METAL WORK PNEUMATIC

REGTRONIC USER MANUAL

EN

1. FEATURES

- *Electrical connection: M12 8-pin connector.*
- *Preset pressure range 0.05-10 bar with possible full scale and minimum pressure regulation.*
- *10-300 mbar adjustable deadband.*
- *Supply pressure: FS+ at least 1 bar, max 11 bar.*
- *12-24 VDC power supply.*
- *IP65 index of protection.*
- *LED indicating pressure achieved and digital output active.*
- *Graphical display and keypad to display the pressure, unit of measurement and parameter setting.*
- *0-10 VDC or 4-20 mA analog output signal.*

2. SETTING

NB: parameter changes can also be effected through the software downloadable from the website www.metalwork.eu
To connect the PC to Regtronic you can use the cable code W0970513019.
In the version with the display, Press OK and ESC together to access the setting menu.
Select the parameter using the arrow keys.
Press ESC to return to the previous page.

⚠ ***During setting, pressure regulation is NOT active.***

Default parameters

Language	*English*
Unit of measure	*bar*
Input	*0/10 VDC*
Dead band	*50 mbar*
Full scale	*10 bar*
Minumum pressure	*0 bar*
Speed regulation control	*10*
Analogue input filter	*8*
Noise damping	*20*
Digital output	*Pressure switch*
PON/P+	*7 bar*
POFF/P-	*5 bar*
Type of contact	*N.O.*

2.1 DISPLAY

2.1.1 LANGUAGE

Italiano
English
Deutsch
Español
Français

- *Select **LANGUAGE** using the arrow keys, then press OK.*
- *Select the desired language using the arrow keys, then press OK.*

2.1.2 UNIT OF MEAS

bar
psi
MPa

- *Select **UNIT OF MEAS.** using the arrow keys, then press OK.*
- *Select the desired unit of measurement using the arrow keys, then press OK.*

2.1.3 CONTRAST

- *Manual display contrast adjustment*
- *Select **CONTRAST** using the arrow keys, then press OK.*
- *Select the value using the arrow keys, then press OK.*
- *Compensation as a function of temperature is automatic.*

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2.1.4 ORIENTATION

Allows you to rotate the display 180 °
- *Select **ORIENTAT.***
- *Press OK to rotate the diplsay*

2.2 SET UP

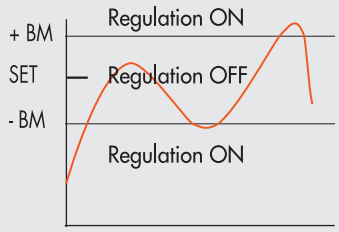
2.2.1 INPUT

0-10 VDC
0-5 VDC
4-20 mA
RS232
Keypad

- *Select **INPUT** using the arrow keys, then press OK.*
- *Select the type of input using the arrow keys and then press OK.*
- *For the type of analog input (0-10 VDC / 0-5 VDC / 4-20 mA), use an appropriate analog signal.*
- *For the type of RS232 input, use the communication protocol described in chapter 7.*
- *For the type of keypad input, set the pressure value using the arrow keys. When you press the display buttons, the set pressure appears; when you release them, the preset pressure is displayed.*

2.2.2 DEAD BAND

This indicates the pressure range in proximity to the set pressure, within which regulation is active. The deadband is + and - the set value. It is advisable to enter low values, 10 or 15 mbar, only if high regulation accuracy is required. High accuracy involves more work for the solenoid valves.

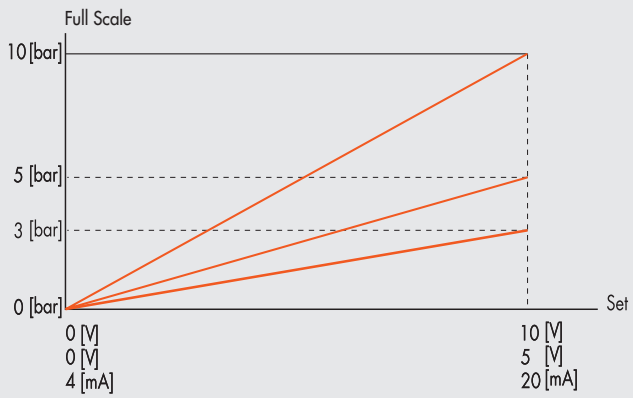


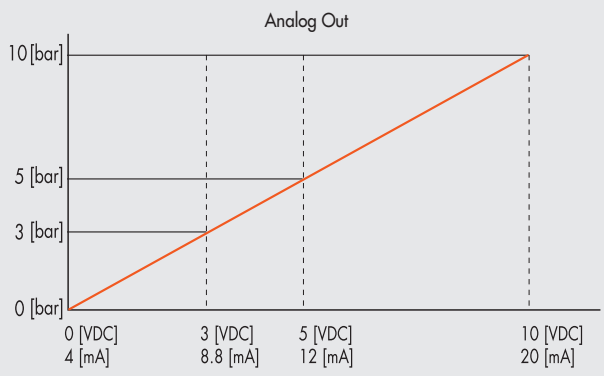
- *Select **DEADB** using the arrow keys, then press OK.*
- *Enter the value using the arrow keys, then press OK.*

2.2.3 FULL SCALE

This indicates the maximum preset pressure. The analog command is divided over the Full Scale. The analog output signal indicates that the preset pressure is 0-10 VDC for 0-10 bar.

Examples with maximum preset pressure 3, 5 and 10 bar





For optimal regulation, the feed pressure must be FS + 1 bar.

