PSC- Precision Speed Controller with InteliClamp®

User manual

Our mission is to make surrounding reality inspiring for eyes and for ears. We follow the idea of Open Eyes Economy where customer satisfied of high quality product and service is more important than pure financial profit for manufacturer. Our goal is to offer novel, luxury things – things with a bit of creator's soul. Using those special things shall be a pleasure for its owner.

So, relax and spend a while with us…

Jacek Siwiński & Wiesław Zawada

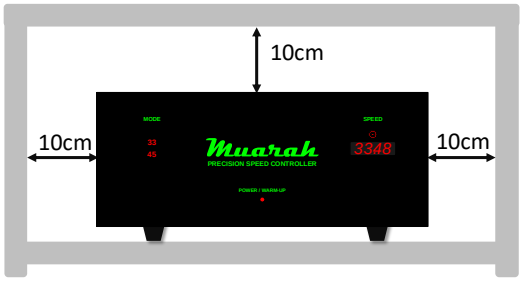
PSC – Precision Speed Controller with InteliClamp®

Precision Speed Controller of turntable motor has been created for music lovers who have keen hearing sense and do not accept vinyl record sound height fluctuation. It also gives possibility to reduce motor noise and comfortable electronic 33/45rpm speed change. With combination with our innovative InteliClamp® PSC offers real speed measurement and presentation to the user online. This patented solution is the first-ever such kind of product on the market!

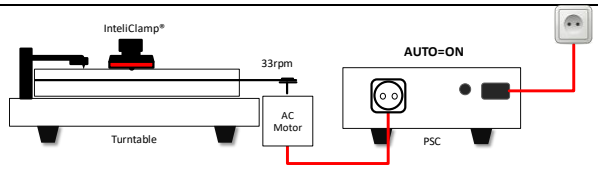
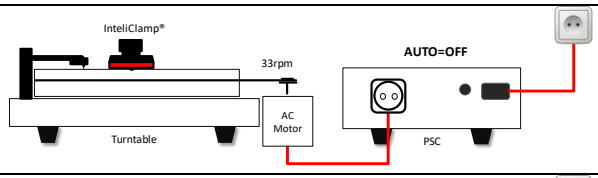
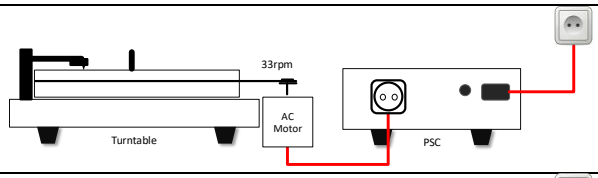
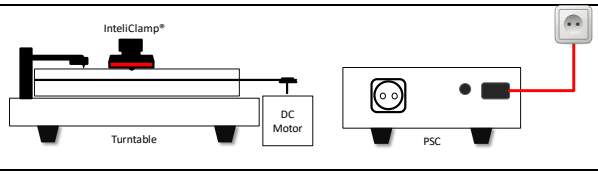
Features:

