

HANDBOOK
FOR
ISA 130/131 DYNAMIC PROCESSORS

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SECTION 1: INTRODUCTION

Thank you for buying your Focusrite ISA dynamics processor. These units were designed by Rupert Neve to offer the ultimate in dynamics performance with the sound character and quality that you have come to expect from a Focusrite design.

Each module is lovingly built and goes through 7 stages of test and soaking to ensure that every production module matches up to the standard of the original reference modules.

We hope that your dynamics unit will provide you with many years of excellent service and this manual provides information to install and use your ISA130/131 and solve any small problems that may arise.

Focusrite currently offers one type of processor, available in two different packages; the 7U high ISA130 and the 1U, 19" ISA131. The dynamics processors contain nearly identical electronic circuitry and are both covered in this manual.

1.1 OVERVIEW

The ISA130/131 designs are full function dynamics processors based around a proprietary VCA design. These VCAs measure better than commercially available devices in terms of specification and sound quality.

The ISA130/131 circuits are identical to those in the world famous Focusrite master recording consoles, but with the addition of equalisation and de-essing circuitry.

Each unit offers a compressor/limiter, expander/gate, de-esser/exciter and versatile eq section.

The compressor/limiter is of the "textbook" type, silently doing it's job without audible "pumping". The soft knee characteristic also adds to the transparency of the compressor/limiter making the whole unit very effective in most situations.

The gate is very sensitive, fast and quiet and the filters and simple bell equalizer may be used in either of the two processing sidechains or across the signal itself.

A de-esser/exciter is also provided which allows "notch" compression in "de-ess" mode (particularly useful for suppressing sibilance) and the opposite in "excite". This last mode is like a frequency conscious aural exciter.

The input and outputs are fully balanced: the audio and key inputs being electronically balanced and the output transformer balanced. This means the unit can be freely connected to any device without damage or signal detriment.

SECTION 2: INSTALLATION

2.1 UNPACKING

The ISA130/131 is sealed in polythene and packed in polystyrene protective blocks in a solid cardboard box. Please retain these items in case you have to return the unit to us for any reason. This packing has been carefully designed and other packing could allow the device to become damaged in transit.

Also enclosed with the device is a warranty card and this manual. If you have purchased an ISA131 there will also be a mains lead provided. If any of these are missing please contact your distributor and obtain a copy.

Please fill in the warranty card and return it to us as soon as possible. This card provides the link between you and us and allows us to service your needs as efficiently as possible.

2.2 POWER CONNECTIONS

ISA130

Assuming that the unit is being installed in a Focusrite rack it will receive it's power from the PSU121H power supply, so just push the unit into the rack in any slot and tighten the knurled screws to support it. For details of the power connections to the PSU121H see it's handbook.

If the unit is to be installed in your own racking system then you will need to refer to the appendices for information on the connector pinout and power capacities. The appendices also provide information on the audio connections for DIY enthusiasts.

ISA131

This unit is supplied in a 19" self contained rack and all connections are made via plugs directly to the rear of the case.

The power is connected via an IEC "euro" shielded socket which is supplied with the device. The user end of the euro is terminated in bare wires which should be connected to the mains supply as follows;

Blue wire	Neutral supply
Brown wire	Live supply
Green/yellow wire	Mains earth

It is important that the earth wire is connected as it provides essential electrical and safety screening.

The ISA 131 has a voltage changeover unit which is accessible from the rear panel. Ensure that the mains voltage selector is set as follows;

Input voltage 200-250 set to 240v

Input voltage 90-120 set to 120v

To change the setting, slide the screwdriver slot either up or down until the correct setting is displayed.

You will note that there are two fuses in the fuse carrier. The fusing arrangement has been designed so that both fuses are always used and do not need altering if used with different mains voltage supplies. The ratings are detailed in the specifications section.

In an ideal world a 1 amp mains fuse should be fitted at the mains plug, not a 13 amp, because the ISA130 is not a kettle.

2.3 AUDIO CONNECTIONS

ISA 130

The audio connectors are on the rack rear panel with one set provided for each rack slot. The connectors are XLRs labelled MIC, LINE, OUT. For ISA 130's these XLRs are connected as follows;

Label ISA130 connection

MIC	Key input
LINE	Channel input
OUT	Channel output

All our XLRs are wired pin 3 cold, pin 2 hot, pin 1 ground.

ISA 131

The audio connections are XLRs on the rear panel alongside the power connectors. Do not get them confused. The audio connectors are marked with their function and are wired the same as the ISA130: pin 1 cold, pin 2 hot, pin 3 ground.

With both units the chassis ground is internally connected to the mains and the signal ground at a star point.

