INSTRUMENT MANUAL

VP51

Digital Proportional Control Valve

IMPORTANT SAFETY WARNING

Please read these instructions carefully **BEFORE** this instrument is installed or maintained.

To conform with the Health and Safety at Work Act 1974 our product should be installed, used and maintained in accordance with :-

1. Normal safety procedures.
2. The installation and operating instructions provided for each instrument.
3. BS6739 for general applications.
4. BSEN 60079 for hazardous area applications.

If for any reason local conditions dictate non-compliance with the above, we should be consulted.

These converters are intended for us in industrial compressed air systems only. Ensure that adequate pressure relief provision is installed if application of system supply pressure could cause downstream equipment to malfunction. Installation should be in accordance with local and national compressed air and instrumentation codes.

Products certified for use in explosion proof (flameproof) or intrinsically safe installation **MUST**

a) Be installed in accordance with local and national codes for hazardous area installations
b) Only be used in situations which comply with the certification conditions stated in this handbook.
c) Only be maintained by qualified personnel with adequate training on hazardous area instrumentation.

Before using these products with fluids other than air, for non-industrial applications, or for life-support systems consult Norgren.

LIMITED WARRANTY, DISCLAIMER & LIMITATION OF REMEDIES

Items sold by Norgren are warranted to be free from defects in materials and workmanship for a period of two years from the date of manufacture, provided said items are used according to Norgrens recommended usages. Norgren's liability is limited to the repair of, refund of purchase price paid for, or replacement in kind of, at Norgren's sole option, any items proved defective, provided the allegedly defective items are returned to Norgren prepaid. The warranties expressed above are in lieu of and exclusive of all other warranties.

There are no other warranties, expressed or implied, except as stated herein. There are no implied warranties of merchantability or fitness for a particular
purpose, which are specifically disclaimed. NORGREN'S liability for breach of warranty as herein stated is the exclusive remedy, and in no event shall NORGREN be liable or responsible for incidental or consequential damages, even if the possibility of such incidental or consequential damages has been made know to NORGREN.

Norgren reserve the right to discontinue manufacture of any product or change product materials, design, or specifications without notice.

Our policy is one of continuous research and development. We therefore reserve the right to amend without notice the specifications given in this document. Customers are responsible for ensuring that the product is used only for the purpose of which it is intended. In case of doubt Norgren will be pleased to advise

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If you need more information, please red the complete handbook.

1. Connect an air supply (11 bar max) to the VP51 filtered to 5 µm; use thread sealant. (e.g. red loctite 542)
   - **Use Oil-Free Air**
   - **Do Not use PTFE Tape**
2. Connect a suitable signal source (0-10V, 4-20mA) to range to pin 3 (blue) +ve and pin 4 (black) common –ve.
3. Connect a 24V dc power supply across Pin 1 (red) and Pin 4 (black)
   - **Check the Connections and Polarity**
4. Connect a suitable load or gauge to the outlet port
5. Switch on supply and the proportional valve should operate
6. Set-up can be made off-line (pressure) for desired outlet pressure, feedback signal and range settings. Fine-tuning can be performed using online set-up.
7. Adjust the Proportional and Integral Gains, Dither Amplitude and Speed, if necessary

The VP51 is a programmable electronic proportional control valve.

The pneumatic section is a diaphragm actuated precision glandless spool valve, pilot pressure applied to the pneumatic section controls the output pressure of the unit.
The pilot pressure is generated and controlled electronically. The feedback signal from the outlet port is compared to the control signal required and ensures a consistent, stable output pressure.

The electronics system requires a nominal 24V DC supply signal. With a 10 Bar standard unit, the user can define their requirements through programming, and set the application parameters needed for the unit, i.e outlet pressure, gain settings, response speed, feedback, etc.

The VP51 Programmable Digital Proportional Control Valve for industrial pneumatic pressure control applications. The VP51 can be programmed to meet application requirements, and a standard 10 bar unit can be set at any required outlet pressure setting below this value.