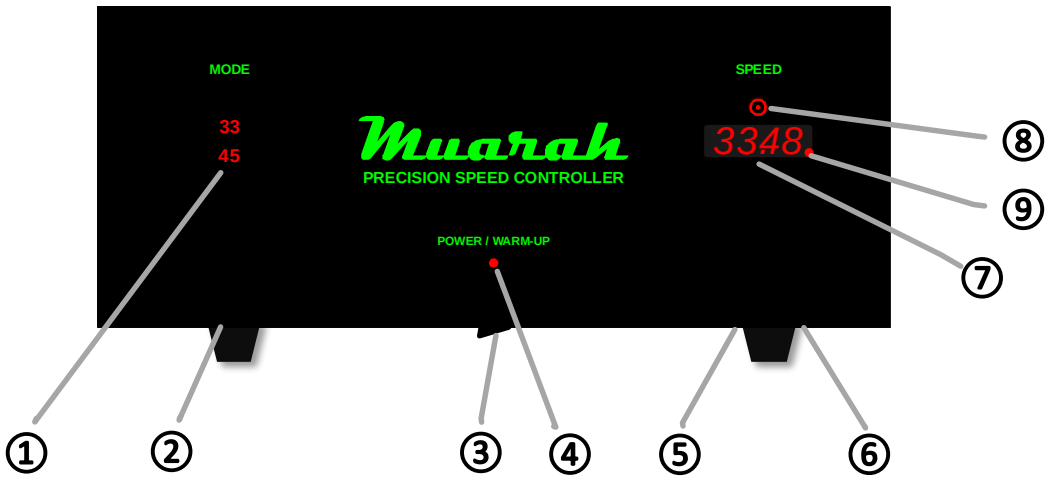
- Elimination of wow caused by mains power supply frequency 50 Hz fluctuations. According to EU standards maximum frequency deviation can reach up to +2/-3Hz. It is equivalent to -60/+40Hz deviation of 1 kHz sound which human ear is sensitive the most. Audiophile ear can distinguish 2-3Hz frequency deviation (~0,1Hz of mains frequency deviation). PSC built in quartz stabilized 230V generator has frequency deviation less than 0.001Hz and is absolutely inaudible for human ear. Online measurements of European grid network are available with 30s latency on web page www.swissgrid.ch
- 50Hz hum elimination by turntable motor vibration reduction. Vibrations are reduced thanks to
    - Mains power supply THD lowering down to <2% when according to EU standards they can reach up to 8% in our houses.
    - Silent Mode feature that drops motor power supply voltage to 70% of nominal level after defined delay from start.
- Platter speed error correction. Such error is typical effect of belt ageing, belt type change, bearing oil viscosity dependence of temperature.
- Electronic 33/45 speed change by one button press
- Real platter speed measurement with 0,01rpm accuracy (InteliClamp® required)
- Real platter speed stabilization. In this mode PSC makes automatic continuous turntable motor speed correction to achieve accurate and stable platter speed (InteliClamp® required)
- Smooth 45rpm motor start. Motor is started with 33rpm speed and after few seconds speeded up to 45rpm. It simplifies heavy platters start-up and extends motor and belt lifetime.

Connection



1) Carefully take PSC out of the shipping carton and plastic bag. Do not hold glass front panel by hand.
2) Place device in proper distance (minimum 10cm) from other electrical equipment like preamplifier to avoid electromagnetic interferences. Take care about proper ventilation because unit generates heat.
3) If PSC was taken from place with different temperature or humidity wait minimum one hour before next steps.
4) Connect turntable motor AC plug to PSC Output socket (depends on mode of operation – see next chapter). **WARNING!** PSC can be used only with turntables equipped with AC motor with maximum power less than 5W. Please contact manufacturer if higher power is required.
5) Connect AC main power to PSC. **WARNING!** Main AC Power going to PSC should not be applied before previous steps.
6) PSC can work in one of 4 modes of operation:

Mode	Connection diagram	Elimination of wow caused by mains power supply frequency z fluctuation	motor vibration reduction	platter speed error correction („pitch")	Fast electronic 33/45 speed change	Real platter speed measurement	Real platter speed stabilization
(A) Speed controller and speed meter		✓	✓		✓	✓	✓
(B) Frequency controller and speed meter		✓	✓	✓	✓	✓	
(C) Frequency controller		✓	✓	✓	✓	Using stroboscope	
(D) Speed meter				If available in turntable		✓	



Front Panel

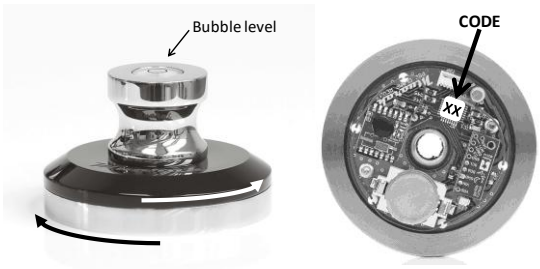
① - Speed mode 33/45rpm indicator
② - Speed mode change button (long press), START/STOP button (short press)
③ - PSC main power ON/OFF switch
④ - POWER ON/ WARM-UP LED
⑤ - Speed SLOWER button
⑥ - Speed FASTER button
⑦ - 4 digit display presenting information about speed and chosen options
⑧ - Radio transmission/AUTO mode indicator
⑨- Silent Mode indicator

Feature configuration

Before use PSC has to be properly configured to adapt to supported turntable and user preferences. To enter the configuration menu turn PSC on with pressed button ②. Release it after 1s. Features can be changed in the following order of appearance on PSC display

PSC and InteliClamp® pairing

If other InteliClamp® than originally provided with PSC will be used special pairing procedure has to be performed before using it.

