



**Digital Peak Programme Meter
478-200/210**

Users Manual



General Description.

The 478-series of audio level measuring instruments is member of a family of instruments designed to take up the heritage of the previous 477-series PPM's.

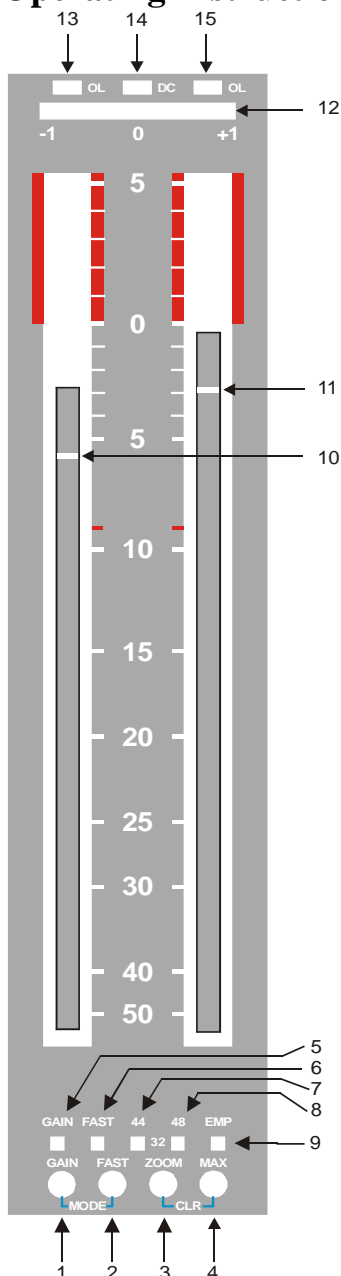
The prime function of this 478-100 series is to measure the peak level of a digital audio signal. Based upon one of today's most powerful DSP's it offers all of its predecessors appreciated qualities like a bright, high definition bargraph display with a multitude of display modes. In addition to that it provides a platform for realizing new functions like **loudness indication** and others not even thought of today. Even though the instrument has been designed for digital inputs, the various scale designs resembles their analogue counterparts.

It facilitates both measurements with 10/5 ms integration time in accordance with the IEC 268-10 and measurements with "zero" integration time. Additionally a spot indication may be superimposed on the normal reading, indicating the absolute level with reference to digital FS.

This enables the sound engineer, working in a mixed analogue and digital environment, to make a direct comparison between signals. Numerous other display functions are available including peak hold, memory, zoom, and an optional compatibility / phase meter.

The instrument is housed in a ruggedized aluminium cabinet with a high contrast, non-glare scale.

Operating Instructions.



1.GAIN. The scale can be offset by 20 dB to extend the measuring range down to -70 dB. The push button [1] has alternating action and the LED [5] will be lit when GAIN is selected.

2.FAST. Either "Fast" or normal (5/10ms) integration time may be selected. The sw.1 has an additional MODE function. By holding sw.1 depressed while pressing sw.2 various display modes (designated "a" to "e" below) are selected sequentially.

Display modes:

a: The mode "a" is easy to distinguish from the rest by the blend-in scale markings. An illuminated background extends to the scale mark "0" to provide clear scale markings, even in dimmed light.

b: In mode "b" a spot indication (10 & 11) is provided below the peak reading of the bar graph. The spot responds to the fastest peaks on the signal ("0" integration time). The calibration of the spot reading is such that the mark "0" (or the start of "overload range") equals digital full-scale level. This means that the distance between the spot indication and the mark "0" on the shown scale represents the true "head room" before digital clipping. This means that even with an analogue type scale and 10ms integration time the true digital peak level can be monitored.

c: In mode "c" a spot will have a "peak hold" action. Otherwise the function is equal of that of mode "b".

d: In mode "d" the spot displays the content of the peak memory. The spot appears either as a dark spot in the bar or as a bright spot in the background above the bar. The spot is calibrated such that the upper end of the background illumination corresponds to digital full-scale level.

e: In mode "e" the illuminated background extends to the top of the scale and the spot acts as a peak hold indication "riding" on the top of the bar. The integration time is the same as the one selected for the bar.

