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

INDEX

1.0 ADR REGULATOR – WORKING SPECIFICATIONS

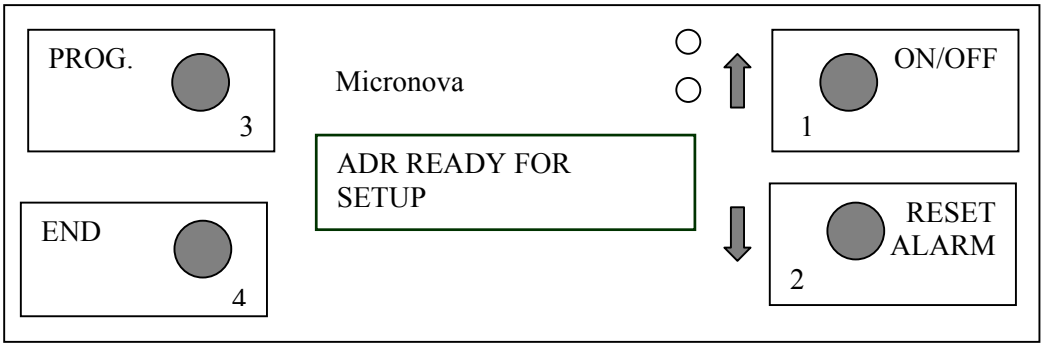
The regulator controls one fan, or a group of fans, driven by a 50/60 Hz three-/single-phase motor, via an algorithm that adjusts the fan speed in accordance with a set of adjustable parameters and pressure or temperature measurements made in real time by the card.

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	Notes
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.

Key 2	Function description	Remarks and state of the adjustment
FUNC MANU-ALE	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 3	**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 curser 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 - 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

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

➔ W O R K I N G 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

➔ W O R K I N G 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.

➔ SENSOR TYPE: CURR. 4 20 mA ⇳	Selects the type of sensors/transducers (Current. 4-20 mA, Current. 0-20 mA, Voltage 0-10V)
➔ PRESSURE MAX. IN BAR 30.0 ⇳	Sets the max value, in bar, for the sensor (for instance could be only 15 Bar 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 TYPE: FREON 22 ⇳	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 100 % ⇳	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 100 % VOLT PER 0S. ⇳	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.

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

4.2 SETTING OF 'ADJUSTMENT' PARAMETERS

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

➔ R E G U L A T I O N S T A R T B A R ⇳	Starting point of the fan. Value in BAR or °C – This is the starting point of the fan with the MINIMUM SET VOLTAGE

➔ R E G U L A T I O N E N D B A R ⇳	END of the working zone (point of MAXIMUM VOLTAGE). Beyond this value the supply voltage to the fan is 100% of the available voltage.

➔ R E G U L A T I O N S E T B A R ⇳	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

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

7.0 Display

7.1 Display if ADR is in OFF – position

A D R R E A D Y
F O R S E T U P

7.2 Display if ADR is working

S 1 > 1 8 . 4 S 2 1 0 . 0 B	S1 = SENSOR 1	S 2= SENSOR 2
G V 1 0 0 % S 1 5 . 0 B	GV= Voltage IN %	S = SET POINT
	> = adjusting quantity	B = BAR
	the SET can be modified during operation.	

7.3 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

7.4 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

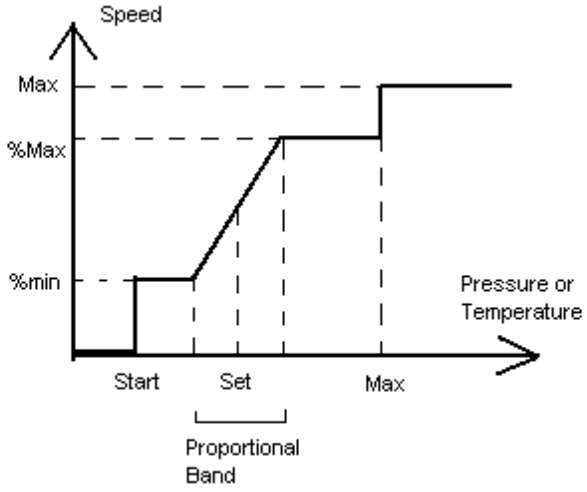
7.5 Manual function of fan

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

A t t e n t i o n
f a n i n m a n u a l

8.0 SCHEMATIC WORKING DIAGRAM OF REGULATOR

Working principle of the device (in pressure or temperature).



