KS 20-1/PRO-16 INDUSTRIAL CONTROLLER CONCISE PRODUCT MANUAL 59533-1

CAUTION: Installation should be only performed by technically competent personnel. Local Regulations regarding electrical installation & safety must be observed. The host equipment is required to provide a suitable electrical, mechanical and fire enclosure to meet relevant safety standards. Impairment of protection will occur if the product is used in a manner not specified by the manufacturer.
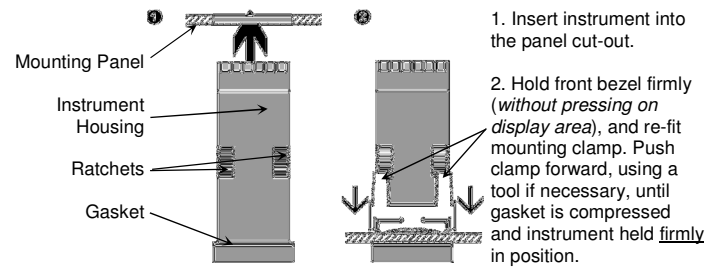
1. INSTALLATION

Panel-Mounting
The mounting panel must be rigid, and may be up to 6.0mm (0.25inch) thick. Cut-out sizes:

Cut-out Dim A
$^1/_{16}$ DIN = 45mm

Cut-out Dim B
$^1/_{16}$ DIN = 45mm

For n multiple instruments mounted side-by-side, cut-out A is 48n-4mm.

Tolerance +0.5, -0.0mm

1. Insert instrument into the panel cut-out.
2. Hold front bezel firmly (*without pressing on display area*), and re-fit mounting clamp. Push clamp forward, using a tool if necessary, until gasket is compressed and instrument held <u>firmly</u> in position.

Mounting Panel
Instrument Housing
Ratchets
Gasket

CAUTION: For an effective IP65 seal against dust and moisture, ensure gasket is well compressed against the panel, with the 4 tongues located in the same ratchet slot.

It is essential that the controller is installed with a minimum of 20mm of free space around the case in order to allow adequate ventilation.

Rear Terminal Wiring
All connections to the device must be made through a spade format or similar connection, with connection to the spade terminal touching both the insulation and conductor material. (Use a standard crimping tool).

All connections must be mechanically secured so as to prevent any wiring becoming loose and coming in contact with other wires or the instrument casing.
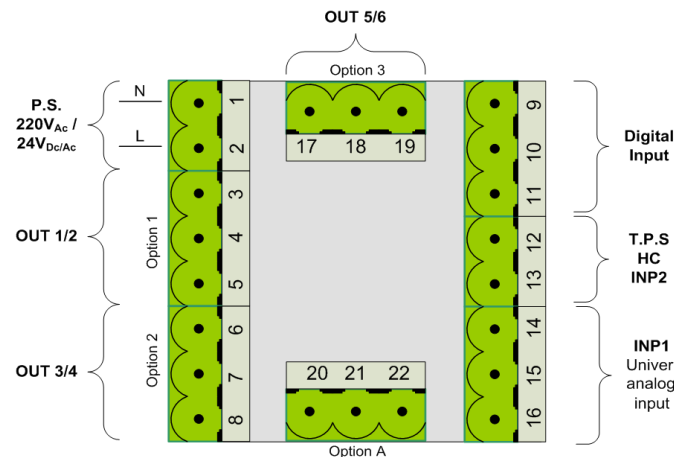
The above applies to any and all connection to hazardous mains supply either direct or indirect (through a switch or relay)
Use copper conductors (except for T/C Inputs)
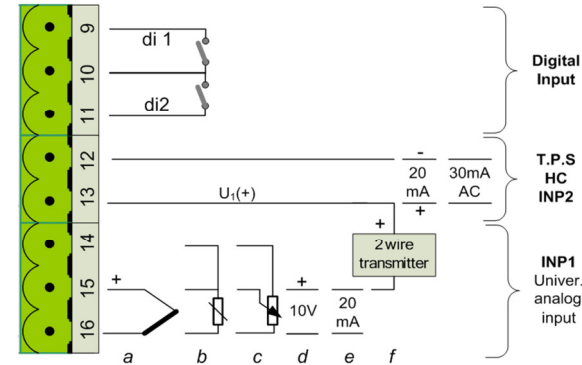**Use Screened Cable on Retransmission Options**
Single Strand wire gauge: Max 1.2mm (18 SWG)
Cabling must have a minimum temperature rating of 80 deg C.
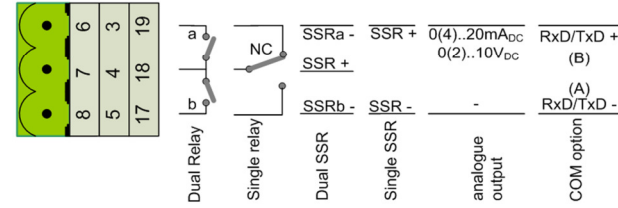
Assignment of connectors to options modules:
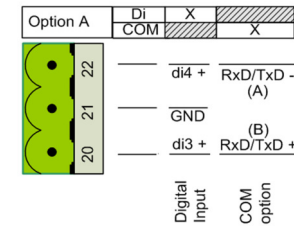

