

Other products from West



Single Loop Temperature Controllers



Multi-Loop Temperature Controllers



Limit Controllers



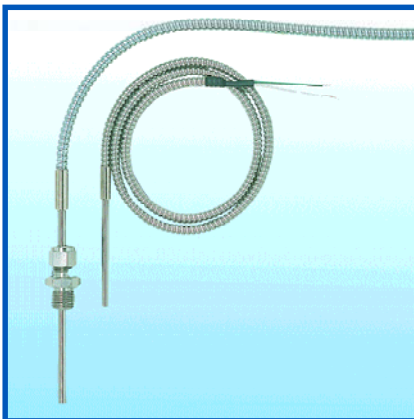
Indicators



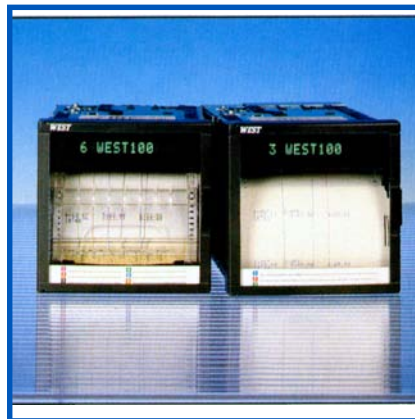
Absolute and incremental encoders



Counters & Timers



A range of sensors



Recorders



Thyristors

West Instruments
The Hyde Business Park
Brighton BN2 4JU UK
Tel: +44 (0) 1273 606271
Fax: +44 (0) 1273 609990
e-mail: info@westinstruments.com
www.westinstruments.com



West Instruments is a division of
Danaher (UK Industries) Ltd.
A member of the Danaher Corporation.

Available From:



[The 8800 series
temperature controllers...

8800 series

...setting a new standard in advanced control]

Why the 8800 & 8840?

Because they are the **most advanced** controllers

The 8800 series is a new advanced range from West Instruments. Just look at what it offers:

- Front Comms Port and Configurator Software
- Two Universal Inputs
- Cascade Control
- Fast Cycle Time (100 ms)
- Up to 16 programs with 16 segments each*
- 4 control (event) tracks*
- Maintenance manager and error list
- Self-Tuning to the setpoint without oscillation
- Day & Night display shows plain text and bargraphs

* 8840 Profiler only

- ▶ Process Controller (8800) and Profiler (8840) versions available
- ▶ Universal continuous/switching version for reduced stocks
- ▶ Two freely configurable analog output, e.g. as process value output
- ▶ Customer-specific Linearisation for all sensors
- ▶ Settings can be blocked via password and internal switch for high security
- ▶ Extended temperature range up to 60 °C allows mounting close to the process
- ▶ Easy 2-point or offset measurement correction
- ▶ Monitoring of heating current and output circuit
- ▶ Emergency operation after sensor break via the “output hold” function
- ▶ Logical combination of digital outputs, e.g. for general alarm
- ▶ RS 422/485 Modbus RTU interface
- ▶ Built-in transmitter power supply
- ▶ Splash-water proof front (IP 65)
- ▶ O₂-measuring with high impedance input (not with 8840)

APPLICATIONS

8800

Furnaces and Ovens
Burners and Boilers
Plastics Processing
Driers
Heat Treatment Plants
Thermal Oil Systems

8840

Chamber Ovens
Melting and Pot Furnaces
Climatic and Test Chambers
Driers
Heat Treatment Plants
Test Beds
Textile Treatment (dyeing)
Glass Industry (tempering)

DESCRIPTION

Our new 8800 series of controllers offers you the best in advanced process control, ensuring the quality, flexibility and value for money you have come to expect of West.

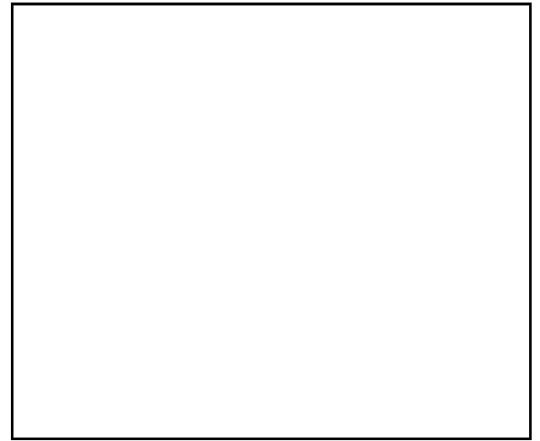
The 8800 Advanced Controller and 8840 Profiler provides a choice of simple 2-point (on/off) control, continuous PID control, or 3-point stepping control. The process value signal is connected via a universal input. A supplementary analog input can be used for heating current measurement, as an external setpoint input, or for position feedback measurement of motorised stepping controllers. The optional 3rd input is an universal input that can be used for several functions, e.g. temperature dependant setpoint correction or differential control.