LOUDNESS

The "FAST" switch may also be used to select **LOUDNESS** indication. To switch to loudness the push button must be pressed for 10 s or more. As an entirely different program is loaded into the DSP the display will blank shortly. To revert to PPM mode the FAST button must be pushed again for more than 10 s.

3.ZOOM. The zoom function will increase the display resolution by a factor of ten. Thus for the shown scale the -50 mark will represent -5dB and the +5 mark will represent +0,5 dB. The LED 5 "GAIN" will flash as a warning in this mode.



4. **MAX.** The meter facilitates a peak memory that continuously stores the highest peak (since last clear). The stored level may be displayed by pressing the MAX button (4). The memory can be cleared by pressing 3&4 simultaneously.
5. **Gain LED.** See point 1
6. **FAST LED.** See point 2.
7. **Sample rate indication.**
8. **Sample rate indication.** When both LEDs are lit it indicates an “unusual” sample rate i.e. 32kHz or 96kHz.
9. **EMP.** The emphasis LED will be lit if the emphasis bit is set in the received digital signal. No de-emphasis will be introduced to the measured audio level whether the emphasis bit is set or not.
10. **See display modes, “b”**
11. **See display modes, “b”**
12. **Phase indication.** (Compatibility). On some models only.
13. **Overload LED.** Overload indication, left channel.
14. **DC-warning.** Any DC content in the audio signal is deliberately filtered out and will not affect the reading. The DC LED will however indicate if abnormal DC levels are present in the audio signal
15. **Overload LED.** Overload indication, right channel.



Instrument set-up.

Numerous parameters (like ref. level etc.) may be set by means of the four buttons on the front.

Normally the standard parameters set by the factory will be satisfactory and therefore no adjustments are needed.

Any adjustment should be done by skilled personnel following the instructions below.

In the following the buttons are referred to by numbers (1,2,3,4) where “1” is the leftmost button (or upper on horizontal scales). Press button 1 is written: [1]. Two buttons may be pressed simultaneously i.e. [1+3].

If the instrument is used in PPM and/or Loudness mode adjustments only affect the active mode and must be performed in both modes.

Adjustment of reference level:

1. Press [1+3] and hold for more than 1.6 s. The display will be lit in both channels with markings pr. 1 dB.
2. Press [3] to decrease reference level in 1 dB steps. Scale max. equals digital FS.
3. Press [4] to increase reference level in 1 dB steps. Scale max. equals digital FS.
4. Press [1] to save settings and resume to normal operation. (Or press [2] to jump to next adjustment point 2)

Adjustment of overload indicator threshold level:

1. Press [1+3] and hold for more than 1.6 s. The display will be lit in both channels with markings pr. 1 dB.
2. Press [2]. The display will be lit in the left channel with markings pr. 1dB.
3. Press [3] to lower the overload indicator threshold.
4. Press [4] to raise the overload indicator threshold.
5. Press [1] to save settings and resume to normal operation. (Or press [2] to jump to next adjustment point 3)

Adjustment of overload indicator threshold timing:

1. Press [1+3] and hold for more than 1.6 s. The display will be lit in both channels with markings pr. 1 dB.
2. Press [2]. The display will be lit in the left channel with markings pr. 1dB.
3. Press [2]. The display will be lit in the right channel with markings pr. 1sample.
4. Press [3] to increase the number of consecutive samples (above threshold level) to activate OL-indicator.
5. Press [4] to decrease the number of consecutive samples (above threshold level) to activate OL-indicator.
6. Press [1] to save settings and resume to normal operation. (Or press [2] to jump to next adjustment point 4)

Activating / deactivating display ballistics:

1. Press [1+3] and hold for more than 1.6 s. The display will be lit in both channels with markings pr. 1 dB.
2. Press [2]. The display will be lit in the left channel with markings pr. 1dB.
3. Press [2]. The display will be lit in the right channel with markings pr. 1sample.
4. Press [2]. The left overload LED will be lit.
5. Press [3] or [4] to toggle display ballistics on/off. Ballistics is on when the right overload LED is lit.
6. Press [1] to save settings and resume to normal operation.

Compensation for “ghost” spot. (Only required if display is replaced.)