Having 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 at the 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 linearly 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 or 230V)

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 for transition from sector 2 to sector 1. In this case the adjustment will use an adapted dead band to follow better the dynamic characteristics of the cooling system.

9.0 ALARM MANAGEMENT/ Remote Control

9.1 Alarm Management ADR

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.

Type of Alarm	Display	Cause	Action
Sensor 1 alarm	LCD: Sensor 1 alarm	Pressure measurement: Measured pressure less than 0 Bar = current on sensor less than 4 mA. Temperature measurement: Sensor open or in short-circuit. Voltage measurement: No alarm is displayed because the sensor measures the total range 0-10V	Impeller at max speed.
Sensor 2 alarm	LCD: Sensor 2 alarm		Impeller at max speed.
Programming Supply error	LCD: Phase alarm Supply	Error in supply phase definition	Output not active.

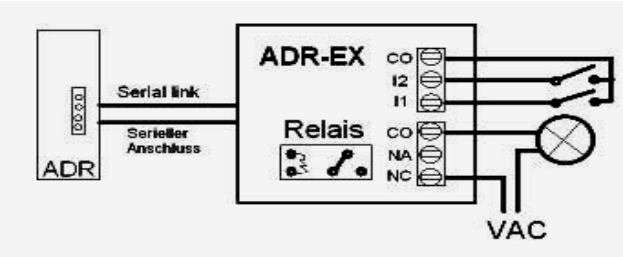
9.2 ADR EX Remote Control (Accessories)

When using the additional ADR EX board as remote control to be connected to the serial port of the ADR board you have to change in the ADR Set up from 2400 or 9600 Baud to I/O O or I/O C

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

The ADR EX-board (order no. ZPK01) allows different digital functions by using the Serial port of the ADR 80 or ADR 230 board.
I**nput:** Remote Control of ADR, External Bypass for 100% Ventilator output,
Output: Alarm-Relay
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 ADR EX board (ZPK01) is supplied with a short connecting cord to serial port ADR ,
Plastic mounting holder.
ADR EX is compatible to safety regulation IP 22

ADR EX for ADR 80 / 230



Display Message when CO- I1 open:

