XPS SERIES

OSC PROTOCOL

REV H.1.0

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1. Disclaimer of warranty and limitation of liability

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2. Introduction

In addition to RDNet proprietary protocol, XPS 16K Power Amplifier supports the possibility to control a set of its functionality using Open Sound Control (OSC) protocol, allowing XPS 16K Power Amplifier monitoring and control from devices or software able to send and receive OSC Commands.

For OSC protocol 1.0 specifications, check the following URL.

XPS 16K Power Amplifier uses UDP transport layer on port 9090 for incoming requests and supports up to 8 simultaneous OSC Clients whose addresses and ports for outgoing replies have been previously added during device configuration; unconfigured OSC Clients will not be allowed to send any request to XPS 16K Power Amplifier, nor notified about device status or parameters change.

While periodic and on-change notifications are most of the times sent to all clients as OSC Bundle(s) with “immediate” time tag for bandwidth optimization purposes, XPS 16K Power Amplifier can accept requests both in the form of OSC Messages and OSC Bundles with any limitation.

3. OSC Commands

In the following, a complete list and description of all the available OSC Commands for XPS 16K Power Amplifier is given.

Please notice that provided command format is always referring to a write or notification case, in which a client is changing the value of a parameter, or the server is notifying the new value of a parameter; when a client is interested in just retrieving any of the parameters listed and marked as "readable", it would be sufficient to send provided command with no OSC Argument following. Please also notice that, for commands with an argument in the form of an OSC Blob, provided bytes numbering always refers to binary data only.

In case of a valid write request, a consequent client re-notification of the written parameter provides request acknowledgment (ACK) functionality; malformed requests are silently not-acknowledged (NACK) instead.

3.1. Client sync request

Command: /sync

Read / write: Read only

Description: Triggers the re-send of ALL defined OSC Commands, to force a client-server state synchronization.

3.2. Discovery

Command: /discovery ,b $x

Read / write: Read only

Description: Returns some device-specific data (revision of the communication protocol and model ID).

$x[0]: Revision of the communication protocol (1 = initial revision).

$x[1-3]: Device model ID (0x40003D = XPS 16K).

3.3. Power-on state

Command: /powered ,i $x

Read / write: Read & Write

Description: Sets current device power-on state, or reads it back if no argument is given.

$x: = 0 for stand-by state, = 1 for powered state, = 2 to toggle current state (available only during write).

3.4. Source Selection List (SSL)

Command: /ssl ,i $x

Read / write: Read only

Description: Returns current Source Selection List (SSL) index in [1; 4] range, representing currently available source channels.

$x	Source Channel Index															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	A1	A2	A3	A4												
2	A1	A2			D1	D2	D3	D4								
3	A1	A2	A3	A4					N1	N2	N3	N4	N5	N6	N7	N8
4	A1	A2			D1	D2	D3	D4	N1	N2	N3	N4	N5	N6	N7	N8

where $A_{1\text{-}4}$ are analog source channels, $D_{1\text{-}4}$ are digital AES/EBU source channels, $N_{1\text{-}8}$ are Dante Network source channels. Cells filled in black refers to source channel index which are unavailable if SSL index assumes the value indicated in left column.

3.5. Output mode

Command: /outmode ,i $x

Read / write: Read only

Description: Returns current device output mode index in [1; 5] range, representing if and how power output channels A, B, C, D are linked together to drive a particular load.

$x	OUT A	OUT B	OUT C	OUT D
1	1-Way	1-Way	1-Way	1-Way
2	2-Way Linked		1-Way	1-Way
3	1-Way	1-Way	2-Way Linked	
4	2-Way Linked		2-Way Linked	
5	4-Way Linked			

Please notice that when two or four channels are linked in 2-Way or 4-Way configuration, only first linked channel will be addressable in OSC Commands requiring output channel index (e.g., if Output Mode = 4, OUT B and OUT D addressing will not be allowed, while changing OUT A parameters will also affect linked OUT B and changing OUT C parameters will also affect linked OUT D).

3.6. Scene flags

Command: /scene/flags ,b $x

Read / write: Read only

Description: Returns scene related flags in the form of an OSC Blob, indicating if recallable scenes are stored in the device or not, and if current scene has local non-stored modifications.