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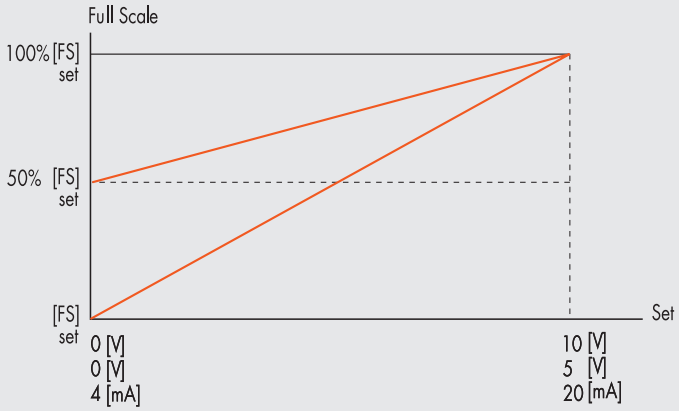
2.2.4 MINIMUM PRESSURE

Indicates the minimum regulated pressure with set 0VDC (4 mA). The value can be set between 0 and 50% of the Full Scale set. The reference set is divided between the Minimum Pressure value and the Full Scale value.



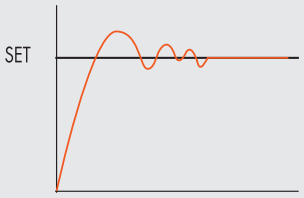
The minimum value which can be set with Keyboard Set is the Minimum Pressure value.

2.2.5 PC ON

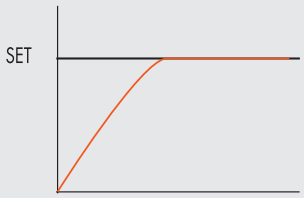
Enables serial transmission, irrespective of the type of input.

2.2.6 SPEED REGULATION CONTROL

Can be used to change the regulator response speed



V = 10 fast adjustment



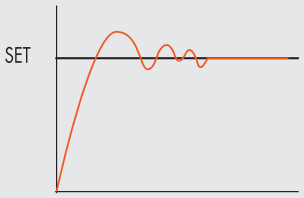
V = 1 low adjustment

2.2.7 ANALOGUE INPUT FILTER

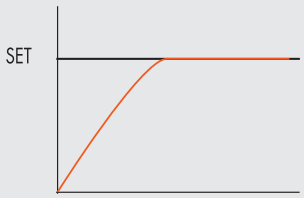
The analogue input filter allows you to set an offset value on the analogue signal. Until the set value is reached, the pressure is kept at 0 and the PRESSURE LED light flashes. This makes it possible to filter any disturbances or small unwanted signals coming from analogue boards, which would cause small and continuous undesired pressure regulations.
The setting range is 0 to 30 and corresponds to an offsetting of 0 to 110 mbar, 0/110 mV, 4/4.25 mA. The default value is 8, corresponding to 40 mbar.

2.2.8 NOISE DAMPING – K FILTER

The K filter can be used to reduce/eliminate disturbances due to noisy analogue signals, which generate unwanted continuous regulation.
The filter is based on a moving average of the set value.
The setting range is 0 – deactivated – to 200.
The higher the value of the filter the more a delay of the pressure regulation is generated.



K filter = 0



K filter = 200

2.2.9 ZERO SETTING (TEMPERATURE COMPENSATION)

The instrument is calibrated at an ambient temperature of 20°C. The pressure value measured by the internal transducer can vary with the ambient temperature and it may be necessary to reset the reading.
The value read can be reset through the reset function.
The function is only active if the pressure displayed is less than 150 mbar.
Upon zero resetting, the temperature compensation activates and the consequent change in pressure is automatically compensated.

⚠ ***CAUTION**: the resetting has an effect on the calibration of the instrument. Before making it, make sure the supply pressure has been removed and the output circuit is disconnected.*

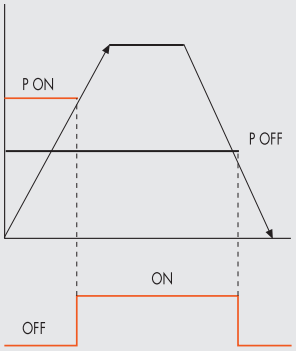
2.2.10 ALARM OF ANALOGUE OUT 4-20 mA

If enabled, disconnection of the connection generates an alarm (default O)

2.3 DIGITAL OUTPUT

Two digital outputs are available, one PNP and one NPN. They can be configured independently as normally open or normally closed.
The P ON (P+) and P OFF (P-) activation/deactivation thresholds are unique.

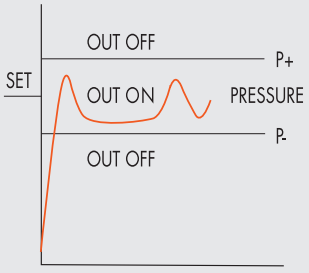
2.3.1 PRESSURE SWITCH CONFIGURATION (P)



- *Select **OUTPUT** using the arrow keys, then press OK.*
- *Select **CONFIGUR.** to select the operating mode, then press OK.*
- *Select **PRESSURE SWITCH**, then press OK. **PRESSURE SWITCH** mode, shown with **CONFIGUR. P.** has been selected.*
- *Use the arrow keys to select **PRESSURE SWITCH** and press OK.*
- *Select **P ON** and press OK. Enter the desired activation pressure and press OK.*
- *Select **P OFF** and press OK. Enter the desired deactivation pressure and press OK.*
- *Press ESC to exit the menu.*

2.3.2 SET (S) REFERENCE

This function can be used to make a "variable" setting for the pressure switch.
Out is activated when the preset pressure is reached, with a tolerance defined by P+ and P-.