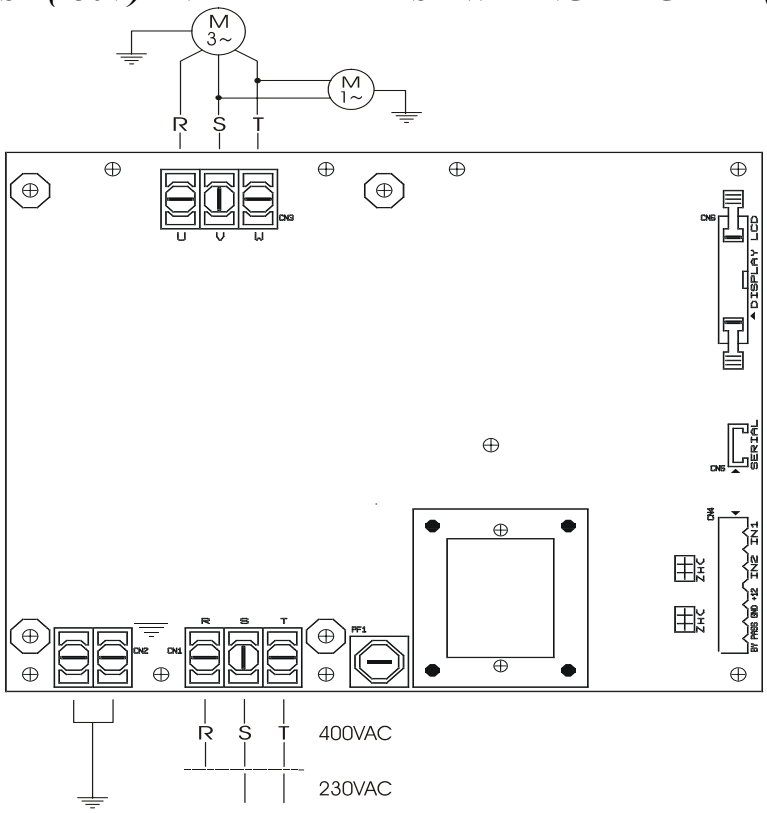
Missing external enable

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

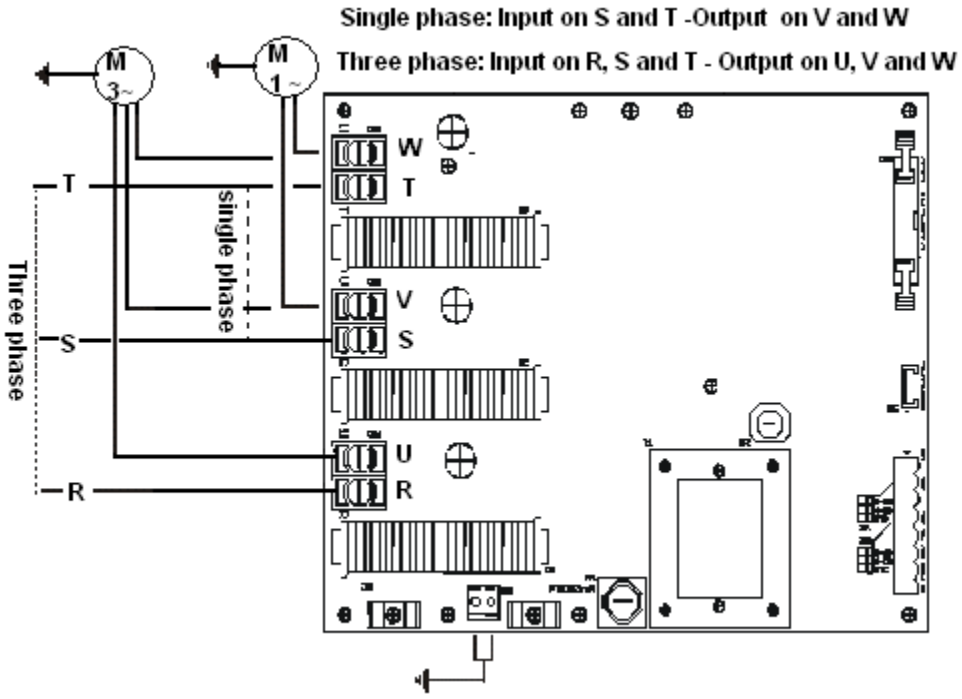
ADR-EX - OUTPUT RELAY - Warning signal				
Einstellung	**I/O O**		**I/O C**	
	CO-NA	**CO-NC**	**CO-NA**	**CO-NC**
Normal	Open	Closed	Closed	Open
Alarm or malfunction of ADR	Closed	Open	Open	Closed

10.0 WIRING DIAGRAMS ADR 80

SINGLE PHASE (230V) AND THREE PHASE WIRING DIAGRAM (400V)