$x[0]: “Is scene stored” flags in the form of bit fields, LSB for Scene #1, MSB for Scene #8. If bit is set, related scene is stored in the device, otherwise bit is cleared.

$x[1]: = 1 if current scene has local non-stored modifications, = 0 otherwise.

3.7. Current scene

Command: /scene/current ,i $x

Read / write: Read & Write

Description: Recalls scene by index if given argument refers to a stored scene or reads back current scene index if no argument is given.

$x: Current scene index in [1; 8] range.

3.8. Priority input source

Command: /priority/source ,i $x

Read / write: Read & Write

Description: Selects priority source by index or reads back currently selected priority source index if no argument is given.

$x: Priority source index in [1; 16] range. Available source indexes are provided by SSL as described in section Source Selection List (SSL).

3.9. Priority input gain

Command: /priority/gain ,f $x

Read / write: Read & Write

Description: Sets priority input gain or reads back current gain if no argument is given.

$x: Priority input gain in [-60.0; +10.0] dB range.

3.10. Priority input enable

Command: /priority/enable ,i $x

Read / write: Read & Write

Description: Provides a virtual GPI to activate/disable priority input or reads back current priority input state if no argument is given.

$x: = 1 to enable priority input, = 0 otherwise.

3.11. Routing source

Command: /routing/$x/$y/source ,i $z

Read / write: Read & Write

Description: Sets Main or Backup source by index for $x output channel (and linked channels, if any) or reads back current Main or Backup source index if no argument is given.

$x: Output channel index in [1; 4] range, where 1 means OUT A and 4 means OUT D. Accepted values for output channel index depends on how output channels are linked together as described in section 3.5 – Output mode.

$y: “main” or “backup” to set / readback Main or Backup source, respectively.

$z: Main or Backup source index in [1; 16] range. Available source indexes are provided by SSL as described in section 3.4 -Source Selection List (SSL).

3.12. Routing gain

Command: /routing/$x/$y/gain ,f $z

Read / write: Read & Write

Description: Sets Main or Backup input gain for $x output channel (and linked channels, if any) or reads back current Main or Backup gain if no argument is given.

$x: Output channel index in [1; 4] range, where 1 means OUT A and 4 means OUT D. Accepted values for output channel index depends on how output channels are linked together as described in section 3.5 - Output mode.

$y: “main” or “backup” to set / readback Main or Backup input gain, respectively.

$z: Main or Backup input gain in [-60.0; +10.0] dB range.

3.13. Routing mode

Command: /routing/$x/mode ,i $y

Read / write: Read & Write

Description: Selects routing mode (strategy) for $x output channel (and linked channels, if any) or reads back currently selected routing mode if no argument is given.

$x: Output channel index in [1; 4] range, where 1 means OUT A and 4 means OUT D. Accepted values for output channel index depends on how output channels are linked together as described in section 3.5 - Output mode.

$y: Routing mode in [1; 5] range, 1 for FORCE MAIN, 2 for FORCE BACKUP, 3 for PILOT TONE, 4 for AES PRESENCE (available only if currently selected Main Source is a digital AES/EBU source channel), 5 for DANTE PRESENCE (available only if currently selected Main Source is a Dante Network channel).

3.14. Output gain

Command: /output/$x/gain ,f $y

Read / write: Read & Write

Description: Sets gain for $x output channel (and linked channels, if any) or reads back current gain if no argument is given.

$x: Output channel index in [1; 4] range, where 1 means OUT A and 4 means OUT D. Accepted values for output channel index depends on how output channels are linked together as described in section 3.5 - Output mode.

$y: Output gain in [-60.0; +10.0] dB range.

3.15. Output mute

Command: /output/$x/mute ,f $y

Read / write: Read & Write

Description: Sets mute state for $x output channel (and linked channels, if any) or reads back current mute state if no argument is given.

$x: Output channel index in [1; 4] range, where 1 means OUT A and 4 means OUT D. Accepted values for output channel index depends on how output channels are linked together as described in section 3.5 - Output mode.

$y: 1 = muted, 0 = unmuted.

