KENTON

MODULAR SOLO

MIDI-CV converter for Eurorack modular synths

PARA VAL GATE

SELECT DEC INC

PARA / VALUE TOGGLE
LONG HOLD TO LOAD / STORE

CV (Hz/V) CLOCK 1

GATE (S-TRIG) CLOCK 2

AUX 1 AUX 3

AUX 2 AUX 4

MIDI IN MIDI OUT

MODULAR SOLO

CE KENTON
www.kenton.co.uk
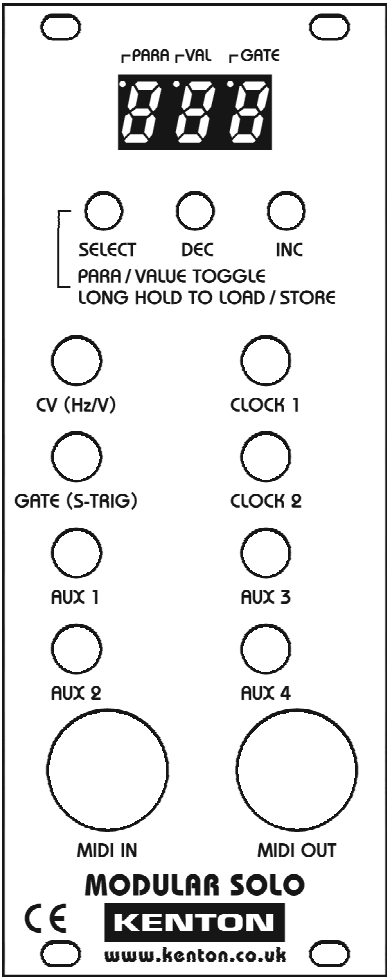
Operating manual

**Warning -
DO NOT ADJUST THE TRIMMERS ON THE PC BOARD.
These are for factory setup ONLY.
All adjustments to scale and tuning are made using the
editing system on the front panel. Parameters 12-15.**

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FCC STATEMENT FOR MODULAR SOLO

NOTE: This equipment has been tested and found to comply with the limits for a
Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are
designed to provide reasonable protection against harmful interference in a
residential installation. This equipment generates, uses and can radiate radio
frequency energy and, if not installed and used in accordance with the
instructions, may cause harmful interference to radio communications. However,
there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception,
which can be determined by turning the equipment off and on, the user is
encouraged to try to correct the interference by one or more of the following
measures:

-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different from that to which the
    receiver is connected.
-- Consult the dealer or an experienced radio/TV technician for help.

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INTRODUCTION

The *MODULAR SOLO* is designed for use in Eurorack (A100) modular systems. It is much more than just a MIDI to CV converter as it incorporates a built in LFO as well as portamento and many other functions. Please take some time to read through this manual prior to first use to avoid any operational difficulties.

CONNECTIONS
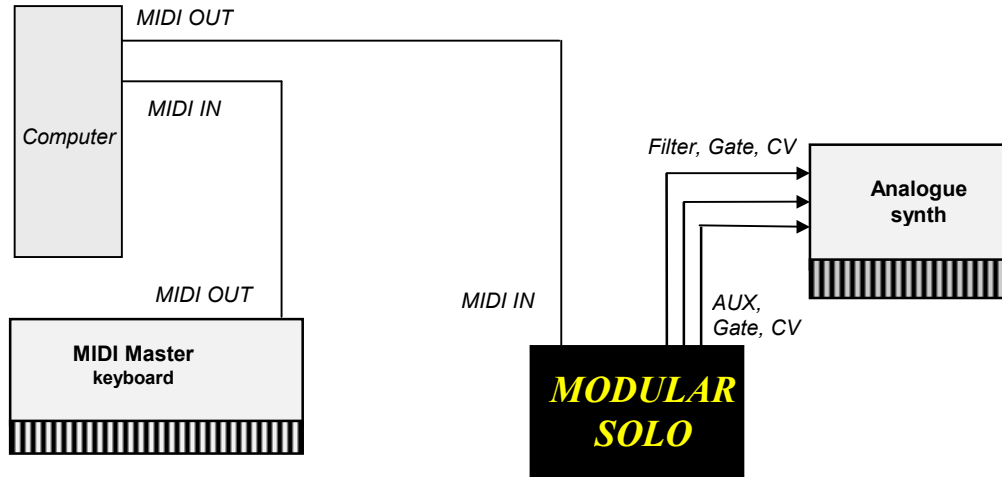
POWER RIBBON
Plug one end of the supplied ribbon cable into the free slot on the Modular Solo and other end into the backplane of your modular case. **Ensure you get the polarity correct.** See page 14 for diagram.

CV (Hz/V)
Plug this into the input marked CV IN, VCO IN, KEY VOLT or KYBD IN etc. on your mono-synth. This controls the pitch of your synth. (What pitch to play)

GATE (S-Trig)
Plug this into the input marked GATE, V-trig, Trig, S-Trig, etc. on your mono-synth. This turns the note on and off on your synth. (When to play)

AUXes 1,2,3,4 [continuously variable aux output]
Plug this into the input marked VCF, fcM, PWM, VCA, Filter, Volume, or any other external control voltage input on your mon-synth. This enables you to control effects such as filter cut-off using MIDI controllers. (Velocity, mod wheel, etc.) Note: not all mono-synths have such additional control inputs.

CLOCK 1 [digital aux output]
Use this as a clock connection or to control stop/start inputs. Signal is either zero or 5v/10v.

CLOCK 2 [digital aux out]
Use this as a clock connection or to control stop/start or trig inputs. Signal is either zero or 5v/10v.

SYNC 24 – (available from the MIDI out by selecting using socket select parameter 91
Connect to an <u>input</u> marked SYNC 24 or DIN SYNC to synchronise the clock of a device which uses this system.

PRESETS [in memory locations 1 to 32]
As supplied, or after a full reset, presets 1 to 26 are all loaded with the default setup for use with an SH-101. This setup is suitable for a lot of other standard CV / Gate synths too. The following presets for other synths are loaded into the following locations. See page 3 for how to load setups.

| Prog	Synth	Changes from default (SH-101) setup
#32	Roland SH-09 (also Moog Prodigy mk1 with KE skts)	Gate 15V
#31	Minimoog	S-trig, coarse tune –5 semitones
#30	Other Moog	S-trig, coarse tune zero
#29	Korg MS-20	S-trig, Hz/V
#28	Yamaha CS-10	S-trig with 5V pullup, Hz/V
#27	ARP2600 (also Odyssey mk1+KE skts)	Gate 15V, Aux1 set to TRIG

EDITING THE *MODULAR SOLO*

Switching On

When the *MODULAR SOLO* is switched on, the words **KENTON MODULAR SOLO** scroll across the display, and the unit reverts to the settings from when it was last used.