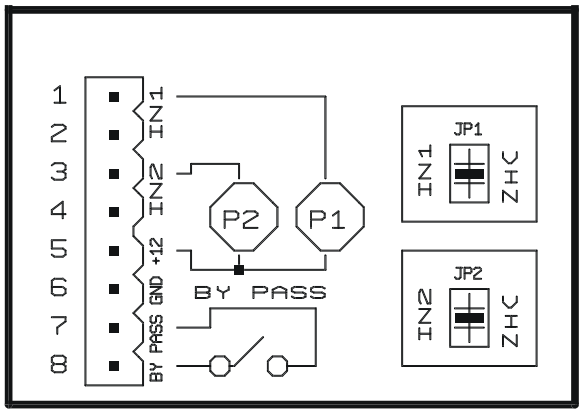


10.1 WIRING DIAGRAM ADR 230



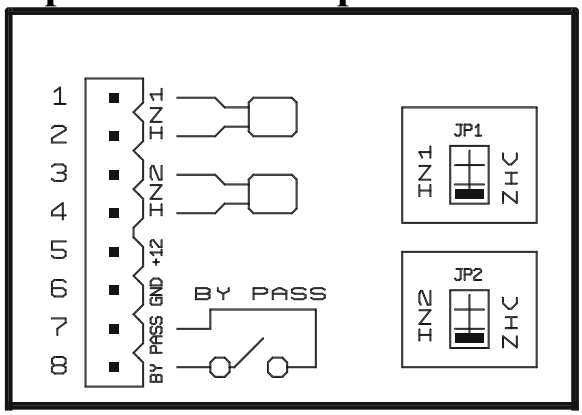
11.0 General connection of Sensors and transducers

INPUT IN mA



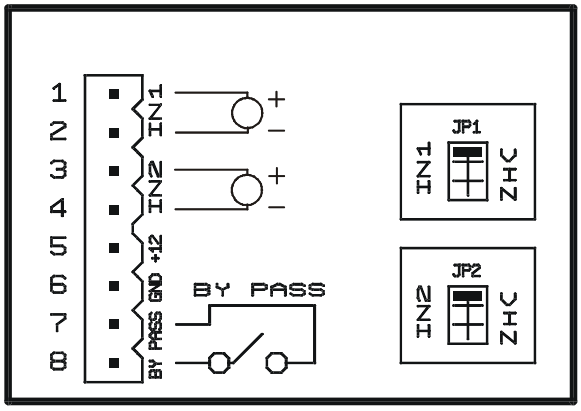
Transducer / Sensor of Current - mA
1. Transducer 0-20 mA
2. Transducer 4-20 mA
Jumper to Letter N

Input NTC - Temperature



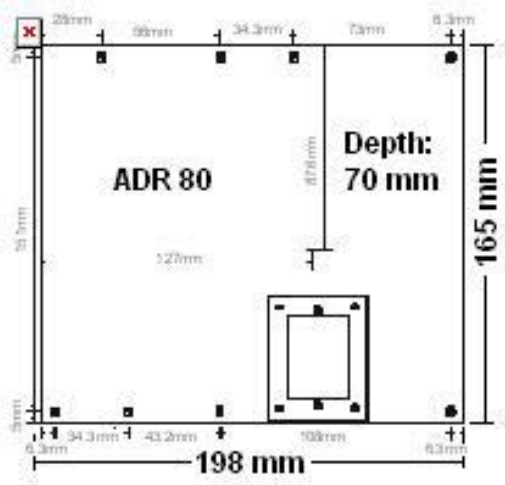
NTC –Sensor 10K
Jumper to I (I of IN)

INPUT Voltage 0-10 V (Sensor or controlled Input)

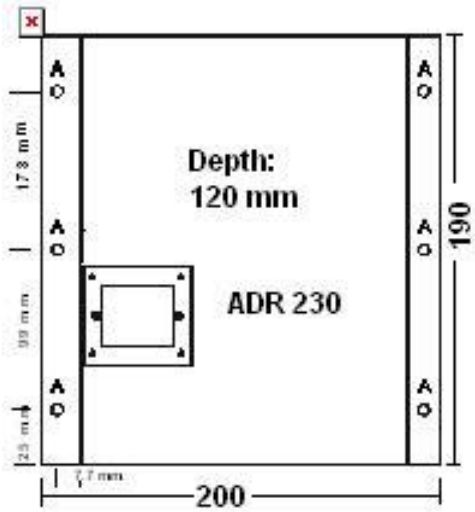


Transducer 0-10V or controlled Input
Jumper to V
Also for connection with CB 2000

12.0 ADR 80 Installation in electrical cabinet on site – ventilation recommended
12.1 ADR 230 –Installation in electrical cabinet on site – ventilation required