3.16. Device name

Command: /labels/device ,s $x

Read / write: Read only

Description: Returns current device name string.

$x: NULL-terminated device name string, maximum 15 chars long.

3.17. Sources labels

Command: /labels/sources ,b $x

Read / write: Read & Write

Description: Sets the label of all source channels or reads back current label of all source channels if no argument is given.

$x: OSC Blob (byte array) of sixteen NULL-terminated strings, one for each of the [1; 16] available source channels described in section 3.4 - Source Selection List (SSL), each of which maximum 15 chars long.

Source	Datatype	Length	Description
A1	String	16 bytes max.	Analog 1 Source Name
A2	String	16 bytes max.	Analog 2 Source Name
A3	String	16 bytes max.	Analog 3 Source Name
A4	String	16 bytes max.	Analog 4 Source Name
D1	String	16 bytes max.	Digital AES/EBU 1 Source Name
D2	String	16 bytes max.	Digital AES/EBU 2 Source Name
D3	String	16 bytes max.	Digital AES/EBU 3 Source Name
D4	String	16 bytes max.	Digital AES/EBU 4 Source Name
N1	String	16 bytes max.	Dante Network 1 Source Name
N2	String	16 bytes max.	Dante Network 2 Source Name
N3	String	16 bytes max.	Dante Network 3 Source Name
N4	String	16 bytes max.	Dante Network 4 Source Name
N5	String	16 bytes max.	Dante Network 5 Source Name
N6	String	16 bytes max.	Dante Network 6 Source Name
N7	String	16 bytes max.	Dante Network 7 Source Name
N8	String	16 bytes max.	Dante Network 8 Source Name

3.18. Outputs labels

Command: /labels/outputs ,b $x

Read / write: Read only

Description: Returns current label (zone name) of all output channels.

$x: OSC Blob (byte array) of four NULL-terminated strings, one for each of the [1; 4] output channels available, each of which maximum 15 chars long. If retrieved labels have some meaning or not depends on how output channels are linked together as described in section 3.5 - Output mode.

Output	Datatype	Length	Description
A	String	16 bytes max.	OUT A Zone Name
B	String	16 bytes max.	OUT B Zone Name
C	String	16 bytes max.	OUT C Zone Name
D	String	16 bytes max.	OUT D Zone Name

3.19. Scenes labels

Command: /labels/scenes ,b $x

Read / write: Read only

Description: Returns current label of all OSC accessible scenes.

$x: OSC Blob (byte array) of eight NULL-terminated strings, one for each of the [1; 8] OSC accessible scenes, each of which maximum 15 chars long. If retrieved labels have some meaning or not depends on if a scene is stored or not as described in section 3.5 - Output mode.

Scene	Datatype	Length	Description
1	String	16 bytes max.	Scene #1 Name
2	String	16 bytes max.	Scene #2 Name
3	String	16 bytes max.	Scene #3 Name
4	String	16 bytes max.	Scene #4 Name
5	String	16 bytes max.	Scene #5 Name
6	String	16 bytes max.	Scene #6 Name
7	String	16 bytes max.	Scene #7 Name
8	String	16 bytes max.	Scene #8 Name

3.20. Error codes

Command: /errors ,b $x

Read / write: Read only

Description: Returns currently active error codes.

$x: OSC Blob (byte array) containing currently active device error codes, one for each class (hardware or software device component). When an error is active, occurrence location and severity are also provided as detailed in the following table.

