KLEIN + HUMMEL

O 900

HIGH DEFINITION STUDIO SUBWOOFER

O 900
PRO C 28
PRO M 68
PRO A 2000

DESCRIPTION AND FEATURES
SYSTEM CONFIGURATION

www.klein-hummel.com

O 900

Studio Subwoofer

Studio Subwoofer O 900

Studio Subwoofer O 900 with O 500C Main Monitor

System components

The O 900 studio subwoofer system can be used with a stereo or 5.1 surround monitoring system and - depending on the chosen configuration - will require some or all of the components shown below:

- **O 900**	**Studio Subwoofer**
- **PRO A 2000**	**Stereo Power Amplifier**
- **PRO C 28**	**Digital FIR Controller**
- **PRO M 68**	**Bass Manager**
- **O 300D / O 400 / O 500C**	**Active Studio Monitors**

Features and Advantages

Characteristics

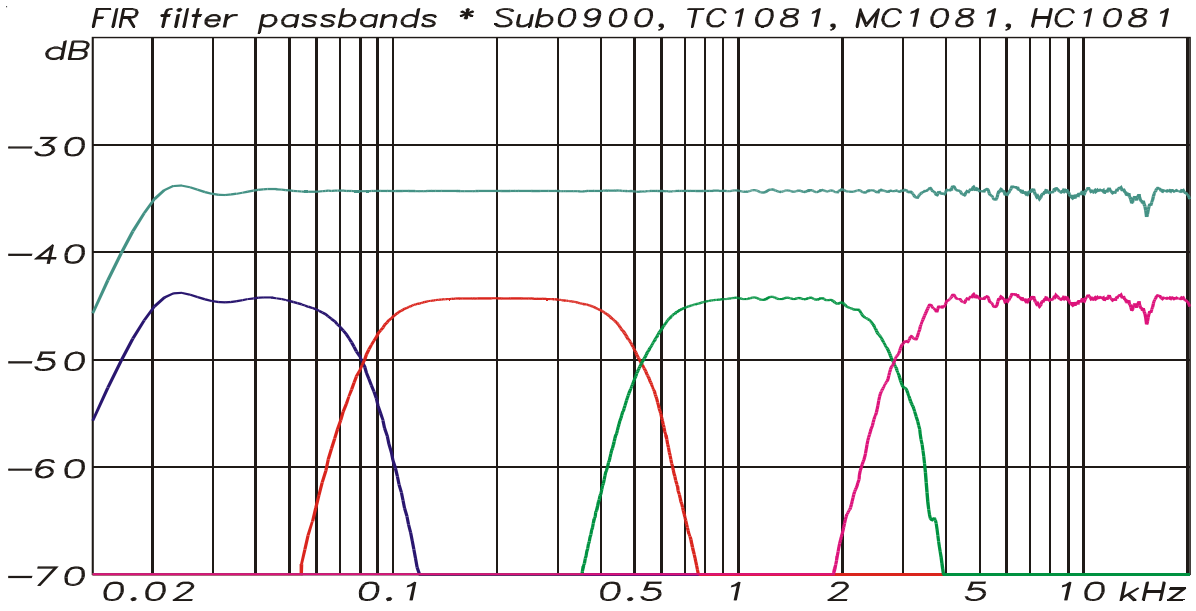
- High performance studio subwoofer with 2 extra long excursion 12“ woofers
- Extremely low frequency reproduction down to 17 Hz (-1.5 dB)
- Very articulate and accurate bass with excellent impulse response
- Maximum sound pressure with remarkably low distortion
- An excellent low frequency complement to studio monitors O 300 D, O 400 and O 500 C
- Magnetically shielded
- Operation through sub output of digital monitor O 500 C or digital controller PRO C 28 applying FIR-filter technology

„No compromise“ woofer design

- Pressure diecast aluminum basket with maximum air flow
- Rear vented voice coil design contributes to the production of very high sound pressure levels with minimal power compression
- Extremely long driver excursion of +/- 50mm yields exceptionally low distortion
- Patented polimeric impregnated Nomex® Kevlar® composite-cone produces a high degree of self damping and lowest distortion at very high excursion
- A demodulation ring reduces distortion and increases heat dissipation

Ingenious enclosure design

- Rigid enclosure design avoids resonance and yields accurate detailed bass linear bass response, independent of volume and higher sound pressure levels
- Large bass reflex ports eliminate unwanted air noise
- Enclosure design can accomodate optional stacking of the O 500 C studio monitor



Free Field Frequency Response, O 900 with O 500C

O 900 Terminals

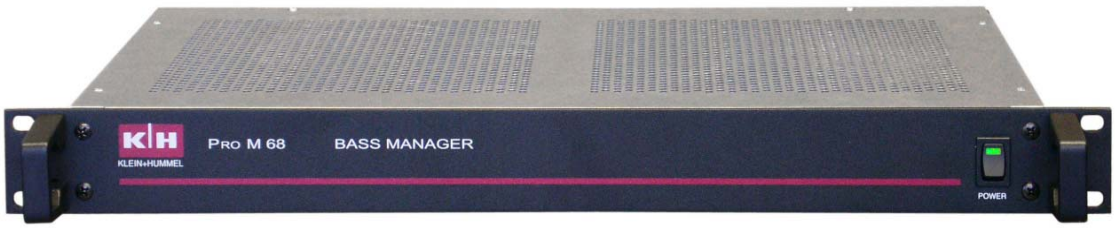
O 900 Rear View

Technical Specifications

Design principle		direct dispersion, bass reflex
Impedance		4 Ω
Frequency response	with digital controller	17 Hz - 200 Hz (± 1,5 dB)
Continuous output power		500 W
Peak power		2000 W
Drivers	woofer	2 x 12“ extra long excursion, aluminum basket, magnetically shielded, polymer impregnated Nomex® -Kevlar® composite cone
Protection circuitry	by digital controller	look-ahead peak and thermo limiter
Cabinet	material	double strutted MDF, 19 mm thick
	surface	painted finish,charcoal grey (RAL 7021), other colors options
	Pole mount adaptor	on top
	dampening material	virgin wool
	baffle cover	reinforced metal grille, optional
Dimensions	(w x h x d)	400 mm x 950 mm x 512 mm
Weight		52 kg
Connectors	2 x Speakon	Input 1 +/-, Through