Universal Input 1 and Digital Inputs 1 & 2:


Options 1, 2 and 3:

Option A:

CAUTION: Check information label on housing for correct operating voltage before connecting supply to Power Input
Fuse: 100 – 240V ac – 1A anti-surge 10A breaking capacity at 250V
24V ac/dc – 315mA anti-surge 3.5A breaking capacity at 48V

Electrical shock can result in death or serious injury. Avoid contact with the leads and terminals. High voltages that may be present on leads can cause electrical shock

Note: At first power-up please check that settings of input and output usage fit to your needs and wiring.

2. FRONT PANEL AND OPERATION BASICS
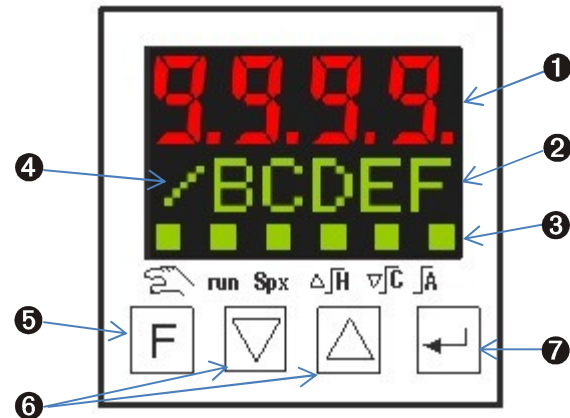
1. Process value display
2. Set-point, controller output or parameter
3. Status LED indicators – see next column
4. Ramp gradient is active
5. F-key to alter or activate functions
6. UP/DOWN to change set-point or controller output value
7. ENTER to accept value and show next screen

Status LED Indicators

|	
✋	Manual mode is active
run	Timer or profiler is active
SPx	Setpoint SP.2 or SP.E is in use
△⌡H	Heat / valve open output is active
▽⌡C	Cool / valve close output is active
⌡A	Alarm is active

Behaviour after power-on
After the supply voltage is switched-on, the unit starts in the operator mode.
The unit will be in the condition in which it was before power-off.
If the controller was in manual mode before power-off, the controller starts with the last output value before power-off.

Operator screens
In operator mode the unit displays the key screens for controller operation. Two screens for the controller (PV with setpoint or output value) and one for the profiler (if configured). The operating level can be expanded with an "Extended operating level". Furthermore the user can access the "function level" with the F-key.
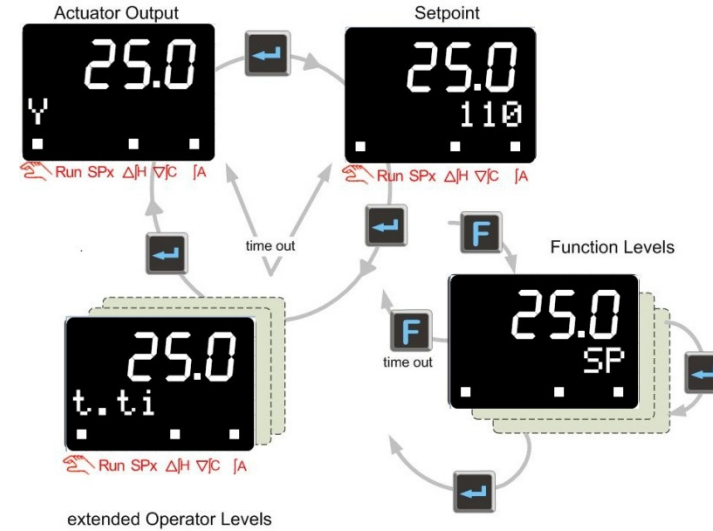
The content of the extended operating level and the function level is based on configurations made with the configuration utility BlueControl. Parameters used frequently or important measured values can be placed into the extended operating level.