Every 8800 and 8840 comes fitted with four process outputs - either relays or up to 2 universal outputs that can be used for operating a solid-state relay, a continuous current/voltage output or to power a two-wire transmitter. Optionally there are two additional opto coupler outputs.

8800 Series

ers on the market

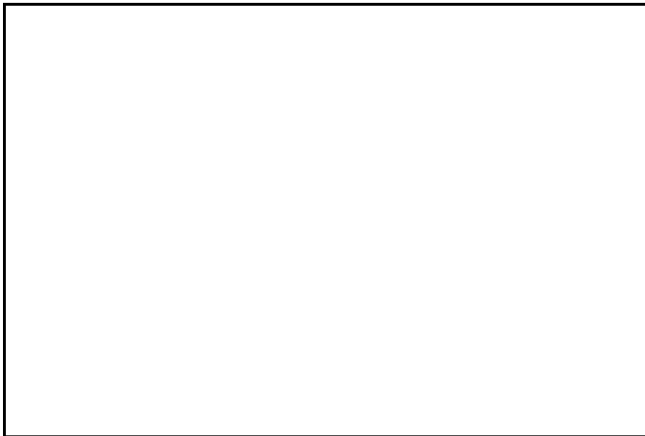
ok at all the features it



Front Comms Port and Configurator

You can control parameter adjustment in seconds with the 8800 series. A convenient front comms port provides instant and easy set-up via the West configurator on your PC without removing the instrument from the panel.

Furthermore, our “simulator” allows you to conduct comprehensive off-line tests, ensuring safe operation for your application.



Cascade Control

In applications where the heating source is remote from the process or the nature of the process exhibits an inherent lag in terms of thermal response, the integrated cascade control function can be used to give tighter control.

Maintenance Manager and error list

The maintenance manager ensures smooth operation of any process. It performs a number of preventative maintenance tasks, such as a reminder for replacement of actuators or other equipment; detection of SSR faults and heating element failure; motor-valve monitoring (on the 8800 only) and detection of an open circuit control loop or detection of transient faults.

Self-tuning during start-up and to setpoint

This function determines the optimum settings for fast line-out without overshoot. With three-point controller configuration, the “cooling” parameters are determined separately, thus ensuring an optimum match to the process. At the push of a button the 8800 determines the best control parameters at the actual setpoint. This function does not require oscillation, and performs a minimal deviation of the process value.

Display and Operation

The “day & night” display of the 8800 is characterised by particularly high contrast in both dark and bright surroundings. The status fields show operating conditions, control mode, and error messages reliably. The display is in plain text and can show various process values numerically or as a bargraph.

Password protection

If required, access to the various operating levels can be protected with a password. Similarly, access to a complete level can be blocked.

TECHNICAL DATA

INPUTS

Input	Used for
INP1	x 1 (process value)
INP2	Heating current, ext. set-point or ext. correction, position feedback Yp, 2nd process value x2, ext.correcting variable Y.E, input for additional limit signalling and indication
INP3 (option)	as for INP2
di1	Programme run/stop, programme reset* Operation disabled, controller off, disabled auto/manual function, reset of stored alarms, switch-over to ...
di2	reset of stored alarms, switch-over to ...
di3 (option)	second set-point SP.2, external set-point SP.E, fixed correcting variable Y2, ext. correcting variable Y.E, manual operation, parameter set 1 ↔ 2, process value INP1 ↔ X2

PROCESS VALUE INPUT INP1

Resolution: > 14 bit
 Decimal point: 0 to 3 decimals
 Digital input filter: adjustable 0.0 to 100.0 s
 Scanning cycle: 100 ms
 Measured value correction: 2-point or offset correction
 Special (-linearisation): 16 segments
 Standard table: temperature sensor KTY 11-6

Thermocouples (Table 1)
 Internal and external temperature compensation
 Input impedance: ≥ 1 MΩ
 Effect of source resistance: 1 μV/Ω

Cold junction compensation
 Max. additional error ± 0,5 K

Sensor break monitoring
 Sensor current: ≤ 1 μA
 Operating sense configurable (see page ????)

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

Thermocouple		Range		Accuracy	Resolution (∅)
L	Fe-CuNi (DIN)	-100 to 900°C	-148 to 1652°F	≤ 2K	0.1K
J	Fe-CuNi	-100 to 1200°C	-148 to 2192°F	≤ 2K	0.1K
K	NiCr-Ni	-100 to 1350°C	-148 to 2462°F	≤ 2K	0.2K
N	Nicrosil/Nisil	-100 to 1300°C	-148 to 2372°F	≤ 2K	0.2K
S	PtRh-Pt 10%	0 to 1760°C	32 to 3200°F	≤ 2K	0.2K
R	PtRh-Pt 13%	0 to 1760°C	32 to 3200°F	≤ 2K	0.2K
T	Cu-CuNi	-200 to 400°C	-328 to 752°F	≤ 2K	0.05K
C	W5%Re-W2%Re	0 to 2315°C	32 to 4199°F	≤ 2K	0.4K
D	W3%Re-W25%Re	0 to 2315°C	32 to 4199°F	≤ 2K	0.4K
E	NiCr-CuNi	-100 to 1000°C	-148 to 1832°F	≤ 2K	0.1K
B ⁽¹⁾	PtRh-Pt%	0(400) to 1820°C	32(752) to 3308°F	≤ 3K	0.3K
special		-25 to 75mV		≤ 0.1%	0.01%