- *Select **OUTPUT** using the arrow keys, then press OK.*
- *Select **CONFIGUR.** to select the operating mode, then press OK.*
- *Select **SET. REF** and press OK. SET REFERENCE mode, shown with **CONFIGUR. S.** has been selected.*
- *Use the arrow keys to select **PRESSURE SWITCH** and press OK.*
- *Select **SET.REF** and press OK.*
- *Select **P+** and press OK.*
- *Enter the upper tolerance pressure and press OK.*
- *Select P- and press OK. Enter the lower tolerance pressure and press OK.*
- *Press ESC to exit the menu.*

2.3.3 ALARM

Using this function allows you to set the activation of the digital out when an alarm is generated.

2.3.4 TYPE OF CONTACT

This function is used to identify whether the digital output is normally open or normally closed.
- *Select **TYPE OF CONTACT** and click OK.*
- *Select **TYPE PNP** or **TYPE NPN**, click OK and enter the type of contact.*
- *Click ESC to exit.*

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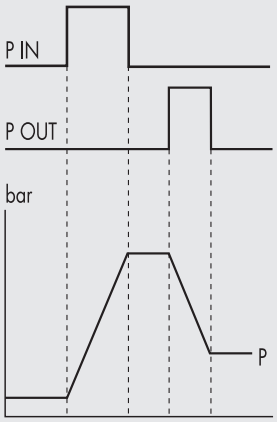
2.4 DEBUG

Utility used for checking correct operation of the two solenoid valves.



- *Select **DEBUG** and press OK.*
- *Select **PIN** and press OK. The in solenoid valve activates and the pressure increases.*
- *Press OK. The in solenoid valve deactivates and pressure stabilizes.*
- *Select **POUT** and press OK. The out solenoid valve activates and pressure decreases.*
- *Press OK, the out solenoid valve deactivates and pressure stabilizes.*

2.5 PASSWORD

This is a three-digit code used to protect the set configuration.

- *Select **SET PASSWORD** with the arrow keys and click OK. On the setting page, use the arrow keys to enter the desired value and click OK to confirm. The system then displays the confirmation message "**PASSWORD SAVED**".*
- *Select **PASSWORD** and click OK to enable/disable the function. If the password set to **ON**, it prevents access to the configuration menu. When you press OK+ESC together to access the configuration menu, you are prompted to enter the password. Enter the saved password. You can use the arrow keys to change the value or click OK to change the field. If the password is set to **OFF**, it is not enabled.*

  If you forget the password, contact the manufacturer to obtain a password reset code.