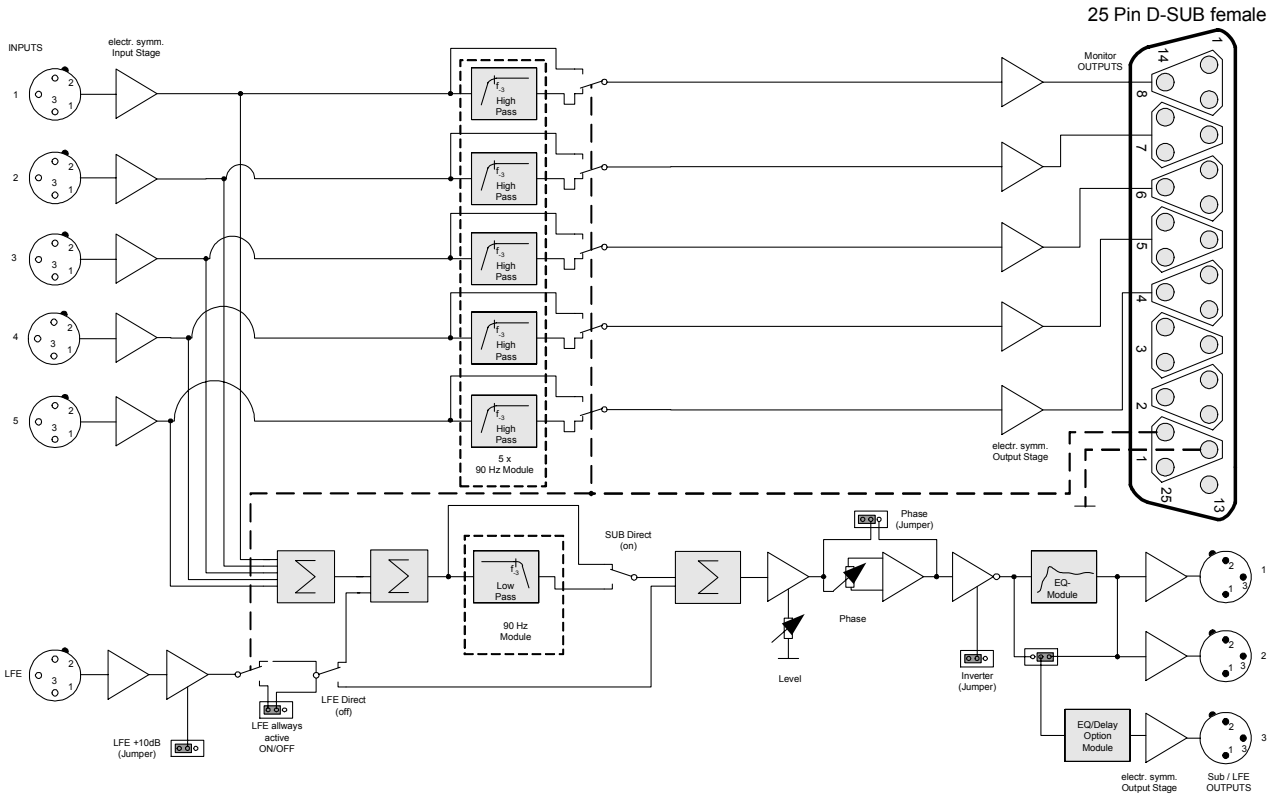
PRO M 68

5.1 Bass Manager



PRO M 68 5.1 Bass manager / summing unit

Schematic Diagram



Features and Advantages

- 5.1 Bass management for 5 active studio monitors and up to 3 studio subwoofers
- High pass filter of input channels with 24 dB/oct and routing to the monitor ouputs
- Low pass filter of input channels with 24 dB/oct, summing up and routing to the sub outputs
- Mixing of LFE signal into all sub outputs
- Flexible LFE signal management: LFE with O dB or + 10 dB amplification
  LFE selection with or without low pass filtering
- flexible high pass / low pass filtering with insert modules
- on/off switch of monitor ways
- Summing up LFE channel and up to 5 subwoofer channels of O 500C monitors to drive O 900 subwoofer
- Volume and phase adjustment of subwoofer outputs infinately variable
- Connection for optional digital delay for active acoustic room mode compensation

Technical Specification

Inputs	6 x XLR
Outputs	3 x XLR (SUB / LFE), D-SUB 25 for 5 monitor outputs
Input impedance, analog	14 kOhms, symmetrical
Max. input level	+ 22 dBu
CMRR	> 85 dB @ 15 kHz
Crosstalk	> 90 dB
Output impedance	20 Ohm, symmetrical
Max. output volume	+ 22 dBu
THD + N	< 0,002% at +4 dBu
THD	< 0,0003% at +4 dBu
DIM 100	< -92 dB
Noise, 20 Hz-20 kHz	< -94 dBu, unweighted
Operation switches	
Bypass remote connector	for external optional bypass switch
SUB input low pass	SUB (90 Hz low pass) / OFF (Full range)
LFE input low pass	LFE (90 Hz low pass) / OFF (Full range)
SUB / LFE level	output level damping 0 ... -15 dB
SUB / LFE phase	ouput phase 0° ... 180°
Ground lift	ON / OFF
Extension options / modules	high pass module 90 Hz
	low pass module 90 Hz
	EQ-modules for O 900 subwoofer
	digital delay UD 2
Dimensions	(H x W x D) 44 mm (1 U) x 483 mm (19“)
Weight	3 kg

PRO C 28

FIR Digital Controller

D·I·G·I·T·A·L FIR Controlled

PRO C 28 Stereo 4 way FIR digital controller

IR Remote control (optional)

Features and Advantages

Characteristics

- Stereo-4-Way digital loudspeaker controller designed for use with studio and PA loudspeaker systems
- Special digital FIR filtering for a completely independent equalization of system amplitude and phase (FIR = Finite Impulse Response)
- Linear phase equalization resulting in a constant group delay over the entire frequency range of the system
- Additional IIR digital filter section providing user-defined equalization with real-time control of changed parameters:
    - o Parametric EQ with 10 full parametric bands of equalization independently for each channel
    - o Room-EQ with IIR filters
- Four separate digital limiters included in every single output channel:
    - o Peak / RMS limiter to avoid distortion and loudspeaker damage by restricting the peak power of the power amplifier
    - o Thermo/excursion limiter to avoid speaker damage caused by overheating of voice coil
- Compact 19" 2U rackmount unit
- All important set-ups are done automatically by loading the individual parameter setup which is delivered for each studio monitor together with the Pro C 28
- All settups in the different menus of the controller can be stored in a system setup
- The possibility to optimize the system performance in a given installation by creating individual, room-specific FIR filter setups which can match every desired room equalization

