

Three-Point Controller

NV4SCRIPT Example

System Requirements

- DAQ system with 1x AIn, 3x DigOut (example created with USB-AD16f and 16 formula channels)
- Miscellaneous:
e-mail connection via SMTP server

Software

- NextView®4 Professional
- NextView®4 Script
- Version: 4.6 and higher

System Configuration

- Live data frequency: 10Hz (depending on DAQ system and scan settings)



Description

Three-point controllers with three switching states feature one input and two outputs switching each output to "ON", "OFF", or "both OFF" depending on a certain positive or negative deviation of the input signal from the desired value. They allow the switching of 2 different energy types and have a usually symmetric "Dead zone" with an upper and lower limit of the deviation where no switching activities take place.

A typical example for a three-point controller is the temperature control with a heating/cooling thermostat. It turns on a heating when the temperature is below a defined minimum temperature and activates a cooling at a certain maximum temperature. Between the two limits, both devices are off.

The NextView4 Script example "Three-Point Controller" implements a temperature control of this kind. A desired value is defined as optimum temperature value as well as the deviations from the desired value from which a heating or cooling is activated.

A safety circuit to implement an "Emergency Stop" function can be realized with the first digital line.

1 Quickstart

1.1 Start Script Example

The configuration (*.nvc), project (*.nvp), and script files (*.nvs) of the script example have been installed in the folder "Script Examples" together with the external programs used. They are available in the following directory (if default settings have been used).

- **Windows® 7/8:** C:\Users\\My Documents\My NextView Projects\Script Examples
- **Windows® XP:** C:\Documents and Settings\\My Documents\My NextView Projects\Script Examples

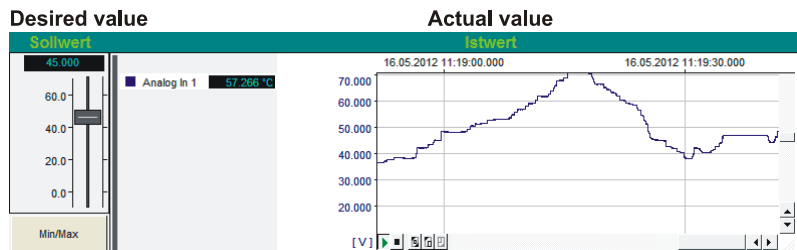
If using default settings during installation, the script example Three-Point-Controller.nvp can be opened via the Windows® 7/XP Start menu or the Windows® 8 Start screen as follows:

- **Windows® 7/XP:** Start / (All) Programs / NextView 4.6 / Script Examples / Three-Point Controller
- **Windows® 8:** Right-click Start screen / "All Apps" / NextView 4.6 / Three-Point Controller

1.2 Controller Settings

The slider "Sollwert" is used to set the desired value for analog input 1.

The lower/upper value for the displayed scale can be defined for the sliders via the button "Min/Max".



The actual values of the analog input are shown in the live display.

The three-point controller is activated by pressing the top left button "3P". The text field aside indicates if the controller is on ("Running") or off ("STOPPED").

Start/Stop controller
Start/Stop Regler

3P Running

Control value **Stellwert**
Heating **Heizung**

OFF **AUS**

Cooling **Kühlung**

ON **EIN**

If the three-point controller is off, the slider "Stellwert" connected to analog output 1 can be used to test the reaction of the system if heating or cooling are on or off. As soon as the three-point controller has been turned on, these values cannot be changed manually anymore but are regulated by the controller.

Two digital multimeters show the current state of the "Digitalleitung Heizung" und "Digitalleitung Kühlung" regulated by the relating control value.

Digital line heating
Digitalleitung Heizung
Digital Out 1/2 **0**

Digital line cooling
Digitalleitung Kühlung
Digital Out 1/3 **1**

The "Regelung Not-Aus" switch (controller emergency stop) disables the three-point controller and sets the control values for heating and cooling to 0 ("AUS" - OFF). The state of the safety circuit is also indicated by a digital multimeter.

Safety circuit
Sicherheitsschaltung
Digital Out 1/1 **1**

Controller emergency stop
Regelung Not-Aus

The switching thresholds to turn on/off heating and cooling are shown in the section "Einstellungen für Temperaturregelung" (Settings for temperature control). The values presented in Kelvin are specified as the difference to the desired values.

Settings for temperature control
Einstellungen für Temperaturregelung

Heizung 'Ein' bei	-2K unter Sollwert	Kühlung 'Ein' bei	1K über Sollwert
Heizung 'Aus' bei	-1K unter Sollwert	Kühlung 'Aus' bei	0K über Sollwert

Heating 'ON' at ... below desired value Cooling 'ON' at ... over desired value
Heating 'OFF' at ... below desired value Cooling 'OFF' at ... over desired value

To make changes for the respective deviation from the desired value, the buttons on the left must be clicked.

Actual, desired, and control value, deviation, and the states of the digital lines for heating and cooling can be recorded for analysis purposes while controlling is on. They are saved in a 3P-* .csv file in the same directory.

Recording **Aufzeichnung**

If the top right button is pressed, set parameters will be saved in the file 3P.ini and be used at the next start of the project. To exit the program, the button "Programm Ende" is pressed.

Save parameters
Parameter speichern

Programm Ende

Program end

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