

SPL 2
SPL 2 *TS*
SPL 3
SPL 3 *TS*

USER MANUAL

DATEQ
audio technologies

Safety instructions

- 1 All safety instructions, warnings and operating instructions must be read first.
- 2 All warnings on the equipment must be heeded.
- 3 The operating instructions must be followed.
- 4 Keep the operating instructions for future reference.
- 5 The equipment may never be used in the immediate vicinity of water; make sure that water and damp cannot get into the equipment.
- 6 The equipment may only be installed or fitted in accordance with the manufacturer's recommendations.
- 7 The equipment must be installed or fitted such that good ventilation is not obstructed in any way.
- 8 The equipment may never be installed in the immediate vicinity of sources of heat, such as parts of heating units, boilers, and other equipment which generates heat (including amplifiers).
- 9 Connect the equipment to a power supply of the correct voltage, using only the cables recommended by the manufacturer, as specified in the operating instructions and/or shown on the connection side of the equipment.
- 10 The equipment may only be connected to a legally approved earthed mains power supply.
- 11 The power cable or power cord must be positioned such that it cannot be walked on in normal use, and objects which might damage the cable or cord cannot be placed on it or against it. Special attention must be paid to the point at which the cable is attached to the equipment and where the cable is connected to the power supply.
- 12 Ensure that foreign objects and liquids cannot get into the equipment.
- 13 The equipment must be cleaned using the method recommended by the manufacturer.
- 14 If the equipment is not being used for a prolonged period, the power cable or power cord should be disconnected from the power supply.
- 15 In all cases where there is a risk, following an incident, that the equipment could be unsafe, such as:
 - if the power cable or power cord has been damaged
 - if foreign objects or liquids (including water) have entered the equipment
 - if the equipment has suffered a fall or the casing has been damaged
 - if a change in the performance of the equipment is noticedit must be checked by appropriately qualified technical staff.
- 16 The user may not carry out any work on the equipment other than that specified in the operating instructions.

Introduction



The SPL2, SPL2TS, SPL3 and SPL3TS are sound pressure limiters (SPL), especially designed for use in public houses, discotheques, etc. The SPL-limiters are no peak-limiters, they only limit the average sound pressure. Trimmers for on-site calibration are positioned behind removable cover(plates) which can be put under seal.

The four different Dateq SPL-limiters form one family. The SPL2 and SPL2TS function without a microphone, the SPL3 and SPL3TS use a special measuring microphone. The SPL2TS and SPL3TS are supplied with a timer, able of setting the maximum sound level for certain periods of the day (see table 1). Basically, all four types are identical. This manual covers all different types. Directions for one specific type, are indicated with a logo in the left margin.

	SPL 2	SPL 2 TS	SPL 3	SPL 3 TS
measuring microphone			•	•
timer		•		•

Table 1 : individual functions limiter types

Measuring microphone (advantages and disadvantages)

In some cases, authorities dictate the use of a measuring microphone. Also when using the limiter with live-music, a measuring microphone will be essential. Using a measuring microphone can have advantages and disadvantages.

- Calibrating the limiter usually takes place during the day, in an empty room. When this room fills with a crowd during the night, acoustical damping will occur, so the maximum sound level will be lower than the level set earlier. When making use of a microphone, the limiter will compensate for this difference.
- Using a measuring microphone can be a disadvantage in smaller rooms, with relatively low maximum sound levels (less than 100 dBA). In these situations, the crowd can easily drown the music, when singing along. This will be detected by the microphone, and the limiter can only react in one way: by reducing the music level. Especially at these moments, this is a totally unwanted effect.

The measuring microphone of the SPL3 and SPL3TS can be bypassed, by means of the bypass-switch behind the left cover, so experimenting with or without a microphone is possible. However in bypass-mode, the SPL3 and SPL3TS can not handle live-music.