The Display

The display has 3 digits each with a dot above. The 1st dot when lit indicates that **PARAMETER** mode is currently selected. The middle dot when lit indicates that **VALUE** mode is currently selected. The 3rd dot will light whenever the *MODULAR SOLO*'s **GATE** is on (key pressed or sustained).
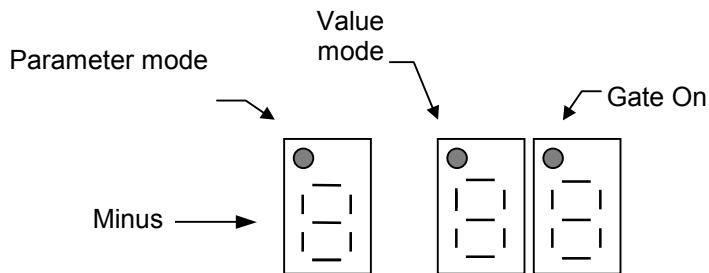
Stepping Through Parameters

Ensure that the **PARAMETER** dot is lit. If you need to, you can change between **PARAMETER** and **VALUE** modes by briefly pressing the **SELECT** button, you can then use the **INC** and **DEC** buttons to scroll through the available parameters. The available parameters are printed on the case of the MODULAR SOLO for convenience. For additional confirmation, a "**P"** will appear in the left digit whenever parameter mode is selected and the parameter name will scroll across the display.

Changing Values

Ensure that the **VALUE** dot is lit. You can change between **PARAMETER** and **VALUE** modes by briefly pressing the **SELECT** button. You can then use the **INC** and **DEC** buttons to scroll through the available values. The left digit is used for displaying the hundreds portion of the value if applicable. It will also have a horizontal dash if a minus value is to be displayed. Minus values up to –127, or positive values up to 255 are used. The display will automatically revert to parameter mode after approximately 10 seconds if neither inc or dec are pressed. The value you have edited will then be saved to 'edit' memory which will be remembered next time you use the *MODULAR SOLO*.

To speed up editing, the **INC** and **DEC** keys will repeat if held. To go faster still, when holding the **INC** key then also press and hold the **DEC** key. Similarly, when holding the **DEC** key, also press and hold the **INC** key.

Storing Setups

Any value you change is automatically stored when reverting to parameter mode (either manually or after the 10 second timeout). You can also store the current setup to a memory location in the range 1 to 32. These can be recalled at a later date.

To store: select parameter 99, press the **SELECT** button to show the value, and use the **INC** and **DEC** buttons to select the location you want to store to. Now press & hold the **SELECT** button (for approx. 6 seconds) until the display reads 'sto' (store).

Loading Setups

To load: select parameter 98, press the **SELECT** button to show the value, and use the **INC** and **DEC** buttons to select the location you want to load from. Now press & hold the **SELECT** button (for approx. 6 seconds) until the display reads 'lod' (load). You can also load setups using program changes if this feature is enabled (default is off). See parameter #93 (prog receive enable).

PARAMETERS

Below is a list of parameters available to edit. The letters in square brackets show [where applicable] what will be shown on the LED display.
See page 20 for a full list of all parameters to use as a handy reference.

Menu
number   Parameter (default)

CV & Gate Outputs -

P 01   MIDI receive channel (default :1)

Range   1 to 16
- Sets the MIDI receive channel.

P 02   Retrig Time (default: 5 = 1mS)

Range   off [off] and 1 to 25   (0.2mS to 5mS)
- If set to off (normal trigger mode), the gate just stays on when a new note is played. (no re-trigger)
If set to a number, a valid new note will briefly turn off the gate to retrigger the envelope generators of your mono-synth. (multiple trigger). The numbers relate to the off time in 0.2mS steps approximately.

P 03   Note priority (default: new)

The following can be selected:
New note priority   [nn]
Low note priority   [lo]
High note priority   [hi]

- Sets the note priority for the converter.
If set to "nn" then the newest valid note played takes precedence.
If set to "lo" then the lowest valid note played takes precedence.
If set to "hi" then the highest valid note played takes precedence.
NB The MODULAR SOLO has a 5 note buffer memory so that trill effects can be achieved.

P 04   Pitchbend range (default: 2)

Range   0 to 12 semitones.
- The pitch bend range can be changed in semitone steps from zero to 12 semitones

P 05   Portamento controller number (default: 65)

- Sets which MIDI controller will turn on/off the portamento function.

The following can be selected:

On   [on]   always on
Off   [of]   always off
Auto portamento   [AU]   normally off but legato playing turns portamento on
MIDI controllers   #0 to 119   data values of 64 and above =on, 63 and below =off

The standard MIDI controller for portamento on/off is #65 which is the default, but with this command , the *MODULAR SOLO* allows you to use another controller, direct control or Auto Portamento if you wish.

P 06   *Portamento time / rate (default :98)*

Range   1 to 127

- Sets the portamento (glide or slide) time. This can also be adjusted in real time over MIDI using controller #5 (portamento time). This number is just a value, it is not calibrated in mS or any other unit. To turn portamento off, set portamento controller (parameter 05) to off, don't use this parameter.

P 07   *Portamento type (default : fixed rate)*

The following can be selected:
Fixed rate   [Fr]
Fixed time   [Ft]

- Fixed rate causes the portamento to slide at the rate set in 06, so that the slide time is proportional to the interval between the start and finish notes.
- Fixed time will attempt to keep the time taken for the slide to be constant, regardless of the interval between the start and finish notes. (In extreme cases this is not always possible)

P 08   *LFO to CV controller number (default: 1)*

Sets which controller will affect modulation amount of the CV output. The following can be selected:
Off   [oFF]
Pitch bend   [Pbd]
Velocity   [VEL]
Aftertouch   [AFt]
MIDI controllers 0 to 119

P 09   *LFO to CV minimum value (default: 0)*

Range   0 to 127
- Sets the level for LFO to CV modulation when the MIDI controller source is at its minimum.
Note that minimum can be set above maximum so that the controller works backwards.
Why would I want to do this? – You may want a pre-set amount of modulation applied at all times

P 10   *LFO to CV maximum value (default: 50)*

Range   0 to 127
- Sets the level for LFO to CV modulation when the MIDI controller source is at its maximum.
Note that minimum can be set above maximum so that the controller works backwards.
Why would I want to do this? – The modulation amount at mod-wheel maximum may be too great or too little

P 11   *LFO to CV reset value (default: 0)*

Range   0 to +127
- Sets the level the LFO to CV modulation will reset to when the *MODULAR SOLO* is powered on or when it receives a controller reset MIDI command or a new setup is loaded from memory. This is equivalent to a MIDI message of this value being received, so it will be influenced by min and max settings above.
Why would I want to do this? – You may want a pre-set amount of modulation that can however be turned off later using the mod wheel

P 12   *Coarse Tune / Transpose (default: 0)*

Range   -24 to +24
- Changing this will change the tuning of the mono-synth in semi-tone steps. If your synth does not play C when you play a MIDI C (note#36), use this to make it as near as possible.
Why would I want to do this? – Your synth might not play a C when zero volts CV is applied to it, either because it is out of adjustment, or maybe it was designed that way (e.g. Minimoog – zero volts = F)

P 13   Fine tune (default: 0)

Range   -127 to +127 (approximately a semitone each way – use P12 above if you need more)
- Fine tunes the mono-synth. This moves all notes up and down by the same amount.

P 14   Scale (default: 0)

Range   -127 to +127
- This is used to tune in the octave scaling of your analogue synth. It will only need adjusting if your synth sounds out of tune as you play further up the keyboard (see 'Tuning in Your Analogue Synth'). - Check whether CV type select has been set correctly (see 'P 15' below).
Note C (MIDI note#36) will not move (assuming transpose is not in operation) so get that in tune first then tune the C two octaves above that by using this parameter.

P 15   CV – Hz/V – 1.2V/oct select (default: CV)

- This should be set to V/oct [CV] for connecting to most synths, such as Roland, SCI, Octave, Oberheim or Moog synths. Set it to Hz/V [Hz] if you are using either Yamaha or Korg mono-synths (except the Monopoly which is volt per octave). A very small number of synths use 1.2 volts per octave [12] (one tenth of a volt per semitone) – in which case select this option.