State-of-the-art audio technology and performance

- Electronically balanced symmetric analogue input stage with lowest noise figures and distortion
- 2 stacked AD converters (Δ/Σ) on each channel („Gain Ranging“ technique) to provide an input dynamic range of more than 130 dB
- Digital signal processing with 48 BIT precision
- Latest generation DA converters (Δ/Σ)
- Smooth LP filtering after DA conversion to guarantee a very musical and clear sound
- High performance power supply to provide double voltage regulation for each functional block
- Wide connection facilities for analogue and digital signals
- Highest quality input transformer can be switched into the analogue input circuit

Extensive limiter concept

Every output channel (4 outputs left channel and 4 outputs right channel) features the following limiter structures which work independently from each other:

- Digital peak and RMS limiter in „look-ahead“-technology with digital modelling of the power amplifiers’ load-performance
  → Short attack time constant for safe prevention of power amplifier clipping
  → „Controlled Overshoot“ allows to use full peak power of the amplifier
  → RMS limiter restricts the maximum continuous power to the power amp’s max. value
- Digital thermo and excursion limiter with modelling of voice-coil temperature and cone excursion
  → Long attack time constants which is adapted to voice coil heating process of each driver
  → Prevention of thermal driver damage
  → Prevention excessive cone excursion
- All limiter settings are included in the parameter setup and will be loaded automatically at system setup

Comfortable Operation

- Easy stand-alone operation via front panel controls
- Alternative operation via remote control RC-55 (optional)
- Optional operation via IBM-compatible PC (RS-232 port integrated)
- Connection of several units via internal MIDI port (IN, OUT, THROUGH)
- New parameter setups transfer into the PRO C 28 by connecting a PC to the RS-232 port
- Internal memory of storing up to 70 different parameter setups
- Switching between different parameter setups can be done in real time during normal operation
- Every setup (even the selected parameter setup) can be stored within a general system setup

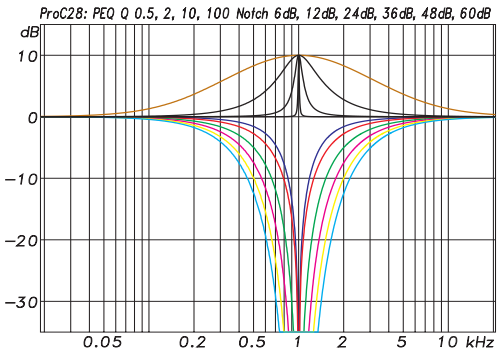
  Remote control providing direct access selection of up to four different system setups

Operation with monitor specific parameter setups

- To upgrade analogue K + H studio monitors (i.e. K + H models O 300 D)
  → Room and positioning equalization using the IIR EQ section and creating a room specific FIR filter setup for maximum system performance.
  → Simple connection between PRO C 28 and K + H monitors via a multicore cable with dedicated multiple pin XLR terminals
- System enhancement with one or more additional subwoofers (i.e. K + H model O 900)
  → Subwoofers will be considered in the parameter setup so that amplitude and phase equalization is extended to the lowest frequencies

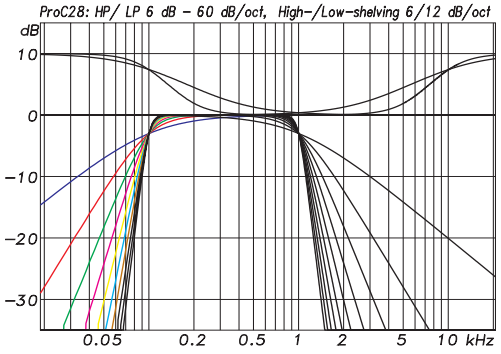
One way full range operation

- High end digital EQ with multiple delay options and sophisticated limiter concepts in a single unit
  → Equalization of other studio monitors and sound reinforcement systems
  → Possibility to use the IIR EQ section and / or the integrated FIR filters to realize filters with a linear phase response