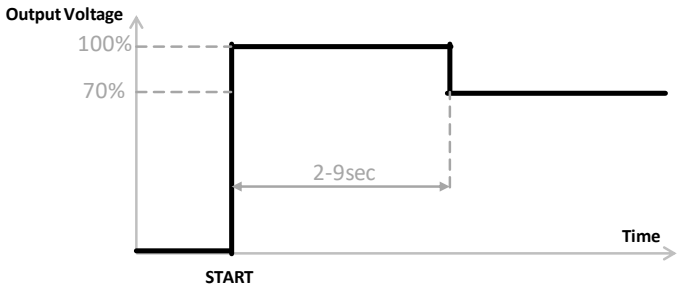


1) Unscrew InteliClamp® enclosure.
2) Read and write down two sign code placed on processor chip
3) Turn PSC on with pressed button ②. Release it after 1s.
4) CodE message will be displayed on front panel as first menu option and after a while the code of currently paired InteliClamp®
5) Using ⑤ and ⑥ buttons set the code which was previously wrote down.
6) Confirm settings using button ②.

Silent Mode

This feature is highly recommended to decrease motor vibrations during record playback. Full power is delivered at the start, providing to motor enough power to run heavy platter into rotation. Power required for maintaining rotation is much less so output voltage is decreased by 30% (power decreased by 50%). Delay time from motor start to Silent Mode activation depends on platter inertia. Heavier platter needs more time to start-up. But not every motor and turntable tolerate 30% voltage drop. In such case Silent Mode feature has to be switched off or set only for 33rpm. Please consult Muarah Audio or turntable manufacturer in case of doubts.

7) SILENt message appears.
8) Using ⑤ and ⑥ buttons feature can be switched On, OFF or 33 (active only for 33rpm mode).
9) Confirm settings using button ②.
10) If On has been chosen next parameter to setup is dELAY
11) Using ⑤ and ⑥ option delay time can be changed from 2 to 9 seconds
12) Confirm settings using button ②.
13) Silent Mode active state (decreased output voltage) is indicated by last dot ⑨ of digital display on front panel.



START/STOP trigger

Starting and stopping turntable motor can be performed in two ways:

1st – when user wants to use PSC as master power on/off switch. In that case turntable/motor power switch is always on.

2nd – when user wants to start and stop the motor using turntable/motor power switch. In that case PSC generates output signal constantly. This mode has to be chosen with turntables with electronic power switch (monostable button, touch sensor etc.). Please consult Muarah Audio or turntable manufacturer in case of doubts. In this case Silent Mode delay timer is triggered by InteliClamp® when it starts measuring and transmitting data to PSC. 45rpm smooth start doesn't work in this mode of operation.

14) StArt StoP message appears.
15) Using ⑤ and ⑥ buttons feature can be set for PSC or turn table.
16) Confirm settings using button ②.
17) After this operation PSC goes back to normal operation

To change feature configuration, PSC has to be switched off and on again as described above.

Recommended settings (please consult Muarah Audio in case of doubts)

Turntable model	Silent Mode	Delay	START/STOP	Comment
Muarah MT1 EVO	On	9	Turn	Older models could not support Silent Mode feature. Ask
Muarah MT1	On	8	Turn	

				Muarah Audio for upgrade
Muarah MT2, MT2SE	On	4	PSC	
Muarah MT3	On/33	5-9	PSC	
Transrotor	On/33	6-9	PSC	Consult with Muarah Audio
Nottingham Analogue	On	5-9	Turn	
VPI Entry models	On	3	PSC	Consult with Muarah Audio
VPI Production/Reference models	On	5-9	PSC	Consult with Muarah Audio
Other		Use rule 1 second for every 1kg of platter weight		Consult with Muarah Audio

Operation

MODE A – SPEED CONTROLLER & SPEED METER

This is the most advanced and recommended mode of operation that utilizes all features of combination of PSC and InteliClamp®. Device stabilizes real platter speed measured by InteliClamp® and presents actual speed on front panel display. Platter speed is automatically tuned to nominal 33.33 or 45 rpm and maintained in very high precision. Manual speed correction is not possible in this mode. When InteliClamp® is taken out of turntable platter PSC will change operation mode to **(C).** Then speed error (platter speed difference between case when turntable motor is connected to PSC and case when is connected directly to mains AC outlet) will be displayed on front panel.