P 16   Gate type select (default: G 05)

- you can select the following types for the GATE output:

Gate V-Trig +5v   [g 05]
Gate V-Trig +10v   [g 10]
Gate V-Trig max   [g 12]   (just over 11v)

Gate is the most common signal used for telling a synth when to play its note. The 10v level Gate is suitable for most synths, such as Roland, SCI, ARP, Oberheim. The 5V level gate may be needed for synths that require a lower gate voltage such as the SH-101.

S-trig +5v pull-up   [S 05]
S-trig +10v pull-up   [S 10]
S-trig max pull-up   [S 12]   (just over 11v)

S-trig +5v pullup would be used for most Moogs & Korgs, and the Yamaha CS range instead of Gate.

AUX1 output

P 20   AUX 1 controller number (default: 16)

- Sets which MIDI controller will control the auxiliary output. The following can be selected:
Off   [oFF]
Pitch bend   [Pbd]
Velocity   [VEL]
Aftertouch   [AFt]
MIDI controllers   0-119

P 21   AUX 1 minimum value (default: 0)

Range   -27 to +100
- Sets the level for the Auxiliary output when the MIDI controller source is at its minimum.
A value of 10 is approximately 1 volt – so 100 is approx. 10 volts and –27 is approx. –2.7 volts
Note that minimum can be set above maximum so that the controller works backwards.

P 22   AUX 1 maximum value (default: 100)

Range   -27 to +100
- Sets the level for the Auxiliary output when the MIDI controller source is at its maximum.
A value of 10 is approximately 1 volt – so 100 is approx. 10 volts and –27 is approx. –2.7 volts.
Note that minimum can be set above maximum so that the controller works backwards.

P 23   AUX 1 reset value (default: 0)

Range   0 to 127
- Sets the level the Auxiliary output will reset to when the *MODULAR SOLO* is powered on or when it receives a controller reset MIDI command or a new setup is loaded from memory. This is equivalent to a MIDI message of this value being received, so it will be influenced by min and max settings above.

P 24   Key scale to AUX 1(default: 0)

Range   0 to 127
- Sets the amount of key scaling which is applied to the Aux output (for opening the filter up as you play notes further up the keyboard. *Most synths do this internally even when connected to a CV converter – however not all do, a particular exception being the Sequential Pro-One. This feature enables key-scale to filter, even when not otherwise available on the synth.*

P 25   LFO to AUX 1 controller (default: 17)

- Sets which Controller will control the LFO depth applied to the AUX1 output.
The following can be selected:
Off   [oFF]
Pitch bend   [Pbd]
Velocity   [VEL]
Aftertouch   [AFt]
MIDI controllers   0 to 119

P 26   LFO to AUX 1 minimum value (default: 0)

Range   0 to 127
- Sets the level for LFO to AUX modulation when the MIDI controller source is at its minimum.
Note that minimum can be set above maximum so that the controller works backwards.

P 27   LFO to AUX 1 maximum value (default: 64)

Range   0 to 127
- Sets the level for LFO to AUX modulation when the MIDI controller source is at its maximum.
Note that minimum can be set above maximum so that the controller works backwards.

P 28   LFO to AUX 1 reset value (default: 0)

Range   0 to 127
- Sets the level the LFO to AUX1 modulation will reset to when the *MODULAR SOLO* is powered on or when it receives a controller reset MIDI command or a new setup is loaded from memory. This is equivalent to a MIDI message of this value being received, so it will be influenced by min and max settings above.

LFO control

P 30   LFO rate / speed (default :116) [approx 6.25Hz]

- Sets the speed of the LFO. Range approx 0.1Hz to 100Hz.
Range   0 to 191
Note: This number is just a numeric value for reference purposes only. It is not calibrated in mS or any other unit. The scale is roughly logarithmic. Approximately 0=0.1Hz 66=1Hz 129=10Hz 191=100Hz

P 31   LFO waveshape (default :TR)

- Sets the LFO waveshape. All waveshapes modulate CV and/or Aux1 any value between 0 to a positive value, except triangle, which modulates positive and negative. The following may be selected: (the downward arrow (↓) indicates the default trigger point when in MIDI sync mode). Note that the sync point can be changed using parameter #33 – LFO Sync Start Point.

Triangle   [TR]   Sawtooth up [SU]

Sawtooth down   [SD]   PulseWidth 10%   [10]

PulseWidth 20%   [20]   PulseWidth 30%   [30]

PulseWidth 40%   [40]   Square   [50]

Sample & Hold   [SH]   (Pseudo random)
(actually a new S/H level for each trigger)

P 32   LFO MIDI SYNC   (default: oFF)

Range, off [oFF], 1 to 96

- Allows the LFO waveform to be synchronised to MIDI clock, with a variable divide ratio. The LFO waveform will automatically adjust its length so that it will start at the beginning of a bar, and last for whatever musical time it is set for (see below for divide ratios).

A divide ratio can be set, so the LFO only re-triggers every so many MIDI clock messages. MIDI sends 24 clocks per quarter note. So if divide is set to 1, there will be 1 cycle of the LFO for every 1 MIDI clock. (i.e. 24 cycles per quarter note). If set to 24, there will be 1 cycle of the LFO for every 24 MIDI clocks. (i.e. 1 cycle of the LFO per quarter note).

Below is a table of values you can set the divide ratio to obtain LFO cycles of various musical lengths:

Note type:	Divide ratio:
Semibreve	96
Minim	48
Crotchets	24
Crotchet triplets	16
Quavers	12
Quaver triplets	8
Semiquavers	6
Semiquaver triplets	4
Demisemiquavers	3
Demisemiquaver triplets	2

Do not use low divide ratios at high clock speeds (particularly 1) and switch off if not using.

P 33   LFO Sync Start Point (default :0)

- Sets where the waveform will start when MIDI sync is active or Key-On reset is on.
Range   0 to 255

P 34   Key-On resets LFO Wave (default :off)

The following can be selected:
Off   [oFF]
On   [on]
- When on, the LFO waveform is reset to the selected start point whenever a new note is played.

AUX2 output

P 40   AUX 2 controller number (default: 7)

- Sets which MIDI controller will control the auxiliary output. The following can be selected:
Off   [oFF]
Pitch bend   [Pbd]
Velocity   [VEL]
Aftertouch   [AFt]
MIDI controllers   0-119

P 41   AUX 2 minimum value (default: 0)

- Sets the level for the Auxiliary output when the MIDI controller source is at its minimum.
Range   -27 to +100
A value of 10 is approximately 1 volt – so 100 is approx. 10 volts and −27 is approx. −2.7 volts
Note that minimum can be set above maximum so that the controller works backwards.

P 42   AUX 2 maximum value (default: 100)

- Sets the level for the Auxiliary output when the MIDI controller source is at its maximum.
Range   -27 to +100
A value of 10 is approximately 1 volt – so 100 is approx. 10 volts and −27 is approx. −2.7 volts.
Note that minimum can be set above maximum so that the controller works backwards.

P 43   AUX 2 reset value (default: 127)

Range   0 to 127
- Sets the level the Auxiliary output will reset to when the *MODULAR SOLO* is powered on or when it receives a controller reset MIDI command or a new setup is loaded from memory. This is equivalent to a MIDI message of this value being received, so it will be influenced by min and max settings above.