Timer

2TS
3TS

A built-in timer can be very useful when the maximum allowed sound level varies per day or time-of-day. For example during the earlier hours of the evening, a higher level can be allowed than later in the evening or at night. The timer will switch automatically to the preset maximum level. The SPL2TS and SPL3TS-clock automatically switches between normal time and daylight savings time. The timer divides each day in 3 TimeSlots. The beginning and ending as well as the maximum sound level of each timeslot can be set by software.



Using the SPL limiter

The limiting-algorithm is designed in such a way that the presence of the limiter action is difficult to notice. Of course it is not recommended to cross the limiter threshold too often.

As soon as the threshold has been crossed more than 14 dB, an extra sanction will come into operation: the limiter will go into a 20 dB mute-mode, but before doing so, the OVERLOAD-LED will blink for a few seconds, to warn the DJ to take back the audio-level. If normally operated, this situation will never occur.

Music-mode / Live mode

3
3TS

The SPL3/3TS-limiters can be operated in two modes: a music-mode, during which the limiter will be a part of the audio-chain, and a live-mode especially for use with live-music, when musicians use their own amplifiers, percussion, etc.

- When signal is applied to the audio-input, the limiter will switch over into music-mode. The DETECT-, REDUCTION- and OVERLOAD-LED's indicate the status of the limiter. When the maximum level is exceeded, the audio-output will be reduced.
- In case no signal is applied to the audio-input, and the measuring microphone measures a sound level above the maximum allowed level, the limiter will switch over to live-mode. The WARNING- and SANCTION-LED's indicate the status of the limiter. In live-mode, the SPL3/3TS becomes a real "guard": because the limiter is not able to reduce the sound level in an active way, guarding the sound level will be done with the aid of two logical outputs. The first output (WARNING) can drive a LED or a lamp (via a solid-state-relay) to warn the musicians that the maximum level is exceeded. The second output is meant for switching the mains supply of the amplifiers of the live-band (via a solid-state-relay). If the WARNING-lamp will be ignored, the SPL3/3TS will sanction by switching off the mains supply of the bands' amplifiers.

Tip



Never try to use the SPL3/3TS in music-mode and live-mode at the same time, for example by feeding some of the bands' instruments through the limiter, while other instruments remain uncontrolled (percussion!). The limiter will unjustly try to reduce the level of only the instruments it is able to reduce, so the whole balance of the mix will be disturbed. Another problem of using both modes at the same time is that the WARNING-output will be disabled when signal is applied to the limiter. This is done because otherwise the WARNING-lamp will blink continuously in music-mode, since the limiter will always try to reach maximum sound pressure level when the input-threshold has been reached.

Product support

For questions about the SPL limiter series, accessories and other products, please contact:

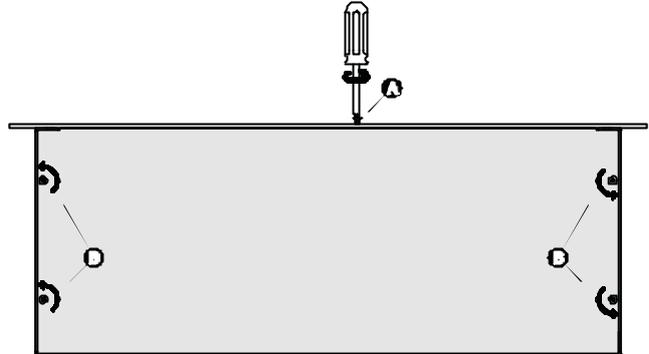
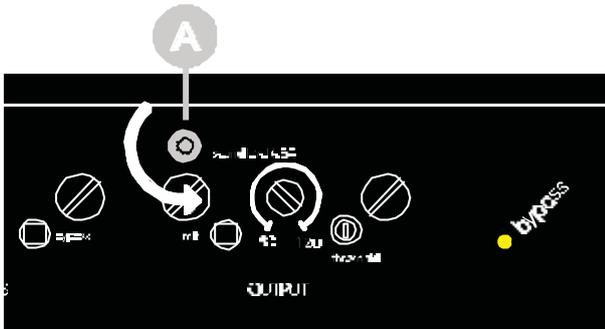
Dateq Audio Technologies B.V.

