The LOK range

Packaged Plate Heat Exchangers for Domestic Hot Water Production

Specialist Programming Guide

Models:

LOK8-50/LOKT8-50
LOK8-100/ LOKT8-100
LOK8-150/ LOKT8-150
LOK8-200/ LOKT8-200
LOK8-250/ LOKT8-250
LOK8-300/ LOKT8-300
LOK8-350/ LOKT8-350
LOK8-400/ LOKT8-400

LOK14-450/ LOKT14-450
LOK14-500/ LOKT14-500
LOK14-550/ LOKT14-550

Lochinvar®
High Efficiency Water Heaters and Boilers

1/16 DIN PROCESS CONTROLLERS
CONCISE PRODUCT MANUAL

CAUTION: Installation should be only performed by technically competent personnel. Local Regulations regarding electrical installation & safety must be observed.

1.0 SELECT MODE

Select mode is used to access the configuration and operation menu functions.
It can be accessed at any time by holding down ↺ and pressing ↺.
In select mode, press △ or ▽ to choose the required mode, press ↺ to enter. An unlock code is required to prevent unauthorised entry to Configuration & Setup modes. Press △ or ▽ to enter the unlock code, then press ↺ to proceed.

Mode	Upper Display	Lower Display	Description	Default Unlock Codes
Operator	**OPtr**	**SLCt**	Normal operation	None
Set Up	**SEtP**	**SLCt**	Tailor settings to the application	**10**
Configuration	**ConF**	**SLCt**	Configure the instrument for use	**20**
Product Info	**inFo**	**SLCt**	Check manufacturing information	None
Auto-Tuning	**Atun**	**SLCt**	Invoke Pre-Tune or Self-Tune	**0**

Note: The instrument will always return automatically to Operator mode if there is no key activity for 2 minutes.

2.0 CONFIGURATION MODE

First select Configuration mode from Select mode (refer to section 2).
Press ↺ to scroll through the parameters, then press △ or ▽ to set the required value. Press AUTO MAN to accept the change, otherwise parameter will revert to previous value. To exit from Configuration mode, hold down ↺ and press △ to return to Select mode.

Note: Parameters displayed depends on how instrument has been configured. Refer to user guide (available from your supplier) for further details. Parameters marked * are repeated in Setup Mode.

Parameter	Lower Display	Upper Display	Adjustment range & Description	Default Value
Input Range/Type	**inPt**	PT100 sensor		**PtC**
Scale Range Upper Limit	**ruL**	Scale Range Lower Limit +100 to Range Maximum		**100**
Scale Range Lower Limit	**rLL**	Range Minimum to Scale Range Upper Limit -100		**0**
Decimal point position	**dPoS**	0 = **0000,** 1 = **000.0,** 2 = **00.00,** 3 = **0.000** (non-temperature ranges only)		**1**
Control Type	**CtYP**	**SnGL**	Primary only	**SnGL**
		duAL	Primary & Secondary (e.g. heat & cool)	
Primary Output Control Action	**CtrL**	**rEu**	Reverse Acting	**rEu**
		dir	Direct Acting	
Alarm 1Type	**AlA 1**	**P_Hi**	Process High Alarm	**P_Hi**
		P_Lo	Process Low Alarm	
		dE	Deviation Alarm	
		bAnd	Band Alarm	
		nonE	No alarm	
High Alarm 1 value*	**PhA 1**	Range Minimum to Range Maximum in display units		Range Max
Low Alarm 1 value*	**PLA 1**			Range Min
Band Alarm 1 value*	**bAL 1**	1 LSD to span from setpoint in display units		**5**
Dev. Alarm 1 value*	**dAL 1**	± Span from setpoint in display units		**5**
Alarm 1 Hysteresis*	**AHY 1**	1 LSD to full span in display units		**1**