Table 1 Thermocouple Ranges

Type	Sensor current	Range		Accuracy	Resolution (∅)
Pt100	0.2mA	-200 to 850°C	-328 to 1562°F	≤ 1K	0.1K
Pt1000		-200 to 200°C	-328 to 392°F	≤ 2K	0.1K
KTY 11-6*		-50 to 150°C	-58 to 302°F	≤ 2K	0.05K
special (8800 only)		0 to 4500Ω		≤ 0.2%	0.01%
special (8840 only)				≤ 0.1%	0.01%
special		0 to 450Ω **			
Poti		0 to 160Ω **			
Poti		0 to 450Ω **			
Poti		0 to 1600Ω			
Poti		0 to 4500 Ω			

Table 2 Resistance Transducers

Range	Input Resistance	Accuracy	Resolution (∅)
0-10V	≈ 110 KΩ	≤ 0.1%	0.6mV
0-100mV	≥ 1MΩ	≤ 0.1%	6 μV
0-20mA	20Ω	≤ 0.1%	1.5 μA

* corresponds to special 0 to 4500Ω

Table 3 Current and Voltage

Current and voltage signals
 Span start, anywhere within
 end of span: measuring range
 Scaling: selectable -1999 to 9999
 Linearisation: 16 segments, adaptable with Configurator
 Decimal point: adjustable
 Input circuit monitor: 12.5% below span start (2mA, 1V)

The measuring range 0 to 100mV can be used together with the special linearisation function for connection of thermocouples with external temperature compensation!

SUPPLEMENTARY INPUT INP2

Resolution: >14 bit
 Scanning cycle: 100 ms
 Heating current measurement via current transformer
 Measuring range: 0 to 50 mA AC
 Scaling: adjustable -1999 to 0,000 to 9999 A
 Current measurement range
 Input resistance approx. 120 Ω
 Span: configurable within 0 to 20mA
 Scaling: adjustable -1999 to 9999
 Input circuit monitor: 12.5% below span start (4 to 20mA to 2mA)
 Potentiometer
 Ranges see Table 2
 Connection: 2-wire
 Lead resistance: max. 30 Ω
 Input circuit monitor: Break

SUPPLEMENTARY INPUT INP3 (OPTION)

Resolution: > 14 bit
 Scanning cycle: 100 ms
 Technical data as for INP1 except the 10V range.

CONTROL INPUTS DI1, DI2

Configurable as direct or inverse switch or push-button
 Connection of a potential-free contact suitable for switching "dry" circuits.
 Switched voltage: 5 V
 Switched current: 100 µA

CONTROL INPUTS DI2, DI3 (OPTION)

The digital input di2 located on the A-card and di2 located on the option card are or-linked.
 Configurable as switch or push-button
 Optocoupler input for active triggering

Nominal voltage: 24 V DC, external
 Current sink (IEC 1131 Type 1)
 Logic "0": -3 to 5 V
 Logic "1": 15 to 30 V
 Current requirement: approx. 5 mA

TRANSMITTER SUPPLY U_T (OPTION)