CLASS	BYTE #	DETAIL	RANGE	DATA TYPE	CONVERSION
FRONT PANEL	0	Error Code	0-255	Uint8	= 0 normally, ≠ 0 when an error is active. See Appendix A – Error Codes for a correct value interpretation.
	1	Flags	Severity	2 bits	WARNING = 0
					ERROR = 1
					FATAL = 2
					(reserved = 3)
			Location	2 bits	INITIALIZATION = 0
					BOOT = 1
					SHUTDOWN = 2
					RUNTIME = 3
			(Reserved)	4 bits	(none)
FLASH MEMORY	2	Error Code	0-255	Uint8	See conversion details listed above.
	3	Flags	Severity	2 bits	
			Location	2 bits	
			(Reserved)	4 bits	
FILESYSTEM	4	Error Code	0-255	Uint8	See conversion details listed above.
	5	Flags	Severity	2 bits	
			Location	2 bits	
			(Reserved)	4 bits	
DSP UPDATE	6	Error Code	0-255	Uint8	See conversion details listed above.
	7	Flags	Severity	2 bits	
			Location	2 bits	
			(Reserved)	4 bits	
LIBRARY UPDATE	8	Error Code	0-255	Uint8	See conversion details listed above.
	9	Flags	Severity	2 bits	
			Location	2 bits	
			(Reserved)	4 bits	
HMI UPDATE	10	Error Code	0-255	Uint8	See conversion details listed above.
	11	Flags	Severity	2 bits	
			Location	2 bits	
			(Reserved)	4 bits	
INITIALIZATION DATA	12	Error Code	0-255	Uint8	See conversion details listed above.
	13	Flags	Severity	2 bits	
			Location	2 bits	
			(Reserved)	4 bits	

CLASS	BYTE #	DETAIL	RANGE	DATA TYPE	CONVERSION
RESOURCES	14	Error Code	0-255	Uint8	See conversion details listed above.
	15	Flags	Severity	2 bits	
			Location	2 bits	
			(Reserved)	4 bits	
GPIO & RELAYS	16	Error Code	0-255	Uint8	See conversion details listed above.
	17	Flags	Severity	2 bits	
			Location	2 bits	
			(Reserved)	4 bits	
AES EBU	18	Error Code	0-255	Uint8	See conversion details listed above.
	19	Flags	Severity	2 bits	
			Location	2 bits	
			(Reserved)	4 bits	
POWER SUPPLY	20	Error Code	0-255	Uint8	See conversion details listed above.
	21	Flags	Severity	2 bits	
			Location	2 bits	
			(Reserved)	4 bits	
POWER AMP	22	Error Code	0-255	Uint8	See conversion details listed above.
	23	Flags	Severity	2 bits	
			Location	2 bits	
			(Reserved)	4 bits	
ADC	24	Error Code	0-255	Uint8	See conversion details listed above.
	25	Flags	Severity	2 bits	
			Location	2 bits	
			(Reserved)	4 bits	
DAC	26	Error Code	0-255	Uint8	See conversion details listed above.
	27	Flags	Severity	2 bits	
			Location	2 bits	
			(Reserved)	4 bits	
DSP CLASS 1	28	Error Code	0-255	Uint8	See conversion details listed above.
	29	Flags	Severity	2 bits	
			Location	2 bits	
			(Reserved)	4 bits	
DSP CLASS 2	30	Error Code	0-255	Uint8	See conversion details listed above.
	31	Flags	Severity	2 bits	
			Location	2 bits	
			(Reserved)	4 bits	
DANTE	32	Error Code	0-255	Uint8	See conversion details listed above.
	33	Flags	Severity	2 bits	
			Location	2 bits	
			(Reserved)	4 bits	
LOAD MONITOR	34	Error Code	0-255	Uint8	See conversion details listed above.
	35	Flags	Severity	2 bits	
			Location	2 bits	
			(Reserved)	4 bits	
BACKUP	36	Error Code	0-255	Uint8	See conversion details listed above.
	37	Flags	Severity	2 bits	
			Location	2 bits	
			(Reserved)	2 bits	

3.21. Device status

Command: /status ,b $x

Read / write: Read only – periodically notified at 10 Hz rate

Description: Returns current device status.

$x: OSC Blob (byte array) containing current device status (level meters, PSU state, FANs speed, temperatures, faults, etc.) of which a detailed overview is provided in the following table.