Alarm 2 Type*	**ALA 2**	Options as Alarm1		**P_lo**
High Alarm 2 value*	**PhA 2**			Range Max
Low Alarm 2 value*	**PLA2**	Options as Alarm1		Range Min
Band Alarm 2 value*	**bAL2**	Options as Alarm1		**5**
Dev. Alarm 2 Value*	**dAL2**	Options as Alarm1		**5**
Alarm 2 Hysteresis*	**AHY2**			**1**
Loop Alarm	**LAEn**	**diSA** (disabled) or **EnAb** (enabled)		**diSA**
Loop Alarm Time*	**Lat 1**	1 sec to 99 mins. 59secs		**99.59**
Alarm Inhibit	**Inh 1**	**nonE**	No alarms Inhibited	**nonE**
		ALA1	Alarm 1 inhibited	
		ALA2	Alarm 2 inhibited	
		both	Alarm 1 and alarm 2 inhibited	
Output 1 Usage	**USE 1**	**Pr i**	Primary Power	**Pr i**
		SEc	Secondary Power	
		A1_r	Alarm 1, Direct	
		A1_d	Alarm 1, Reverse	
		A2_r	Alarm 2, Direct	
		A2_r	Alarm 2, Reverse	
		LP_d	Loop Alarm, Direct	
		LP_r	Loop Alarm, Reverse	
		Or_d	Logical Alarm 1 OR 2, Direct	
		Or_r	Logical Alarm 1 OR 2, Reverse	
		Ad_d	Logical Alarm 1 AND 2, Direct	
		AD_r	Logical Alarm 1 AND 2, Reverse	
		rEtS	Retransmit SP Output	
		rEtP	Retransmit PV Output	
Linear Output 1 Range	**tYP 1**	**0_5**	0 to 5 V DC output	**0_10**
		0_10	0 to 10 V DC output	
		2_10	2 to 10 V DC output	
		0_20	0 to 20 mA DC output	
		4_20	4 to 20 mA DC output	
Retransmit Output 1 Scale maximum	**Ro1H**	-1999 to 9999 (display value at which output will be maximum)		Range max
Retransmit Output 1 Scale minimum	**Ro1L**	-1999 to 9999 (display value at which output will be minimum)		Range min
Output 2 Usage	**USE2**	As for output 1		Sec or Al2
Linear Output 2 Range	**tYP2**	As for output 1		**0_10**
Retransmit Output 2 Scale maximum	**Ro2H**	-1999 to 9999 (display value at which output will be maximum)		Range max
Retransmit Output 2 Scale minimum	**Ro2L**	-1999 to 9999 (display value at which output will be minimum)		Range min
Output 3 Usage	**USE3**	As for output 1		**A1_d**
Linear Output 3 Range	**tYP3**	As for output 1		**0_10**
Retransmit Output 3 Scale maximum	**Ro3H**	-1999 to 9999 (display value at which output will be maximum)		Range max
Display Strategy	**diSP**	**1, 2, 3, 4, 5** or **6** *(refer to section 8)*		**1**

Serial Communications Protocol	**Prot**	**ASC1**	ASCII	**Mbn**
		Mbn	Modbus with no parity	
		MbE	Modbus with Even Parity	
		Mbo	Modbus with Odd Parity	
Serial Communications Bit Rate	**bAud**	**1.2**	1.2 kbps	**4.8**
		2.4	2.4 kbps	
		4.8	4.8 kbps	
		9.6	9.6 kbps	
		19.2	19.2 kbps	
Comms Address	**Addr**	**1**	1 to 255 (Modbus), 1 to 99 (ASCII)	**1**
Comms Write	**CoEn**	**r_W**	Read/Write	**r_W**
		R_0	Read only	
Digital Input 1 Usage	**diG1**	**diS1**	Setpoint 1 / Setpoint 2 select*	**diSi**
		diAS	Automatic / Manual select	
Digital Input 2 Usage	**diG2**	**diS1**	Setpoint 1 / Setpoint 2 select*	**dirS**
		DiAS	Automatic / Manual select	
		dirS	Remote/Local setpoint select	
Remote Setpoint Input Range	**rinP**	**0_20**	0 to 20 mA DC input	**0_10**
		4_20	4 to 20 mA DC input	
		0_10	0 to 10 V DC input	
		2_10	2 to 10 V DC input	
		0_5	0 to 5 V DC input	
		1_5	1 to 5 V DC input	
		100	0 to 100mV DC input *Available on full RSP (Slot B) only*	
		Pot	Potentiometer(2K Ω minimum) *Available on full RSP (Slot B) only*	
RSP Upper Limit	**rSPu**	-1999 to 9999		Range max
RSP Lower Limit	**rSPL**	-1999 to 9999		Range min
RSP Offset	**rSPo**	Constrained within Scale Range Upper & Scale Range Lower limits		**0**
Configuration Lock Code	**CLoc**	0 to 9999		**20**