AUX3 output

P 50   AUX 3 controller number (default: Velocity)

- Sets which MIDI controller will control the auxiliary output. The following can be selected:
Off   [oFF]
Pitch bend   [Pbd]
Velocity   [VEL]
Aftertouch   [AFt]
MIDI controllers   0-119

P 51   AUX 3 minimum value (default: 0)

- Sets the level for the Auxiliary output when the MIDI controller source is at its minimum.
Range   0 to +100
A value of 10 is approximately 1 volt – so 100 is approx. 10 volts.
Note that minimum can be set above maximum so that the controller works backwards.

P 52   AUX 3 maximum value (default: 100)

- Sets the level for the Auxiliary output when the MIDI controller source is at its maximum.
Range   0 to +100
A value of 10 is approximately 1 volt – so 100 is approx. 10 volts.
Note that minimum can be set above maximum so that the controller works backwards.

P 53   AUX 3 reset value (default: 0)

Range   0 to 127
- Sets the level the Auxiliary output will reset to when the *MODULAR SOLO* is powered on or when it receives a controller reset MIDI command or a new setup is loaded from memory. This is equivalent to a MIDI message of this value being received, so it will be influenced by min and max settings above.

AUX4 output

P 60   AUX 4 controller number (default: Aftertouch)

- Sets which MIDI controller will control the auxiliary output. The following can be selected:
Off   [oFF]
Pitch bend   [Pbd]
Velocity   [VEL]
Aftertouch   [AFt]
MIDI controllers   0-119

P 61   AUX 4 minimum value (default: 0)

- Sets the level for the Auxiliary output when the MIDI controller source is at its minimum.
Range   0 to +100
A value of 10 is approximately 1 volt – so 100 is approx. 10 volts.
Note that minimum can be set above maximum so that the controller works backwards.

P 62   AUX 4 maximum value (default: 100)

- Sets the level for the Auxiliary output when the MIDI controller source is at its maximum.
Range   0 to +100
A value of 10 is approximately 1 volt – so 100 is approx. 10 volts.
Note that minimum can be set above maximum so that the controller works backwards.

P 63   AUX4 reset value (default: 0)

Range   0 to 127
- Sets the level the Auxiliary output will reset to when the *MODULAR SOLO* is powered on or when it receives a controller reset MIDI command or a new setup is loaded from memory. This is equivalent to a MIDI message of this value being received, so it will be influenced by min and max settings above.

CLOCK1 output

P 70   Clock1 type (default: clock normal)

- Sets which MIDI controller will control AUX2 output. The following controllers can be selected:

Clock normal   [cLn]
Clock inverted   [cLi]
Stop/start normal   [SSn]
Stop/start inverted   [SSi]

The ON voltage can be set using parameter 73 – clock1 voltage.
Inverted settings mean that on is zero and off is high. (like s-trig).

P 71   Clock1 divide ratio - (default: d2)

available values c24, c48 & d2 to d24,
- sets the ratio of MIDI clocks to output pulses from the Clock1 output.

c24 – special drum machine mode – outputs 24 cpqn – used for many drum machines
c48 – special drum machine mode – outputs 48 cpqn – for Linn & Oberheim drum machines
N.B. Some drum machines use other values e.g. the Roland CR78 uses 12 cpqn (div ratio 2)

If set to 2, there will 12 pulses from the clock1 output for every 24 MIDI clocks = 12 cpqn
If set to 24, there will be 1 pulse from the clock pulse output for every 24 MIDI clocks = 1 cpqn
(Note there are 24 MIDI clocks per quarter note)

Below is a table of values you can set the divide ratio to in order to obtain a clock pulse at various musical time intervals:-

Note type		Divide ratio	CPQN (clocks per quarter note)
Crotchets	(quarter notes)	24	1
Crotchet triplets		16	
Quavers	(eighth notes)	12	2
Quaver triplets		8	
Semiquavers	(sixteenths)	6	4
Semiquaver triplets		4	6
Demisemiquavers		3	8
Demisemiquaver triplets		2	12

P 72   Clock1 shift (default: 0)

Range   0 to 255
- Sets the number of MIDI clock pulses allowed to pass before the Clock1 output starts giving out clock pulses. Low values can be used to make Clock1 & Clock2 out of phase with each other. Higher values can be used to delay the start of one clock relative to the other. This setting has no effect when the clock has been started, it only has an effect immediately following a MIDI start or continue command.

P 73   Clock1 voltage (default: 05)

- Sets the voltage of the Clock1 output. The following can be selected:

+5v output   [05]
+10v output   [10]

CLOCK2 output

P 80   Clock2 type (default: clock normal)

- Sets which MIDI controller will control AUX2 output
The following controllers can be selected:

Clock normal   [cLn]
Clock inverted   [cLi]
Stop/start normal   [SSn]
Stop/start inverted   [SSi]
Note trigger pulse   [t r g]

The ON voltage can be set using parameter 83 - clock2 voltage.
Inverted settings mean that on is zero volts and off is high. (like s-trig).
If 'Note trigger pulse' is selected, Clock2 will give a short trigger pulse whenever a valid new MIDI note is received – this can be used to drive the envelope generator on synths that require a separate trigger for this. (Only usually needed by the Arp 2600, Arp Odyssey mk1 and a few modulars)

P 81   Clock2 divide ratio - (default: d2)

- Sets the ratio of MIDI clocks to output pulses from the Clock2 output.
available values d2 to d24. Note that only the clock1 output can give 24cpqn and 48cpqn.

If set to 2, there will 12 pulses from the clock1 output for every 24 MIDI clocks = 12 cpqn
If set to 24, there will be 1 pulse from the clock pulse output for every 24 MIDI clocks = 1 cpqn
(Note there are 24 MIDI clocks per quarter note)

Below is a table of values you can set the divide ratio to in order to obtain a clock pulse at various musical time intervals:-

Note type		Divide ratio	CPQN (clocks per quarter note)
Crotchets	(quarter notes)	24	1
Crotchet triplets		16	
Quavers	(eighth notes)	12	2
Quaver triplets		8	
Semiquavers	(sixteenths)	6	4
Semiquaver triplets		4	6
Demisemiquavers		3	8
Demisemiquaver triplets		2	12

P 82   Clock2 shift (default: 0)

Range   0 to 255
- Sets the number of MIDI clock pulses allowed to pass before the Clock2 output starts giving out clock pulses. Low values can be used to make Clock1 & Clock2 out of phase with each other. Higher values can be used to delay the start of one clock relative to the other. This setting has no effect when the clock has been started, it only has an effect immediately following a MIDI start or continue command.

P 83   Clock2 voltage (default: 05)

- Sets the voltage of the Clock2 output. The following can be selected:

+5v output   [05]
+10v output   [10]

Global Parameters

P 90   Continue = start - (default: on)

- Sets how MIDI Continue messages are treated. The following can be selected:
Off   [oFF]
On   [on]
- when set to on, all continue messages are treated as if they were MIDI start messages.
- when set to off, continue messages will only be treated as start if immediately preceded by a song position pointer = zero message. Some sequencers use this instead of a start message.
Note this parameter affects the DIN sync 24 output as well as the Clock1 and Clock2 outputs.

P 91   Socket select - (default: MIDI Out/Thru)

- Sets the function of the MIDI Out socket. The following can be selected:
MIDI Out/Thru   [MO]
Sync 24   [Syn]

P 92   Sysex Device Number (default :1)

- Sets the SysEx device number for this unit.
Range   1 to 16

P 93   *Prog receive enable - (default: Off)*

- Sets the function of the MIDI Out socket. The following can be selected:
MIDI Out/Thru   [MO]
Sync 24   [Syn]

P 98   *Load Prog*

- Sets the number of the program to be loaded as the current setup .
Range 1 to 32
To load the selected program, press and hold the *SELECT* button until **LoD** appears in the display.