Course of action:

1) Set turntable belt in 33.33rpm position
2) Turn on PSC using ③ button.
3) Pressing ② button for ca. 1.5sec choose required nominal speed 33 or 45 rpm. Display ① informs about nominal speed chosen.
4) Place InteliClamp® on turntable platter spindle
5) Turn on the motor using ② button on PSC (short press) or power button of turntable/motor (START/STOP feature configuration dependent)
6) Change operation mode to Auto On by simultaneous short pressing ⑤ and ⑥ button.
7) In a few seconds radio transmission indicator ⑧ will go on. Display ⑦ will present real platter speed measured online. Pulse light of ⑧ indicator indicates PSC is in AUTO ON mode and stabilizes turntable platter speed to exact 33.33 or 45.00 rpm accordingly.
8) After 5 to 15 seconds the platter reaches nominal speed and since that moment speed is stabilized by PSC. All settings are kept in PSC memory and will be recovered during next turning on so time to reach the stable speed will be shorter.

MODE B – FREQUENCY CONTROLLER & SPEED METER

In that mode of operation PSC stabilizes only power supply frequency what is directly translated to speed stabilization of the motor but not turntable platter. Real platter speed measured online by InteliClamp® is

presented on front panel display. Although frequency is stable platter speed can change due to reasons described in the manual introduction. It can be corrected manually. When InteliClamp® is taken out of turntable platter PSC will change operation mode to **(C)**. Then speed error (platter speed difference between case when turntable motor is connected to PSC and case when is connected directly to mains AC outlet) will be displayed on front panel.

Course of action:

1) Set turntable belt in 33.33rpm position
2) Turn on PSC using ③ button.
3) Pressing ② button for ca. 1.5sec choose required nominal speed 33 or 45 rpm. Display ① informs about nominal speed chosen.
4) Place InteliClamp® on turntable platter spindle
5) Turn on the motor using ② button on PSC (short press) or power button of turntable/motor (START/STOP feature configuration dependent)
6) Change operation mode to Auto OFF by simultaneous short pressing ⑤ and ⑥ button.
7) In a few seconds radio transmission indicator ⑧ will go on. Display ⑦ will present real platter speed measured online.
8) Manual speed correction can be made using buttons: ⑤ – SLOWER and ⑥ – FASTER.

MODE C – FREQUENCY CONTROLLER

Most of controllers available on the market work in that mode of operation. PSC stabilizes only power supply frequency what is directly translated to speed stabilization of the motor but not turntable platter. Front panel display presents frequency error as difference between output frequency and 50/60Hz or 67.5/81Hz for 33 and 45 setting accordingly recalculated for rpm. In that mode real platter speed is undetermined and can change due to reasons described in the manual introduction. Real platter speed can be verified using stroboscope light and stroboscope disc. It can be corrected manually. Then speed error (platter speed difference between case when turntable motor is connected to PSC and case when is connected directly to mains AC outlet) will be displayed on front panel.

Course of action:

1) Set turntable belt in 33.33rpm position
2) Turn on PSC using ③ button.
3) Pressing ② button for ca. 1.5sec choose required nominal speed 33 or 45 rpm. Display ① informs about nominal speed chosen.
4) Turn on the motor using ② button on PSC (short press) or power button of turntable/motor (START/STOP feature configuration dependent)
5) Display ⑦ presents theoretical speed error based on assumption that turntable is mechanically ideal and resulting speed is exactly 33.33rpm for 50/60Hz and 45rpm for 67.5/81Hz of power supply.
6) Using stroboscope light and stroboscope disc or using embedded turntable stroboscope make necessary corrections using buttons: ⑤ – SLOWER and ⑥ – FASTER. Stable stroboscope disk bars mean nominal speed is achieved.

MODE D – SPEED METER

In that mode of operation PSC displays real platter speed measured by InteliClamp®. Speed correction can be made in turntable itself if available.