De Paal 37
1351 JG ALMERE
The Netherlands

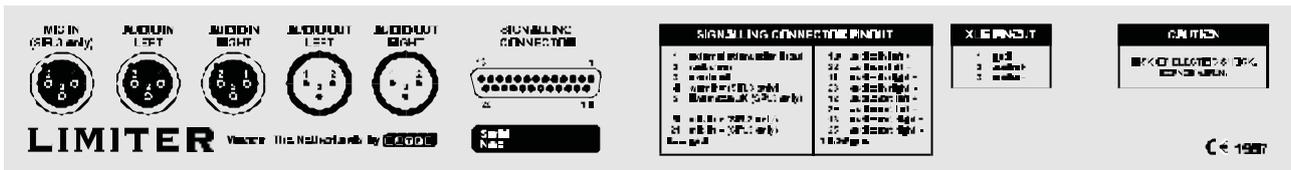
Telephone: +31 36 54 72 222
Fax: +31 36 53 17 776
E-mail: info@dateq.nl
Internet: www.dateq.nl

Connectors

To prevent modification of the connections after calibration and sealing, the connectors of the limiter are inaccessible after sealing of the cover plates at the front. To access the connectorboard, remove the right cover plate at the front panel.



Unfasten screw (A) with a torx-screwdriver (see illustration). Now remove the 4 torx-screws (B) from the top lid. The top cover can be removed now. Gently lift the frontside a little, and slowly shift the top lid to the rear. The connectorboard will become visible.



3 Mic Input (only use the original DATEQ-microphone) (XLR 3-pins female)

Pin	Function	Type
1	Ground	A-GND
2	Audio +	In
3	Audio -	In

Audio In Left / Right (balanced XLR 3-pins female)

Pin	Function	Type
1	Ground	A-GND
2	Audio +	In
3	Audio -	In

Audio Out Left / Right (balanced XLR 3-pins male)

Pin	Function	Type
1	Ground	A-GND
2	Audio +	Out
3	Audio -	Out

Signalling Connector (25-SUBD female)

Pin	Function	Type
1	external attenuation input (variable resistor 10 k Ω linear)	In
2	reduction	Out
3	overload	Out
4	warning	Out
5	live mode OK	Out
9	mic in +	In
21	mic in -	In
10	audio in left +	In
22	audio in left -	In
11	audio in right +	In
23	audio in right -	In
12	audio out left +	Out
24	audio out left -	Out
13	audio out right +	Out
25	audio out right -	Out
6..8	gnd	
14..20	gnd	

Connectors

3
SPL3
SPL3TS

MIC IN

Jack connector for the measuring microphone, supplied with the SPL3 and SPL3TS. The limiter does not function without a connected microphone, except when the microphone is bypassed. The microphone cable can be extended, maximum is 100 meters (300 feet), but be aware of the polarity of the symmetrical cable. Mount the microphone to the wall or ceiling. Try to choose the position of the microphone in such a way, that the microphone picks up a good quality audio-signal. Try to prevent resonance for certain frequencies, or feeding the microphone with a filtered sound. Experience learns that it is advisable to try to position the microphone not too close to the crowd, so the balance between "human noise" and "electronic noise" tends to tip the scale in favour of "electronic noise". Sometimes authorities dictate the location where the measuring microphone should be mounted.

AUDIO IN L/R

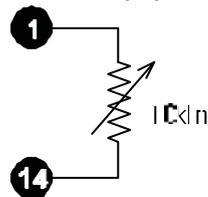
Balanced audio inputs left and right.

AUDIO OUT L/R

Balanced audio outputs left and right.

EXTERNAL ATTENUATION INPUT

External volume control is possible by connecting a 10k Ω variable resistor. This way it is possible to control the volume from another place than where all the equipment is situated, for instance behind the bar.