Output: 22 mA / 18 V

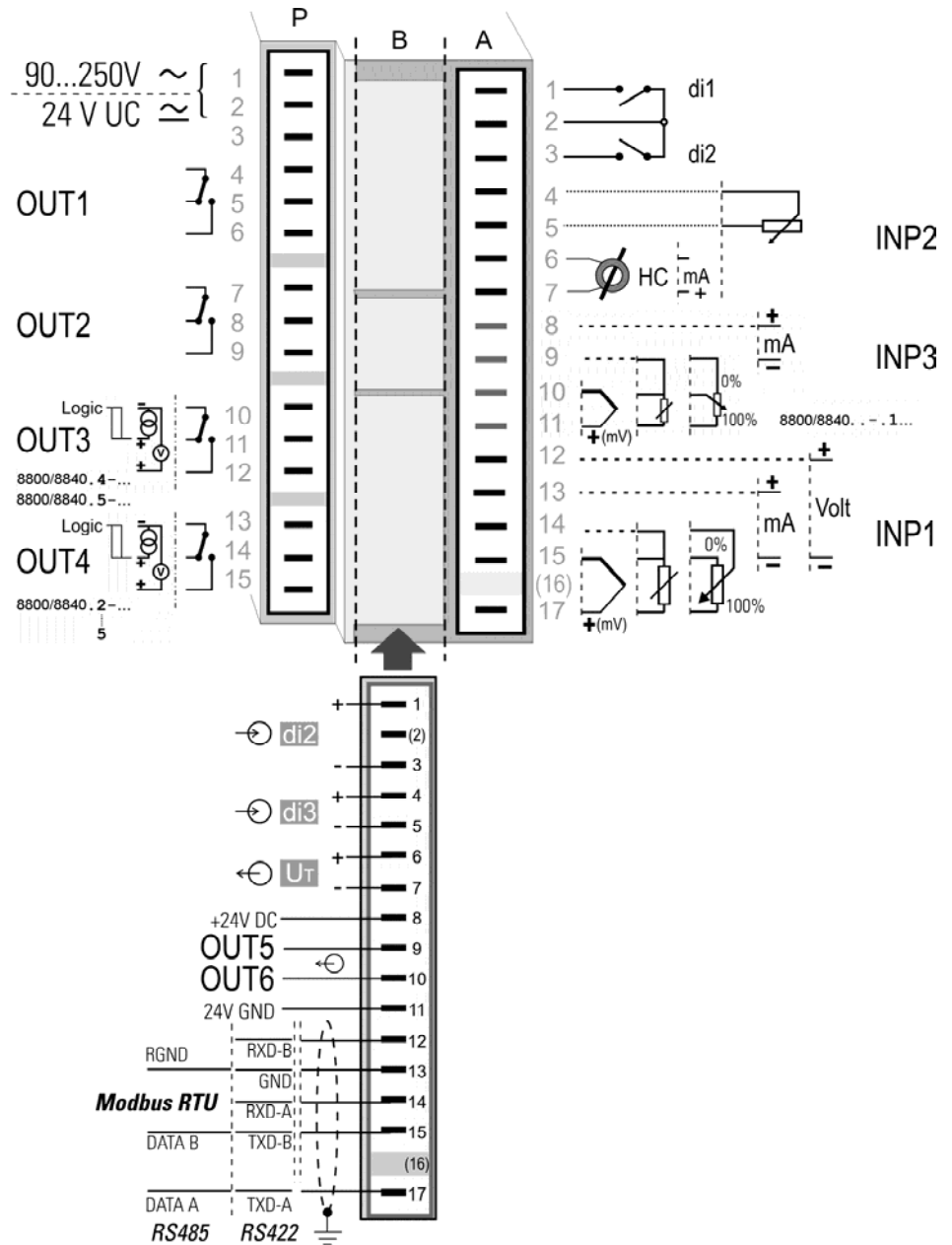
If the universal outputs OUT3, 4 are used there may be no external galvanic connection between measuring and output circuits

OUTPUTS

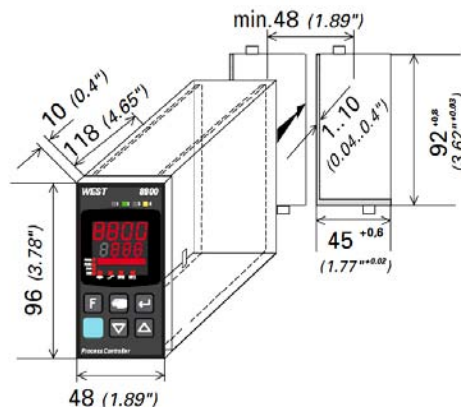
* All logic signals can be OR-linked

Output	Used for
OUT1, 2 (relays)	Control output heating/cooling or Open/Close, limit contacts, alarms*. For 8840 only - control (event) tracks, programme end, operator call
OUT3, 4 (relays or logic)	as OUT1 and OUT2
OUT3, 4 (continuous)	Control output, process value, measured values INP1/2/3, set-point, control deviation, position feedback Y _p , transmitter supply 13V/22mA
OUT5 OUT6 (optocoupler)	as OUT1 and OUT2

Electrical Connections



Dimensions (mm)



Galvanic isolations

- Safety isolation
- Functional isolation

Mains supply	Process value input INP1 Supplementary input INP2 Optional input INP3 Digital inputs di1, di2
Relay OUT1	RS422/485 interface
Relay OUT2	Digital inputs di2, 3
Relay OUT3	Universal output OUT3
Relay OUT4	Universal output OUT4
	Transmitter supply U _T OUT5, OUT6

RELAY OUTPUTS OUT1 TO OUT4

Contacts:	Potential-free changeover contact
Max. contact rating:	500 VA, 250 VAC, 2A at 48 to 62 Hz, resistive load
Min. contact rating:	6 V, 1 mA AC/DC
Operating life (electric):	800.000 duty cycles with max. rating

Note:

If the relays operate external contactors, these must be fitted with RC snubber circuits to manufacturer specifications to prevent excessive switch-off voltage peaks.