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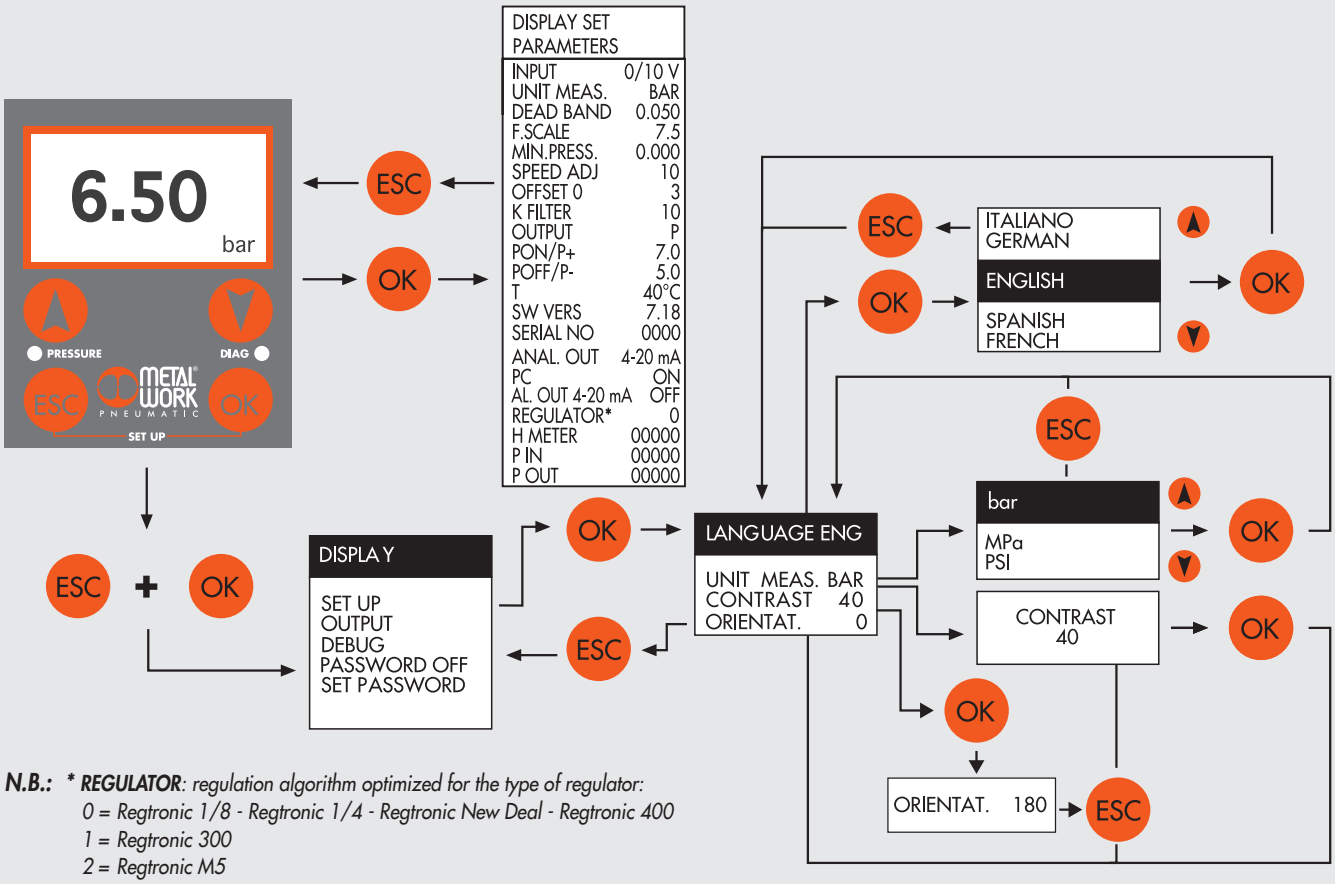
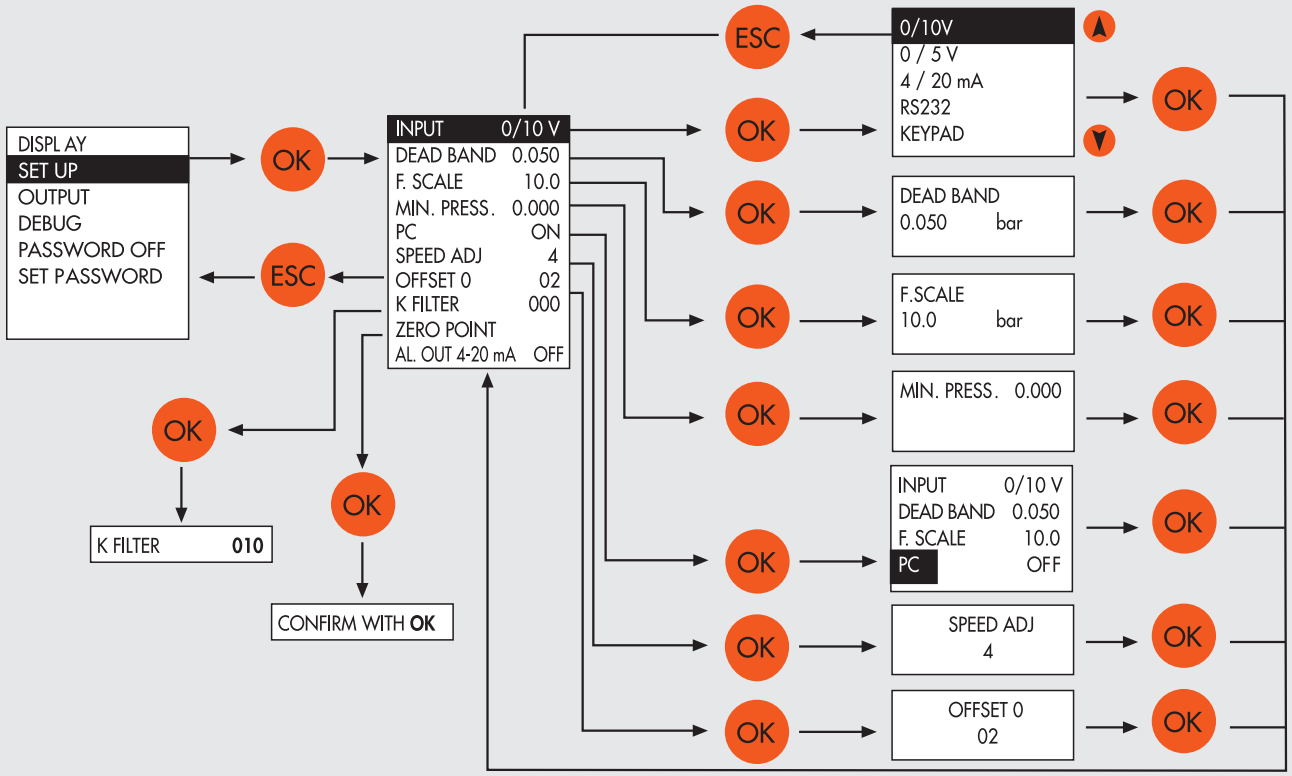
3. ACCESS TO THE MENU

- *Press OK to display the set parameters.*
- *Press OK and ESC together to access the parameter setting menu.*
- *Use the up and down arrows to scroll through the menu and modify the parameters.*



N.B.: ***REGULATOR**: regulation algorithm optimized for the type of regulator:*
0 = Regtronic 1/8 - Regtronic 1/4 - Regtronic New Deal - Regtronic 400
1 = Regtronic 300
2 = Regtronic M5