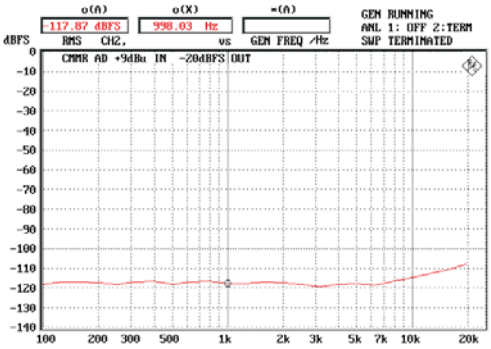
Filter Functions - Examples

Parametric EQ and Notch Filter with different Q's



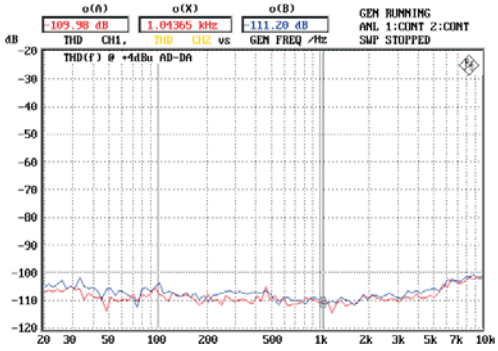
Filter Functions - Examples

High Pass, Low Pass, High Shelving, Low Shelving with Different Slopes



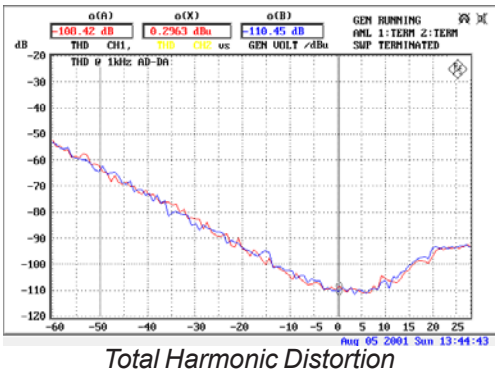
CMRR

Analog Input vs. Frequency at 9 dBu



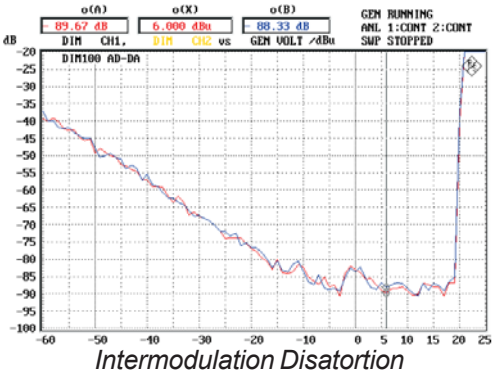
Total Harmonic Distortion

Vs. Frequency at 4 dBu Gain, Gain 0 dB



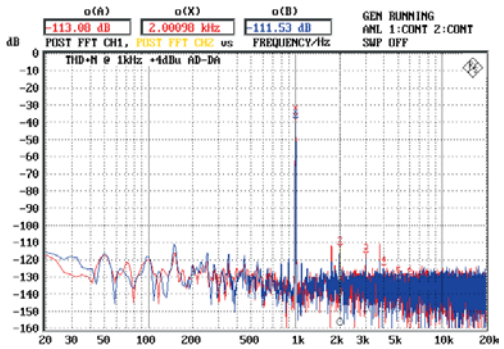
Total Harmonic Distortion

Vs. Input Level at 1 kHz Gain, Gain 0 dBu



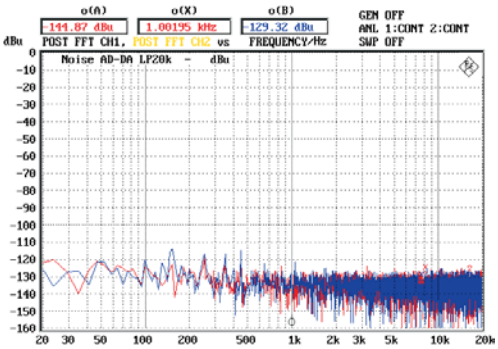
Intermodulation Disatortion

According to DIM 100 vs. Input Level, Gain 0 dB



Total Harmonic Distortion

At 1 kHz, 4 dBu, Gain 0 dB (1st Harmonic Cecreased by 40 dB)



Noise Floor

Gain 0 dB

Technical Specifications

Analog inputs	2 x XLR
Impedannce	10 kOhm (both: electron. symm. and transformer balanced)
Max. input level	24 dBu
CMRR	> 80 dB @ 15 kHz
Crosstalk	> 80 dB
Analog outputs	8 x XLR, electronic symmetrical
Outputimpedance	< 70 Ohm
Resolution	24 Bit, Delta/Sigma
Full scale output ranges	16, 12 or 6 dBu
Input digital	AES/EBU, XLR 110 Ohm transf. balanced, S/P-DIF; BNC, 75 Ohm
Output digital (insert)	AES/EBU, XLR 110 Ohm transf. balanced
Interface, remote control	MIDI, RS232 D-Sub D 25 pin
Baud rate	9600, 31520
Remote control	IR, model RC 55 (optional)
Audio Performance	
THD @ 1 kHz, + 6 dBu	0,0004 %
Noise floor	- 126 dB
Signal processing	
A/D conversion	resolution type 24 bit stacked AD, D/S
Sample rate	44,1 kHz, 48 kHz
D/A conversion	24 Bit, Delta/Sigma
Latency time behavior	basic latency time 5-7 ms, depending on individual way
Filter delay time	depending on filter type
Factory set parameters	
Filter algorithm	FIR-filters (Finite Impulse Response)
max.no. of parameter setups	depending on filter length, typically 50
Filter types	Linear phase, mixed linear/ minimal phase, minimal phase
Output ways	1 - 4
Equalizations	linearizing amplitude and phase, individually set according to connected monitors and user specification
Slopes	user defined up to 96 dB/oct.
Peak limiter	„look ahead“ 1,5 ms and „controlled overshoot“
Thermo/excursion limiter	simulation of coil and magnet temperature
Room specific filter setups	optional, requires individual measuring procedure by K + H
User defined equalizer	IIR (Infinite Impulse Response) filter algorithms
Filters / channel	10 fullyparametric filter types, Hi-/Low-Shelving 6/12dB/oct, high-/low pass 6/12 dB/oct; peak filter
EQ for room equalization	filter algorithms with IIR-filters
Filter types	Low-Cut; low; mid; high
Delay	Master delay 0 - 999 ms; channel delay 0 - 92 ms
Mains supply	117 V AC (90 - 130 V), 230 V AC (160 V - 250 V) internal selector
Power consumption	27 VA
Dimensions (H x W x D)	88 mm (2 HE) x 483 mm (19“) x 310 mm
Weight	4.9 kg

PRO A 2000

Stereo High Performance Amplifier

PRO A 2000 Stereo high performance power amplifier

Outstanding Audio Performance

The PRO A 2000 meets the highest demands in the modern world of audio technology. Outstanding audio performance in combination with absolute operational safety, high reliability, sophisticated extension options, and various control and diagnosis indicators make the PRO A 2000 a high class versatile power amplifier for studio and other sound reinforcement applications.

Output Power

2 x 650 watts RMS @ 4 Ohm
2 x 1000 watts RMS @ 2 Ohm
1 x 2100 watts RMS @ 4 Ohm in bridge mode

Features and Advantages

Outstanding audio performance

- Extremly low total harmonic distortion also under full load condition	THD+N -95 dB / 1 kHz / 2 Ohm
- Minimum distortion even at high frequencies	THD+N -85 dB/10 kHz / 2 Ohm
- Very low noise	120 dB (unweighted) or better

Smart temperature controlled Limiter

- reduces output power gradually by about 10 dB when temperature rises to a critical value: *no premature switching off*

Overload current limiter

- causes the level to be reduced but provides for undistorted audio signal when operating into a 1.5 Ohms load or less

Efficient cooling system

- 4 three step controlled fans operating in a push-pull arrangement for most efficient cooling

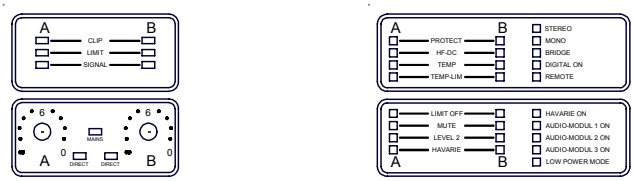
Energy saving mode

- Low Power Mode during audio signal pauses for lower power consumption and less heat generation, minimum fan noise

Extensive diagnosis indication

- All modes are indicated via colored LED´s in the diagnosis section:

  - o Mono / Stereo / Bridge mode
  - o 2nd Volume control / Limiter in action
  - o Remote control in function / Audio modules in function / Digital interface in function
  - o Redundant amplifier in function
  - o Audio signal presence and clipping