REDUCTION

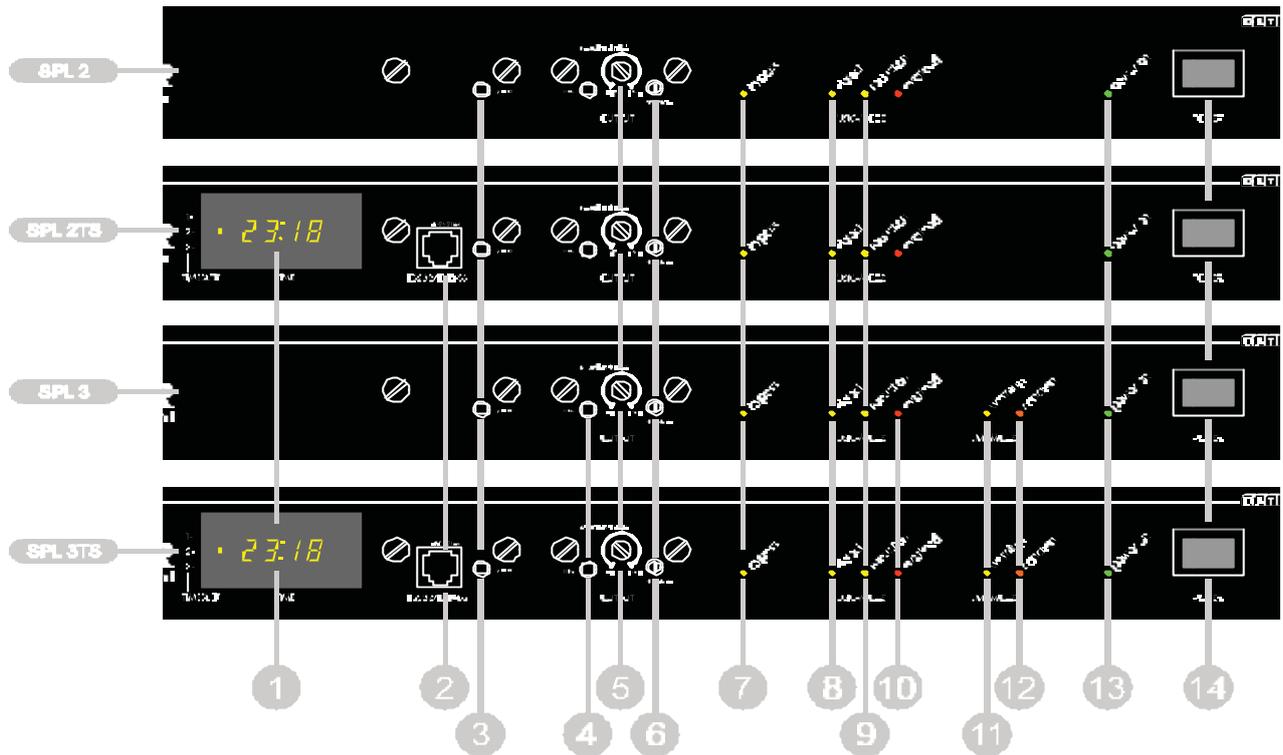
Connection for LED's or solid-state-relays, for external signalling of the REDUCTION situation (20 V DC / 10 mA).

OVERLOAD

Connection for LED's or solid-state-relays, for external signalling of the OVERLOAD situation (20 V / 10 mA).

	WARNING	Connection for LED's or solid-state-relays, for external signalling of the WARNING situation (20 V / 10 mA).
	LIVE MODE OK	Output for driving the switched power for the "live"-amplifiers (normally this output is "on" (+20 V / 10 mA DC), in the case of sanction, current is switched off).
	MAINS	Mains connection cable. The SPL limiters operate at 220 .. 240 V AC. The limiter has a built-in self recovering fuse which does not need to be replaced.

