ADVANCE PRO

Dear friends,

we very much appreciate your confidence in our products, which you have expressed by purchase of our controller ADVANCE Pro for brushless motors (BLDC). The development of the most recent controllers contains our entire motor control experience of long standing. These controllers will fully comply with all requirements of the user and in connection with the new programming card they will fulfill even the most ambitious wishes. The new programming card is compatible with controllers of the Advance Plus line and simultaneously controllers of the Advance Pro line are compatible with the programming card ProgCard Plus.

As a standard property the controllers offer heat protection, battery low discharge protection as well as current limitation. **Controllers Advance XX Pro** (except for the Advance 10 Pro mini) and **Advance XX Pro SB** contain an integrated stabilized current supply (BEC) for receivers and servos. Controllers of the **Advance XX Pro Opto** type are not equipped with this kind of supply and must be furnished with an independent current supply as for instance a battery of 4 x NiXX or an external stabilized current supply. The Opto-Controllers provide a galvanic separation between the power drive (motor, controller, flight battery) and the receiver with servos. This galvanic separation ensures interruption of reception disturbing ground loops, which severely influence HF-Signals and thus receiver reception quality. We recommend the application of opto-controllers in cases where the BEC circuit becomes unable to fulfill your demands (current supply of a larger number of servos and the unavoidability of a seperate current source) as well as in models with higher current consumption and higher input voltages.

Model	Sustained Current [A]	Input Voltage [V]	BEC Voltage [V]	Max. Current BEC [A]	Dimensions [mm]	Weight [g]
Advance 08 Pro	8	5-15	5.0	2	28x17x5	6
Advance 10 Pro	10	5-15	-*	-*	23x17x7	7.5
Advance 12 Pro	12	5-15	5.0	2	28x17x7	9
Advance 18 Pro	18	5-15	5.0	2	33x23x9	21
Advance 30 Pro	30	5-15	5.0	2	44x26x9	28
Advance 40 Pro	40	5-15	5.0	3	53x26x10	35
Advance 40 Pro Opto	40	5-25.2	-	-	53x26x9	35
Advance 70 Pro	70	5-15	5.0	3	53x26x13	38
Advance 70 Pro SB HS	70	6-25.2	5.5	5	53x26x13	38
Advance 70 Pro Opto	70	5-25.2	-	-	53x26x11	38
Advance 77 Pro Opto	77	6-42	-	-	53x26x14	40

* - ESC is not fitted with BEC. The receiver is powered directly from the power battery.

Model	NiXX	LiIon	LiPol	LiFe
Advance 08 Pro	6 – 8	2 – 3	2 – 3	2 – 3
Advance 10 Pro Mini - *	6 - 10	2 - 3	2 - 3	2 – 4
Advance 12 Pro	6 – 10	2 – 3	2 – 3	2 – 4
Advance 18 Pro	6 – 10	2 – 3	2 – 3	2 – 4
Advance 18 Pro SB	6 – 12	2 – 4	2 – 4	2 – 4
Advance 30 Pro	6 – 10	2 – 3	2 – 3	2 – 4
Advance 30 Pro SB	6 – 12	2 – 4	2 – 4	2 – 4
Advance 40 Pro	6 – 12	2 – 4	2 – 4	2 – 4
Model	NiXX	LiIon	LiPol	LiFe
Advance 40 Pro Opto	6 – 16	2 – 6	2 – 6	2 – 7
Advance 70 Pro	6 – 12	2 – 4	2 – 4	2 – 4
Advance 40 Pro SB HS	6 – 16	2 – 6	2 – 6	2 – 7
Advance 70 Pro SB HS	6 – 16	2 – 6	2 – 6	2 – 7
Advance 70 Pro Opto	6 – 16	2 – 6	2 – 6	2 – 7
Advance 77 Pro Opto	12 – 30	3 – 10	3 – 10	4 – 12
Advance 90 Pro Opto	14 – 30	4 – 10	4 – 10	4 – 12

* - ESC is not fitted with BEC. The receiver is powered directly from the power battery.