Fuses:
1 x F630 mA – 250 Vac
6,3 x 32 mm
1 x F630 mA – 250 Vac
5 x 20 mm

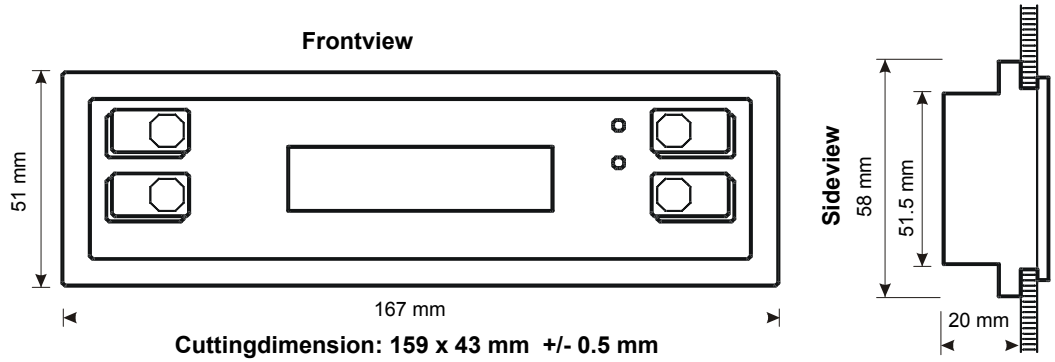


13.0 Dimension of Controller in metal box (mm) IP 55

13.0 ADR 80 DP

13.1 ADR 230 DP

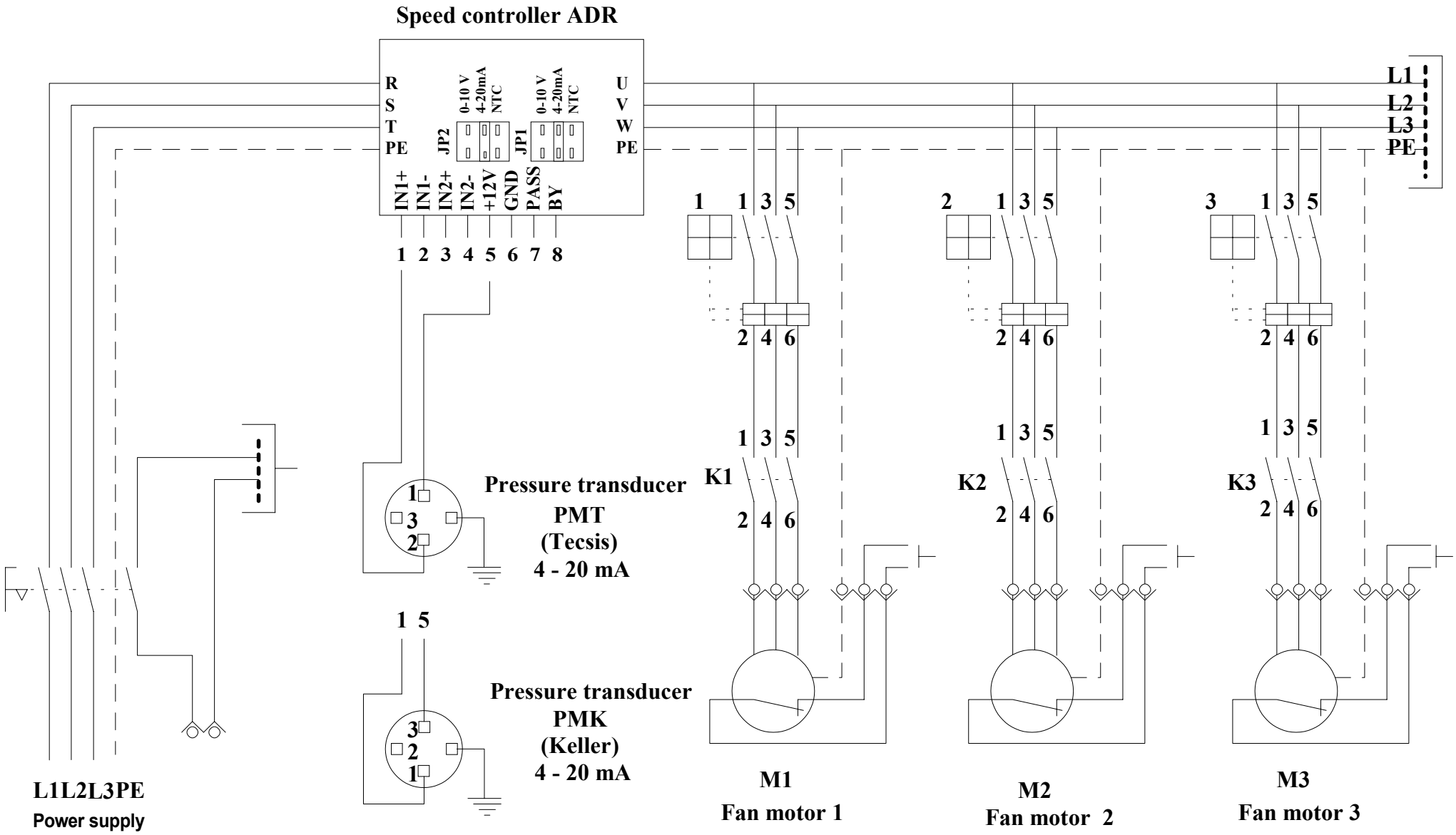
14.0 Installation of LCD-Display



FAN SPEED CONTROL ADR 80 - 230

	SET - UP Parameter	***Choice***	***Set up***
1	Power supply	Three phase / single phase	V /Ph /Hz
2	Cos Phi (power factor)	Data or "Auto"	
3	Serial port: configuration (remote control only)	I/O – 2400 - 9600	
4	Number of probe	1 / 2	
5	Minimum out put (line)	0 - 100 %	
6	Maximum out put (line)	0 – 100 %	
7	Max. % Power Starting	0 – 10 sec	
8	Net address (for remote control only)	0 -100	
9	Probe functions	1 (one probe only) 2 (two probes)	
1. Sensors or Pressure transducer IN1 (S1 or S2 visible when 2 probes defined)			
10	S1 – Regulation	Pressure / Temperature / Volts	
11	S1 – Probe-typ	Current 4 – 20 mA Current 0 – 20 mA Voltage.0 – 10 V	
12	S1 – max Pressure of probe in bar	Bar	
13	S1 – Input for regulation	in Bar / in °C	
14	S1 – Refrigerant typ	22, 407, 404, 134, 507,410	
15	S1 – Working as:	Chiller / Heatpump	
2. Sensors or Pressure transducer IN2 (only visible when 2 probes defined)			