Operation



2TS
3TS **1 TIME display.** In normal mode the LED-display shows the time-of-day, in military format (24h-format). When switching on the limiter, the date and time will scroll through the display. This is the easiest way to check if the time and date are set correctly. The 3 LED's on the left side of the display indicate which TimeSlot is active. Be sure the installation engineer or authority who programs the limiter leaves a programmed settings list, so the settings can always be checked afterwards. Other messages than time-of-day can appear on the display:

1 29-12-97 13:46

Time : 13:46
Year : 97
Month : 12 (December)
Day : 29
Weekday : 1 (monday)

23:18 This is the normal mode of the display. The display indicates the time-of-day.

b P:2 The timer switched the limiter in bypass-mode. The number indicates the active bypass-period: in this case bypass-period 2. This message alternates with the time.

Err.3 The timeslot-data in the memory of the timer is corrupted. The limiter has to be programmed again to solve the problem. As long as the problem persists, the limiter will remain in error-mode: the maximum output of the limiter will be reduced considerable.

Err.4 Something went wrong when programming the timer. The timer needs to be reprogrammed, otherwise the limiter will remain in error-mode.

E r r 5 The internal check of the limiter failed. Have the limiter repaired by authorised service personnel.

2TS **3TS** **2 RS232-connector.** The installation engineer or authority that calibrates the limiter is able to program the limiter, with the aid of a special computer program. Each day of the week is divided into 3 TimeSlots. The attenuation of each timeslot and the timeslot boundaries can be programmed with this program. Also special bypass-periods can be set: periods during which the limiter-functions are not active, for example during special events. 20 Different bypass periods can be programmed. The computer program is able to make a hardcopy of the data programmed in your limiter. It is useful to keep a hardcopy with the limiter, so the programmed data can always be checked. If your installation engineer or the calibrating authority doesn't have this program at his disposal, please contact your DATEQ-representative. With some restrictions, software is available freely.

3 **Bypass-switch.** The mentioned bypass periods can also be set manually with the aid of the bypass switch behind the left cover. Leave the right cover under seal when setting the limiter in bypass-mode. This way the limiter doesn't have to be recalibrated after each special event.

3 **4 Mic-switch.** Mic-switch pressed: limiter with the aid of the measuring microphone. Mic-switch released: the measuring microphone is unused. This means that the live-mode can not be used. N.B.: after switching mode, the limiter needs to be recalibrated!

2 **5 Output Level adjustment.** With this trimmer the maximum allowed sound pressure level can be set. Apply signal to the input of the limiter (preferably white noise), so that the threshold will be crossed (DETECT and REDUCTION-LED are on). Adjust the OUTPUT LEVEL so that sound level will be the maximum allowed level.

3 **6 Sound Level adjustment.** With this trimmer the maximum allowed sound pressure level for the SPL3 and SPL3TS can be set. Apply signal to the input (preferably white noise), so that the threshold will be crossed (DETECT and REDUCTION-LED are on). Adjust the SOUND LEVEL so that sound level will be the maximum allowed level. The adjusted sound level is automatically also the valid maximum sound level in live-mode. This means that the limiter can also be adjusted in another way: apply signal (preferably white noise) to the microphone by means of an external audio amplifier and speakers. Be sure that the maximum sound level is reached. Now adjust the SOUND LEVEL trimmer so that the LIVE-WARNING-LED just starts blinking. Decreasing the noise level only 1 dB should quiet the blinking LIVE-WARNING-LED eventually.

6 **Threshold adjustment.** The threshold-level is factory-set to 0dBm. As soon as the audio input level exceeds 0dBm, the limiter will reduce output level. In the case a mixing console is connected to the limiter, it is desired that the level meters on the console will indicate "0 dB" at the point the threshold is crossed. If the output level of the mixing console is different from 0dBm (775mV), the threshold level can be readjusted.

When using the SPL3 with a measuring microphone the threshold-setting has no function.

It takes some time before the limiter settles itself after adjusting the SOUND-LEVEL or the THRESHOLD-trimmer. Take this into account, when calibrating the limiter.

7 **Bypass indication.** This LED blinks if the limiter is switched in bypass-mode. This can be the result of a pre-programmed bypass period in the SPL2TS/3TS, or a pressed bypass-switch (behind the left front cover) in all limiters.