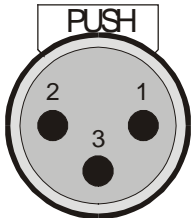
1. Press [1+3] and hold for more than 1.6 s. The display will be lit in both channels with markings pr. 1 dB.
2. Press [1] and hold for more than 6 s. All LED’s are lit in sequence for inspection.
3. Press [2] The display will be lit in both channels with a falling spot in the right channel.
4. Press [3] if a bright “ghost” of the spot appears in the left channel.
5. Press [4] if a dark “ghost” of the spot appears in the left channel.
6. Press [1] to save settings and resume to normal operation.



Terminal connections.

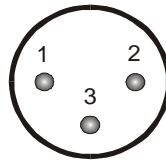
Digital (AES3) input and output.

XLR – female



1. Screen
2. Digital input +
3. Digital input -

XLR - male.



1. Screen
2. Digital output +
3. Digital output -

The XLR – male connector facilitates a passive loop-through of the AES signal to other apparatus. Hence the instrument is fitted with a switch able input termination. If the loop-through output is not being used, the switch (positioned between the two connectors) should be in the 110 Ω position.

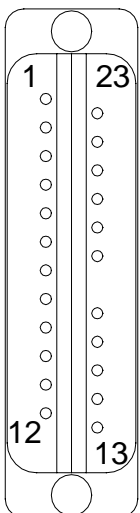
Power connector.

Power is supplied through the coaxial low voltage socket. A mating connector should have an outer diameter of 5.5mm and a hole diameter of 2.1mm. Either a 24V dc or a 18V ac supply should be used.

Optional Tuchel T2700 connector.

The meter is for a limited time period available with Tuchel type T-2700 connector

The mating part (type T-2701)
Seen from rear (soldering) side.



N.C.	1		
N.C.	2	23	+ Vcc
N.C.	3	22	N.C.
N.C.	4	21	N.C
N.C.	5	20	N.C
N.C.	6	19	N.C
N.C.	7	18	N.C
N.C.	8	□	
N.C.	9	17	N.C.
Input screen	10	16	N.C.
Digital input (-)	11	15	N.C.
- Vcc	12	14	Digital input (+)
		13	Chassis



Technical specifications.

Supply voltage.....20-32 V dc or 18V ac
Current consumption, @ 24V supply 160 mA typ. (Max. 220 mA)

Signal input:

Input type Serial digital audio interface (IEC 958/AES3)
Input impedance High impedance, floating, ($Z_i > 1 \text{ k}\Omega$) or 110 ohms
Minimum input signal $V_{\text{min}} = 200 \text{ mV}$, $T_{\text{min}} = 0.5 \times T_{\text{nom}}$ (IEC 958)
Sampling rates..... 48 kHz, 44.1 kHz and 96 kHz
SPDIF and TOSLINK optical inputs available on request.

Measuring characteristics:

Main reading (bar graph):

Integration time 5/10 ms (IEC 268-10, 1991-03)
Return time..... 1.7 s (0 to - 20 dB) (IEC 268-10, 1991-03)
Reference level selectable 0 to 31 dB below max. digital code.
Overload indication The bar intensity is increased within overload range.
Low frequency cut-off DC-blocking; Cut-off frequency $< 0.3 \text{ Hz}$

Secondary reading (spot):

Integration time "zero"
Return time..... 1.7 s (0 to - 20 dB) (IEC 268-10, 1991-03).
Scale max. Scale max. equals the lower limit of intensified bar range.
Reference level Scale max. corresponds to max. digital code level.

Phase indication:(option) 0 to 180°. - Resolution: 18°.

Additional functions:

Gain: Additional 20 dB gain selectable on front.
Mode The Bar-Graph display can be operated in various modes.
Memory: A peak memory is provided. Reset is controlled from a push-button on the front.
Zoom: To enable extremely accurate reading around "0 dB", the scale may be expanded by a factor of 10.

LED Indicators:

Flashing LEDs on top of each bar for instantaneous digital overload.
Excessive DC-content in either channel.
Gain, when selected.
Sampling rate and preemphasis, if present.

Loudness.

The instrument facilitates measurement of loudness in accordance with the algorithm proposed by the IRT.
The loudness mode is activated/deactivated by pressing the "FAST" button on the instrument front for more than 10s.