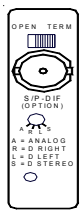


Signal Indication, Control Panal and Diagnosis Section

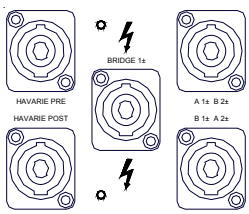
Optional extension facilities

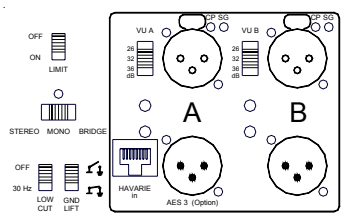
The PRO A 2000 offers a number of slots to insert feature modules for the functions listed below:

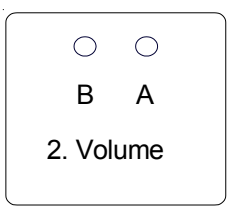
- Controller modules for speaker and speaker systems in studio and sound reinforcement applications
- S/P-DIF, AES/EBU digital interface 24 Bit/96 kHz
- Remote control interface
- Remote diagnosis module with display
- Parametric 2 x 2 band EQ
- 70 / 100 V output transformer slide in unit, 2 x 600 watts, 30 Hz – 20 kHz ± 1.5 dB
- Redundant amplifier extension option
- Highest performance transformer balanced option



S/P-DIF, AES/EBU digital interface







Inout and output connectors,mode and gain switches, 2nd volume control

Technical Specifications

Output power 20 Hz ... 20 kHz, 0.1 % THD+N

Operation	RMS	Peak
8 Ohms mono or stereo	2 x 395 watts	2 x 420 watts
4 Ohms mono or stereo	2 x 650 watts	2 x 850 watts
2 Ohms mono or stereo	2 x 1,000 watts	2 x 1,200 watts
8 Ohms bridge	1 x 1,300 watts	1 x 1,650 watts
4 Ohms bridge	1 x 2,100 watts	1 x 2,500 watts

Audio performance

Frequency response	> 20 Hz ... 20 kHz ± 0.5 dB at rated output power
THD+N	< -95 dB / 0.002 % at 1 kHz and rated output power into 4 Ohms
	< -85 dB / 0.006 % at 20 Hz...20 kHz and rated output power into 4 Ohms
DIM 100	< -85 dB / 0.006 % at rated output power into 4 Ohms
Noise	< -120 dB unweighted at 26 dB gain and rated output power
Dampening	> 400:1 at 1 kHz and 4 Ohms
Crosstalk	< -60 dB at rated output power into 4 Ohms, 20 Hz...20 kHz
CMRR	> 70 dB at 20 Hz ... 20 kHz

Features

Gain	26 / 32 / 36 db switchable per channel
Low-cut	30 Hz / 12 dB per octave slope
Limiters	peak, RMS, overcurrent and temperature
	all switchable except for the temperature limiter
Ground lift	
Energy saving mode	active as no input signal is present, level and time controlled

Power supply

Mains voltage	180 ... 250 V AC, 50 ... 60 Hz
Power consumption	idle 50 VA in energy saving mode
	about 2,500 VA RMS power
Mains fuse	16 A slow blow

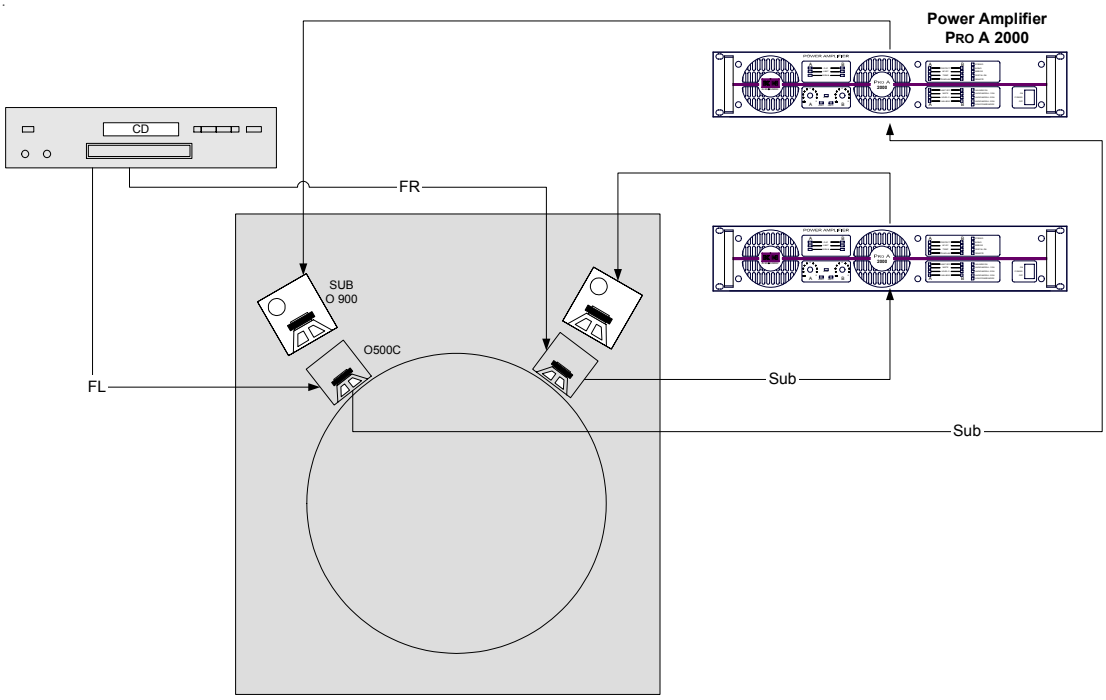
Dimensions, weight, design

Dimensions (H x W x D)	88 mm (2 units) x 483 mm (19“) x 470 mm over all
Weight	21 kg without options, packed up
Mechanical structure	2 mm steel frame with an aluminium front panel and
	screwed on 19-inch fastening angles