Maximum recommended servo numbers with BEC Controllers

Advance 10 Pro Mini:
If the 2s (7.4V) power battery is used, there is the same voltage even on the connector for a receiver. It is necessary to use high voltage servos or cut the red wire and power the servos and receiver from another power supply, similarly as Opto controllers.
If the 3s (11.1V) power battery is used, there is the same voltage even on the connector for a receiver. It is necessary to cut the red wire and power the servos and receiver from another power supply, similarly as Opto controllers.
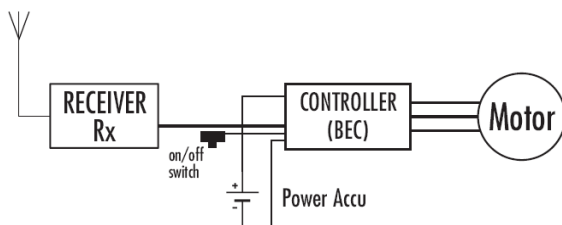
Note: When using fast or digital servos, the shown numbers must be decreased.

General Principles:

- please read this instructions properly
- use only new plugs of good quality, which must be soldered properly to the controller cables (look out for flux remnants on the plugs)
- connection cables to the flight battery can be extended to a maximum length of 20 cm
- pay attention to the distance between all cables and the receiver with antenna – it should be kept as large as possible
- connect the flight batteries to the flight system shortly before the start and disconnect them immediately after landing
- if you don´t use the model, always disconnect all batteries of the flight system
- prevent the possibility of wrong polarity connections of the controller or batteries (use different types of connectors)
- do not connect the controller to current supplies other than an appropriate battery (with corresponding input voltage and current load)
- prevent possible injuries by moving mechanical parts of the model (motor, gear box etc.); always keep in mind that the motor may start unintentionally
- every time before switching on check the controller and receiver circuitry and the transmitter frequency
- arrange the controller in the model within the air cooling flow and provide air passage openings of adequate size (inlets and outlets)

Installation of the controller in the model:

Circuit diagram of the controller with BEC (without BEC)   *Circuit diagram of the opto-version controller*
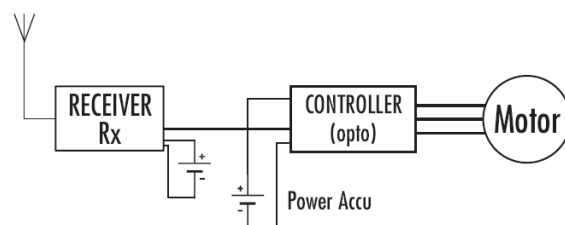
- fasten the motor with screws to the motor mount (adjust screw lengths – by tightening of too long screws the motor windings may be destroyed)
- choose the right position of the controller with regard to cooling, cable length and receiver antenna position
- plug the JR connector into the receiver throttle channel (in case of controllers with BEC switch off the switch)
- place the model in such a manner that an unintentional motor start may not endanger other people
- switch on the transmitter and check the full throttle channel deflection, which should generally come to +/- 100% or +/- 80% with Multiplex radios
- the transmitter throttle stick must stand in motor stop position
- connect the flight batteries (pay attention to correct polarity)
- batteries have to be connected by one single attempt (be careful not to allow multiple „on" – „off" touches of the plugs)
- connect the on board current supply of the radio (in case of controllers with BEC switch on the switch)

- the motor transmits a single or double beep to confirm the correct connection, the controller is ready to operate the motor
- a single beep announces an activated brake, the double beep says that the brake is deactivated in the motor Stop position
- you may start the motor now using the throttle stick
- if the above mentioned confirmation beeps are missing, disconnect the flight battery and check whether: the JR-plug is correctly connected to the throttle channel, the throttle stick is in the Stop position (Brake / Off) or the transmitter throttle channel is possibly in the reverse position
- a change of motor rotation direction can either be achieved by interchange of any two of the three connecting cables between the motor and the controller or by adjustment via the programming card Advance ProgCard Pro.

Controller adjustment

There exist three possibilities to adjust wanted parameters of the Advance Pro line controllers. The basic programming procedure is the parameter adjustment with the aid of the RC equipment *(only a few of the parameters can be programmed this way)*. A more comfortable and faster method is programming via the programming card which is intended for programming of the Advance Plus controller line (ProgCard Plus – *only a limited number of programming parameters accessible)* and via the new extended programming card **ProgCard *Pro** (all Parameters are accessible for programming)* .
The controller adjustments stay in its memory even after disconnection of flight batteries.