P 99   *Store Prog*

- Sets the number of the program into which the current setup will be stored.
Range 1 to 32
To store to the selected program, press and hold the *SELECT* button until **Sto** appears in the display.

OTHER USEFUL INFO

The *MODULAR SOLO* will always respond to controller #64 (sustain pedal)

You can use program changes to load programs from memory if enabled in parameter 93

To get the parameter name to scroll across the display, press the *SELECT* button twice.

Leave parameter 32 (LFO MIDI sync) set to OFF unless you are actually using it.

If you have stopped a sequence and are left with a hanging note, you can turn it off by holding the SEL button for about 6 seconds until the display shows **noF** (note off) except while parameters 98 or 99 are selected (in which case the long hold executes load or store).

RESETTING THE *MODULAR SOLO* TO FACTORY DEFAULTS

If you wish to reset your *MODULAR SOLO*, you can do so by turning the power on whilst holding down all three push buttons. This will return the MODULAR SOLO to it's default settings. 'Fd' (factory defaults) will momentarily be displayed when this has been done.

DIRECTING CV & GATE OUTPUTS TO THE BUS

There are two jumpers for linking CV & Gate to the bus situated behind the power/bus connector. Both jumpers are set to off at manufacture. A jumper always links 2 out of the 3 pins, so the centre pin is always used. When a jumper links the two pins nearest the bottom edge of the PCB then it is connected to the bus. CV is the jumper nearest the bottom edge of the PCB. Gate is the other.

INFORMATION ABOUT THE POWER CONNECTOR

The power connector is wired in the standard way with the –12v pins nearest the edge of the PC board.
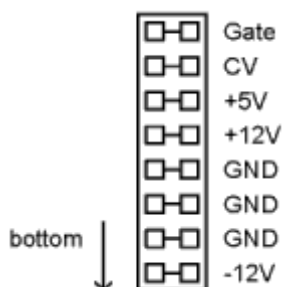
The bottom is the edge of the PC board

TUNING THE *MODULAR SOLO* TO YOUR SYNTH

It may be that your synth is slightly out of tune, so it will be necessary to adjust the *MODULAR SOLO* to compensate for the tuning of your synth. **NEVER** use the trimmers on the PC board for tuning, these are for factory setup ONLY.

1, Firstly, ensure that your analogue synth is as in-tune as possible when playing from its own keyboard. Do this by adjusting the tuning or pitch knob on your analogue synth whilst playing middle C on both this and your master keyboard (or whatever you use for tuning reference). To do this, you may need to disconnect the analogue synth from the *MODULAR SOLO*.

2, Connect the converter to your analogue synth and MIDI system. Check the *MODULAR SOLO* is switched to the correct scaling system, Hz/V for Korg and Yamaha, or V/oct for anything else (see Editing Parameters section). Set transpose to zero. Now press bottom C (MIDI note #36) on your digital synth. Both synths should sound, don't worry at this stage if they are not in tune.

3, Using bottom C (MIDI note #36) as a reference (you must use this note for maximum accuracy) tune in the *MODULAR SOLO* with your analogue synth by adjusting the parameter **FINE TUNE** and **TRANSPOSE** if necessary (see Editing Parameters section) until it is exactly in tune.

4, When your digital & analogue synths are in tune at the bottom , play middle C, two octaves up on your digital synth. (MIDI note #60). Now adjust the **SCALE** parameter (see Editing Parameters section) until both synths are in tune. The analogue synth should now play correctly across it's complete range from your master keyboard, if this is still not the case go back to step 3 and repeat the process for final tweaking.

CHECK LIST FOR SETTING UP THE *MODULAR SOLO*

1-   Make sure all cable connections have been made.
2-   Set MIDI receive channel you wish to use.
3-   Make sure you have set the GATE output correctly to either 'Gate'
                 or 'S-Trig' type triggers.
4-   Make sure you have set the CV output correctly to either 'V/oct'
                 or 'Hz/V'.
5 -   You may wish to adjust the AUX, or any other settings to those that
                 work best for your set-up.

BOOT MENU OPTIONS

Some combinations of buttons can be pressed at power up to adjust settings or enter other operational modes. First ensure the power switch is off, press the required button or buttons, then turn the power switch on. The various modes are described below.

SEL only   – Enters MIDI analyser mode [displays ANL] described on page 12
DEC only   – not used
INC only   – Displays the firmware revision number, described below
SEL & DEC & INC   – Reset to factory defaults [displays Fd] – described on page 10

Firmware revision display:

While the **INC** button is held, the firmware revision number [1xxx] will be displayed in pairs – two dashes then digits 1 & 2 then digits 3 & 4 repeated. Releasing the INC button will revert to the normal operational mode.

MIDI analyser mode:

The *MODULAR SOLO* has a built-in MIDI analyser function. This feature allows you to see what types of MIDI messages are being transmitted by your master keyboard/sequencer making the *MODULAR SOLO* a useful diagnostic tool.

To enter analyser mode, you must power on the *MODULAR SOLO* whilst holding the **SELECT** button. The display will then show 'rC' for receive channel & status mode. This means the display will show the MIDI receive channel of any messages it receives in the right hand two digits, and will show status in the left digit – this is explained further down the page.
Using the **INC**, **DEC**, and **SELECT** buttons, different types of MIDI messages received may be displayed:

SELECT	Short press	[rC] Receive channel & status
	Long press	[PC] Program change
DEC	Short press	[nt] Note number
	Long press	[nv] Velocity
INC	Short press	[Cn] Controller number
	Long press	[Cv] Controller value

For whichever of the above selected, the *MODULAR SOLO* will display the value it receives for the type of message currently selected.
Although pitchbend and after-touch are not strictly controllers, when Controller <u>number</u> [Cn] mode is selected, 'pb' will be displayed if a pitchbend message is received, and 'af' will be displayed if an after-touch message is received.
If Controller <u>value</u> [Cv] mode is selected, and pitchbend or after-touch messages are received, their values will be displayed.
When Receive channel & status [rC] mode is selected, the right hand 2 digits show the received MIDI channel (if applicable) and the left hand digit operates as a received MIDI message indicator. LED segments will flash when then following types of messages are received: Note on, Note off, Sysex, Timing clock (MIDI clock), Start, Stop, Continue.
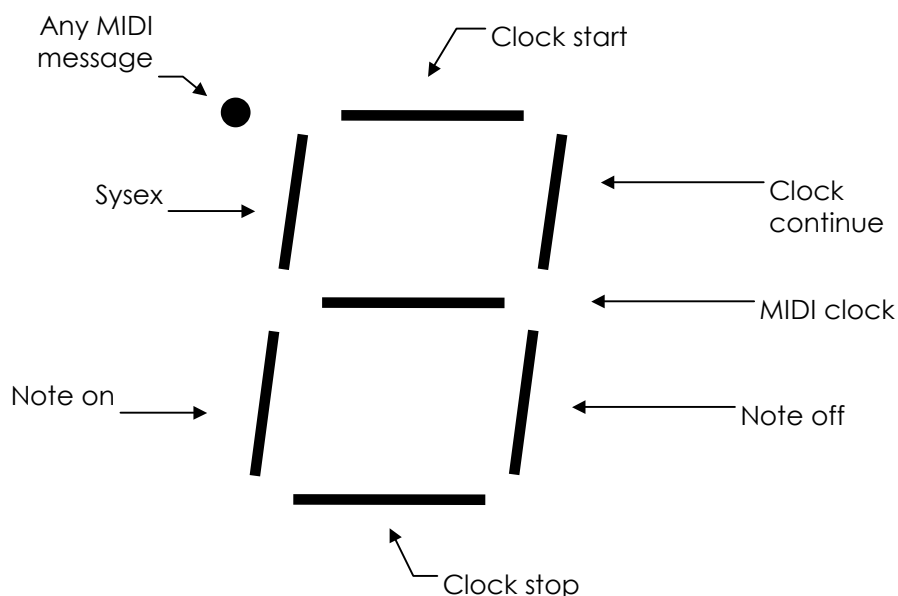
The top left dot (any MIDI message) operates in all modes, not just for Receive Channel & Status mode.