See the full user manual for details. Download at:
http://www.west-cs.com/products/models/pro-16-single-loop-controller

3. CONTROLLER OPERATION
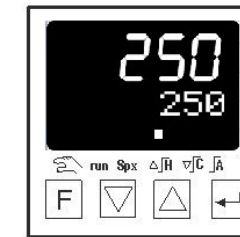
This is the start screen in controller mode. The upper display line always shows the process value. The lower line is used for the setpoint.

A second screen shows the output value in the lower line. The status line has six LED beacons which indicate the following (left to right): controller in **manual** operation, **timer or program is active**, alternative **setpoint** used, **heat mode active** or valve open, **cool mode active** or valve close and limit **alarm** active.

Changing the setpoint
The setpoint can be adjusted by pressing the UP/DOWN-keys.

Control Functions
The F-key opens the function list in the lower display line. Depending on configurations (LOGI) the list contains the following groups of parameters:

Err	No reset of the error list
Ereset	Resetting the error list
SP	Internal setpoint active
SP.E	External setpoint active
SP.2	Second setpoint active
On	Controller/Signaler and Limit 1 are active
Off	Controller/Signaler and Limit 1 are switched off
Auto	Automatic operation
Man	Manual operation

Loc	Local-operation adjustment via front-panel possible
rem	Remote-operation adjustment via front-panel not possible
blc.P	Configuration-, parameter and calibration-level blocked
blc.C	Configuration-level blocked
u.blc	All blocking cancelled

After opening the list the display will show the actual setting of the first section. Use the ENTER key to scroll to the next section and UP/DOWN-Keys to select functions. To activate the selected setting press ENTER or just wait 2 seconds before proceeding to the next screen.

Example: Select setpoint SP.2
Press the F-key (display will show Err)
Press ENTER until you see SP, SP.E or SP.2
Select SP.2 with the UP/DOWN-Keys
Press ENTER to activate
Press the F-key to leave the function level

Self-tuning
If the permissions in the configuration menu allow, self-tuning can be initiated by simultaneously pressing the UP and ENTER key. The lower display line will toggle between the setpoint and the self-tuning state. Press the same keys to abort an active self-tuning.

Please refer to the full manual to learn about the meaning of the state messages and see the different optimization methodologies available.

See the full user manual for details. Download at:
http://www.west-cs.com/products/models/pro-16-single-loop-controller

4. PROFILER OPERATION
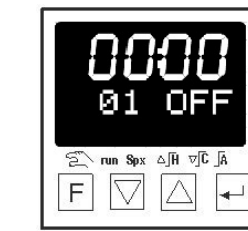
Operating the Profiler
The F-key opens the profiler control menu in the lower display line. The display will show "P:" followed by the actual state. Depending on the configuration, the menu allows the user to select run/stop or run/stop/reset with the UP/DOWN-keys. Press ENTER to make the selected state active.

OFF	Stop program execution and reset
Stop	Stop program execution
run	Start program execution

The profiler start screen is shown above. The upper display line shows the program or segment execution time.

The lower line shows the program-number or segment-number and the state of the profiler. Details for both lines can be configured.

Screen sequence shown below:
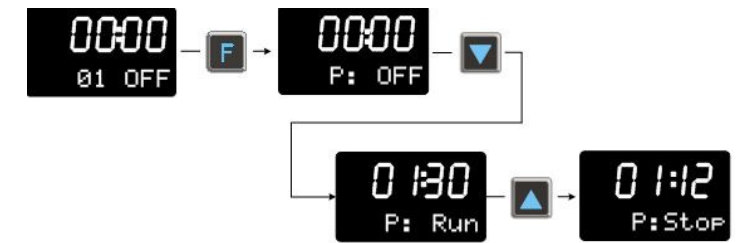
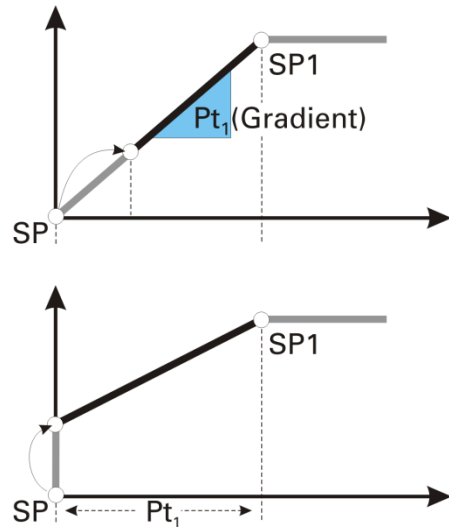### Program/segment selection
Prerequisite: Programmer is in the reset or stop condition and program / segment selection (Pr.no / Pr.SG) is set in the extended operating level.

