MODEL 320
HEATED
NON-METHANE HYDROCARBON
CUTTER
OPERATING MANUAL

The Signal Instrument Company Limited
12 Doman Road, Camberley
Surrey, GU15 3DF
England

Tel: +44 (0) 1276 682841
Fax: +44 (0) 1276 691302

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INTRODUCTION

The Signal Model 320 Cutter is specifically designed as a portable, stand-alone unit to allow users to achieve both Methane (CH_4) and Total Hydrocarbon (THC) measurement when used with a THC analyser.

The Model 320 Cutter utilises selective catalytic oxidation of Hydrocarbons to remove almost all of the Non-Methane Hydrocarbon content of a sample, leaving just Methane to be measured on the THC Analyser.

For ease of operation, the Model 320 Cutter is designed with a heated gas switch to select the desired gas path: CH_4 or THC. This enables users to take measurements of each with a minimum of sample gas path change-over time. This in turn enables the calculation of Non-Methane Hydrocarbons within the sample.

SPECIFICATION

- **Converter Chamber**
  Fully Heated
- **Wetted Materials**
  316 Stainless Steel
  Catalyst
  PEEK
- **Gas Connections**
  ¼" Stainless Steel
- **Gas Change Over Valve**
  Heated Ball Valve
- **Chamber Temperature**
  Fully Adjustable
- **Temperature Control**
  Accurate PID Controlled
- **Warm Up Time**
  60 minutes
- **Sample Settle Time**
  <30 minutes
- **Drift**
  <20ppm Methane Equivalent in 1hr
- **Filter**
  Stainless Steel Sintered Disk
- **Sample Flow**
  2 L/min maximum
- **Inlet THC Concentration**
  2000ppm C_3H_8 (Propane) equivalent maximum HC cutting ability
  Unlimited CH_4 (Methane) measurement (THC analyser permitting)
- **Power Requirements**
  320W
- **Weight**
  Approx. 10Kg

INSTALLATION

PLUMBING

Using ¼“ PTFE or PFA tubing and the supplied ¼” Stainless Steel fittings:

- Connect the INLET on the rear panel to the SAMPLE SOURCE.
- Connect the OUTLET to the ANALYSER.

NOTE: *For HOT SAMPLE, it is necessary to reduce the risk of Hydrocarbon condensation in the sample gas path:*

> *Signal Heated Sample Line should be used to supply the Signal Model 320 with sample gas.*
>
> *Also, insulated tubing should be placed between the Model 320 and the Analyser (for lengths up to 1 metre), or Signal Heated Sample Line (for lengths greater than 1 metre).*

ELECTRICAL

The Model 320 Cutter should only be supplied with its stated voltage from a stable and reliable electricity source (e.g. UK mains).

Using incorrect voltage may void warranty.

Set-Up

The Signal Model 320 Cutter must be set-up correctly before use. The set-up procedure **must be followed before usage** for optimum performance.

Once the Model 320 has been correctly installed, follow the instructions below to ensure that greater than 98% of the Propane is removed from the sample.

- Switch on the Model 320 and allow the temperature to stabilise. This should take no longer than 20 minutes.
- Set the gas path on the Model 320 to THC.
- Apply Propane of a known concentration to the inlet of the Model 320 and make a note of the reading obtained by the analyser (R_A).
- Switch the Model 320 gas path to CH_4.
- Allow the reading to stabilise.
- Make a note of the reading obtained by the analyser (R_C).
- Calculate the percentage cut using the following equation:

  % CUT = $(1 - R_C/R_A) \times 100$
- If the value is below 98%, increase the temperature of the cutter (see *Operation)* by increments of 1°C and repeat the above steps until the desired cut is achieved.

METHANE CONCENTRATION CALCULATION

- Set the gas path on the Model 320 to THC.
- Apply Methane of a known concentration to the inlet of the Model 320.
- Make a note of the reading by the analyser (R_{MA}).
- Switch the Model 320 gas path to CH_4.
- Allow the reading to stabilise.
- Make a note of the reading obtained by the analyser (R_{MC}).
- Calculate the concentration factor using the following equation:

  Concentration factor, $C = R_{MC}/R_{MA}$
- During normal operation, to find the actual Methane concentration of the sample, the value obtained by the analyser (R_N) whilst the Model 320 is in CH_4 mode, must be modified as follows:

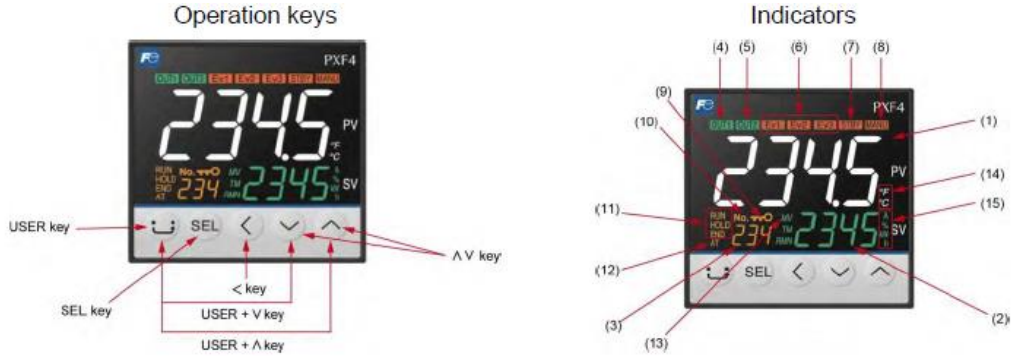
  Actual Methane concentration = R_N/C

NOTE: *See Analyser User Manual for instructions on analyser Span procedures.*

OPERATION

TEMPERATURE CONTROL

The temperature of the Cutter must be set and allowed to stabilise fully before use.