16	S2 – Regulation	Pressure / Temperature / Volts	
17	S2 – Probe-typ	Current 4 – 20 mA Current 0 – 20 mA Voltage.0 – 10 V	
18	S2 – max Pressure of probe in bar	Bar	
19	S2 – Input for regulation	in Bar / in °C	
20	S2 – Refrigerant typ	22, 407, 404, 134, 507,410	
21	S2 – Working as:	Chiller / Heatpump	
Regulation Parameter			
1. Sensor or pressure transducer			**Bar °C**
22	S1 – Regulation Start	Beginn Regelung : Bar /°C	
23	S1 – Regulation Stop	Ende Regelung : Bar / °C	
24	S1 – Regulation Set	Sollwert in Bar / °C	
25	S1 – Proportional band	Regelbreite in Bar / °C	
2. Sensor or pressure transducer			
26	S2 – Regulation Start	Start Regulation: Bar / °C	
27	S2 – Regulation Stop	End of Regulation Bar / °C	
28	S2 – Regulation Set	Set in Bar / °C	
29	S2 – Proportional band	Proportional band Bar / °C	

In case of malfunctions or questions to the installation itself it is recommendable to provide us with a complete information about the set up and regulation data. The table contains a choice of the most important configurations in set up and regulation. If possible you should sent us also an electrical drawing how the ADR and fans are connected. This form can also be used to file data in office for service reasons.