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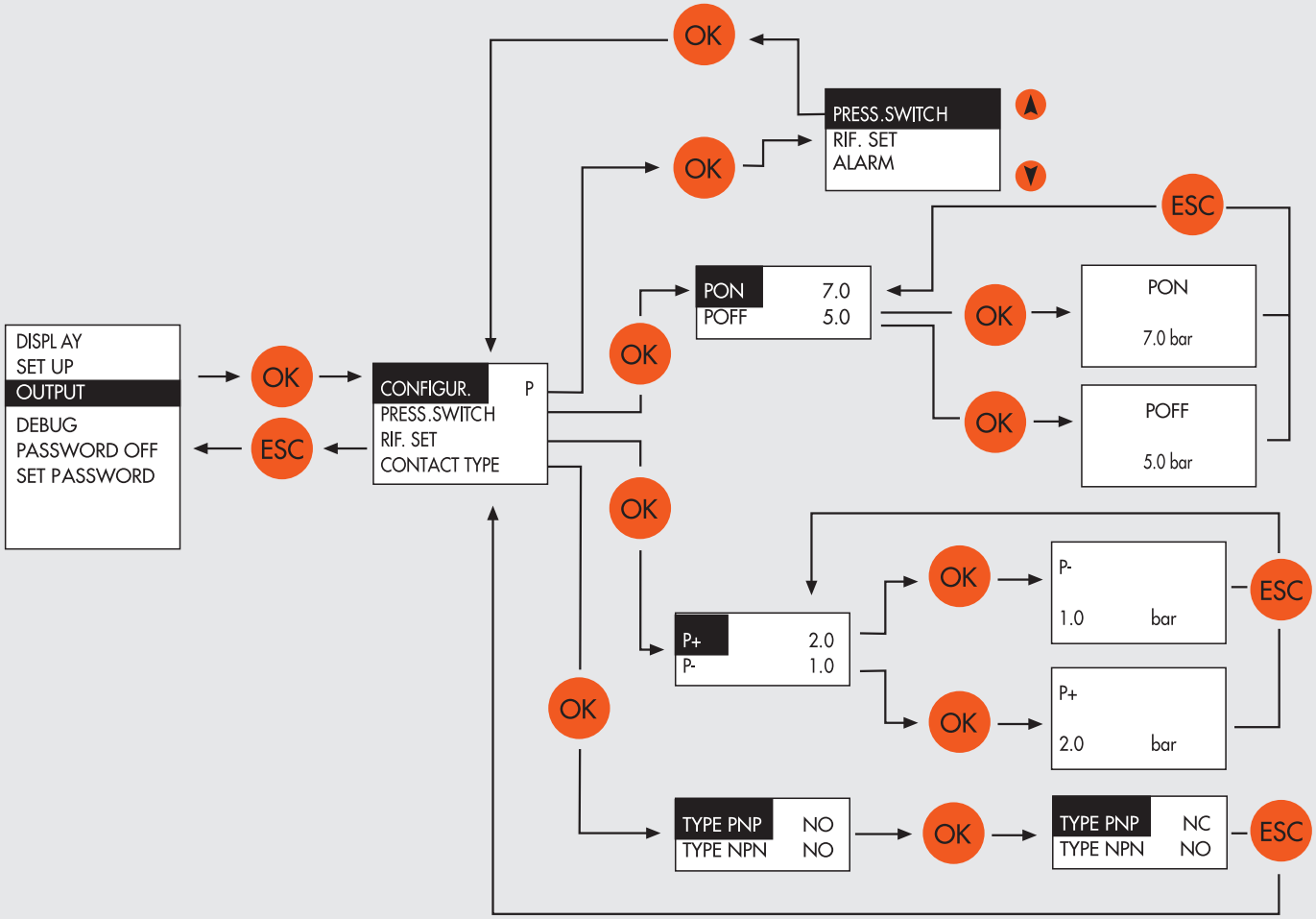
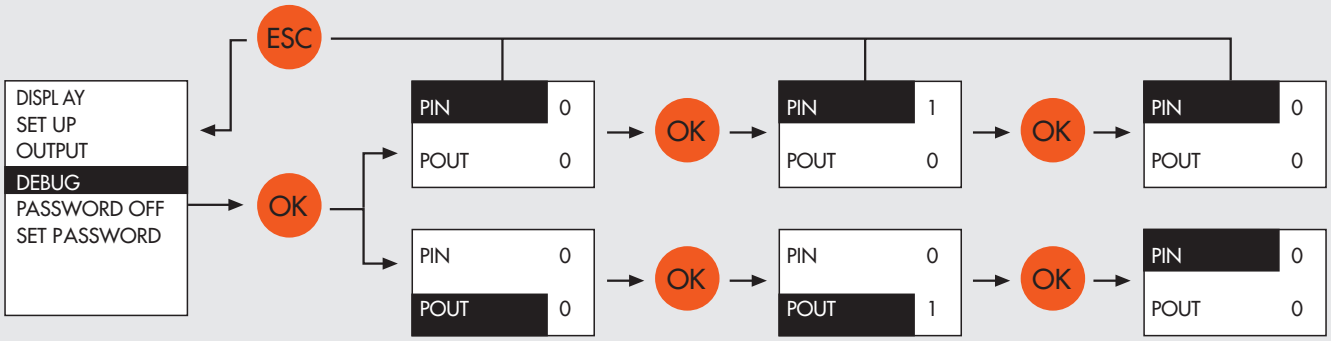
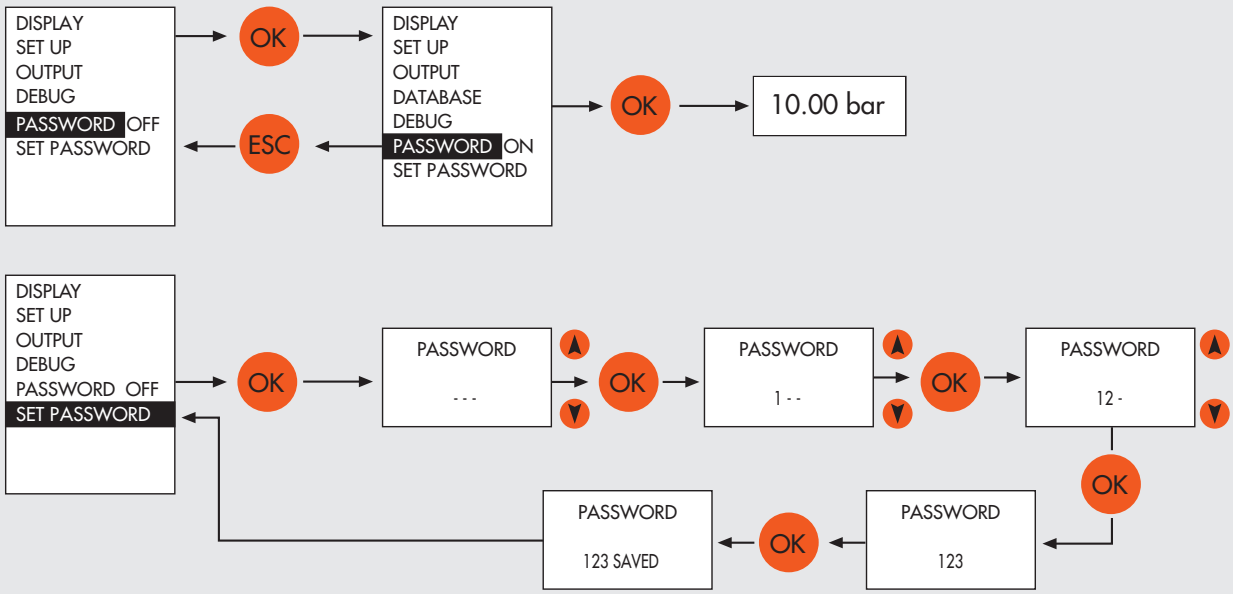