System Configurations

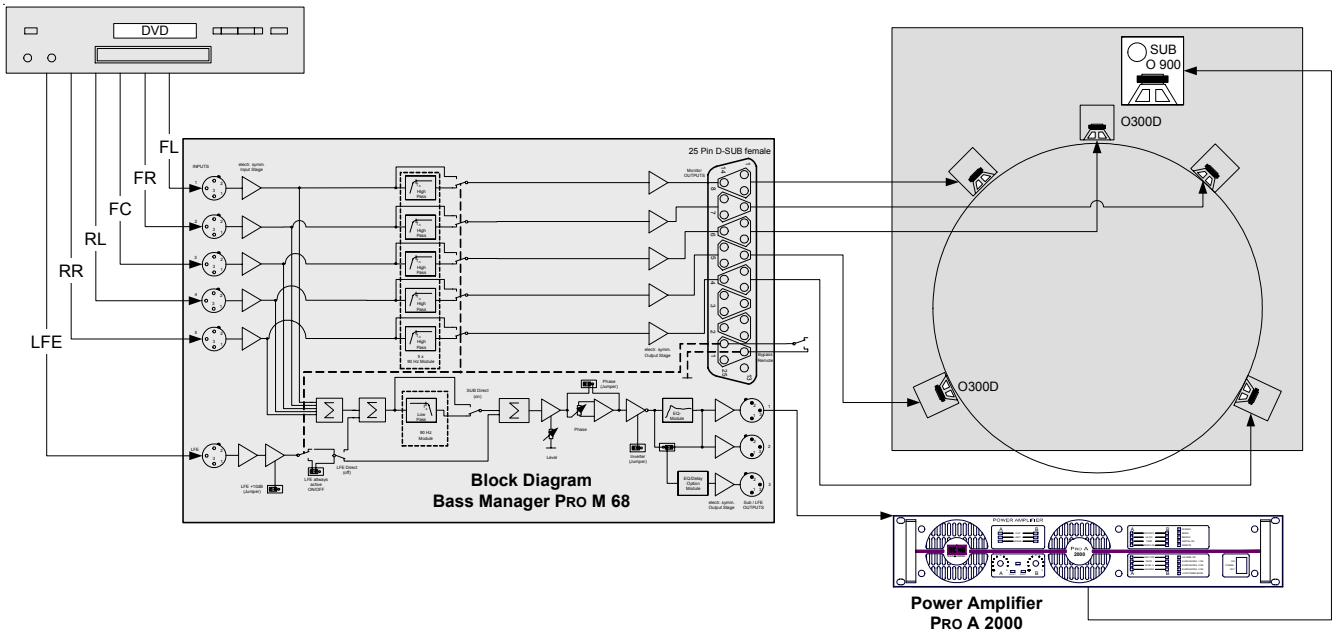
1) Stereo Setup

with 2 x O 500C, 2 x O 900 as sub extension and 2 x PRO A 2000 amplifiers

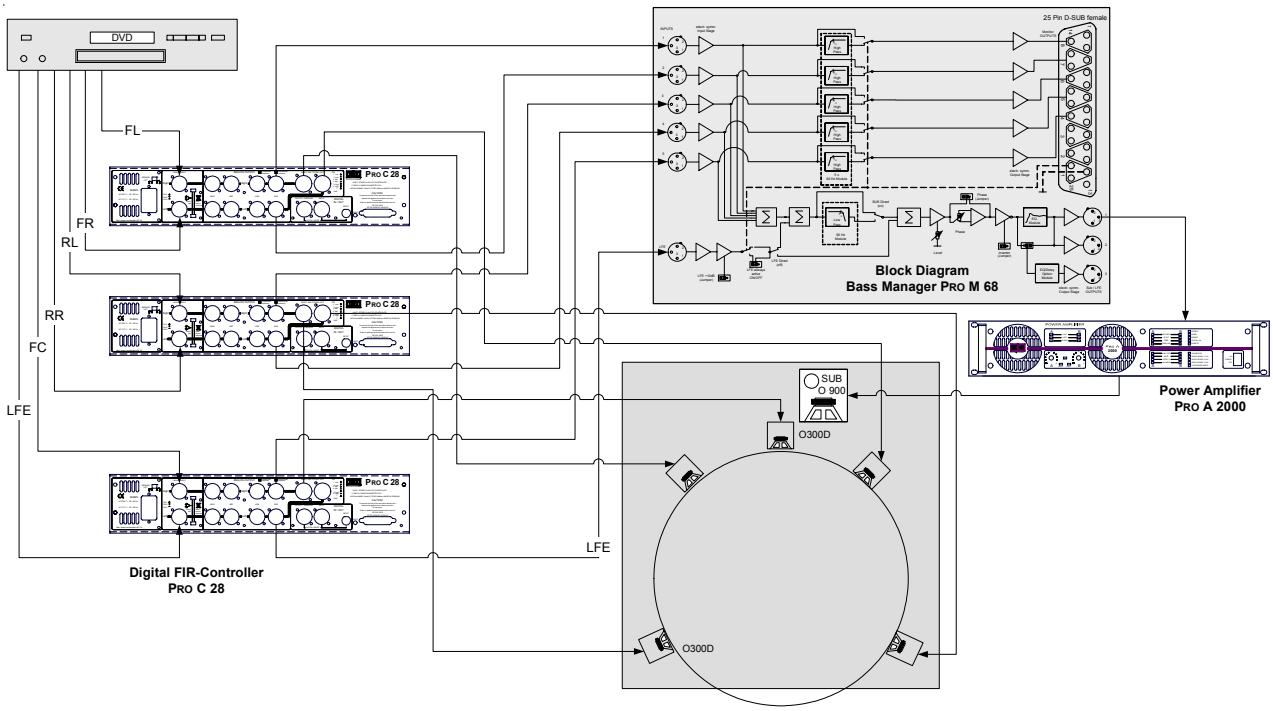


2) 5.1 Setup

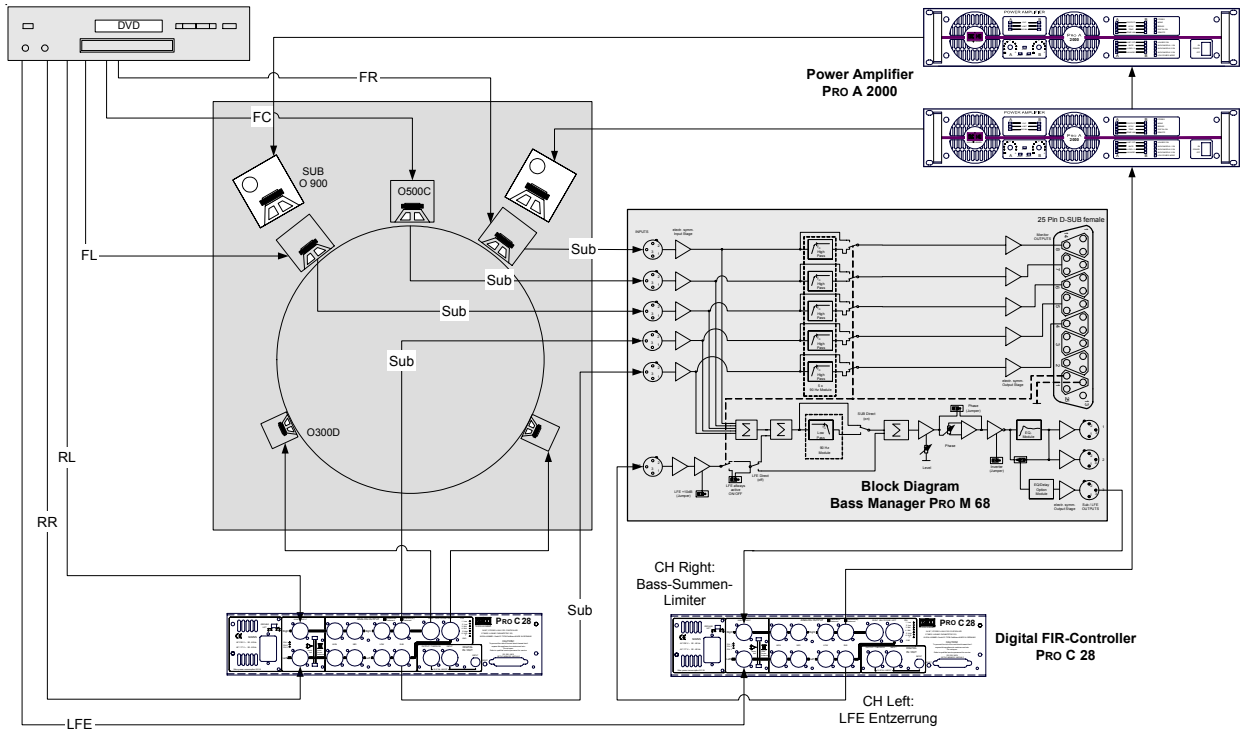
with 5 x O 300 D, 1 x O 900 as sub extension and LFE, 1 x PRO M 68, 1 x PRO A 2000