Warranty

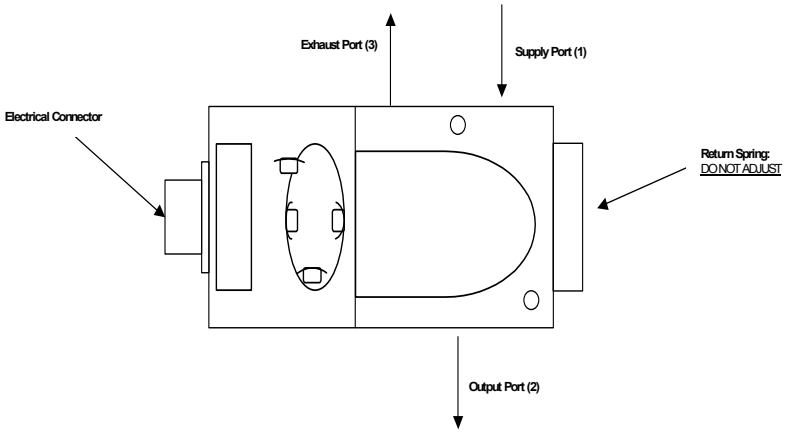
A two-year warranty applies to all Norgren products. For terms and conditions ask for a copy of our ‘General Conditions of Sale.’

Pneumatic Installation:

Supply Pressure:	5 bar minimum supply pressure 1 bar (14.5psig) above maximum output required (14 bar 203psig) max)
Output Pressure Range:	0-10 bar (0-145psig)
Media:	Clean, dry 50µm filtered air
Port Size:	¼"BSP or ¼" NPT

Connect pipe-work using 10mm OD, 8mm ID, plastic pipe, cut cleanly at right angles, with push-fit pipe connections.

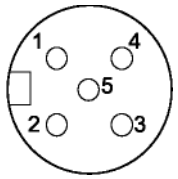
Fit an exhaust silencer to Port 3 if required (this will only slightly degrade exhaust performance) The connector plug must be hand-tight only, to a tightening force less than 3 Newtons.



Electrical Installation:

- Power Supply : 24V D.C power supply (± 25% with 250mA current capability)
- Signal: 0-10V, 4-20mA, as ordered
- Monitor: 10V full scale; Switch mode settable

Connect the unit as follows using 5-core, screened cable and the M12 socket connector supplied.



Pin 1: +24V D.C. supply (+ve) (RED)
Pin 2: 1V/bar monitor output (WHITE)
Pin 3: Control signal (+ve) (BLUE)
Pin 4: Common (DC supply, signal and feedback return) (-ve) (BLACK)
Pin 5: Chassis (GREEN/YELLOW)

Electrical connector pin looking in to the end of the instrument

Programmable Proportional Pressure Control Valve

User Interface Functions and Descriptions

The VP51 has a 2 x 8 digit alphanumeric display with a permanent backlight, which under normal operation displays the current pressure and input signal. This is referred to as the default screen. By using the keypad, the user can gain access to a range of settable parameters.