	BYTE #	DESCRIPTION	RANGE	DATATYPE	CONVERSION	SUGGESTED LED COLOR
PSU	0	Mains Voltage	0-255	Uint8	V_P = value * 1.7647	
	1	Mains Current	0-255	Uint8	A_{RMS} = value	
	2	PSU Temperature Primary	0-255	Uint8	°C = value	
	3	PSU Temperature Secondary	0-255	Uint8	°C = value	
	4	FAN 1 Speed	0-255	Uint8	RPM = value * 30	
	5	FAN 2 Speed	0-255	Uint8	RPM = value * 30	
	6	FAN 3 Speed	0-255	Uint8	RPM = value * 30	
	7	PSU Status	General Error	1 bit	(1 = error)	
			FAN 1 Error	1 bit	(1 = error)	
			FAN 2 Error	1 bit	(1 = error)	
			FAN 3 Error	1 bit	(1 = error)	
			(Reserved)	4 bits	(none)	
OUT A	8	Level Meter	0-255	Uint8	dBFS = (value * 60/255) – 60	
	9	Gain Reduction	0-255	Uint8	dB = value * 60/255	
	10	AMP Temperature	0-255	Uint8	°C = value	
	11	AMP Status	Overtemperature	1 bit	(1 = shutdown)	
			DC Protection	1 bit	(1 = shutdown)	
			VHF Protection	1 bit	(1 = shutdown)	
			Overcurrent	1 bit	(1 = shutdown)	
			Load Monitor	2 bits	DISABLED = 0	OFF
					OK = 1	GREEN
					SHORT = 2	YELLOW
					OPEN = 3	YELLOW
			Signal Status	2 bits	NO SIGNAL = 0	BLACK
					PRESENCE = 1	GREEN
					LIMIT = 2	ORANGE
					ERROR = 3	RED
OUT B	12	Level Meter	0-255	Uint8	dBFS = (value * 60/255) – 60	
	13	Gain Reduction	0-255	Uint8	dB = value * 60/255	
	14	AMP Temperature	0-255	Uint8	°C = value	
	15	AMP Status	Overtemperature	1 bit	(1 = shutdown)	
			DC Protection	1 bit	(1 = shutdown)	
			VHF Protection	1 bit	(1 = shutdown)	
			Overcurrent	1 bit	(1 = shutdown)	
			Load Monitor	2 bits	DISABLED = 0	OFF
					OK = 1	GREEN
					SHORT = 2	YELLOW
					OPEN = 3	YELLOW
			Signal Status	2 bits	NO SIGNAL = 0	BLACK

	BYTE #	DESCRIPTION	RANGE	DATATYPE	CONVERSION	SUGGESTED LED COLOR
					PRESENCE = 1	GREEN
					LIMIT = 2	ORANGE
					ERROR = 3	RED
OUT C	16	Level Meter	0-255	Uint8	dBFS = (value * 60/255) – 60	
	17	Gain Reduction	0-255	Uint8	dB = value * 60/255	
	18	AMP Temperature	0-255	Uint8	°C = value	
	19	AMP Status	Overtemperature	1 bit	(1 = shutdown)	
			DC Protection	1 bit	(1 = shutdown)	
			VHF Protection	1 bit	(1 = shutdown)	
			Overcurrent	1 bit	(1 = shutdown)	
			Load Monitor	2 bits	DISABLED = 0	OFF
					OK = 1	GREEN
					SHORT = 2	YELLOW
					OPEN = 3	YELLOW
			Signal Status	2 bits	NO SIGNAL = 0	BLACK
					PRESENCE = 1	GREEN
					LIMIT = 2	ORANGE
					ERROR = 3	RED
OUT D	20	Level Meter	0-255	Uint8	dBFS = (value * 60/255) – 60	
	21	Gain Reduction	0-255	Uint8	dB = value * 60/255	
	22	AMP Temperature	0-255	Uint8	°C = value	
	23	AMP Status	Overtemperature	1 bit	(1 = shutdown)	
			DC Protection	1 bit	(1 = shutdown)	
			VHF Protection	1 bit	(1 = shutdown)	
			Overcurrent	1 bit	(1 = shutdown)	
			Load Monitor	2 bits	DISABLED = 0	OFF
					OK = 1	GREEN
					SHORT = 2	YELLOW
					OPEN = 3	YELLOW
			Signal Status	2 bits	NO SIGNAL = 0	BLACK
					PRESENCE = 1	GREEN
					LIMIT = 2	ORANGE
					ERROR = 3	RED
METERS & ROUTING	24	Routing Status (A-B)	OUT A	4 bits	MAIN = 0	GREEN
					BACKUP = 1	YELLOW
					MIX = 2	GREEN
					GENERATOR = 3	ORANGE
					PRIORITY = 4	RED
					(reserved) = 5:7	(none)
			OUT B	4 bits	MAIN = 0	GREEN
					BACKUP = 1	YELLOW
					MIX = 2	GREEN
					GENERATOR = 3	ORANGE
					PRIORITY = 4	RED
					(reserved) = 5:7	(none)
	25	Routing Status (C-D)	OUT C	4 bits	MAIN = 0	GREEN
					BACKUP = 1	YELLOW
					MIX = 2	GREEN
					GENERATOR = 3	ORANGE
					PRIORITY = 4	RED
					(reserved) = 5:7	(none)
			OUT D	4 bits	MAIN = 0	GREEN