To exit MIDI analyser mode, the power switch of the *MODULAR SOLO* must be turned off then on again.

PROBLEMS YOU MAY ENCOUNTER WHEN USING MIDI CLOCK

When using MIDI clock in conjunction with the *MODULAR SOLO*, please note the following.

First, ensure that the *MODULAR SOLO* is actually receiving MIDI clock. This is not as silly as it sounds - there are a number of reasons why it may not be receiving MIDI clock messages in the first place. If you are having problems, go into the MIDI analyser mode described on page 13 and see if the *MODULAR SOLO* is actually receiving the MIDI clock messages. If the *MODULAR SOLO* is not receiving clock messages, here are a few points to watch for:-

Some MIDI mergers & patch bays actually remove MIDI clock information from the data stream, or you may have to enable it for the port you are using.

Users of CUBASE note that the default for MIDI clock is for it NOT to be sent, you will have to go into the MIDI synchronisation page and select MIDI clock to transmit.

If you have more than one MIDI port attached to your computer, note that MIDI clock does not necessarily come out of all MIDI ports – it may only come out of a pre-assigned or selected one.

There is more information about MIDI clock problems on our website in the "Support" section.

MORE ABOUT MIDI CLOCK ON THE MODULAR SOLO

See information about parameters 70-73 and 80-83 on pages 11 to 13.

Note that no output will happen on clock1 and/or clock2 unless one of the following conditions is met:

1) A MIDI start command is received. (Unfortunately not all sequencers send start commands)
2) A MIDI continue is received, immediately preceded by a song position pointer zero message.
3) A MIDI continue is received and "continue = start" is set on.

Sync 24 is available at the MIDI Out DIN socket (5 pin 180 degree DIN connector) if parameter 91 is set to **Syn** (for sync).

Pin 1 - Stop = 0 volts / 1Start = +5 volts (or continue if selected)
Pin 3 - 5 volt positive going pulses; 24 clocks (pulses) per quarter note, the same as MIDI
Pin 2 - Ground (zero volts)
Pins 4 & 5 are not used for sync (but are used for MIDI)

Sync 24 is always available subject to a MIDI clock signal being present – it is **not** affected by the clock divide parameters, however it **is** affected by the continue = start parameter #90.

A BRIEF GUIDE TO MIDI TO CV CONVERSION FOR THE BEGINNER

MIDI-CV converters can have up to four different types of outputs used to control analogue synths, usually labelled CV, GATE, S-TRIG and AUX. Below is a description of what they do:

Pitch - CV outputs (V/oct, Hz/V)

The CV (control voltage) is a voltage that tells the synth what note to play. Most synths use the 1 Volt per Octave (V/oct) pitch scaling system to control the pitch. This means, that each octave is 1V (V=volts) apart (or 0.0833V per semitone).

For example, bottom C (MIDI note #36) corresponds to 0 Volts. The next C will be 1V, 2V, 3V etc.. Synths using this system include Roland SH101, Sequential Circuits Pro 1, ARP Odyssey, Oberheim OB 1.

Some other synths, most notably Korg and Yamaha, use a different pitch scaling system. This is an exponential method called Hertz per volt (Hz/V). This means that for the next octave up, the voltage is doubled. So bottom C (note#36) will be 0.25V, the next C will be 0.5V, 1V,2V, 4V etc.

If you are not sure which C is MIDI note #36, use MIDI analyser mode to check.

If you use a Hz/V synth with a V/oct pitch output (or vice-versa), the synth will play out of tune but will not cause any damage to the synth.

Note - The Korg Monopoly is an exception. Although other Korg synths use Hz/V scaling, this synth actually uses V/oct scaling.

Gate - (Or S-TRIG)

The GATE (sometimes called V-trig [voltage trigger]) signal is a voltage that tells the synth when to play the note. The GATE voltage will usually be a positive voltage when the note is on, and 0V when off.

Some other synths, like Moog, Korg, and Yamaha, use S-TRIG (Short Trigger) instead of GATE. This signal still tells the note when to play, but it is a different type of signal (electrically). To tell the note to play, the converter will provide a short circuit at it's S-TRIG output (0V), and to turn off the note the output will be open circuit (literally like opening and closing a switch).

A point to watch for: unless you know the synth, it will not always be clear what type of CV and GATE signals are required to play the synth.

For instance, the Korg MS20 requires an S-TRIG signal, but the input is labelled TRIG. Another example is the Yamaha CS5. The pitch input is marked CV, but requires a Hz/V signal. The best way to check is either ask someone who knows, or just try all types of output till the synth works correctly. If you do plug your synth to the wrong outputs, it shouldn't do any harm, although always start out with minimum voltages.

Here's a general guide to the most common synths and how to hook them up to your converter

SYNTH MODEL	CV OR HZ/V?	S-TRIG OR GATE	AUXILIARY CONNECTIONS	NOTES
MINIMOOG	CV	S-TRIG (5V)	FILTER OR LOUDNESS	CINCH-JONES CONNECTOR NEEDED
MOOG PRODIGY	CV	S-TRIG (5V)	FILTER	KIT AVAILABLE FOR FILTER IF NOT FITTED
MOOG ROGUE	CV	GATE (5V)		KIT AVAILABLE FOR FILTER
MOOG SOURCE	CV	S-TRIG (5V)		KIT AVAILABLE FOR FITLER
ROLAND SH-101	CV	GATE (5V)	CLOCK IN (SYNC)	KIT AVAILABLE FOR FILTER/MODULATION
ROLAND MC-202	CV	GATE (5V)		KIT AVAILABLE FOR CV/GATE/FILTER/SLIDE
ROLAND TB-303	CV	GATE (5V)	FILTER (SEE RIGHT)	KIT AVAILABLE FOR CV/GATE/FILTER/SLIDE/ACCENT
SEQUENTIAL PRO-1	CV	GATE (15V)	FILTER	
KORG MS-10/20	HZ/V	S-TRIG (5V)	ANY OTHER	THERE ARE MANY EXTRA INPUTS ON THE MS10/20
KORG 700S/770	HZ/V	S-TRIG (5V)	FILTER	KIT AVAILABLE FOR CV/GATE AND FILTER
KORG MONOPOLY	CV	GATE (15V)	VCF/PORTAMENTO	ARPEGGIO CAN ALSO BE CONTROLLED
YAMAHA CS-10/20/30	HZ/V	S-TRIG (5V)		FILTER AVAILABLE FOR CS-5
ARP ODYSSEY (&AXXE)	CV	GATE (15V)		KIT AVAILABLE FOR FILTER
ARP 2600	CV	GATE (15V)	FILTER	
OCTAVE CAT/KITTEN	CV	GATE (15V)	FILTER	

This is a general guide only, further socket kits are available, and many other synths can be controlled. There simply is not the space to detail all connections to all synths. However if you visit our website you will find more information there.