Adjustable parameters of the Advance Pro controllers:
**The initial production line controller adjustments:**

brake *(Brake)*	brake on, medium braking effect *(Medium)*
advance timing of the motor *(Timing)*	automatic advance timing *(Timing Auto)*
acceleration *(Acceleration)*	medium acceleration *(Medium)*
type of the applied flight battery *(Accu Type)*	Li-Ion or Li-Pol
cut-off voltage *(Cut off per cell)*	medium *(Medium)*
cut-off *(Cut off type)*	control of slow-down *(slow down)*
change of direction of motor rotation *(rotation)*	to the right *(right)*

**1.** **Controller Adjustment with the Aid of RC Equipment (Transmitter and Receiver)**
- **with aid of the RC equipment only one of the controller parameters can be adjusted at a time**
- **if you want to change several parameters, you have to repeat the following procedure**
- plug in the JR-plug into the receiver throttle channel
- switch on the transmitter and shift the throttle stick to position „full throttle"
- connect flight batteries (pay attention to polarity)

- switch on the on-board supply of the RC equipment (in case of controllers with BEC switch on the switch)
- wait for 5 seconds, you will hear 4 tones ♫♫ confirming the transfer into programming mode
- furthermore five single tones will follow until five groups of five multiple tones
- these five multiple tone groups represent the individual parameters of the controller adjustment
- a confirmation of the selected parameter will be achieved by shifting the throttle stick back into the „Motor Stop" position during the time of transmission of the multiple tone groups
- by disconnection of flight batteries the adjustment procedure ends

**Adjustable parameters of the Advance Pro controller with aid of the RC equipment:**
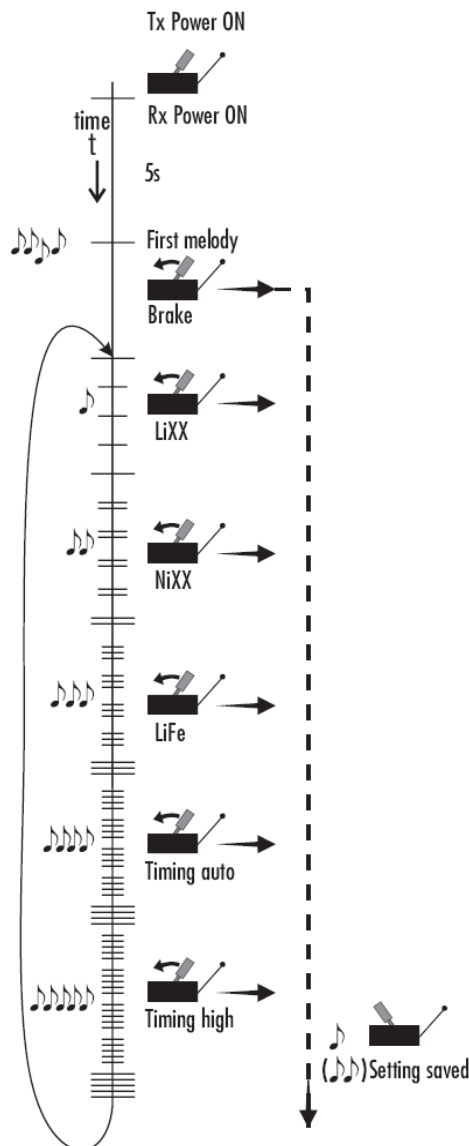
Brake – confirmation by throttling down after the first melody (4 tones)

♫♫ - off / on (medium brake), the condition changes from brake off to brake on or vice versa

Type of applied batteries – confirmation by throttling back during the time of transmission of multiple tone groups

♪ - single tone – Li-Ion, Li-Pol batteries
♪♪ - double tone – NiCd, NiMh batteries
♪♪♪ - triple tone – LiFe batteries

Adjustment of advance timing (Timing) -confirmation by throttling back during the time of transmission of multiple tone groups

♪♪♪♪ - four tones – automatic adjustment of advance timing / Timing of the motor (this adjustment is suitable for all motor types)

♪♪♪♪♪ - five tones - advance timing / motor timing adjustment for high advance values (this adjustment is suitable for multipole motors with 10 or more poles as well as for outrunners)

Cut-off voltages per cell for different types of batteries are available in the production adjustment table. This table is valid only if the controller has not been reprogramed with the aid of the programming card. If the controller has once been adjusted with help of the programming card, it will respect the cut-off voltage which has been adjusted by the programming card and in case of a change of the applied battery type with aid of the RC equipment it will only change the type of battery, but the cut-off voltage per cell as adjusted formerly by the programming card stays preserved. See the table of voltage cut-off alternatives with aid of the programming card.