DISPL AY
SET UP
OUTPUT
DEBUG
PASSWORD OFF
SET PASSWORD
OK
ESC
CONFIGUR. P
PRESS.SWITCH
RIF. SET
CONTACT TYPE
OK
PRESS.SWITCH
RIF. SET
ALARM
OK
PON 7.0
POFF 5.0
OK
OK
ESC
PON
7.0 bar
POFF
5.0 bar
OK
P+ 2.0
P- 1.0
OK
OK
P-
1.0 bar
P+
2.0 bar
ESC
OK
TYPE PNP NO
TYPE NPN NO
OK
TYPE PNP NC
TYPE NPN NO
ESC


DISPL AY
SET UP
OUTPUT
DEBUG
PASSWORD OFF
SET PASSWORD
ESC
OK
PIN 0
POUT 0
OK
PIN 1
POUT 0
OK
PIN 0
POUT 0
PIN 0
POUT 0
OK
PIN 0
POUT 1
OK
PIN 0
POUT 0

EN



4. TECHNICAL DATA

		REGTRONIC				REGTRONIC NEW DEAL		REGTRONIC 300			REGTRONIC 400			
Threaded port		M5	1/8"		1/4"		3/4"	1"	1/2"	3/4"	1"	1"	1 ¼"	1 ½"	2"
Fluid		Filtered, unlubricated air.													
		The air must be filtered at least 10 µm and without condensation.													
MIN inlet pressure	bar	Regulation pressure + 1 bar													
MAX inlet pressure	bar	11													
Temperature range	°C	from 0 to 50													
Pressure regulation range	bar	from 0.05 to 10 (settable full scale and minimum pressure)													
Flow rate at 6.3 bar ΔP 0.5	Nl/min	10	1300		1500		10000		4500			18000			20000
Flow rate at 6.3 bar ΔP 1	Nl/min	10	1450		1700		13000		7000			-			-
Exhaust flow rate at 6.3 bar with 0.1 bar overpressure	Nl/min	2	600		1300		1800		250			400			400
Exhaust flow rate at 6.3 bar with 0.5 bar overpressure	Nl/min	9	1000		1500		2000		500			850			850
Response time with ΔP =1 bar	Volume [cc]	100	100	1000	100	1000	1000		1000			1000			1000
from 6 to 7 bar	s	0.5	0.1	0.15	0.1	0.15	0.27		0.25			0.2			0.2
from 7 to 6 bar	s	0.55	0.1	0.15	0.1	0.15	0.27		0.33			0.35			0.35
Weight	kg	0.2	0.38		0.38		1.3		1.5			5			5.8
Class of protection		IP 65													
Supply voltage range	VDC	12 -10% 24 +30%													
Minimum operating voltage	VDC	10.8													
Maximum operating voltage	VDC	31.2													
Maximum admissible voltage	VDC	32 *													
Current absorption		max 220 mA at 12VDC													
Input signal (input impedence)	Voltage	0 to 5 VDC, 0 to 10 VDC (approx. 6.3 KΩ)													
	Current	4 to 20 mA (approx. 100 Ω)													
	Serial ports	RS 232													
	Manual	Keypad													
Output signal	Analog version in voltage	0 to 10 VDC (1 VDC = 1 bar) - 1 mA max													
	Analog Version in current	4 to 20 mA (4 mA = 0 bar, 20 mA = 10 bar)													
	Digital	PNP open collector output: max 24VDC 60 mA													
		NPN open collector output: max 24VDC 60 mA													
Hysteresis		± 0.2% (Full scale)													
Repeatability		± 0.2% (Full scale)													
Sensitivity/Dead-band		setting range 10 to 300 mbar													
Output pressure (display version)	Accuracy	± 0.3% (Full scale)													
	Unit of measurement	bar, MPa, psi													
	Minimum resolution	0.01 bar - 0.001 MPa - 0.01 psi													
Analog output accuracy		± 0.1% of the reading													
Temperature characteristics		max 2 mbar / °C													
Installation position		In any position													
Notes		The features shown refer to the static condition only. With air consumption on the output side, the pressure may vary.													