OUT3 , OUT4 AS UNIVERSAL OUTPUT

Galvanically isolated from the inputs.

Freely scalable

DA-converter limiting frequency T_{90} :	50 ms
Limiting frequency of the complete continuous controller:	> 2 Hz
Resolution:	11 bit

Current output

0/4 to 20 mA, configurable.

Signal range:	0 to approx. 22 mA
Load:	$\leq 500\Omega$
Load effect:	none
Resolution:	$\leq 22 \mu\text{A}$ (0.1%)
Error:	$\leq 40 \mu\text{A}$ (0.2%)

Voltage output

0/2 to 10V, configurable

Signal range:	0 to 11 V
Load:	$\geq 2 \text{ k}\Omega$
Load effect:	none
Resolution:	$\leq 11 \text{ mV}$ (0.1%)
Error:	$\leq 20 \text{ mV}$ (0.2%)

OUT3, OUT4 used as transmitter supply

Output: 22 mA / $\geq 13 \text{ V}$

OUT3 used as logic output

Load $\leq 500\Omega$	0/ $\leq 20 \text{ mA}$
Load $\geq 500\Omega$	0/ $> 13 \text{ V}$

OUTPUTS OUT5, OUT6 (OPTIONAL)

Galvanically isolated opto-coupler outputs.

Grounded load:

common positive control voltage.

Output rating: 18 to 32 VDC; =70 mA

Internal voltage drop: =1 V with I_{max}

Protective circuit: built-in against short circuit, overload, reversed polarity (free-wheel diode for relay loads).

FUNCTIONS

Control behaviour

- Signaler with asymmetric adjustable switching differential (ON/OFF controller)
- PID controller (2-point and continuous)
- Delta / Star / Off or 2-point controller with switch over from partial to full load
- 2 x PID (heating/cooling)
- 3-point stepping controller with or without position feedback
- Continuous controller with internal positioner (stepping controller)

Two parameter sets for manual gain scheduling
Self-tuning control parameters or adjustable manually via front keys or configurator.

Behaviour with 2- and 3-point controllers

- Standard behaviour:
For precise matching of the required output value at the output signal limits, the controller changes the cycle times for heating and cooling automatically and continuously.
- With constant cycle times:
The length of the shortest heating and cooling pulse is adjustable.
- Water cooling linear (heating=standard): (8800 only)
To ensure a sufficient cooling effect, the cooling function starts only after reaching an adjustable temperature value. The pulse length is adjustable, too and remains constant for all output values.
- Water cooling nonlinear (heating=standard): (8800 only)
The general function is described above but the controller additionally takes in consideration that the water cooling is usually much stronger than the heating (thus preventing unfavorable behavior when changing from heating to cooling).

Set-point functions

- Adjustable set-point gradient (rate) 0.01 to 9999 °C/min
- Set-point control
- Set-point/cascade control
- Set-point/cascade control with external correction
- Programme control (8840 only)
- Programme control with external correction (8840 only)

Process value calculation

- Standard ($x_{\text{eff}} = \text{INP1}$)
- Ratio ($\text{INP1}/\text{X2}$)
- Difference ($\text{INP1}-\text{X2}$)
- Max ($\text{INP1}, \text{X2}$)
- Min ($\text{INP1}, \text{X2}$)
- Mean value ($\text{INP1}, \text{X2}$)
- Switch-over between INP1 and X2

Behaviour with sensor break or short circuit:

- Control outputs switched off
- Switch-over to a safe output value
- Switch-over to a mean output value

8840 Profiler Additional Features

Programmes:	8 or 16 (dep. on version)
Control tracks:	4
Segments:	16 each
Types of segments:	ramp (setpoint and time) ramp (setpoint and ramp) dwell segment (with limit monitoring suppression) Step segment (with limit monitoring suppression) End segment

All types of segments can be combined with "wait at the end and operator call"

Time base:	configurable hrs:mins or mins:secs
------------	------------------------------------

Max. segment duration:	9999 hours = 1 year 51 days
------------------------	-----------------------------

Max. prog. duration:	16 x 9999 hrs = >18 years
----------------------	---------------------------

Ramp	0.01°C/hr (/min) to 9999°C/hr (/min)
------	--------------------------------------

Program Names:	8 characters, adjustable with Configurator
----------------	--

Bandwidth control	Upper and lower bandwidth configurable for each programme
-------------------	---

SPECIAL FUNCTIONS

Modbus Master

The 8800 and 8840 can be configured as Modbus Master. This enables it to transmit user-specified signals or parameters cyclically to all connected Slave controllers. For example, the following applications are possible:

- Set-point shifting relative to the set-point adjusted in the Slave (see picture)
- Matching of control parameters, limit contacts, etc.
- Limiting the output value (override control OVC)

DAC ensures operational safety (8800 only)

Digital Actuator Control monitors the most important functions of the actuator and is able to detect problems long before they cause large control deviations. Typical disturbances are a blocked actuator, a defective motor or capacitor and all related problems with an actuator.