2.4 SUPPLEMENTARY

The ISA 131 also has a link function whereby two units may be connected together to form effectively a stereo unit. When this is done additional link cables have to be made between the two units. The connectors are two

phonos, one marked out and one marked in. To link the two modules you connect the out of the master to the in of the slave.

It is possible to link ISA130 modules by hardwiring the rack connectors, or taking these points to an external switch. The appendices tell you where the connections appear on the DIN connector; to link the devices just connect the connections together.

SECTION 3: OPERATION

Both dynamics processors have virtually identical controls, which are described below. The ISA131 has some additional controls which are described separately at the end of this section.

3.1 OVERVIEW

Both units have the same overall block structure which is laid out in fig 1. The balanced input stage feeds a relay switching matrix which feeds the main Focusrite VCA. The output of the VCA feeds another relay matrix which finally feeds the main output transformer stage. In addition there are three sidechains; compressor, expander/gate, de-esser, and two filters, one eq section, a balanced key input and a full metering section.

The first relay matrix allows the user to insert any of the two filter sections into the compressor or expander/gate sidechains or the main audio path pre the VCA. The second matrix allows you to do likewise with the eq section except that if the eq is switched to the main audio path it appears post VCA. The de-esser sidechain has its own dedicated eq.

Each of the three sidechains can be switched in independently and the net result of the sidechains is summed and fed to the VCA. Three twenty segment meter monitors the input, compressor and expander/gate sidechains respectively.

3.2 INPUT

The input stage is electronically balanced with an input impedance of 10k ohms. The CMRR is excellent so the input should cope with any line device (excluding unbuffered telephone lines).

The output of the balanced buffer feeds the input meter, which has a 40dB range centred about 0dB.

3.3 COMPRESSOR/LIMITER

The compressor section has one button and 5 pots associated with it. The function of these is as follows:

Comp in button

This button switches the compressor in and out of circuit, by connecting the sidechain to the VCA. It also switches the compressor meter with the compressor sidechain. The meter shows the amount of compression or gain reduction.

Threshold pot	This pot sets the level at which the compressor starts to function. It is labelled in dBs and actually indicates the level at which the input signal will have been compressed by 3dB. The compressor has an "over easy" curve which means that the compressor comes in slowly at the threshold point rather than coming in savagely.
Ratio pot	This pot sets the rate of compression of the compressor for signal levels greater than the threshold. It is marked in ratios of 1.5 to infinity and relates how much the input signal must rise in order for the output signal to rise by 1dB. Therefore in the infinity position the compressor will function as a limiter, keeping a constant output level for an increasing input level over the threshold.
Attack pot	This pot sets how quickly the compressor responds to input signals which exceed the threshold level. It is marked in subjective intervals between fast and slow and its effect is to determine how "punchy" the compressor sounds to fast transient edges.
Release pot	This pot is the complement to the attack pot. It determines how slowly the compressor recovers from compression when the input signal dies below the threshold and is marked in seconds. Its effect is to determine how "dead" the compressor sounds to dying transients.
Gain pot	This pot adds additional gain into the compressor when it's switched in. Because the compressor reduces gain, the subjective response is that the compressed signal is quieter. The make-up gain pot adds back the volume.

3.4 DE-ESSER

There is a switch and two pots associated with this device. These are described as follows:

De-ess switch	This switch switches the de-esser in and out by connecting the sidechain to the VCA. Unlike the compressor there is no meter for this device.
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Freq pot This pot selects the frequency which the de-esser will respond to. It is actually the frequency control of a bandpass filter and selects a narrow range of frequencies about the centre markings on the front panel.

Sensitivity pot This pot adjusts the amount of emphasis or de-emphasis that the de-esser applies to the input signal. It is a centre tapped pot with the centre position being neutral or park (off). Turning the pot clockwise boosts the output level and turning the pot anti-clockwise reduces the output signal level, both dependant on the frequency content of the input signal.

3.5 EXPANDER/GATE

This section has 5 switches and 4 pots associated with it as follows:

Gate in switch This switch switches the gate in and out of circuit by connecting the sidechain to the VCA. It also switches the gate meter with the sidechain, showing the amount of gain reduction occurring.

Expand switch This switch converts the gate to an expander. The switch is lit to show that the expander circuitry has replaced the Gate's.

Key switch This switch replaces the input to the expander/gate sidechain from the main input signal with the external key input signal. The key input is electronically balanced with an input of 10k ohms.

Key listen switch This switch sends the output of the key input stage directly to the main output allowing you to hear the signal present on the key input.

Fast attack switch This switch modifies the attack time of the expander/gate from normal to very fast (50uS).

Threshold pot This pots sets the level of the input signal below which the expander/gate starts to function. It is marked in dBs and like the compressor has an "over easy" curve for expansion. The gate however, cannot be described as over easy and cuts rapidly, but silently.