A further point to watch for. Some synths use stereo jacks for the CV and GATE connections. Moog, for instance, use a stereo jack for CV In/Out, and a stereo jack for S-TRIG In/Out on some synths.

Whether the tip or the ring is in or out is hard to say as Moogs seem to vary from synth to synth! – The Rogue however uses RING for inputs and TIP for outputs.
Octave who made the Cat and Kitten synths also use stereo jacks. CV and GATE outputs are on one stereo jack, and the inputs are on another stereo jack.

Auxiliary outputs - More control

The AUX outputs can be used to control functions such as filter cut-off or volume control. This depends on what control inputs your synth has. Most mono-synths have at least a Filter input, e.g. the Sequential Pro 1. Some synths, such as the Minimoog, also have VCA inputs (volume). Synths such as the Korg MS20 and ARP 2600 have even more inputs to control effects such as Pulse Width. The *MODULAR SOLO* has 4 Aux outputs. By plugging an AUX output into the external control input of the synth, e.g. Filter input, the cut-off frequency can be controlled over MIDI.

The AUX outputs are not controlled by MIDI note numbers. The converter allows you to set which MIDI controller, e.g. Modulation Wheel, (or even velocity, after-touch, or pitch bend), will control the level of the AUX voltage to control the synth's extra input.

Only synths that have the appropriate inputs can be controlled from a MIDI-CV converter.

The synth needs some sort of CV and GATE inputs.

CVs might be labelled CV In, OSC In, Keyboard In, VCO In, Key Volt, etc.

GATEs (and S-TRIG) may be labelled GATE In, S-TRIG, V-TRIG (voltage trigger, same as gate), Trig In, etc.
Any additional inputs may be utilised, like Filter, VCF fcM, VCF, PORTA (portamento), Loudness, VCO, PWM, etc. by using the converter's AUX output.

Some synths that cannot be connected to a MIDI-CV converter via CV, GATE, AUX Outputs (as they do not have them). This includes just about all polyphonic synths.

Receiving a firmware upgrade over MIDI:

You need to start sending the SysEx firmware upgrade within 20 seconds from when P01 first appears in the display, otherwise the upgrade will be ignored. (i.e. when the display has stopped scrolling)
Read instructions included in the firmware upgrade zip file.
The number **2** should flash in the display while the dump is being received then number **3** *[all received]* followed quickly by **4** *[CRC check OK]*, then after about 5 seconds a steady **5**. The **5** indicates the update has been successful. Wait 10 seconds then turn off the power to the modular case. Wait 10 seconds then power-on again The *Modular Solo* will now run with the new firmware.
Warning - NEVER UNPLUG WHILE THE 4 IS SHOWING
Possible error states: hangs at stage **2** = not enough bytes received.   **8** shows – dump is corrupt
For both of the above situations, turn off the modular case and start again.

It is essential that power is maintained to the *MODULAR SOLO* during the firmware upgrade process. Failure of power during stage 4 will leave the *Modular Solo* unusable and require return of the unit to Kenton.

MODULAR SOLO MENU

CV / GATE -

        01 - MIDI receive channel
        02 - multi trig
        03 - note priority - recent/lo/hi
        04 - pitchbend range semitones
        05 - portamento controller
        06 - portamento rate/time
        07 - portamento type
        08 - lfo to cv controller
        09 - lfo to cv min value
        10 - lfo to cv max value
        11 - lfo to cv reset value
        12 - coarse tune / transpose - semitones
        13 - fine tune amount
        14 - scale amount
        15 - v.oct / hz.v / 1.2v select
        16 - gate select

AUX1 -

        20 - aux1 controller
        21 - aux1 min
        22 - aux1 max
        23 - aux1 reset level
        24 - key scaling to aux1
        25 - lfo to aux1 controller
        26 - lfo to aux1 min value
        27 - lfo to aux1 max value
        28 - lfo to aux1 reset value

LFO -

        30 - LFO rate/time
        31 - LFO wave shape
        32 - LFO midi sync
        33 - LFO start point offset
        34 - LFO key-on reset

AUX2 -

        40 - aux2 controller
        41 - aux2 min
        42 - aux2 max
        43 - aux2 reset level

AUX3 -

        50 - aux3 controller
        51 - aux3 min
        52 - aux3 max
        53 - aux3 reset level

AUX4 -

        60 - aux4 controller
        61 - aux4 min
        62 - aux4 max
        63 - aux4 reset level

CLOCK1 -

        70 - clk1 type
        71 - clk1 divide
        72 - clk1 shift
        73 - clk1 voltage

CLOCK2 -

        80 - clk2 type
        81 - clk2 divide
        82 - clk2 shift
        83 - clk2 voltage

GLOBAL -

        90 - continue=start
        91 - midi out socket select
        92 - sysex device number
        93 - prog receive enable
        98 - load program
        99 - store program

STANDARD MIDI CONTROLLER NUMBERS

Controller Number		Control Function
Decimal	**Hex**	
0	00H	Bank select MSB
1	01H	Modulation wheel/lever
2	02H	Breath controller
3	03H	Undefined
4	04H	Foot controller
5	05H	Portamento time
6	06H	Data entry MSB
7	07H	Main volume
8	08H	Balance
9	09H	Undefined
10	0AH	Pan
11	0BH	Expression controller
12-15	0C-0FH	Undefined
16-19	10-13H	General purpose controllers (1-4)
20-31	14-1FH	Undefined
32-63	20-3FH	LSB for controllers 0-31
64	40H	Damper pedal (sustain) (Hold 1)
65	41H	Portamento
66	42H	Sostenuto
67	43H	Soft pedal
68	44H	Undefined
69	45H	Hold 2
70-79	46-4FH	Undefined
80-83	50-53H	General purpose controllers (5-8)
84-90	54-5AH	Undefined
91	5BH	External effects depth
92	5CH	Tremolo depth
93	5DH	Chorus depth
94	5EH	Celeste (detune) depth
95	5FH	Phaser depth
96	60H	Data increment
97	61H	Data decrement
98	62H	Non-registered parameter number LSB
99	63H	Non-registered parameter number MSB
100	64H	Registered parameter number LSB
101	65H	Registered parameter number MSB
102-119	66-78H	Undefined
120-127	79-7FH	Reserved for channel mode messages

SYSEX CONTROL

The *MODULAR SOLO* can be controlled by SysEx (System Exclusive) messages in the following formats:

The first five bytes of SysEx for the MODULAR SOLO are always the same for all data types

```
[ 1 ]   0F0h   - Sysex command
[ 2 ]   00h    - Company ident first byte
[ 3 ]   20h    - Company ident second byte
[ 4 ]   13h    - Company ident third byte
[ 5 ]   14h    - Product code – MODULAR SOLO
[ 6 ]   zzh    - where zz is 0 - 0Fh = device number 1-16  or 7Fh = firmware upgrade
```

For program dump request:
```
[ 7 ]   10h    - program dump request
[ 8 ]   xx     - prog  number to dump from (1 to 40) or 0 = edit buffer (current)
[ 9 ]   0F7h   - end of exclusive
```

The *MODULAR SOLO* responds by sending a program dump in the format given below for dump receive

For program dump receive:
```
[ 7 ]   40h       - program dump receive
[ 8 ]   xx        - prog  number to dump from (1 to 40) or 0 = edit buffer (current)
[ 9 ]   0uuuuuuu  - where uuuuuuu = high 7 bits of data (either 0 or 1 for MODULAR SOLO)
[ 10 ]  0hhhhhhh  - where hhhhhhh = low 7 bits of data
9 & 10 above are repeated 48 times (for 48 bytes of data)
[ 105 ] 0F7h   - end of exclusive  (total bytes 105)
```

For firmware upgrade:

```
[ 7 to 65406]  = 65400 bytes - where 57225 bytes of 8 bit code are packed as 65400 bytes of 7 bits
[ 65407 ]   0F7h   - end of exclusive  (total bytes 65407)
```

Note that *MODULAR SOLO* must start receiving the firmware upgrade within 20 seconds of the P01 message appearing in the display after power-up, otherwise it will be ignored.