3) 5.1 Setup
with 5 x O 300 D, 1 x O 900 as sub extension and LFE, 3 x PRO C 28, 1 x PRO A 2000, 1 x PRO M 68

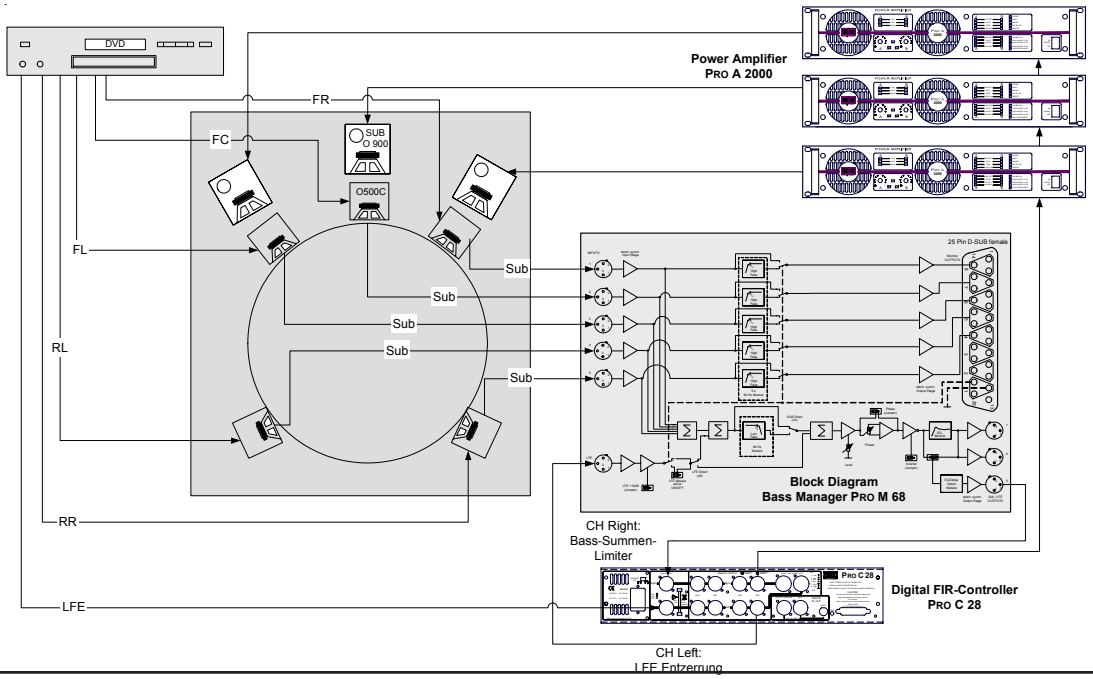


4) 5.1 Setup
with 3 x O 500 C, 2 x O 300D, 2 x O 900 as LFE and sub extension, 2 x PRO C 28, 2 x PRO A 2000, 1 x PRO M 68



