TC Electronic FireworX MIDI specification

Document revision history:
V1.00   1999/07/20   First publication

This document applies to 2.00 and later versions of the FireworX software. If your software version is older, please contact your local dealer for further information about software update and update fee.

General message format:

0xF0	MIDI System Exclusive message start
0x00	3 byte manufacturer ID for TC Electronic
0x20	..
0x1F	..
<Device ID>	System Exclusive device ID (User parameter)
0x40	FireworX model ID
<Message type>	FireworX message type
<Data>	Data depends on message type
..	..
..	..
0xF7	MIDI System Exclusive message terminator

Preset numbers

Preset numbers are represented in the SysEx messages as 2 bytes (14-bit value). The first byte is the 7 most significant bits and the second byte is the 7 least significant bits.

Preset numbers in SysEx messages are mapped accordingly:

0x0000 (0)	Edit buffer
0x0001 (1) to 0x0190 (400)	Factory bank (400 presets)
0x0801 (2049) to 0x08C8 (2248)	User bank (200 preset positions)
0x1001 (4097) to 0x1320 (4896)	Card bank (800 preset positions)

When recalling presets with program changes, sending a controller 0 and controller 32 change (according to the FireworX user setting of 'Bank selection') can be used to indicate bank number, and will offset any subsequent program change numbers with 128 * bank number. If the FireworX user setting of program change 'Mapping mode' is set to 'Into all banks', bank number 16 addresses the start of the user presets, and bank number 32 addresses the start of the card presets.

Binary data

Messages containing binary data dumps consists of a set of byte-pairs containing a data byte split into two nibbles. The most significant nibble is sent in the first byte and the least significant nibble is sent in the second byte. The dump is terminated with a one byte checksum value which is the negative sum of all data bytes in the dump truncated to 7 bits. ie. (-sum(all data bytes)) & 0x7F. Note that the checksum is calculated on the actual data bytes and not on the split nibble bytes.

Expanded and packed preset data format

The FireworX uses two different representations of a preset. The expanded format contains all elements available for construction of a preset. The edit buffer preset is represented in expanded format, where all parameter adjustments are preserved regardless of routing. The alternative packed format is used for storage of presets in the user bank and the card bank, and simply is a way of excluding data for effects not included in the effects routing. Recalling a preset will set all non-routed effects to default values. The size of a packed preset is significantly reduced compared to the expanded format, and thus transmission time over MIDI is minimized. The packed format however is of variable size and address of effects parameters within the preset data varies according to effect routing.

FireworX message types:

SYXTYPE_USERBANKREQUEST	0x40
SYXTYPE_USERBANKHEADER	0x10
SYXTYPE_USERBANKDATAPACKET	0x11
SYXTYPE_PRESETRECALL	0x44
SYXTYPE_PRESETREQUEST	0x45
SYXTYPE_PRESETREQUESTPART	0x46
SYXTYPE_PRESETREQUESTPACKED	0x48
SYXTYPE_PRESETDELETE	0x50
SYXTYPE_PRESETDATA	0x20
SYXTYPE_PRESETDATAPART	0x21
SYXTYPE_PRESETDATAPACKED	0x24
SYXTYPE_PRESETDATAISEMPTY	0x28

User Bank Request

0xF0	SysEx
0x00	TC Electronic
0x20	..
0x1F	..
<Device ID>	Device ID
0x40	FireworX
0x40	SYXTYPE_BANKREQUEST
0xF7	EOX

FireworX will respond to this with Bank Header and Data Packet messages containing the entire user bank presets.

User Bank Header

0xF0	SysEx
0x00	TC Electronic
0x20	..
0x1F	..
<Device ID>	Device ID
0x40	FireworX
0x10	SYXTYPE_BANKHEADER
<Packets MSB>	Number of Bank Data Packet messages to be transmitted
<Packets LSB>	..
0xF7	EOX

User Bank Data Packet

0xF0	SysEx
0x00	TC Electronic
0x20	..
0x1F	..
<Device ID>	Device ID
0x40	FireworX
0x11	SYXTYPE_BANKDATAPACKET
<Packet ID>	Data packet identifier, counting up from 0
<Data>	64 bytes data sent as 128 nibbles + 1 checksum
..	..
0xF7	EOX

The User Bank Header and Data Packet messages are also supported on FireworX devices with software versions prior to 2.00. If this backward compatibility in preset dumps is not required, then the Preset Request Packed and Preset Data Packed messages provides greater flexibility.