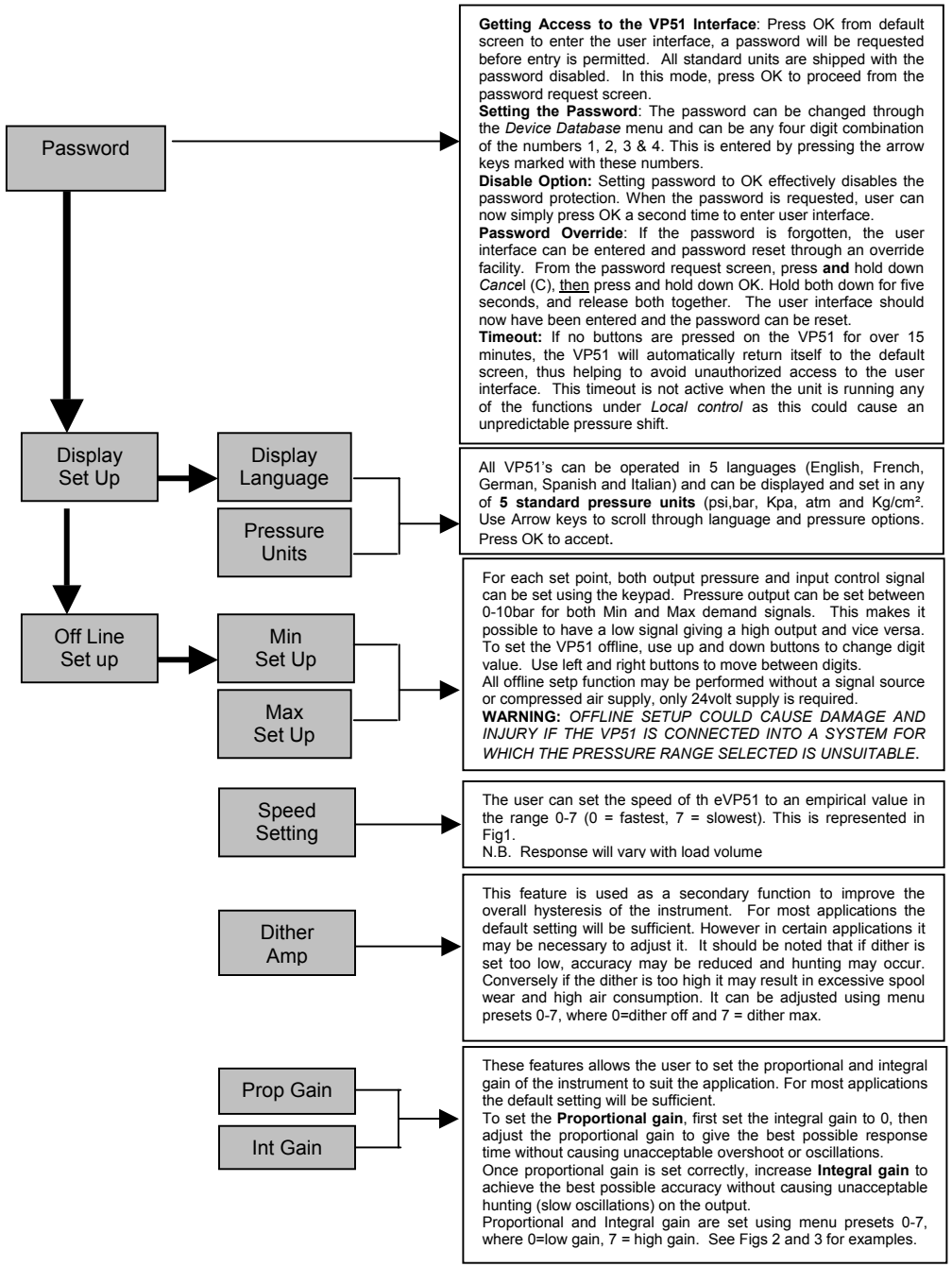
The VP51 user interface is navigated using a six-button keypad - Up, Down, Left, Right, OK and Cancel:
Use the OK button to enter the menu from the default screen, move to the next level of the menu structure and accept changes within functions.

Use the Cancel *(C)* button to move back through the levels of the menu structure and to cancel changes within functions.

Use the Up and Down buttons to move between menu options within a level and to set digit values within functions. Use the Left and Right buttons to move between settable digits within functions.

Offline and Online Range Setup: The VP51 input signal and output pressure ranges can be set independently. For both set points, output pressure can be set at any value between 0 and 10 bar, to the nearest 0.1 bar. Likewise, input signal can be set between 0 and 10V (or 4 and 20mA). It is also possible to set the VP51 to be reverse acting, so that for a low input signal, the pressure is high and vice versa.

Important: It should be noted that the *Max* and *Min* set points do not become the operating limits of the instrument but are simply the two points required to define the gradient and offset of the straight line characteristic of the VP51. For example, if the *Min* set point is set to 1.5 Bar at 1.0V and the *Max* set point is 8.5 Bar at 8.0V then at 0V the output pressure will be 0.5 Bar and at 9V, the output pressure will be 9.5 bar. It should also be noted that the instrument accuracy, as quoted in the datasheet, applies to the product configured as a 0-10 bar instrument. For reduced ranges, the percentage accuracy will therefore decrease.



On-Line Set Up → **Min Set Up** / **Max Set Up**

To set the VP51 range online, it must be connected to an air supply and an external input signal as well as the 24V supply signal.
Set the input signal to the required maximum or minimum value, then use the up and down buttons to fine tune the VP51 to its host system.
Important: The ***Online Setup*** function is only intended for fine-tuning of the VP51. If large adjustments are required to th eVP51 range, use the *Offline* Setup function.