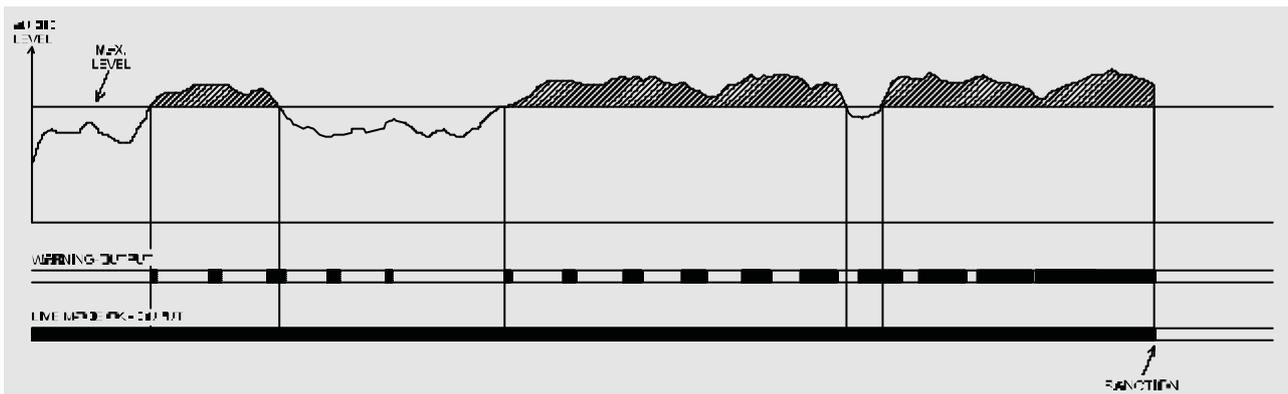
8 **Detect indication.** As soon as the input level exceeds the threshold level, the DETECT-LED lights up.

9 Reduction indication. When the limiter needs to reduce its output level, the REDUCTION-LED lights up.

10 Overload indication. As soon as the threshold is crossed more than 14dB, the SPL-limiter can not guarantee the audio quality of its output. To prevent this situation, a sanction by means of an extra attenuation of 20 dB will occur. If the threshold is crossed more than 14dB, the OVERLOAD-LED starts blinking. If no action is taken, the OVERLOAD-LED will light continuously after a few seconds, and an extra 20 dB attenuation will go into effect.

11 WARNING-indication. In music mode, the DETECT/REDUCTION/OVERLOAD-LED's are active, while in live mode, the WARNING/SANCTION-LED's are active. When the measuring microphone detects a sound pressure level higher than the allowed maximum, the WARNING-LED will blink. If this situation persists, the blinking will become more intense (increasing duty-cycle). See figure below. An external lamp can be connected with the same indication (via a solid-state-relay).

12 SANCTION-indication (live-mode). If the sound level remains exceeded, the blinking WARNING-LED will light continuously. A few seconds after this, the SANCTION-LED will light, and the current of the "Live mode OK"-pin will be switched off. This should be used to switch of the mains from the live-bands amplifiers. After 30 seconds the limiter will reset, and power will be reapplied.



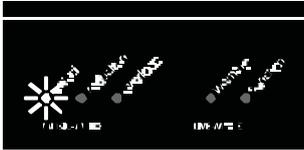
WARNING- and LIVE MODE OK- outputs

13 POWER ON-indication. This LED is on when the limiter is switched on.

14 POWER-switch. This is the mains switch of the limiter. When switched off, no audio will be fed through the limiter, and all outputs will be shut off. When switched on, the limiter needs some settling-time (blinking DETECT-LED (8)). After this, the limiter is ready for use.

Error messages

There are a few error situations in which the limiter will switch off its output, while one of the LED's at the front will blink to indicate that there is something wrong.



DETECT-LED (8) blinking: limiter is initialising after switching the power on. This situation will not last longer than a 2 seconds.

3
3TS

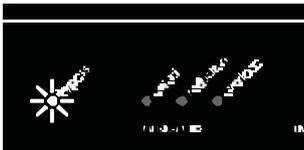


DETECT- & WARNING-LED (8) (11) blinking: limiter is initialising after switching the power on. In this case, the measuring microphone is switched on.