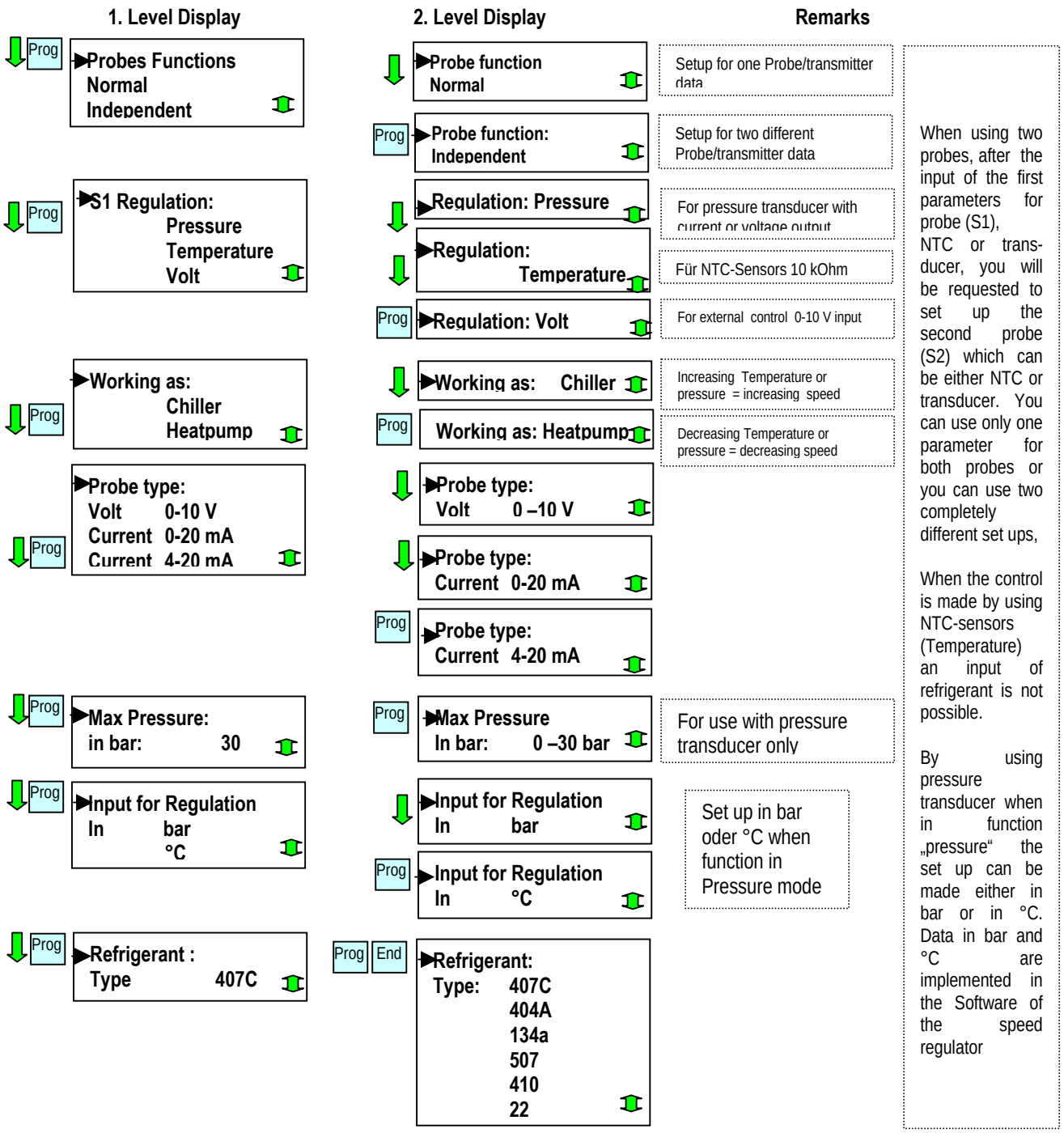


Micronova Speed controller ADR 80 /230
Wiring Diagram with multiple fan motors

Attention: Do not exeed max current when connecting to multiple fan motors. In that case use master/slave combination with 2nd, 3rd, ... ADR80 or 230