Temperature Controller Front Panel

USER key
- Press this key once in PV/SV display to switch between SV display and MV display.
- Press and hold this key in PV/SV display to start the assigned function. (No function is allocated at the factory.)
- Press this key once in operation control mode, channel-selection mode, or setup mode to return to PV/SV display.

SEL key
- Press this key once in PV/SV display to move to operation control mode.
- Press and hold this key in setup mode to move to channel selection mode.
- Press this key once in channel selection mode to move to setup mode.
- Press and hold this key in setup mode to move to channel selection mode.
- Press this key once in parameter selection submode of setup mode to enter parameter editing submode.
- Press this key once in parameter editing submode to save the change and return to parameter selection submode.

< key
- Use the this key to select the digit when changing values.

v∧ key
- Use the this key to change SV value when in PV/SV screen.
- During in operation control mode, channel selection mode, or setup mode, this key allows you to change parameters to be displayed.
- During in parameter setting mode, this key allows you to change parameter settings.

USER + ∧ key
- Press and hold this key in PV/SV display to start the assigned function.
  (The factory set function for this key is switching between RUN and standby.)

USER + v key
- Press and hold this key in PV/SV display to start the assigned function.
  (The factory set function for this key is switching between start/stop of auto-tuning.)

(1) Indicates process value (PV)
Shows parameter name when in parameter setting.

(2) Set point (SV)
Shows set value. Shows parameter set point when in parameter setting.

(3) Screen No.
Shows screen No. when in parameter setting.

(4) OUT1 indicator
Lights during control output 1 is ON.

(5) OUT2 indicator
Lights during control output 2 is ON.

(6) EV 1, EV 2, EV 3 indicators
Lights during digital output 1 to 3 are ON.

(7) STBY indicator
Lights during standby.

(8) MANU indicator
Lights during manual mode.

(9) Lock indicator
Lights during key lock.

(10) No. indicator
Lights during a screen No. is displayed.

(11) RUN/HOLD/END indicators
Lights during ramp/soak operation.

(12) AT indicator
Lights during auto tuning.

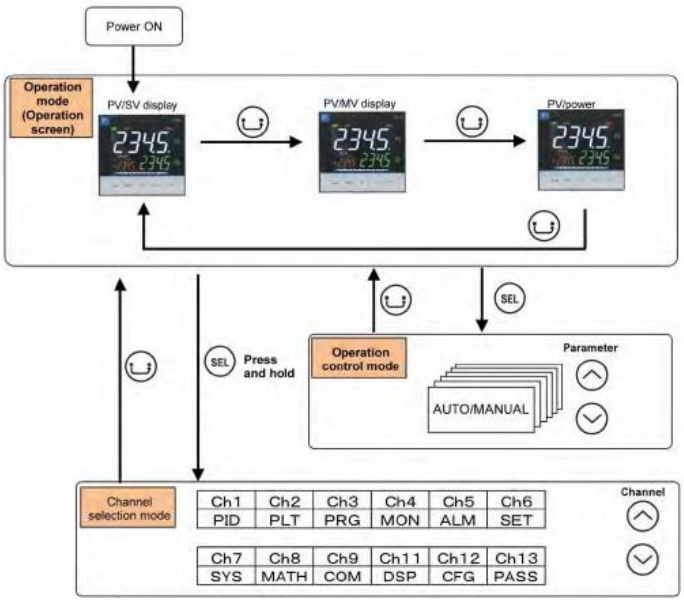
(13) MV indicator
Lights during MV is displayed on SV display.

(14)°C/°F indicator
Shows the temperature unit under use.

(15) A, %, kW/h indicator
Shows the unit being applied to values on SV display during the operation mode.

Power On

The unit has three modes, Operation, Operation control and Channel selection mode.



Operation mode
In this mode the normal operation is performed. The process value (PV) and the set value (SV) are displayed. The device starts in this mode when you turn on the power. You can change the set value (SV) in this mode. You can check the output value (MV) and the amount of electric power by switching the screen.
Operation control mode
In this mode you can put the device to standby or change the alarm set value.
Channel selection mode
In this mode you can select the parameter channel to be displayed.

Viewing and Setting Parameters

At power up, the controller will be in the operational mode — process variable (PV) will be displayed.

NOTE: PV is the temperature of the Cutter and it is not programmable.

How to Input Set-Point Value (SV)

- The SV is a target value for control.
- SV must be within the range between SVL (lower limit) and SVH (upper limit) which belong to Pid parameter.