**** IMPORTANT! Voltage greater than 32VDC will damage the system irreparably.***

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5. INSTALLATION AND OPERATION

5.1 PNEUMATIC CONNECTION

Pneumatic connection is via the threaded holes in the body.
It is important for the regulator pressure not to exceed 11 bar and the compressed air to be filtered at 10 µm and dried, to prevent impurities or excessive condensate from causing a malfunction.
The supply pressure must always be higher than the preset pressure.
The regulator pressure must be at least 1 bar higher than the full scale value.
If a silencer is mounted on the outlet, the flow rates and response times may vary. Check the silencer periodically for clogging and replace if necessary.

5.2 ELECTRICAL CONNECTION

*This is by means of M12 female circular 8-pin connector (**to be ordered separately**).*
Refer to the wiring diagram below.
Wrong connections may permantenly damage the regulator.

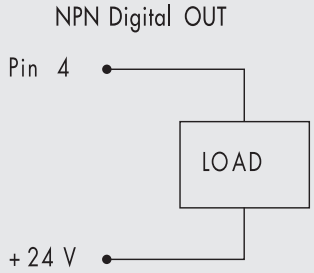
5.2.1 CONNECTOR PIN CONFIGURATION

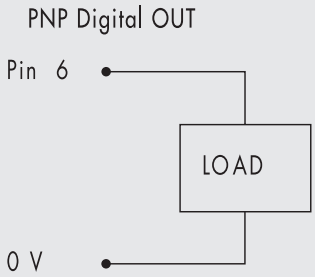
1 = TX (RS232)	*(WHITE)*
2 = RX (RS232)	*(BROWN)*
3 = set 0-10 VDC / 0-5 VDC / 4-20 mA	*(GREEN)*
4 = digital out NPN	*(YELLOW)*
5 = analog out	*(GREY)*
6 = digital out PNP	*(PINK)*
7 = 0 VDC (GND)	*(BLUE)*
8 = power supply 12-24 VDC	*(RED)*

colours' sequence in compliance with Metal Work prewired connectors.

Regulator connector viewed from above

5.2.2 DIGITAL OUT CONNECTION



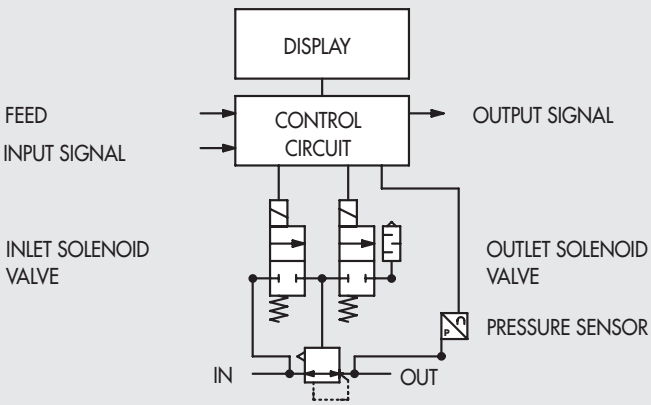


5.3 OPERATING PRINCIPLE

Using a software algorythm, the control circuit compares the input signal with the output pressure measured by the pressure sensor. When there is a change, it activates the inlet and outlet solenoid valves to re-establish an equilibrium. This gives an output pressure that is proportional to the input signal.

N.B.: removing the power supply, the outlet pressure doesn't get discharged

5.3.1 FUNCTION DIAGRAM



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6. TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSES	SOLUTION
The display does not come on	No power supply	Check the power supply, make sure it is enough and check the wiring is in accordance with the wiring diagram
The unit does not respond or responds wrongly to the setpoint	Wrong input signal configuration	Configure the appropriate type of input from the menu
		Check the signal wire is connected to the right pin
The unit does not reach the desired pressure	Setpoint too low	Provide a suitable setpoint
	The full-scale setting is at a lower pressure than desired	Set the full scale correctly
	The supply pressure is too low	Increase the supply pressure
The display shows an unreal value	Wrong unit of measurement	Check the unit of measurement
The display is difficult to read	Poor contrast	Adjust the contrast
The unit adjusts continually	Air leak in the circuit after the unit	Eliminate the leak
	Continuous variation in volume	Normal behaviour; the unit has to keep adjusting the maintain the preset pressure
	Deadband too small	Increase the deadband
	The analogue command signal is disturbed	Increase the value of the K filter
	The unit set to 0 adjusts continually	Increase the value of the analog input filter
Other problems	Contact the manufacturer	