The procedure to select a defined program (Pr.no) followed by a segment (Pr.SG) is shown below. When starting the programmer now, program operation starts at the beginning of the selected segment in the selected program.
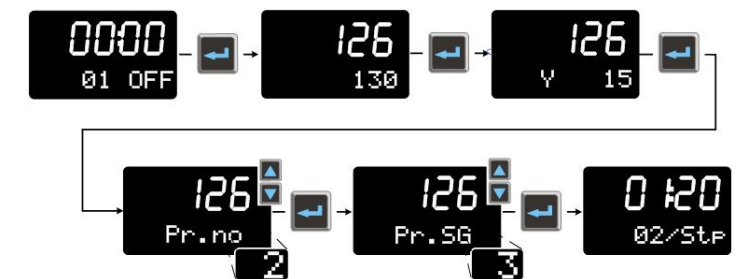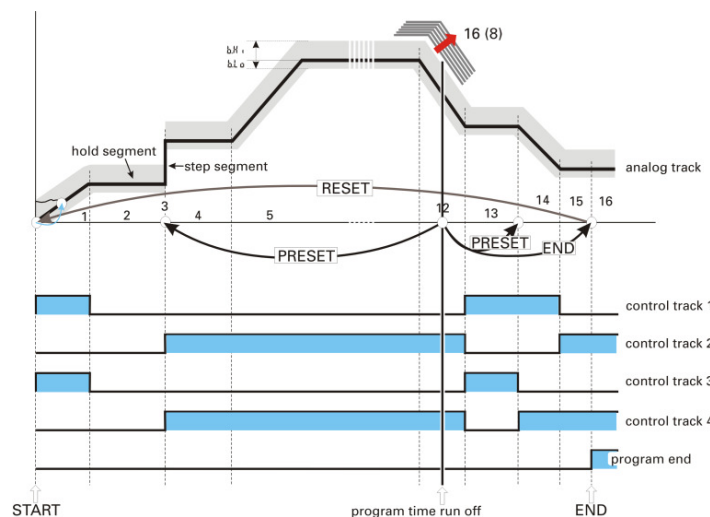
Search run at programmer start

The programmer starts the first segment at the actual process value (search run). This may change the effective runtime of the first segment.
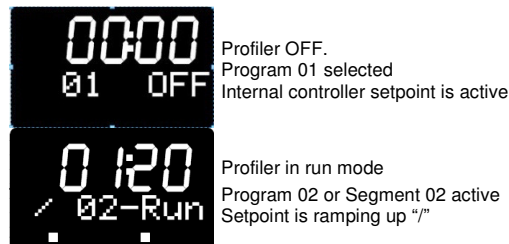

General Profiler Overview

Programs	16
Control outputs	4
Segments	16 per program
Segment types	ramp (set-point and time)
	ramp (set-point and gradient)
	hold segment (holding time)
	step segment (with alarm suppression)
	end segment
	All segment types can be combined with "Wait at the end and call operator"
Time units	configurable in hours:minutes or minutes:seconds
Maximum segment duration	9999 hours = 1 year 51 days
Maximum program duration	16 x 9999 hours = > 18 years
Gradient	0.01℃/h (/min) to 9999℃/h (/min)
Program name	8 characters, adjustable via BlueControl software
Bandwidth control	bandwidth high and low (b.Lo,b.Hi) limits definable for each program

Examples of profiler displays:

Profiler OFF.
Program 01 selected
Internal controller setpoint is active

Profiler in run mode
Program 02 or Segment 02 active
Setpoint is ramping up "/"

End of Program
The last setpoint remains active

See the full user manual for details. Download at:
http://www.west-cs.com/products/models/pro-16-single-loop-controller