Speed regulator ADR 80 / 230 Setup

1. Level Display	2. Level Display	Remarks
Prog **ADR Regulator Ready**		**1**. Closing sub-programs as Setup, Regulation and Language always has to be finished with End. 1 oder 2 x End leads to Startlevel **2.** After set up of any function in the sub programs confirm with Prog **3.** Within main- and sub-programs the selection has to be done by using the arrow keys on the right hand side of the LCD ⇑ or ⇓
⇓ **Setup-Parameter** ⇓ **Regelulation** Prog End **Language**		
Deutsch **Italiano** **English**		
Prog **Setup-Parameter**		
Prog **Power supply:** **Single Phase** **Three Phase**	⇓ **Power supply: SinglePhase** Prog **Power supply: Three Phase**	
⇓ **Cos Phi:** **Auto**		Cos Phi- „Auto“ recommended
⇓ Prog **Serial port** **Config: 9600** **2400** **I/O**	⇓ **Config: 9600** ⇓ **Config: 2400** Prog **Config: I/O**	To be used when connected to modem for the Microvision remote control I/O to be set only for additional board ZPK01 (ADREX) for external ON/OFF and Alarm
⇓ Prog **Number of Probe 1** **2**	⇓ **Number of probe: 1** Prog **Number of probe: 2**	Number of pressure transducer or sensors with different or equal set up.
⇓ Prog **Minimum Output Phase (line) 0 - 100%**	Prog **Minimum Output Phase (line) 10 %**	Recommended min. 10-15 % to reduce heavy starts of the fan motors.
⇓ Prog **Maximum Output Phase (line) 0 - 100 %**	Prog **Maximum Output Phase (line) 80 %**	To reduce noise level in most of the running times max. 80 –85 % recommended. 100% will be switched on at max. Temperature/Pressure.
⇓ Prog **Max % Power Starting: 0 - 10 sec**	Prog **Max % Power Starting: 5 sec**	5 sec recommended to prevent heavy starts and long term problems for the motor. Motor starts with 60–70 %
⇓ Prog **Net Address: 0 - 100**	Prog **Net Address: 0**	To be set only when remote control Software Microvision is applied to the regulator


1. Level Display
2. Level Display
Remarks
Prog
Probes Functions
Normal
Independent
Probe function
Normal
Setup for one Probe/transmitter data
Probe function:
Independent
Setup for two different Probe/transmitter data
S1 Regulation:
Pressure
Temperature
Volt
Regulation: Pressure
For pressure transducer with current or voltage output
Regulation:
Temperature
Für NTC-Sensors 10 kOhm
Regulation: Volt
For external control 0-10 V input
Working as:
Chiller
Heatpump
Working as: Chiller
Increasing Temperature or pressure = increasing speed
Working as: Heatpump
Decreasing Temperature or pressure = decreasing speed
Probe type:
Volt 0-10 V
Current 0-20 mA
Current 4-20 mA
Probe type:
Volt 0 –10 V
Probe type:
Current 0-20 mA
Probe type:
Current 4-20 mA
Max Pressure:
in bar: 30
Max Pressure
In bar: 0 –30 bar
For use with pressure transducer only
Input for Regulation
In bar
°C
Input for Regulation
In bar
Input for Regulation
In °C
Set up in bar oder °C when function in Pressure mode
Refrigerant :
Type 407C
End
Refrigerant:
Type: 407C
404A
134a
507
410
22
When using two probes, after the input of the first parameters for probe (S1), NTC or transducer, you will be requested to set up the second probe (S2) which can be either NTC or transducer. You can use only one parameter for both probes or you can use two completely different set ups,
When the control is made by using NTC-sensors (Temperature) an input of refrigerant is not possible.
By using pressure transducer when in function „pressure“ the set up can be made either in bar or in °C. Data in bar and °C are implemented in the Software of the speed regulator
Temperature control
Pressure control
Regulation
Regulation
Start -30 bis+ 35 °C
Start 1,5 bis 27 bar
Stop -29 bis +80 °C
Stop 3.0 bis 28
Set -29.5 bis +79.5 °C
Set 2.0 bis 27.5 bar
Proportional
Band 0.5 bis >=45 °C
Proportional
Band 0.5 bis >= 10