3
3TS



WARNING- & SANCTION-LED (11)(12) blinking: the supplied microphone is not connected correctly. Check the connection.



BYPASS-LED (7) blinking: the limiter is in BYPASS-mode, and will simply pass all audio on the input directly to the output.

Frequently asked questions

3
3TS

When installing a limiter based on a measuring microphone, a few problems can rise, which not everyone will realise in advance. To give a better insight in the operation of the limiter, the most frequently asked questions and their answers are mentioned below:

If the crowd makes too much noise (singing along with the music), the SPL3/3TS reduces the output level. How do I prevent this problem?

Especially in relatively small rooms, where the maximum allowed sound level is relatively low, the crowd is often capable of drowning the music. Of course this will be detected by the measuring microphone, and the limiter can only do one thing: reducing the music level, which is totally comprehensible, but rather undesired. **This problem can be prevented by mounting the microphone at a location where the balance between crowd and music tends to tip the scale in favour of music (closer to the speakers).** Another possibility is not using the measuring microphone. Realise that after relocating or switching off the measuring microphone, the limiter needs to be recalibrated.

I only use the SPL3/3TS for live music. What to do with the threshold trimmer?

The threshold trimmer has no function in live-mode. The setting of the threshold is only important in the case the microphone is not used. In that case the limiter is monitoring the input signal in order to calculate the necessary attenuation. When using the microphone, only the measured microphone-sound-level is important.

Even with the SOUND LEVEL trimmer turned fully clockwise, the maximum sound level is too low. What to do now?

It is likely that the maximum sound level is far higher than what will be allowed by the authorities. The SPL3/3TS is designed to handle sound levels from as low as 80 dBA to nearly 120 dBA. If for one reason or another, more sound level is desired, **increase the distance between microphone and speakers**. This way the limiter will detect a lower sound level, so the limiter will apply less reduction.

With a live band, some instruments and the vocals are going via the main PA-system, through the SPL3/3TS. The other instruments are protected with the switched sanction output of the limiter. When the maximum level is exceeded, all sources via the main PA-system will be attenuated, while all "self support" instruments remain at the original level, so the whole balance of the mix is gone.

This is right. The SPL3 and SPL3TS are not suitable to be used in music mode and live mode at the same time. When the maximum level is exceeded, there is only one sensible thing to do for the limiter: reducing the output level, which will disturb the balance of the mix if some instruments are not controlled by the VCA's of the limiter. **Use the limiter only in live mode in such cases.**

Technical specifications

INPUTS

3 3TS	MIC (measuring microphone)	XLR-3 female, electronically balanced, use only the supplied microphone
	LINE (left & right)	XLR-3 female, electronically balanced
	Signal level.....	-14 .. +6 dBu
	Input impedance	10 k Ω

OUTPUTS

	LINE (left & right)	XLR-3 male, electronically balanced
	Output impedance	600 Ω

GENERAL

AUDIO

Frequency response.....	20 Hz .. 20 kHz
Signal/noise ratio	> 80 dB
THD+N.....	< 0.05 %

LIMITING

Limiter threshold (adjustable)	-14 .. +6 dBu (without measuring microphone)
Limiter threshold (adjustable)	80 .. 120 dBA (with measuring microphone)
Output reduction (adjustable)	0 .. -40 dB (without measuring microphone)

EXTERNAL SIGNALLING

External attenuation	0 .. -20 dB (10 k Ω variable resistor)
Signalling- and switch outputs	20 V / 10 mA DC

POWER SUPPLY

Supply voltage.....	220..240 VAC / 50 Hz
Power consumption.....	10 W (SPL2 / SPL3), 20 W (SPL2TS / SPL3TS)

SIZE AND WEIGHT

Front.....	483 x 45 mm (B x H) = 19", 1HE
Depth	175 mm
Weight (net.)	3.2 kg (SPL2 / SPL3), 3.5 kg (SPL2TS / SPL3TS)