Monitor Set Up → **Monitor Output**

Display function that provides feedback facility for user information.
In the **Analog 0-10V mode**, the output signal is in the range 0-10V, reflecting the output pressure in bar
When the mode **Hi = P2> XX.X Bar**, the output signal is 10V when the output pressure is above the specified threshold and is 0V otherwise. The threshold can be set within this mode.
When the mode **Hi=P2 OK**, the output signal reflects the state of the red LED-Hi when not flashing.

Green On Limits

The Green LED is normally permanently on to indicate power on. It will flash when output pressure is outside a specified window. The output pressure is compared with that required and the green LED will flash when the difference is greater than the green on limits value.

Red On Limits

Red LED is normally off. Can be set to flash if output pressure does not reach the required value within a specified time limit. Red LED will also flash when running in local control functions.
Important: For large loads and speed settings other than '0' the time delay on the red LED should be set such that it does not start flashing under normal response conditions. This can be done measuring the normal system response time for the chosen load and speed setting and then setting the time delay to something greater than the measured time. Thus the red LED will only flash if the system is failing to respond in the required time.

Local Control → **Manual Control**

Local control function enables the user to manually set output pressure using arrow keys. To accept command press OK. This will display an output pressure warning. To return to Remote Control press C followed by OK. This will display the main menu structure.
Manual control is part of the ***Local Control*** menu. Within Manual Control the user can set the VP51 to output any pressure between 0 and 10 bar to 3 significant figures, without affecting the end points. The up and dow buttons are used to change digit values. The left and right buttons to move between digits.

WARNING: MANUAL CONTROL COULD CAUSE DAMAGE AND INJURY IF THE VP51 IS CONNECTED INTO A SYSTEM FOR WHICH THE PRESSURE CHANGES SELECTED ARE UNSUITABLE.

Device Database

Display function that shows device ID, Serial No.
Database Contents: Users have read only access to part number, serial number, software version, factory calibration data and run time. All this data is accessible under the Device Database menu.
Tag Number: The VP51 has a user settable eight digit tag. Use the lfet and right buttons to move between digits and the up and down buttons to set the digits.
Help: For further assistance on the VP51, visit the Norgren website at www.norgren.com

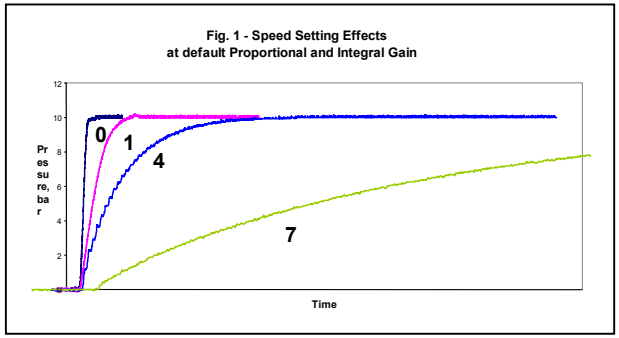
Factory Defaults

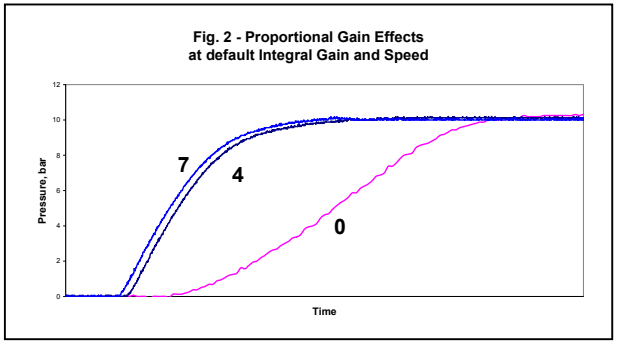
Factory defaults settings can be restored from any user set conditions. At the *Factory Defaults* menu, press *OK* and you will be invited to restore defaults. Press *OK* again and all VP51 settings will be restored to their factory set values as printed on data label.
WARNING: RESTORING FACTORY DEFAULTS COULD CAUSE DAMAGE AND INJURY IF THE VP51 IS CONNECTED INTO A SYSTEM FOR WHICH THE FACTORY SET RANGE (0-10BAR, 0-10v) IS UNSUITABLE.