5. ALARM MESSAGES

In case of an alarm the lower display line will toggle between red and green and an alarm screen will be added to the list of operator screens. Navigate to the alarm screen by pressing the ENTER-key. You will find one of the following messages:

Alarm	Description	Corrective Action
Fbf.1/2/3	Feedback failure Input 1/2/3	Check sensor and wiring
Sht.1/2/3	Short circuit Input 1/2/3	Check input wiring
POL.1/3	polarity reversal Input 1/3	Check input wiring
HCA	Heater current alarm	Check heating element and wiring
SSr	Solid state relay	Check SSR and output circuit
LooP	Loop alarm	Check fuses, heaters and wiring
AdA.H	Adaption Heat	refer to auto tuning section in full manual
Ada.C	Adaption Cool	refer to auto tuning section in full manual
Lim. 1/2/3	Limit alarm	Check process
Inf.1	Info service interval (life time counter)	
Inf.2	Info service interval (relay cycle counter)	
E.1	Hardware problem	Contact repair department /service centre
E.2	Internal problem	Check for EMC issues Try power on reset
E.4	Option module problem	Check option module fitting or contact repair department /service centre

6. SETUP AND CALIBRATION

After power-up, the controller will show the operating level in the lower level text line. The controller status is retained and will be the same as before the last power-down. To access the options for parameter set-up, configuration and calibration, press ENTER for more than 3 seconds.
This will now allow the options to be accessed: Use the UP/DOWN-keys to select the option and ENTER to go to the next option.
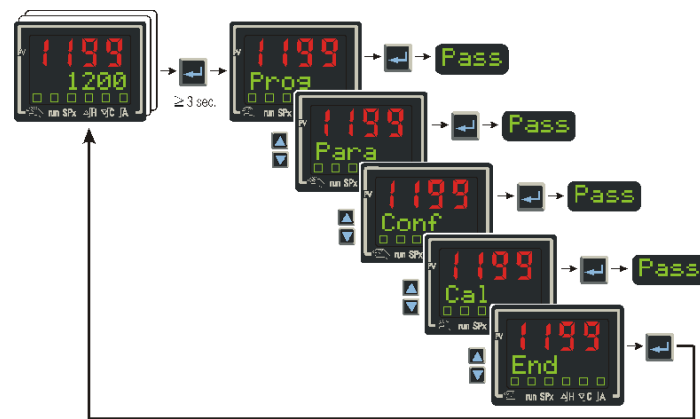
Sections:
PROG: This is used to edit programs for the profiler.
PARA: This allows access to the two sets of PID parameters, setpoint limits, scaling of input signals, alarm limits and the program selection.
CONF: Used to select the controller function, activate the profiler, to set input types, to choose alarm functions, to assign functions to outputs and to configure the user interface.
CAL: This section is used for calibration of the process inputs.

After choosing a section the display will show the first option of the sub-section. Use the same procedure to choose and enter the desired sub-section.

Sub-sections: (for example PARA)
Cntr: Contains PID parameters.
Par.2: Contains a second set of PID parameters.
Setp: Contains setpoint limits
Inp.1: Contains scaling and input filter
Inp.2: Contains scaling

Lim: Contains alarm limits
End:

When in a sub-section, the display will toggle between the parameter name and its value. Use the UP/DOWN-keys to change settings and ENTER to move to the next parameter. When at the end of a sub-section the display will show "done" and then the next sub-section name. At the end of the sub-section list the display will show "End" and return to the operator level.

See the full user manual for details. Download at:
http://www.west-cs.com/products/models/pro-16-single-loop-controller

Note: It is highly recommended that the controller is used in conjunction with the BlueControl configuration utility. This will increase ease of use, save set-up time and help prevent controller malfunction.

A demonstration version of the BlueControl configuration utility is available as a free download from http://www.west-cs.com. The full "Expert" version is available to purchase from your local dealer.