6.1 LIST OF ALLARMS

ALARM	POSSIBLE CAUSES	SOLUTION
+V NPN DOUT SHORT-CIRCUIT ALARM	NPN output to power supply unit has shortcircuited	Eliminate the cause of the shortcircuit. Switch the unit off and back on again to reset the alarm.
0V PNP DOUT SHORT-CIRCUIT ALARM	PNP output to earth has shortcircuited	Eliminate the cause of the shortcircuit. Switch the unit off and back on again to reset the alarm.
LOW VDC ALARM	Supply voltage below 10.8 VDC	Increase to a sufficient voltage
0V P. INP SHORT-CIRCUIT ALARM	Supply solenoid valve has shortcircuited	Switch the unit off and back on again. If the alarm persists, contact the manufacturer.
0V P. OUT SHORT-CIRCUIT ALARM	Drain solenoid valve has shortcircuited	
P. INP DISCONNECTED ALARM	Fill solenoid valve disconnected	
P. OUT DISCONNECTED ALARM	Drain solenoid valve disconnected	
ANALOG SET ALARM	Occurs with 4-20 mA input when the current exceeds 23mA	Send the unit a correct input signal. Switch the unit off and back on again the reset the alarm.
PRESSURE OUT OF RANGE ALARM	Downstream pressure exceeds 10200 mbar	Check to see if the drain is blocked. The alarm resets automatically when the pressure drops below the threshold.
ANALOG OUTPUT DISCONNECTED ALARM	The 4-20 mA analogue output alarm activated and disconnected.	Connect the output to the control system or disable the alarm.

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7. SERIAL COMMUNICATION PROTOCOL

Communication protocol can be used to configure and control the regulator via an PC serial port. To activate serial communication, set the RS232 to ON on the set-up page.
The communication protocol is 2400 8 N 1 (8 bits, no parity, 1 stop bit) and the commands are in ASCII format.
All commands are the following type:

ESCcnnnnn

*Where **ESC (Escape)** prepares the unit to receive commands, **c** is the command and nnnnn is the associated parameter, the length of which depends on the actual command.*
*For example, the control to regulate the pressure to 1 bar must be **ESCP01000**, which in ASCII-HEX becomes **1B50303130303030**.*

The available controls are shown herewith below.

• Set Unit of measurement
Sets the unit of measurement. The command is the following type:

ESCcn

*Where **n** =*
0 = pressure in bar
1 = pressure in MPa
2 = pressure in psi

*If **n** is not one of these values, the unit does not change.*

• Set type of input
Sets the type of control.The command is the following type:

ESCdn

*Where **n** =*
0 = 0-10 VDC input
1 = 0-5 VDC input
2 = 4-20 mA input
3 = keypad input
4 = serial input

*If **n** is not one of these values, the type of control does not change*

• Set Deadband
Sets the deadband. The command is the following type:

ESCbnnn

*Parameter **nnn** must always be 3 digits. The value must be expressed in mbar.*

• Set Full Scale
Sets the full scale. The command is the following type:

ESCEnnnnn

*Parameter **nnnnn** must always be 5 digits. The value must be expressed in mbar*
(e.g. ESCE7000, the set full scale is 7000 mbar)

• Minimum pressure set
Set the minimum regulated pressure with set 0.
The maximum value which can be set is the 50% of the FS. The control is type:

ESCennnnn

*The parameter **nnnnn** must be always defined on 5 figures. The value must be expressed in mbar*
(For example, ESCe01000, the minimum pressure is set at 1000 mbar)

EN

• *Digital output configuration*
Sets the type of digital output and the activation/deactivation values. The command is the following type:

ESCO1sssssxxxxx

Where:
***1** = type of output (0 = pressure switch 1 = reference)*
***sssss** = output activation threshold*
***xxxxx** = output deactivation threshold*
Parameters s and x must always be 5 digits. The value must be expressed in mbar.

• *Set Pressure*
Sets the pressure to reach. The command is the following type:

ESCPnnnnn

*Parameter **nnnnn** must always be 5 digits. The value must be expressed in mbar*
(e.g. ESCP01001, the set pressure is 1001 mbar)

• *Read preset pressure*
Displays the preset pressure value. This command requires no parameters.
It is the following type:

ESCp

The response is:

ESCpnnnnn

*Parameter **nnnnn** represents the pressure in mbar (e.g. ESCp05600, the preset pressure is 5.60 bar)*

• *Read type of regulator*
It is the following type:

ESC&

The expected response is:

ESC&n

• *Analogue OUT 4-20 mA alarm enable*
It is the following type:

ESCt

The expected response is:

ESCtn *(0 = deactivated; 1 = active)*

• *Read configuration*
Displays a string with complete module configuration. This command requires no parameters.
It is the following type:

ESCi

The expected response is:

ESCi05322b050c0d2E10000O10500002000e01000&0t0

Where:
***05322** = the pressure reading*
***050** = the deadband (b = the set deadband code)*
***0** = the unit of measurement (c = the set unit of measurement code)*
***2** = type of control (d = the set type of control code)*
***10000** = the full scale (E = the code)*
***1** = type of output (0 = pressure switch 1 = reference) (O = the code)*
***05000** = output activation threshold*
***02000** = output deactivation threshold*
***01000** = minimum pressure*
***0** = type of regulator*
***0** = alarm analogue OUT 4-20 mA enable*

The type of parameter is indicated before the value, except for pressure.

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7.1 SERIAL CABLE CONNECTION DIAGRAM

M12 connector		9-pin D-Sub connector
PIN 1 (TX)	———	PIN 2
PIN 2 (RX)	———	PIN 3
0VDC	———	PIN 5

8. LED INTERFACE

	LED PRESSURE	SOLUTION
☀	Flashing	In regulation
●	ON	Regulation OFF
○	OFF	No power supply
	LED DIAG	**SOLUTION**
●	ON	Digital output active
○	OFF	Digital output is not active

NOTES

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