The DAC function is available for three-point stepping controllers with potentiometer position feedback measured via INP3.

LIMIT SIGNALLING FUNCTIONS

Max., Min. or Max./Min. monitoring with adjustable hysteresis.

Signals which can be monitored:

- Process value
- Control deviation
- Control deviation with suppression during start-up or set-point changes
- Effective set-point
- Output signal Y
- Input values of INP1, INP2, INP3
- Difference INP1 - X2. This function allows to detect aged thermocouples.

Functions

- Input signal monitoring
- Input signal monitoring with latch (reset via front key or digital input)
- Rate of change monitoring (/min)
- Adjustable discriminator time of 0 to 9999 seconds

Several limit signals or alarms can be OR-linked before being output.

Applications: Release of a brake with motor actuators, general alarms, etc.

ALARMS

Heating current alarm

- Overload and short circuit
 - Open circuit and short circuit
- Limit value adjustable 0 to 9999 A

Control loop alarm

Automatic detection if there is no response of the process to a change of output value.

Sensor break or short circuit

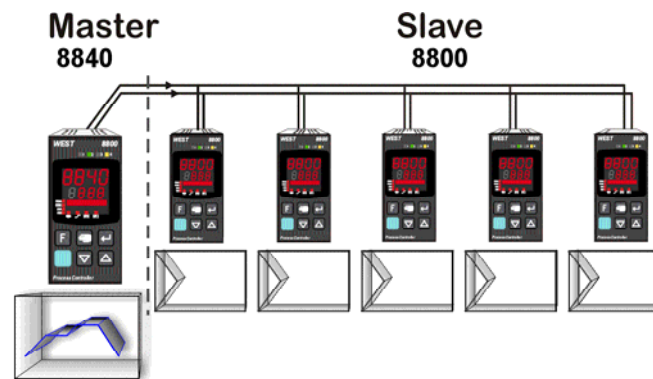
Depending on selected input type, the input signal is monitored for break and short circuit.

MAINTENANCE MANAGER

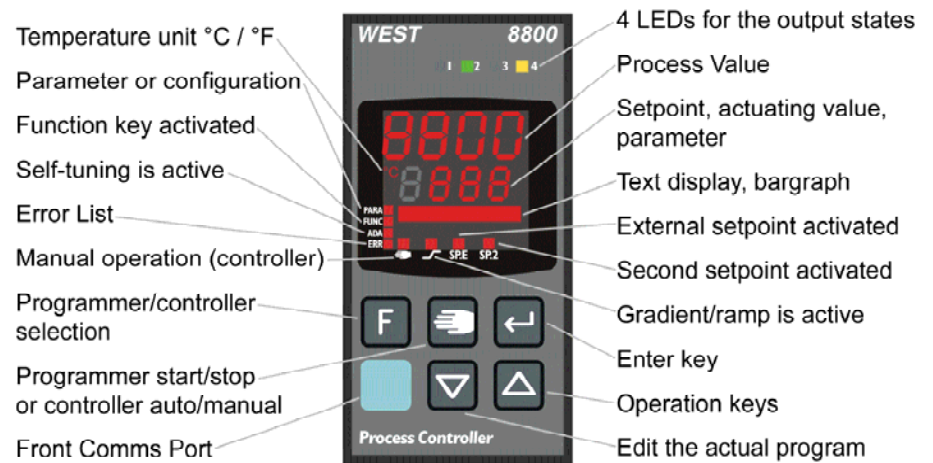
Display of error signals, warnings, and latched limit messages in the error list.

Signals are latched, and can be reset manually.

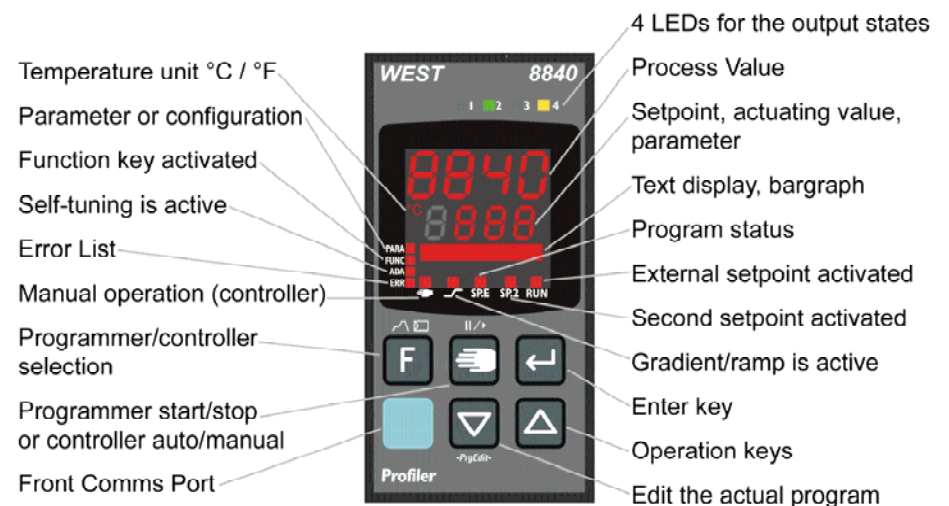
Modbus Master function sends the setpoint to the slave controllers