7. SPECIFICATION

INPUTS

Process Value Input INP1
Resolution:	> 14 bit
Decimal point:	0 to 3 decimal places
Digital input filter:	adjustable 0.000...9999 s
Scanning cycle:	100 ms
Measured value correction:	2-point or offset correction

Thermocouples
Input impedance: 1 MΩ
Effect of source resistance: 1 V/Ω
Thermocouple types: B, C, D, E, J, K, L, N, R, S, T
Resistance thermometer: PT100, PT1000, KTY 11-6

Cold junction compensation
Max. additional error: < 0.5 K

Sensor break monitoring
Sensor current: ≤ 1 µA
Operating sense configurable

Resistance thermometer
Connection: 3-wire
Lead resistance: max. 30Ω
Input circuit monitor: Break and short circuit

Current and voltage signals
Span start, end of span: anywhere within measuring range
Scaling: Selectable -1999...9999
Linearization: 16 segments, configurable with BlueControl
Decimal point: adjustable
Input circuit monitor: 12.5% below span start (2mA, 1V)
Resolution: > 14 bit
Scanning cycle: 100 ms
Accuracy: Better than 0.1%

Heating current measurement via current transformer
Measuring range: 0...30mA AC
Scaling: adjustable -1999..0,000..9999 A
Accuracy: 0.25%

Remote setpoint measurement range
Input resistance: approx. 120Ω
Span: configurable within 0 to 20mA
Scaling: adjustable -1999...9999
Input circuit monitor: 12.5% below span start (4..20mA 2mA)

CONTROL INPUT DI1 & DI2

Configurable as direct or inverse switch or push-button.
Connection of a potential-free contact suitable for switching "dry" circuits.
Switched voltage: 3.3V
Switched current: < 10mA

CONTROL INPUTS DI3 & DI4 (OPTIONAL)

These inputs (if ordered) are in the option A position and are configurable as direct or inverse.
Nominal voltage: 24 V DC, external current sink (IEC 1131 Type 1)
Logic "0": -3...+5V
Logic "1": +15...+30V
Current requirement: approx. 5mA

OUTPUTS

Relay – option 1-3
Contacts: Potential free changeover
Max contact rating: 2A@ 250V 48…62Hz
Min contact rating: 6V, 1mA
Duty cycle: I = 1A/2A, 250,000/150,000 operations @ 250V resistive

Dual relay – option 2
Contacts: 2 NO contacts with shared common
Max contact rating: 2A@ 250V 48…62Hz
Min contact rating: 6V, 1mA
Duty cycle: I = 1A/2A, 500,000/200,000 operations @ 250V resistive

SSR - option 1-3
Voltage: 10V into 500Ω minimum

Dual SSR - option 1-3
Voltage: 10V into 500Ω minimum

Linear DC output option 1 & 3
(1) Current output

0/4mA...20 mA, configurable.
Signal range: 0...approx. 22mA
Load: ≤ 500 Ω
Load effect: none
Resolution: (0.1%)
Error: (0.2%)

(2) Voltage output

0-10 V
Signal range: 0...11 V
Load: ≥ 2KΩ
Resolution: ≤ 0.1 %
Error: ≤ 0.2 %

Bus interface - option 3 or option A
Physical: RS485, at 1200, 2400, 4800, 9600 or 19200 bps.
Protocol: Modbus RTU Communications

Transmitter power supply
Output: 22 mA / ≥ 18 V

8. ENVIRONMENTAL

Operating Conditions (For indoor use)
Ambient Temperature: 0℃ to 60℃ (Operating), −20℃ to 70℃ (Storage).
Relative Humidity: 75% yearly average no condensation
Supply Voltage and Power: 100 to 240V AC ±10%, 50/60Hz, 11.5VA (mains voltage input version)
24V AC ±10%, 50/60Hz, 11.5VA or 24V DC ±10%, 10W (low voltage input version)

Certification
Standards: CE, UL, cUL
EMI: Complies with EN61326 (Susceptibility & Emissions).
Safety Considerations: Complies with EN61010-1
Pollution Degree 2, Installation Category II.
Front Panel Sealing: To IP65 (IP20 behind the panel).

Physical
Front Bezel Size: $^{1}/_{16}$ DIN = 48 x 48mm.
Depth Behind Panel: 110mm.
Weight: 0.21 Kg maximum.

Cleaning
If cleaning is necessary, the front panel should be cleaned by washing with warm soapy water and drying immediately using a dry, lint free cloth.

Manufacturing site
Address:
The Hyde Business Park
Brighton
BN2 4JU
United Kingdom

Full user documentation
More comprehensive user documentation is available in the full user manual which is available to download at:
http://www.west-cs.com/products/models/pro-16-single-loop-controller

Symbol Explanation

  Caution: general danger to life or limb