For info change:
```
[ 7 ]    20h           - info change
[ 8 ]    0uuuuuuu   - where uuuuuuu = high 7 bits of parameter address (always zero for M. SOLO)
[ 9 ]    0hhhhhhh   - where hhhhhhh = low 7 bits of parameter address
[ 10 ]   0uuuuuuu   - where uuuuuuu = high 7 bits of data (either 0 or 1 for MODULAR SOLO)
[ 11 ]   0hhhhhhh   - where hhhhhhh = low 7 bits of data
[ 12 ]   0F7h   - end of exclusive
```

The *MODULAR SOLO* responds by changing the specified data and updating the display if necessary. Parameter data are accessed at the following addresses:-

Address	Function	Range	Notes (see end)
00	Receive chan	0 - 15	{ 1 }
01	trig / retrig	0 - 25	
02	note priority	0 - 2	
03	pitchbend range	0 - 24	
04	portamento cont #	253 - 0 - 119	{ 3 }
05	portamento time / rate	0 - 127	
06	portamento type	0 – 1	0=fixed rate / 1= fixed time
07	LFO to CV depth controller #	252 - 0 - 119	{ 4 }
08	LFO to CV min val	0 - 127	
09	LFO to CV max val	0 - 127	
10	LFO to CV reset val	0 - 127	

11	coarse tune / transpose	232 > 0 > 24	{ 2 }
12	fine tune val	129 > 0 > 127	129>0 = -ve
13	scale val	129 > 0 > 127	129>0 = -ve
14	v/o or hzv or 1.2v select	0 - 2	
15	gate select	0 - 4	
16	Aux1 Cont #	252 > 0 > 119	{ 6 }
17	Aux1 min val	0 - 127	
18	Aux1 max val	0 - 127	
19	Aux1 reset val	0 - 127	
20	Key scale to Aux	0 - 127	
21	LFO to Aux1 cont #	252 - 0 - 119	{ 4 }
22	LFO to Aux1 min val	0 - 127	
23	LFO to Aux1 max val	0 - 127	
24	LFO to Aux1 reset value	0 - 127	
25	Lfo speed	0 - 191	
26	Lfo waveshape	0 - 8	{ 7 }
27	Lfo MIDI sync	0 - 96	{ 8 }
28	Lfo sync start point	0 - 255	
29	Key-on resets LFO wave	0 - 1	{ 10 }
30	Aux2 Cont #	251 > 0 > 119	{ 6 }
31	Aux2 min val	0 - 127	
32	Aux2 max val	0 - 127	
33	Aux2 reset val	0 - 127	
34	Aux3 Cont #	251 > 0 > 119	{ 6 }
35	Aux3 min val	0 - 127	
36	Aux3 max val	0 - 127	
37	Aux3 reset val	0 - 127	
38	Aux4 Cont #	251 > 0 > 119	{ 6 }
39	Aux4 min val	0 - 127	
40	Aux4 max val	0 - 127	
41	Aux4 reset val	0 - 127	
42	Clock1 type	0 - 3	
43	Clock1 divide	0 - 24	{ 9 }
44	Clock1 shift	0 - 255	
45	Clock1 voltage	0 - 1	{0=5v 1=10v}
46	Clock2 type	0 - 4	
47	Clock2 divide	0 - 24	{ 9 }
48	Clock2 shift	0 - 255	
49	Clock2 voltage	0 - 1	{0=5v 1=10v}
64	cont = start	0 - 1	{ 11 }
65	socket select	0 - 1	{0=MIDI 1=Sync}
65	SysEx device number	0 - 15	{0-15 = 1-16 }
67	Prog receive enable	0 - 1	{ 10 }

{ NOTES }

{ 1 } Data 0 - 15 corresponds to MIDI channels 1 - 16
{ 2 } 232 = -24 semitones 0 = no transpose 24 = + 24 semitones - 25 to 231 are invalid
{ 3 } 253=pmt off 254=pmt on 255=auto pmt & 0 - 119
{ 4 } 252=ignore 253=pitchbend 254=velocity 255=aftertouch & 0 - 119
{ 5 } 0= -64 64=0 127=+63
{ 6 } 252=ignore 253=p.bend 254=vel 255=aft & 0 - 119
{ 7 } 0= triangle 1= saw up 2= saw down 3= 10% pulse etc. as display
{ 8 } 1 - 96 corresponds to sync divide 1 to 96 and 0 = off
{ 9 } 0 - 23 corresponds to arpeggio divide 1 to 24
{ 10 } 0=off 1=on
{ 11 } 0 = continue ignored   1 = continue=start

All SysEx addresses and data are range checked and out-of-range values
will either be ignored or adjusted to give a valid response.

SPECIFICATIONS

Power Input	Power is supplied by the power supply in the modular case
Power consumption	+ve supply 85mA max / -ve supply 3mA
MIDI	In & Out/Thru (via DIN sockets)
Analogue outputs	CV on 3.5mm mono jack (V/oct or Hz/V or 1.2V/oct) Gate on 3.5mm mono jack (Gate or S-trig – with or without pullups) Aux1-4 on 3.5mm mono jack
Digital outputs	Clock1 & 2 on 3.5mm mono jacks (off=0 volts on=+5/10 volts) Sync 24 on pins 1 & 3 of MIDI out DIN socket (selectable)
Weight	170g
Dimensions	128mm high x 50mm wide x 80mm deep
D to A conversion main CV D to A conversion Aux Outs	16 bit high quality / low drift DAC Aux 1 & 2 12 bit DACs – Aux 3 & 4 10 bit PWM
Non-volatile memory	EEPROM (no back-up battery required)
Processor	32 bit ARM processor

WARRANTY

The *MODULAR SOLO* comes with a 12 month (from purchase date) back to base warranty, (i.e. customer must arrange and pay for carriage to and from Kenton Electronics).

WEEE DIRECTIVE

Correct disposal of this product at the end of its working life.

(applies to the European Union & other European countries with separate collection systems)

The crossed-out wheelie bin symbol affixed to this product indicates that it should not be disposed of with other household wastes at the end of its working life. To prevent possible harm to the environment or to human health from uncontrolled waste disposal, please separate this from other types of wastes and recycle it responsibly to promote the sustainable re-use of material resources.

Household users should contact either the retailer where they purchased the product, or their local government office for details of where and how they can take this item for environmentally safe recycling.

Business users should contact their supplier and check the terms and conditions of the purchase contract. This product should not be mixed with other commercial wastes for disposal.

KENTON

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