Display and operation - 8800 Advanced Controller:



Display and operation - 8840 Profiler:





OPERATION AND DISPLAY



Display

Multi-function Day & Night display with red backlighting (adjustable)

Process value: 4 x 7 segment 10,5 mm
 Lower display: 4 x 7 segment 7,8 mm
 Text display: 8-character dot matrix used as numeric or bargraph display

Operating functions

The functions of the  key for the 8800 and 8840 and the  key for the 8840 are configurable:

Function		
Remote (no front operation)		X
SP.2 (2nd setpoint)		X
Y.2 (2nd output value)	X	X
SPE (external setpoint)	X	X
Manual operation	X	X
C.OFF (controller function off)	X	X
Lock of manual key		X
Reset of latched limits and error list	X	X
Parameter set 1 \leftrightarrow 2		X

Several functions can be combined e.g. SP.2 and parameter set switch-over (gain scheduling) with only one key.

POWER SUPPLY

Depending on version:

AC SUPPLY

Voltage: 90 to 260 VAC
 Frequency: 48 to 62 Hz
 Power consumption approx. 8 VA

UNIVERSAL SUPPLY 24 V UC

AC voltage: 20.4 to 26.4 VAC
 Frequency: 48 to 62 Hz
 DC voltage: 18 to 31 V DC
 Power consumption: approx: 8 VA (W)

BEHAVIOUR WITH POWER FAILURE

Configuration, parameters, and adjusted set-points, control mode:

Non-volatile storage in EEPROM

FRONT COMMS PORT

Connection of PC via PC adaptor (see "Accessories"). The configurator is used to configure, set parameters, and operate the 8800 and 8840.

BUS INTERFACE (OPTION)

RS 422/485 INTERFACE

Galvanically isolated
 Physical: RS 422/485
 Protocol: Modbus RTU
 Transmission speed: 2400, 4800, 9600, 19.200 bits/s
 Address range: 00 to 99
 Number of controllers per bus: 32
 Repeaters must be used to connect more controllers.

ENVIRONMENTAL CONDITIONS

Protection modes

Front panel: IP 65
 Housing: IP 20
 Terminals: IP 00

Permissible temperatures

For specified accuracy: 0 to 60°C
 Warm-up time: < 15 minutes
 Temperature effect: <100ppm/K
 For operation: -20 to 65°C
 For storage: -40 to 70°C

Humidity

75% yearly average, no condensation

Shock and vibration

Vibration test Fc (DIN 68-2-6)
 Frequency: 10 to 150Hz
 Unit in operation: 1g or 0.075mm
 Unit not in operation: 2g or 0.15mm
 Shock test Ea (DIN IEC 68-2-27)
 Shock: 15g
 Duration: 11ms

Electromagnetic compatibility

Complies with EN 61 326-1

- Complies with the immunity requirements for continuous, unattended operation
- Complies with the emission requirements class B for rural areas
- Surge disturbances may increase the measurement error and lead to error messages

GENERAL

Housing Material: Makrolon 9415 flame-retardant
 Flammability class: UL 94 VO, self extinguishing
 Plug-in module, inserted from the front

Safety Tests

Complies with EN 61010-1 (VDE 0411-1)
 Over voltage category II
 Contamination class 2
 Working voltage range 300 VAC
 Protection class II

Certifications

UL Certification (applied for)

For 8800 only:

Type test to DIN 3440

Can therefore be used in:

- Heat generation plants with outflow temperatures up to 120°C to DIN 4751
- Hot-water plants with outflow temperatures above 110°C to DIN 4751
- Thermal transfer plants with organic transfer media to DIN 4754
- Oil-heated plants to DIN 4755

Electrical Connections

- Screw terminals for conductor cross-section from 0.5 to 2.5mm

Mounting

Panel mounting with two fixing clamps at top/bottom or left/right

Close mounting possible

Mounting position: Not critical

Weight: 0.27kg (9.52 oz)

Accessories supplied with unit

Operating instructions
 2 fixing clamps

ACCESSORY EQUIPMENT

Front Comms Port (Engineering Tool)

PC-based programme for configuring, setting parameters and operating the 8800 and 8840 controllers. Moreover, all the settings are saved, and can be printed on demand. Depending on version, a powerful data acquisition module is available, complete with trend graphics.