Related parameters: SVL (page 50), SVH (page 50)

[Setting example] Changing the SV from 250°C to 1195°C

Display	Operating procedure
245 PV 250 SV	1. Check that the PV/SV display is shown.
	2. Press ∧ ∨ key to change SV to "1195".
245 PV 1195 SV	3. Press the SEL key to save the change. (The change will be saved after three seconds, even if you do not press any key.)

PARAMETER LIST

The following explains each channel parameter.

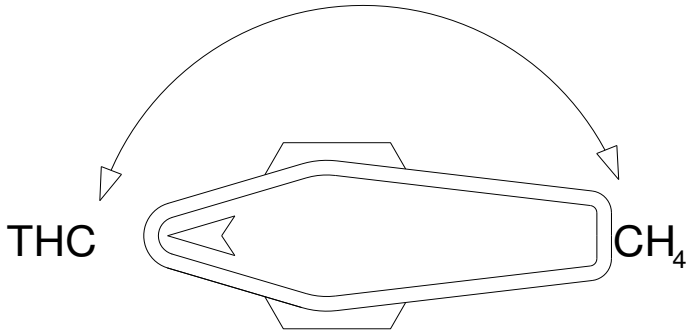
- The range of the parameters in the shaded area indicates the industrial values. When you change the PV input lower limit (Pvb), PV input upper limit (PvF), or decimal place position (Pvd), reconfigure all the industrial values.
- When the parameter that has [RESET] on its Remarks column is changed, turn off the power once, and then re-start the controller.

Operation control parameter

No	Parameter: Display	Parameter: Name	Function	Setting range	Initial value	Remarks
001	MAN	Switchover between auto and manual mode	Switchover between auto and manual modes	oFF (auto) / on (manual)	oFF	This parameter is not displayed in default setting. If you need to change this parameter, change the setting of "Cn11 dSP" so that it appears.
002	SLEV	Switchover between RUN and standby	Switchover the operation mode between RUN and standby	oFF(RUN) / on(standby)	oFF	
003	REM	Local/remote switchover	Switches SV between local/remote	LoCL (local) / REM (remote)	LoCL	
004	PGoC	Ramp soak control command	Changes ramp soak run states	oFF (stop)/run (run)/hLd (hold)	oFF	Displays End (when ending) or GS (during guaranty soak).
005	AT	Auto-tuning run command	Runs auto-tuning.	oFF (stop)/1/st/4/th (normal type)/Lo (low PV type)	oFF	
006	LACH	Alarm output latch release command	Cancels the alarm output latch state	oFF / rST (latch resets)	oFF	
007	SUV	SV selection	Chooses the SV No. used for control	LoCL Sv1 Sv2 Sv3 Sv4 Sv5 Sv6 Sv7 dI (chooses SV according to DI)	LoCL	"When changing the SV with the front key, do not change the "Svn" parameter via communication. Otherwise, the changed SV may not be stored correctly."
008	PI nU	PID selection	Chooses the PID No. used for control	LoCL (PID city) Pid 1 (PID group No. 1) Pid 2 (PID group No. 2) Pid 3 (PID group No. 3) Pid 4 (PID group No. 4) Pid 5 (PID group No. 5) Pid 6 (PID group No. 6) Pid 7 (PID group No. 7) dI (chooses PID group according to DI)	LoCL	
009	AL 1	ALM1 set value	Sets the alarm value for ALM1.	Absolute value alarm: 0 to 100% FS Deviation alarm: -100 to 100 % FS	2.50 %FS	
010	A1-L					
011	A1-H					
012	AL2	ALM2 set value	Sets the alarm value for ALM2.	Absolute value alarm: 0 to 100% FS Deviation alarm: -100 to 100% FS	2.50%FS	
013	A2-L					
014	A2-H					
015	AL3	ALM3 set value	Sets the alarm value for ALM3.	Absolute value alarm: 0 to 100% FS Deviation alarm: -100 to 100% FS	2.00%FS	
016	A3-L					
017	A3-H					
018	AL4	ALM4 set value	Sets the alarm value for ALM4.	Absolute value alarm: 0 to 100% FS Deviation alarm: -100 to 100% FS	2.50%FS	
019	A4-L					
020	A4-H					
021	AL5	ALM5 set value	Sets the alarm value for ALM5.	Absolute value alarm: 0 to 100% FS Deviation alarm: -100 to 100% FS	2.00%FS	
022	A5-L					
023	A5-H					
027	WMd	Electric power calculation command	Switches among on/off/hold of electric power calculation.	oFF (stop calculation) run (run calculation) hLd (suspend calculation)	oFF	
028	LoC	Key lock	Sets the key lock to prevent wrong operation.	oFF (no lock) ALL (all lock) PArA (All but SV locked)	oFF	

GAS PATH CONTROL

With the Model 320 Cutter correctly installed and set up, the gas output path from the Cutter can be switched directly between Methane-only (CH_4) output, and Total Hydrocarbon (THC) output.



Rotate the valve control knob on the front panel through 180°, as illustrated above, to select the desired gas path.