3.0 SETUP MODE

Note: Configuration must be completed before adjusting Setup parameters.

First select Setup mode from Select mode (refer to section 2). The MAN LED will light while in Setup mode. Press to scroll through the parameters, then press or to set the required value.
To exit from Setup mode, hold down and press to return to Select mode.

Note: Parameters displayed depends on how instrument has been configured.

Parameter	Lower Display	Upper Display Adjustment Range & Description	Default Value
Input Filter Time Constant	**FiLt**	OFF or 0.5 to 100.0 secs	**2.0**
Process Variable Offset	**OFFS**	±Span of controller	**O**
Primary Power	**PPW**	Current power levels *(read only)*	N/A
Secondary Power	**SPW**		
Primary Proportional Band	**Pb_P**	0.0% (ON/OFF) and 0.5% to 999.9% of input span	**10.0**
Secondary Proportional Band	**Pb_S**		
Automatic Reset	**ArSt**	1 sec to 99 mins 59 secs and OFF	**5.00**

Parameter	Lower Display	Upper Display Adjustment Range & Description	Default Value
(Integral Time)			
Rate (Derivative Time)	**rATE**	00 secs to 99 mins 59 secs	**1.15**
Overlap/Deadband	**OL**	-20 to +20% of Primary and Secondary Proportional Band	**0**
Manual Reset (Bias)	**biAS**	0%*(-100% if dual control)* to 100%	**25**
Primary ON/OFF Differential	**diFP**	0.1% to 10.0% of input span centred about the setpoint. (*Entered as a percentage of span*)	**0.5**
Secondary ON/OFF Diff.	**diFS**		
Prim. & Sec. ON/OFF Differential	**diFF**		
Setpoint Upper Limit	**SPuL**	Current Setpoint to Range max	R/max
Setpoint Lower limit	**SPLL**	Range min to Current Setpoint	R/min
Primary Output Power Limit	**OPuL**	0% to 100% of full power	**100**
Output 1 Cycle Time	**Ct1**	0.5, 1, 2, 4, 8, 16, 32, 64, 128, 256 or 512 secs.	**32**
Output 2 Cycle Time	**Ct2**		
Output 3 Cycle Time	**Ct3**		
High Alarm 1 value	**PhA1**	Range Minimum to Range Maximum	R/max
Low Alarm 1 value	**PLA1**		R/min
Deviation Alarm 1 Value	**dAL1**	±Span from SP in display units	**5**
Band Alarm 1 value	**bAL1**	1 LSD to span from setpoint	**5**
Alarm 1 Hysteresis	**AHY1**	1 LSD to full span in display units	**1**
High Alarm 2 value	**PhA2**	Range Minimum to Range Maximum	R/max
Low Alarm 2 value	**PLA2**		R/min
Deviation Alarm 2 Value	**dAL2**	±Span from SP in display units	**5**
Band Alarm 2 value	**bAL2**	1 LSD to span from setpoint	**5**
Alarm 2 Hysteresis	**AHY2**	1 LSD to full span in display units	**1**
Loop Alarm Time	**Lati**	1 LSD to full span in display units	**99.59**
Auto Pre-tune	**APt**	**diSA**(disabled) or **EnAb** (enabled)	**diSA**
Auto/manual Control selection	**PoEn**		
Setpoint Select shown in Operator Mode	**SSEn**		
Setpoint ramp adjustment shown in Operator Mode	**SPr**		
SP Ramp Rate Value	**rP**	1 to 9999 units/hour or Off (blank)	**OFF**