	BYTE #	DESCRIPTION	RANGE	DATATYPE	CONVERSION	SUGGESTED LED COLOR
					BACKUP = 1	YELLOW
					MIX = 2	GREEN
					GENERATOR = 3	ORANGE
					PRIORITY = 4	RED
					(reserved) = 5:7	(none)
	26	OUT A – Main Level Meter	0-255	Uint8	dBFS = (value * 60/255) – 60	
	27	OUT A – Backup Level Meter	0-255	Uint8	dBFS = (value * 60/255) – 60	
	28	OUT A – Pilot Tone Detector Meter	0-255	Uint8	dBFS = (value * 60/255) – 60	
	29	OUT B – Main Level Meter	0-255	Uint8	dBFS = (value * 60/255) – 60	
	30	OUT B – Backup Level Meter	0-255	Uint8	dBFS = (value * 60/255) – 60	
	31	OUT B – Pilot Tone Detector Meter	0-255	Uint8	dBFS = (value * 60/255) – 60	
	32	OUT C – Main Level Meter	0-255	Uint8	dBFS = (value * 60/255) – 60	
	33	OUT C – Backup Level Meter	0-255	Uint8	dBFS = (value * 60/255) – 60	
	34	OUT C – Pilot Tone Detector Meter	0-255	Uint8	dBFS = (value * 60/255) – 60	
	35	OUT D – Main Level Meter	0-255	Uint8	dBFS = (value * 60/255) – 60	
	36	OUT D – Backup Level Meter	0-255	Uint8	dBFS = (value * 60/255) – 60	
	37	OUT D – Pilot Tone Detector Meter	0-255	Uint8	dBFS = (value * 60/255) – 60	
	38	Priority Input Level Meter	0-255	Uint8	dBFS = (value * 60/255) – 60	

4. Appendix A – Error Codes

The following table provides a detailed description for all the possible error codes (from 0 to 255) reported by one or more error classes through 3.20 - Error codes.

OSC Command when a hardware or software device failure is detected.

CODE	DESCRIPTION
0-1	No error.
2	Warning condition detected, fail-safe protection strategy active.
3-4	(reserved)
5	Generic error.
6	Service, driver or peripheral internal error.
7	Operation timed out.
8	Service, device or peripheral busy, retry later.
9	Parameter out of bounds.
10-11	System software exception.
12	Data transfer or communication error.
13	Too much data (buffer overrun).
14	Missing data (buffer underrun).
15	Stream, file or connection open failed.
16	Stream, file or connection close failed.
17	Read or receive error.
18	Write or send error.
19	Upper memory or queue limit reached.
20	Data mismatch or component compatibility verification failed.
21	Memory allocation failed.
22	Peripheral, device or task setup failed.
23	Checksum verification failed.

5. Document revision history

DATE	REVISION	NOTES
21/03/2022	A.1.0	Initial release.
29/08/2022	B.1.0	Wrong load monitor values in device status description, fixed.
29/08/2022	C.1.0	Wrong routing status values in device status description, fixed.
13/11/2023	D.1.0	Remote standby functionality added.
09/02/2024	E.1.0	Error codes added.
04/04/2024	F.1.0	Non-relevant error codes details fixed.
11/11/2024	G.1.0	/discovery command added.
10/12/2025	H.1.0	Add Load Monitor, Backup error code and Dante Presence Backup Strategy.

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