Range pot

Expander:

This pot sets the amount of expansion that occurs when the device is active. When the signal falls below the threshold the signal is expanded at a ratio of 2:1 until the attenuation equals the range setting (in dBs). The gain remains fixed at this value for all signals smaller than this.

Gate:

In gating the range determines to what level the gain is reduced. If a range of 80 is chosen, when gated the gain will be -80dB.

Release pot

This pot determines how slowly the expander/gate recovers from expansion/gating after the signal level has risen above the threshold. Although the gate will close quickly, it will open slowly once threshold level is restored as determined by the setting of this pot. Expansion release works in an identical manner. It is calibrated in seconds from .1 to 5 seconds.

Hold pot

This pot only functions with the gate and determines how long the gate stays open after the input signal drops below the threshold to close the gate. When the time has elapsed the gate closes with the same speed as set by the release. Like the release pot it is calibrated in seconds.

3.6 FILTERS

There are 4 switches and four pots associated with the filters. These are described below;

Hi-pass filter in switch

This switch switches the hi-pass filter in and out of circuit. The switch cycles through 4 positions as follows:

POSITION 1 lights only the switch LED: The filter is in the audio path.

POSITION 2 lights the compressor LED: The filter is in the compressor sidechain.

POSITION 3 lights the gate/expander LED: The filter is in the expander/gate sidechain.

POSITION 4 turns all LEDs off: The filter is inactive.

Lo-pass filter in switch	This switch switches the lo-pass filter in and out of circuit. It functions identically to the hi-pass filter switch as described above.
Eq in switch	This switch switches the eq in and out of circuit. It functions identically to the hi and lo pass filters described above.
x10 switch	This switch multiplies the frequency range shown on the bell eq by 10 so that the range increases from 60-600 to 600-6000 Hz.
20-400 Hz pot	This pot controls the -3dB point of the hi-pass filter.
1k-20k Hz pot	This pot controls the -3dB point of the lo-pass filter.
60-600 Hz pot	This pot controls the centre frequency of the bell eq filter.
Level pot	This pot governs the cut and boost of the bell eq filter.

The ISA131 in addition has a front panel power switch and a link switch. And no, we're not going to describe the power switch.

3.7 LINK

The link switch enables a master device to control a slave device if the link cables are installed. In this mode the individual units will servo together so that they both have identical gain characteristics, irrespective of the individual front panel controls. What actually happens is that the device with the most gain reduction at that moment in time will control all the units linked together.

If the link cables are not installed on pushing the link switch it's LED will light and absolutely nothing else will happen.

Note that the de-esser circuits do not link.

SECTION 4: PROBLEM SOLVING

This section is intended to provide some helpful information in the event of a problem arising.

In the event of a problem arising **DON'T PANIC.**

Panic should be reserved for later on when after reading this section you find you still have a problem.

PROBLEM 1: IT WON'T WORK

- 1) Define "won't work".
 - a) It doesn't pass audio.
 - b) There are no lights on the front panel.

If a) look at problems 4,5 or if b) look at problem 2,3.

PROBLEM 2: NO LIGHTS APPEAR

First check that no lights appear under any circumstances. For instance check that the link or the filters don't work if pushed. If only some functions don't work see problem 3. If the unit is dead, read on.

The first piece of useful information is that there are no user serviceable parts inside the units. In plain English this means that there are no fuses inside. In the following, part 1) deals with ISA130s, 3) with ISA131s.

- 1) ISA130 Are the ISA121 power supply LEDs on ?

YES The ISA121 is working. Proceed to 2)
NO Is the mains supply to the rack on ?

YES Has the euro lead blown a fuse ?
NO Turn the supply on and try again.

YES Replace the lead/fuse and try again.
NO Has the rack blown a fuse ?

YES Replace the fuse and try again.
NO Pull out all the modules in the rack. Does the ISA121 come back to life ?

YES Panic. One of your modules has gone sick. Find the rogue by substitution and return it for prompt repair.

NO Panic. Your ISA121 is broken. There is a slim chance that it could be the connector. Your best course of action is to 'phone your distributor and get the unit fixed.

- 2) Are the rest of the modules in your rack looking dead?

YES Something very funny is going on. Have a cup of tea and look at it again. The most logical conclusion is that the rack never worked in the first place. If this is not the case, panic.

NO Relax. This is the right answer. Remove the ISA130 and substitute it into some other slots. Does it work in them ?

- YES No real cause for panic here, just mild annoyance. It looks like some of the slots in your rack are damaged. Return the rack for repair.
- NO Panic. Your ISA130 is no more. It has ceased to be. Please return it for prompt repair and accept our apologies.

3) ISA131 Are the power LEDs lit ?

- YES Check to see what else works and go to problem 3
- NO Has the mains fuses in the euro gone ?

- YES Replace the fuse and try again
- NO Are both fuses in the 131 intact ?