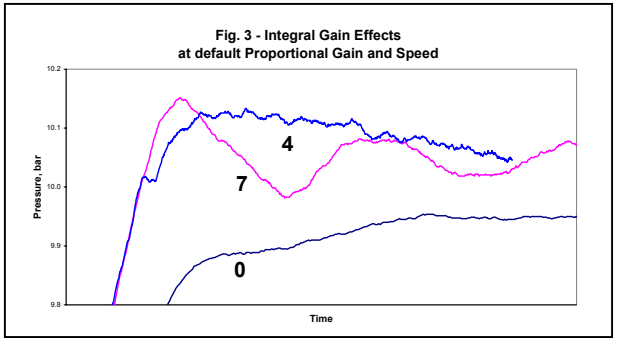
WARNING MESSAGES

Warning P2 Shift → This message indicates that the output pressure (P2) may change as a result of user intrevention. If this is acceptable OK should be pressed, if this is not acceptable

Remote Control → This message will appear when leaving manual control. It prompts the user to confirm that the instrument should return to being driven by a remot control signal. To accept this press OK, to remain in manual press C.







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MAINTENANCE

The VP51 does not have components that require user maintenance. If there is a concern or problem contact your regional Norgren Distributor.

PROBLEM	POSSIBLE CAUSES	SUGGESTED ACTION
No output pressure	Loss/no control signal	Check connection/wiring
	No Power supply	
	Faulty Ground Wiring	
	Contamination	Use adequate 50 micron filtration
Low Output Pressure	Insufficient Input Pressure	Increase input pressure
	Incorrect wiring	Check all common –ve connections are correct
	Low load volume	Check Pipe size is adequate (ie. >4mm)
Continuous Full Output Pressure	Blocked Spool	Use adequate 50 micron filtration
	Non-common grounding	Check common-ve and earth wiring are correct and separate
Maximum Outlet pressure not available	Insufficient Input pressure	Increase available input pressure
Maximum Outlet pressure too high	Calibration	Check Zero and Span Potentiometer settings
Outlet pressure Oscillates (Chattering)	Wiring problem	Check common –ve
	Interference Effects	Use shielded cable
	Calibration	Reduce Gain Setting
	Low load volume	Check Pipe Assembly
Unit behaves above/below specification	Settings changed from Factory Set-up	Customer to re-adjust Zero and Span in unison
	Check signs of damage to external casing	
	Age of Unit	
Unit has an air leak	Confirm system set-up. Correct power and pressure inputs	If mis-handling of unit has led to failure such as incorrect voltage supplied to PCB or contamination the unit will be considered beyond repair.
	Has the unit been opened?	

SPECIFICATIONS

Medium:	Compressed air, Non-lubricated
Input/Output Signal	See Product Selector on Datasheet
Supply Pressure Range	Up to 10bar, user adjustable
Preferred Range (low Pressure)	5bar minimum operating pressure
Operating Temperature Range	-20ºC to 50ºC (ambient)
Dew Point	-20ºC pressure at 7bar g in accordance with ISO 8573.1
Environmental Protection	IP65 in normal operation

RFI/EMI Protection is incorporated

TYPICAL PERFORMANCE FIGURES

Accuracy	±100mbar (1% full 10 bar range)
Supply Pressure Effect	1 bar (14.5 psi) above maximum output required. Up to 14bar (203 psi max)
Temperature Effect	Typically better than 0.03% of span/ºC for span and zero over operating range
Response Time	<80mS (10-90% step into 0.1l load)
Flow Capacity	1300 l/min
Air Consumption (Typical)	<5l/min
Input Impedeance	10KΩ for voltage variants 250Ω for current variants
Insulation Resistance	>100MΩ at 50Vdc, electrical terminals to case
Over Current Protection	Over voltage to 30V (non-continuous, 60 seconds) Variant
Long Term Stability	100-200 million cycles
Rangeability	Multiturn trimpots for zero and span, acessible via removeable grommet. Zero and span pots to provide 50% rangeability (applicable to variants listed in Input Impedance).
Life	>30 million 100% steps

Thank you for reading this data sheet.

For pricing or for further information, please contact us at our UK Office, using the details below.

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