Parameter	Lower Display	Upper Display Adjustment Range & Description	Default Value
Setpoint Value	**SP**	Scale range upper to lower limits. (when dual or remote setpoint options are used, **SP** is replaced by **SP1** & **SP2** or **LSP** _ or = before the legend indicates the currently active SP)	Scale Range Minimum
Local Setpoint Value	**_LSP**		
Setpoint 1 Value	**_SP1**		
Setpoint 2 Value	**_SP2**		
Setup Lock Code	**SLoc**	0 to 9999	**10**

4.0 AUTOMATIC TUNING MODE

First select Automatic tuning mode from Select mode *(refer to section 2).*
Press to scroll through the modes, then press or to set the required value.
To exit from Automatic tuning mode, hold down and press , to return to Select mode.

Pre-tune is a single-shot routine and is thus self-disengaging when complete.
If **APt** in Setup mode = **EnAb**, , Pre-tune will attempt to run at every power up*.
Refer to the full user guide (available from your supplier) for details on controller tuning.

Parameter	Lower Display	Upper Display	Default Value
Pre-Tune	**Ptun**	**On** or **OFF**. Indication remains **OFF** if automatic tuning cannot be used at this time	**OFF**
Self-Tune	**Stun**		
Tune Lock	**tLoc**	0 to 9999	**0**

Note: Automatic tuning will not engage if either proportional band = 0.
Also, Pre-tune will not engage if setpoint is ramping, or the PV is less than 5% of input span from the setpoint.

5.0 PRODUCT INFORMATION

First select Product information mode from Select mode *(refer to section 2).*
Press to view each parameter. To exit from Product Information mode, hold down and press to return to Select mode.

Parameter	Lower Display	Upper Display	Description
Input type	**In_1**	**Uni**	Universal input
Option 1 module type fitted	**OPn1**	**nonE**	No option fitted
		rLY	Relay output
		SSr	SSR drive output
		Tri	Triac output
		Lin	Linear DC voltage / current output
Option 2 module type fitted	**OPn2**		As Option 1
Option 3 module type fitted	**OPn3**	**nonE**	No option fitted
		rLY	Relay output
		SSr	SSR drive output
		Lin	Linear DC voltage / current output
		Dc24	Transmitter power supply
Auxiliary Option A module type fitted	**OPnA**	**nonE**	No option fitted
		R485	RS485 communications
		diGi	Digital Input*
		rSPi	Remote Setpoint Input *(basic)*

Auxiliary Option B module type fitted	**OPnb**	**nonE**	No option fitted
		rSPi	Remote Setpoint Input *(full)* and Digital Input 2
Firmware type	**FW**	Value displayed is firmware type number	
Firmware issue	**ISS**	Value displayed is firmware issue number	
Product Revision Level	**PrL**	Value displayed is Product Revision level	
Date of manufacture	**dOM**	Manufacturing date code *(mmyy)*	
Serial number 1	**Sn1**	First four digits of serial number	
Serial number 2	**Sn2**	Middle four digits of serial number	
Serial number 3	**Sn3**	Last four digits of serial number	

6.0 MESSAGES & ERROR INDICATIONS

These messages indicate that an error has occurred or there is a problem with the process variable signal or its wiring.

Caution: Do not continue with the process until the issue is resolved.