- YES Panic. It looks like the internal power supply is broken. Please return your 131 for repair.
- NO Replace the broken fuse(s) and try again.

PROBLEM 3: SOME LIGHTS NOT WORKING

1) Are the switches switching the audio ?

YES The most likely answer is that the LEDs have gone. Obtain some from your friendly LED retailer and replace them. Alternatively we would be happy to send you some ourselves.

NO Panic. Something fishy here. Please return your device to be repaired.

PROBLEM 4: METERS NOT WORKING

1) No meters working. Is signal passing through the device properly ?

YES If nothing registers on the input meter for 0dB signals then panic. Please return the device for repair.

NO Are the audio connections correct ?

- YES Panic. Please return the unit for repair.
- NO Connect the unit properly and try again.

2) Compressor meter not working. Is the compressor in ?

YES Is the threshold set above the input signal level ?

NO Switch it in and try again.

YES Turn it down until the compressor kicks in.

NO Panic. The meter circuitry could be broken. Please return the device for repair.

3) Expander meter not working. Is the gate/expander in ?

YES Is the threshold set above the input signal level ?
NO Switch the section in and try again.

YES Reduce the threshold and try again.
NO Is the range pot set above 0dB ?

YES Increase the range and try again.
NO Is the key in with nothing connected ?

YES Apply a signal to the key or switch key off
NO Panic. The meter circuitry could be broken.
Please return the device for repair.

PROBLEM 4: NO AUDIO COMING OUT

1) Check to see that power is connected and turned on.
Are the audio connections properly made?

YES Is the gate fully on ?
NO Connect the audio properly and try again.

YES Turn the gate off and try again.
NO Is the key listen on ?

YES Turn it off and try again.
NO Panic. There could be a problem with the VCA.
Please return the device for repair.

PROBLEM 5: AUDIO ATTENUATED WITH NO PROCESSING

1) Is the processing sidechains fully off ?

YES Are the XLRs wired up with the correct phase ?
NO Turn it off and try again.

YES Panic. Please return the unit for repair.
NO Rewire the phase correctly and try again.

PROBLEM 6: LINK DOESN'T WORK

1) Are the link cables in the right way ?

YES Are all the units in circuit ?
NO Fit link leads correctly.

YES Panic. Please return your device for repair.
NO Switch all units in and try again.

Any other problems please contact your dealer.

SECTION 5: APPENDICES

5.1 CONNECTOR PINOUT - ISA310

The ISA130 has a 64w DIN 41612 connector wired as follows:

<u>Pin</u>	<u>Row</u>	
2	a	c
4	nc	Key input +ve
6	nc	Key input -ve
8	nc	0v
10	nc	Audio input +ve
12	nc	Audio input -ve
14	nc	0v
16	Compressor link	nc
18	Exp/gate link	nc
20	nc	nc
22	nc	nc
24	+ 10v unregulated	0v
26	0v	nc
28	-15v	Audio output +ve
30	0v	Audio output -ve
32	+ 15v	0v

5.2 SPECIFICATIONS

COMPRESSOR

Threshold	-28 to +12dBu in 4dB steps
Ratio	1.5, 2, 3, 5, 10, infinity. In switched steps
Attack	300us to 90ms, continuously variable.
Release	100ms to 4sec, continuously variable.
Gain	0 to 20dbu make-up gain, continuously variable,

DE-ESSER

Freq	1k to 10kHz, continuously variable.
Sensitivity	From excite to de-ess

EXPANDER/GATE

Threshold	-40 to +10dBu, continuously variable.
Range	0 to -80dBu, continuously variable.
Attack	1ms or 50us, switchable.
Release	100ms to 5sec, continuously variable.
Hold	20ms to 4sec, continuously variable.

EQUALISER AND FILTERS

Hi-pass (18dB/octave)	20 to 400Hz, continuously variable, 3rd order
Lo-pass	1k to 20k, continuously variable, 3rd order (18dB/octave)
Mid eq	60 to 6kHz in two switched bands, +/- 16dB gain.

METERS

Input	20 segment LED -20 to +20dBu in 4dB steps.
Compression	20 segment LED, 0 to 20 dB gain reduction in 1dB steps.
Exp/gate	20 segment LED, 0 to 20 dB gain reduction in 1dB steps.

GENERAL

All inputs	10kohm input impedance, 20-20KHz. >60dB CMRR
Noise	>80dBu @ 4dBu input.
Freq	-3dB at 120KHz.
Type THD+N	0.002% @ 1KHz, 0dBu input
	0.005% @ 1KHz, 10dBu input
	0.01% @ 1KHz, 20dBu input
Power	ISA130 only: +/- 15v, 200mA typ.
	ISA131 only: Protected by 2x 0.5 amp anti-surge fuses.