Course of action:

1) Place InteliClamp® on turntable platter spindle
2) Turn on the motor in required mode 33 or 45rpm
3) Turn on PSC using ③ button.
4) Pressing ② button for ca. 1.5sec choose required nominal speed 33 or 45 rpm. Display ① informs about nominal speed chosen.
5) In a few seconds radio transmission indicator ⑧ will go on. Display ⑦ will present real platter speed measured online.
6) Using stroboscope light and stroboscope disc or using embedded turntable stroboscope make necessary corrections in turntable itself if available. Stable stroboscope disk bars mean nominal speed is achieved.

General instructions

1) Each time PSC is turned on the worm-up procedure is performed. It takes ca. 4sec before output signal is provided to output socket. POWER/WARM-UP ④ red indicator flashes during warm-up phase.
2) Most of turntable embedded stroboscope lights are powered directly from AC mains. Due to AC mains frequency fluctuation (as was described in manual introduction) the result of measurement using such stroboscope can be inaccurate.
3) 50Hz stroboscope gives false result on 45rpm strobo discs because mathematic calculation of required number of bars on the disk gives fractional number. In most cases stable bars means 45.11rpm in this case. The same is for 60Hz mains and 33.33rpm speed combination. To overcome this problem special stroboscope light has to be used.
4) To save battery life InteliClamp® detects immobility state and automatically goes to „sleep” mode after several seconds. To „wake” him up again it should be gently shaken. If it went to sleep on turntable platter it can be hard to wake him up by only starting platter rotation. In that case it should be gently knocked by finger from the top.
5) In case InteliClamp® measurement results are out of range expected by PSC for chosen nominal speed setting Err message will be displayed on front panel. To solve this problem change the nominal speed using button ②. If it doesn't help set PSC in **MODE C** (InteliClamp® not used) and set the speed pitch to „0” (zero). Then place InteliClamp® on platter again. If problem still exists please contact Muarah Audio service.
6) Bubble indicator mounted on top of InteliClamp® grip has to be used to turntable levelling only when turntable plate is not rotating. Accuracy of bubble meter is limited.

InteliClamp® battery replacement

1) Battery (CR2032 alkaline type) has to be replaced when message bAtt is displayed on front panel in **(A) (B)** or **(D)** modes of operation or when InteliClamp® will stop functioning (e.g.: wrong measurement results are displayed from time to time)
2) To replace battery unscrew InteliClamp® enclosure.

3) The battery has to be lever up by small, thin screwdriver

4) Only brand new CR2032 alkaline battery of prime quality shall be used.
5) For transportation battery shall be removed from InteliClamp® to avoid discharging.

Maintenance

1) PSC stainless steel cover should be regularly dusted off. Gently wipe fingerprints from the surface by soft cotton cloth soaked with spirit.
2) Front glass panel can be wiped using soft cotton cloth and glass cleaner.
3) Gently wipe fingerprints from the InteliClamp® surface by soft cotton cloth.
4) When you plan not to use InteliClamp® for a longer period of time (over 3 months) remove battery from holder.

Important safety instructions!

1) **WARNING!!!** Using PSC with motor of power grater then maximum depicted on PSC rear panel or DC motor can destroy controller and motor. Please consult any doubts with PSC manufacturer.
2) On any account should PSC cover be opened!

Specification

• Nominal speed	33.33, 45.00 rpm
• Output	230V (10W max), <2% THD (Note 1)
• Output frequency stability	< +/-0.00005%
• Output frequency error	< 0.0005%
• Speed measurement resolution	+/- 0.01 rpm
• Pitch control	+/-2rpm with 0.01rpm resolution
• Automatic speed regulation accuracy (in AUTO mode with InteliClamp®)	33.33, 45.00rpm +/-0.01 rpm
• Wireless band connection PSC – InteliClamp®	ISM 868MHz
• Dimensions (width/length/height)	21cm/35cm/11cm
• PSC weight	3.1kg
• InteliClamp® dimensions (diameter/height)	78mm/52mm
• InteliClamp® weight	570g
• Power consumption	< 40VA (Note 1)
• InteliClamp® battery lifetime	approx. 4 months (one record listened per day)

Note 1: Parameters can vary for different PSC version