Preset Recall

0xF0	SysEx
0x00	TC Electronic
0x20	..
0x1F	..
\<Device ID\>	Device ID
0x40	FireworX
0x44	SYXTYPE_PRESETRECALL
\<Preset MSB\>	Preset number
\<Preset LSB\>	..
0xF7	EOX

Preset Request

0xF0	SysEx
0x00	TC Electronic
0x20	..
0x1F	..
\<Device ID\>	Device ID
0x40	FireworX
0x45	SYXTYPE_PRESETREQUEST
\<Preset MSB\>	Preset number
\<Preset LSB\>	..
0xF7	EOX

The FireworX responds with either a Preset Data message or a Preset Data Is Empty message.

Preset Request Part

0xF0	SysEx
0x00	TC Electronic
0x20	..
0x1F	..
\<Device ID\>	Device ID
0x40	FireworX
0x45	SYXTYPE_PRESETREQUESTPART
\<Preset MSB\>	Preset number
\<Preset LSB\>	..
\<Address MSB\>	Start address within expanded preset structure
\<Address LSB\>	..
\<Size MSB\>	Data size in bytes
\<Size LSB\>	..
0xF7	EOX

The FireworX responds with either a Preset Data Part message or a Preset Data Is Empty message.

Preset Request Packed

0xF0	SysEx
0x00	TC Electronic
0x20	..
0x1F	..
\<Device ID\>	Device ID
0x40	FireworX
0x47	SYXTYPE_PRESETREQUESTPACKED
\<Preset MSB\>	Preset number
\<Preset LSB\>	..
\<Count MSB\>	Number of consecutive preset positions to send
\<Count LSB\>	..
0xF7	EOX

If \<Count\> is 0 or 1 only the specified preset position will be sent. Otherwise the number of the last preset sent will be \<Preset\> + \<Count\> - 1.

The FireworX responds to this by sending a sequence of Preset Data Packed messages and Preset Data Is Empty messages for all preset positions in the specified range.

Preset Delete

0xF0	SysEx
0x00	TC Electronic
0x20	..
0x1F	..
<Device ID>	Device ID
0x40	FireworX
0x45	SYXTYPE_PRESETDELETE
<Preset MSB>	Start preset number
<Preset LSB>	..
<Count MSB>	Number of consecutive preset positions to delete
<Count LSB>	..
0xF7	EOX

If <Count> is 0 or 1 only the specified preset position will be deleted. Otherwise the number of the last preset deleted will be <Preset> + <Count> - 1.

The FireworX responds to this by unconditionally deleting any stored presets in the specified range, restricted to either user or card bank according to the start preset.

Preset Data

0xF0	SysEx
0x00	TC Electronic
0x20	..
0x1F	..
<Device ID>	Device ID
0x40	FireworX
0x20	SYXTYPE_PRESETDATA
<Preset MSB>	Preset number
<Preset LSB>	..
<Size MSB>	Data size in bytes
<Size LSB>	..
<Data>	Data bytes sent as <Size> * 2 nibbles + 1 checksum
..	..
0xF7	EOX

Contains the complete preset data in expanded data format.

Preset Data Part

0xF0	SysEx
0x00	TC Electronic
0x20	..
0x1F	..
<Device ID>	Device ID
0x40	FireworX
0x20	SYXTYPE_PRESETDATAPART
<Preset MSB>	Preset number
<Preset LSB>	..
<Address MSB>	Start address within expanded preset structure
<Address LSB>	..
<Size MSB>	Data size in bytes
<Size LSB>	..
<Data>	Data bytes sent as <Size> * 2 nibbles + 1 checksum
..	..
0xF7	EOX

Contains part of the preset data in expanded data format.

Preset Data Packed

0xF0	SysEx
0x00	TC Electronic
0x20	..
0x1F	..
<Device ID>	Device ID
0x40	FireworX
0x22	SYXTYPE_PRESETDATAPACKED
<Preset MSB>	Preset number
<Preset LSB>	..
<Size MSB>	Data size in bytes
<Size LSB>	..
<Data>	Data bytes sent as <Size> * 2 nibbles + 1 checksum
..	..
0xF7	EOX

Contains the complete preset data in packed data format.

Preset Data Is Empty

0xF0	SysEx
0x00	TC Electronic
0x20	..
0x1F	..
<Device ID>	Device ID
0x40	FireworX
0x28	SYXTYPE_PRESETDATAISEMPTY
<Preset MSB>	Start preset number
<Preset LSB>	..
<Count MSB>	Number of consecutive preset positions which are empty
<Count LSB>	..
0xF7	EOX

If <Count> is 0 or 1 only the specified preset position is empty. Otherwise the number of the last preset which is empty is <Preset> + <Count> - 1.

This message is only used by the FireworX in response to any preset data request messages that has requested data for empty preset positions. Sending this message to the FireworX will not have any effect.