend a alarm signal for an malfunction of the speed controller to a far away place.

Input and output has to be connected potential free.

Remark: By using the serial port of the ADR it is not possible any longer to connect the ADR to a network with modem etc.

The ADREX board (ZPK01) is supplied with a short connecting cord to serial port ADR and Plastic mounting holder. ADREX is compatible to safety regulation IP 22

ADREX for ADR 80 / 230



Display Message when CO- I1 open:

MISSING EXTERNAL ENABLE



ADR-EX INPUT (Remote control)	
Contact	Function
CO	Common
I1	Remote control CO-I1=Open: ADR output: 0% CO-I1= Closed: ADR in Function
I2	By Pass CO-I2=Open: ADR in function CO-I2= Closed: ADR 100% output

ADR-EX - OUTPUT RELAY - Warning signal				
Setting	I/O O		I/O C	
	CO-NA	CO-NC	CO-NA	CO-NC
Normal	Open	Closed	Closed	Open
Alarm or malfunction of ADR	Closed	Open	Open	Closed

15.2 Installation of ZPK01 (ADREX) in ADR 80DP ADR 230DP



Example 1:
ZPK01 installed on

Example 2:
ZPK01 installed inside of the box