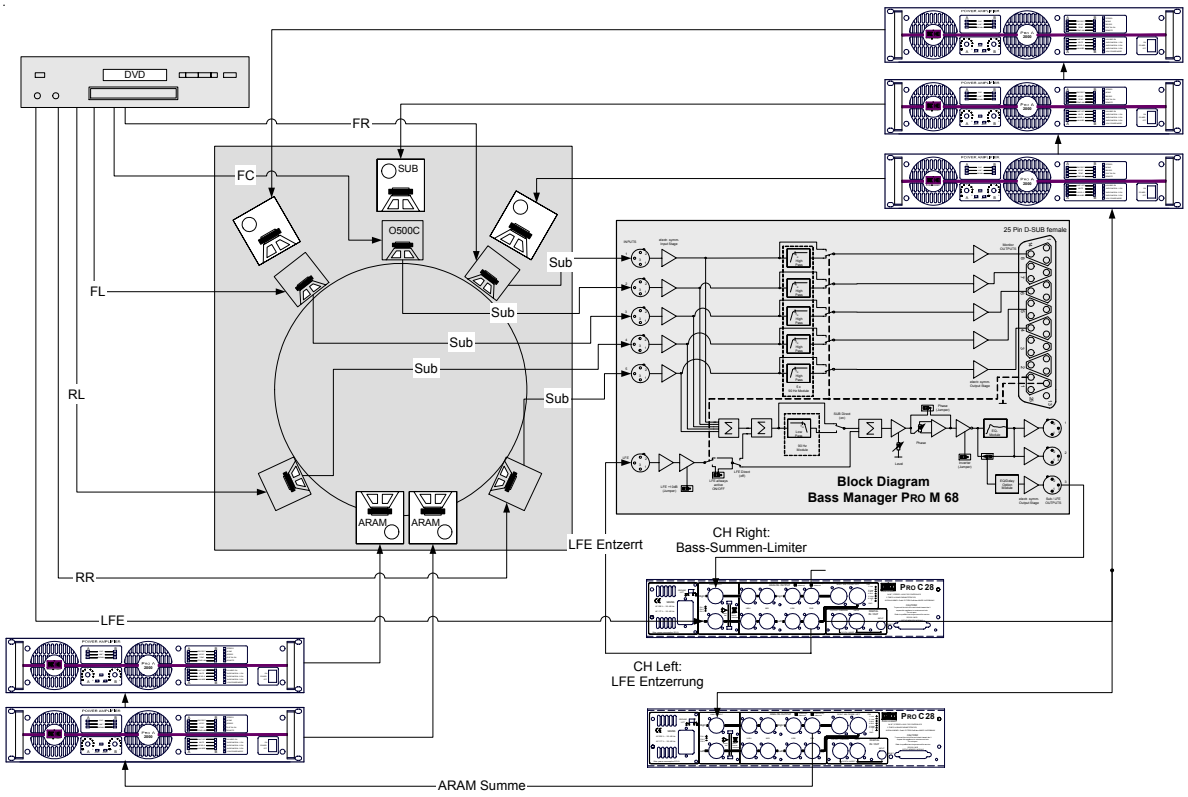
5) 5.1 Setup

with 5 x O 500 C, 3 x O 900 as LFE and sub extension, 1 x PRO C 28, 3 x PRO A 2000, 1 x PRO M 68



6) 5.1 Setup

with 5 x O 500 C, 2 x O 900 as LFE and sub extension, 2 x O 900 as ARAM (Active Room Mode Absorption Module) 2 x PRO C 28, 5 x PRO A 2000, 1 x PRO M 68



Recommmended System Configurations

No.	configuration	Qty.	Model (Front)	Qty.	Model (Rear)	Qty.	Sub/LFE	Sub/LFE for position	ProA2000	ProM68	ProC28
1	Stereo	2	O110			1	O800	L+R			
2	Stereo	2	O 300D			1-2	O 800	L+R			
3	Stereo	2	O 400			1-2	O 800	L+R			
4	Stereo	2	O 500C			1	O 900	L+R	1	1	1
5	Stereo	2	O 500C			2	O 900	L+R	2		
6	5.0	3	O 110	2	O 110	1	O 800	L+C+R			
7	5.0	3	O 110	2	O 110	2	O 800	L+C+R+LS+RS			
8	5.0	3	O 300D	2	O 110	1	O 800	L+C+R			
9	5.0	3	O 300D	2	O 110	2	O 800	L+C+R+LS+RS			
10	5.0	3	O 300D	2	O 300D	1	O 800	L+C+R			
11	5.0	3	O 300D	2	O 300D	2	O 800	L+C+R+LS+RS			
12	5.0	3	O 400	2	O 110	1	O 800	L+C+R			
13	5.0	3	O 400	2	O 110	2	O 800	L+C+R+LS+RS			
14	5.0	3	O 400	2	O 300D	1	O 800	L+C+R			
15	5.0	3	O 400	2	O 300D	2	O 800	L+C+R+LS+RS			
16	5.0	3	O 400	2	O 400	1	O 800	L+C+R			
17	5.0	3	O 400	2	O 400	2	O 800	L+C+R+LS+RS			
18	5.0	3	O 500C	2	O 300D	1	O 900	L+C+R	1	1	2
19	5.0	3	O 500C	2	O 300D	2	O 900	L+C+R oder L+C+R+LS+RS	2	1	2
20	5.0	3	O 500C	2	O 500C	1	O 900	L+C+R	1	1	1
21	5.0	3	O 500C	2	O 500C	2	O 900	L+C+R oder L+C+R+LS+RS	2	1	1
22	5.1	3	O 110	2	O 110	1	O 800	LFE			
23	5.1	3	O 110	2	O 110	1	O 800	L+C+R+LS+RS+LFE		1	
24	5.1	3	O 110	2	O 110	2	O 800	L+C+R+LS+RS+LFE			
25	5.1	3	O 300D	2	O 110	1	O 800	LFE			
26	5.1	3	O 300D	2	O 110	1	O 800	L+C+R+LS+RS+LFE		1	
27	5.1	3	O 300D	2	O 110	2	O 800	L+C+R+LS+RS+LFE			
28	5.1	3	O 300D	2	O 300D	1	O 800	LFE			
29	5.1	3	O 300D	2	O 300D	1	O 800	L+C+R+LS+RS+LFE		1	
30	5.1	3	O 300D	2	O 300D	2	O 800	L+C+R+LS+RS+LFE			
31	5.1	3	O 300D	2	O 300D	1	O 900	L+C+R+LS+RS+LFE	1	1	
32	5.1	3	O 300D	2	O 300D	1	O 800	LFE			3
33	5.1	3	O 300D	2	O 300D	2	O 800	L+C+R+LS+RS+LFE		1	3
34	5.1	3	O 300D	2	O 300D	1	O 900	L+C+R+LS+RS+LFE	1	1	3
35	5.1	3	O 400	2	O 110	1	O 800	LFE			
36	5.1	3	O 400	2	O 110	2	O 800	L+C+R+LS+RS+LFE			
37	5.1	3	O 400	2	O 300D	1	O 800	LFE			
38	5.1	3	O 400	2	O 300D	2	O 800	L+C+R+LS+RS+LFE			
39	5.1	3	O 400	2	O 400	1	O 800	LFE			
40	5.1	3	O 400	2	O 400	2	O 800	L+C+R+LS+RS+LFE			
41	5.1	3	O 400	2	O 400	1	O 900	L+C+R+LS+RS+LFE	1	1	
42	5.1	3	O 500C	2	O 300D	1	O 900	LFE	1		1
43	5.1	3	O 500C	2	O 300D	1	O 900	L+C+R+LFE oder L+C+R+LS+RS+LFE	1	1	2
44	5.1	3	O 500C	2	O 300D	2	O 900	L+C+R+LFE oder L+C+R+LS+RS+LFE	2	1	2
45	5.1	3	O 500C	2	O 500C	2	O 900	LFE	1		1
46	5.1	3	O 500C	2	O 500C	2	O 900	L+C+R+LFE oder L+C+R+LS+RS+LFE	2	1	1
47	5.1	3	O 500C	2	O 500C	3	O 900	L+C+R+LS+RS+LFE	3	1	1

Subject to change without notice
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