Visibility Mask

The configurator can be used to blind out parameters in the instrument. Thus, only allowed parameters can be changed on site. Safety relevant parameters are invisible!

Simulation

The built-in simulation serves to test the controller settings, but can also be used for general training and observing the interaction between controller and control loop.

Configurations that can only be implemented via the configurator (not via the front-panel keys):

- Customer-specific linearisations
- Enable “forcing” for inputs/outputs
- Adjustment of limits for operating hours and switching cycles
- Switch-over to 60Hz mains frequency
- Master/slave configuration
- Disable operator actions and operating levels, plus password definition
- Prevent automatic optimisation of cycle times T1, T2

Hardware and Software requirements:

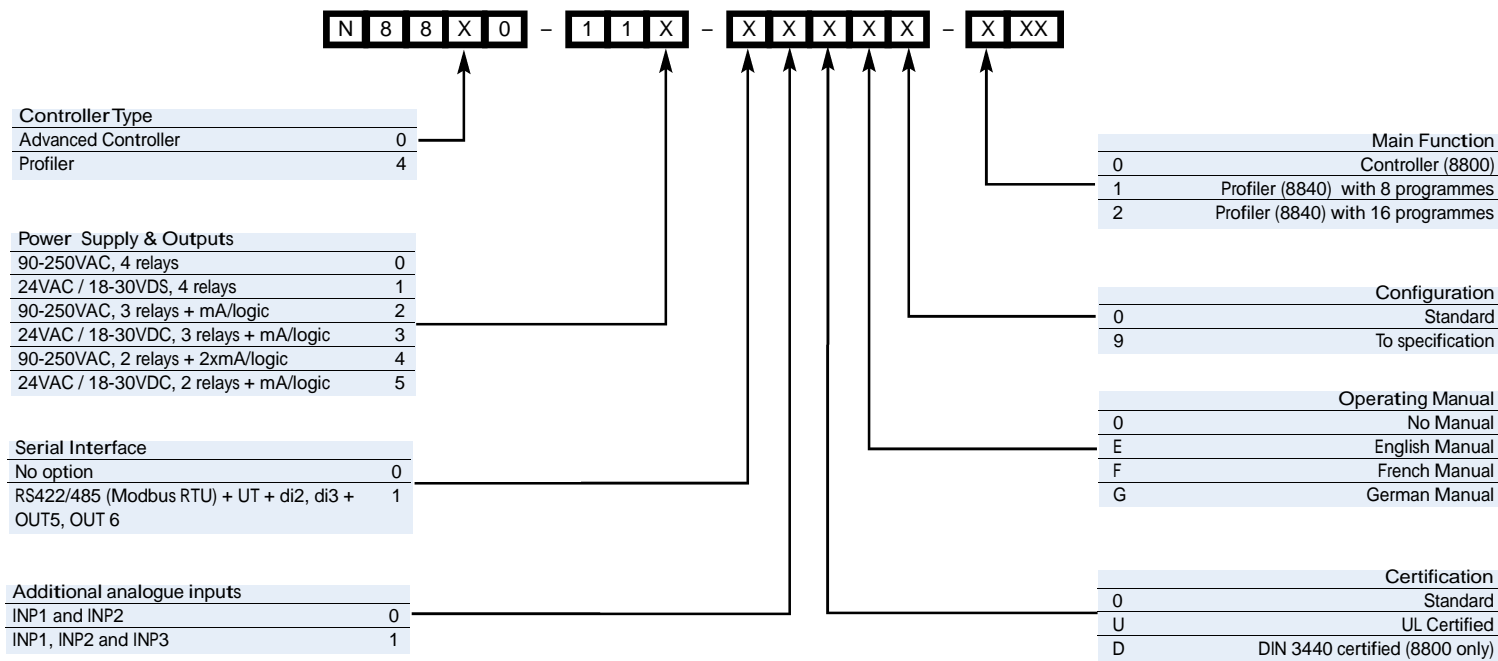
Windows 95/98/NT/2000

PC adapter (see “Accessories”) is required for connecting the controller

Configurator, versions and functionality

Functionality	Mini	Basic
Parameter and configuration setting	yes	yes
Controller and control loop simulation	yes	yes
Download: writes an engineering to the controller	yes	yes
Online mode / visualisation	SIM only	yes
Creation of user defined linearisations	SIM only	yes
Configuration of extended operating level	SIM only	yes
Upload: reads an engineering from the controller	SIM only	yes
Basic diagnostic function	SIM only	yes
File, save engineering data	no	yes
Printer function	no	yes
Online documentation, help system	no	yes
Measurement correction (calibration procedure)	no	yes
Programme editor	SIM only	SIM only
Data acquisition and trend function	SIM only	SIM only

ORDER CODE



In accordance with our policy of continuous improvement, we reserve the right to change specifications from those shown in this document.

ACCESSORY PART NOS