Parameter	Upper Display	Lower Display	Description	
Instrument parameters are in default conditions	**Goto**	**ConF**	Configuration & Setup required. This screen is seen at first turn on, or if hardware configuration has been changed. Press ↺ to enter the Configuration Mode, next press △ or ▽ to enter the unlock code number, then press ↺ to proceed	
Input Over Range	**(HH)**	Normal	Process variable input > 5% over-range	
Input Under Range	**(LL)**	Normal	Process variable input > 5% under-range	
Input Sensor Break	**OPEn**	Normal	Break detected in process variable input sensor or wiring	
RSP Over Range	Normal	**(HH)**	RSP input over-range	*** also seen wherever RSP value would be displayed*
RSP Under Range	Normal	**(LL)**	RSP input under-range	
RSP Break	Normal	**OPEn**	Break detected in RSP input signal	
Option 1 Error	**Err**	**OPn1**	Option 1 module fault	
Option 2 Error		**OPn2**	Option 2 module fault	
Option 3 Error		**OPn3**	Option 3 module fault	
Option A Error		**OPnA**	Option A module fault or RSP in both A & B	
Option B Error		**OPnb**	Option B module fault	

7.0 OPERATOR MODE

This mode is entered at power on, or accessed from Select mode *(see section 2).*

Note: All Configuration mode and Setup mode parameters must be set as required before starting normal operations.

Press ↻ to scroll through the parameters, then press △ or ▽ to set the required value.

Note: All Operator Mode parameters in Display strategy 6 are read only (see **diSP** *in configuration mode), they can only be adjusted via Setup mode.*

Upper Display	Lower Display	Display Strategy and When Visible	Description
PV Value	Active SP Value	1 & 2 *(initial screen)*	PV and target value of selected SP *Local Setpoints are adjustable in Strategy 2*
PV Value	Actual SP Value	3 & 6 *(initial screen)*	PV and actual value of selected SP (e.g. ramping SP value). *Read only*
PV Value	*(Blank)*	4 *(initial screen)*	Process variable only *Read only*
Active SP Value	*(Blank)*	5 *(initial screen)*	Target value of selected setpoint only. *Read only*
SP Value	**SP**	1, 3, 4, 5 & 6 if digital input is not **diSA** and RSP not fitted	Target value of SP Adjustable *except in Strategy 6*
SP1 Value	**_SP1**	Digital input = **diSA**. _ lit if active SP = **SP1**	Target value of SP1 *Adjustable except in Strategy 6*
SP2 Value	**_SP2**	Digital input = **diSA**.. _ lit if active SP = **SP2**	Target value of SP2 *Adjustable except in Strategy 6*
Local SP Value	**_LSP**	RSP fitted. _ or ‾ lit if the active SP = **LSP**	Target value of local setpoint *Adjustable except in Strategy 6*
Remote SP Value	**rSP**	RSP fitted. _ or ‾ lit if the active SP = **rSP**	Target value of remote setpoint *Read only*
diGi, **LSP** or **rSP**	**SPS**	RSP is fitted, digital input is not **diSA** and **SSEn** is enabled in Setup mode	Selects local/remote active setpoint **LSP** = local SP, **rSP** = remote SP **diGi** = selection via digital input (if configured). *Note: selecting* **LSP** *or* **rSP** *will override digital input, active SP indication changes to* ‾ *Adjustable except in Strategy 6*
Actual SP Value	**SPrP**	**rP** is not blank	Actual (ramping) value of selected SP. *Read only*
Ramp Rate	**rP**	**SPr** enabled in Setup mode	SP ramping rate, in units per hour *Adjustable except in Strategy 6*

8.0 MANUAL CONTROL

If **PoEn** is set to **EnAb** in Setup mode, manual control can be selected/de-selected by pressing the AUTO MAN key in Operator mode, or by changing the status of a digital input if **diGi** or **diG2** have been configured for **diAS** in Configuration mode. While in Manual Control mode, the MAN indicator will flash and the lower display will show **P*xxx*** (where ***xxx*** is the current manual power level). Switching to/from manual mode is via Bumpless Transfer. Press △ or ▽ to set the required output power.

Caution: Manual power level is not restricted by the **OPuL** power limit

NOTES

NOTES

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