2. Controller adjustment with aid of the programming card – ProgCard Pro

Connection of the ProgCard to the Controller with BEC   *Connection of the ProgCard to the Controller with OPTO*
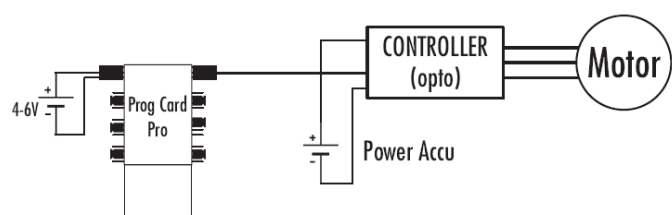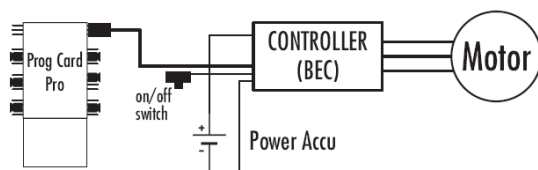
- the programming card ProgCard is intended for adjustments of the lines of the Advance Plus controllers (the side of the programming card shows the designation Advance **ProgCard plus**) as well as for the Advance Pro controllers (the side of the programming card shows the designation Advance **ProgCard Pro**)
- choose the positions of all six shorting plugs in accordance with your controller adjustment requirements (on the side with the designation ProgCard Pro – yellow)
- plug-in the JR plug of the controller into the ProgCard socket designated „controller" (orange wire – pulse, brown wire – minus, red wire – plus)
- connect the controller to the motor – connect the flight battery (pay attention to safety regulations – always keep in mind that the motor may unintentionally start)
- in case of a controller with BEC, switch on the switch
- in case of a controller without BEC (Opto), connect to the position marked "external power for opto" the 4.8 V current supply of the ProgCard (receiver battery)
- after one second you will hear a beep from the motor which confirms a controller adjustment change (if there was no parameter change the confirmation beep will not come)
- switch off the switch (in case of the Opto-version disconnect the current supply from the ProgCard)
- disconnect the flight battery
- plug the JR-plug into the receiver throttle channel

Programming Alternatives of the Controller with the Aid of the Programming Card ProgCard Advance Pro:

- **Brake**
  - Brake – off: Brake switched off
  - Brake – medium: Brake on, medium braking effect (this adjustment is suited for gear drives)
  - Brake – hard: Brake on, higher brake intensity

- **Timing / Advance timing of the motor**
  - Timing – auto: automatic advance timing (this adjustment is suitable for all motor types)
  - Timing – high: high advance timing (this adjustment is suitable for multi-pole motors with 10 or more poles and for motors with rotating outer magnets „Outrunners", as for instance AXI or similar)
  - Timing – low: low advance timing (this adjustment is suitable for „classic concept" motors „Inrunners" with 2 to 8 poles)
- **Acceleration**
  - Acceleration – high: fast acceleration and deceleration of the motor
  - Acceleration – medium: medium acceleration and deceleration of the motor
  - Acceleration – low: slow acceleration and deceleration of the motor
- **Battery Type – Type of the connected flight battery**
  - Battery Type – NiXX: flight batteries of the NiCd or NiMh type
  - Battery Type – LiXX: flight batteries of the Li-Ion or Li-Pol type
  - Battery Type – LiFe: flight batteries of the Li-Fe type
- **Cut off Voltage – Cut off voltage of the controller**
  - Cut off voltage – high: higher cut off voltage for the selected cell type
  - Cut off voltage – medium: medium cut off voltage for the selected cell type
  - Cut off voltage – low: lower cut off voltage for the selected cell type
- **Cut off Type – Motor cut off mode due to voltage drop beneath the adjusted cut off voltage of the controller**
  - Cut off type – hard: the motor is switched off immediately after the adjusted battery voltage has been achieved (suitable adjustment for gliders)
  - Cut off type – slow down: after achieving the adjusted battery voltage, the controller decreases the motor power in such a way that the battery voltage until complete motor cut off does not drop below this level
- **Rotation – Change of the direction of motor rotation**

Rotation – direction of motor rotation: if a change of motor direction is required. When the shorting plug is inserted into this position, **the controller only accepts the change of direction of motor rotation and ignores the other adjustments of the ProgCard.** This condition is signaled by permanent beeping of the motor until the flight battery is disconnected. After the change of direction of motor rotation return the shorting plug back to its original position at the Cut off type position.

Cut Off voltage per cell [V]	Li-Ion/Pol	NiCd / NiMh	Li-Fe
High	3.2 V	0.9 V	2.8 V
Medium	3.0 V	0.8 V	2.5 V
Low	2.8 V	0.6 V	2.2 V

3. Programming Alternatives of the Controller with the Aid of the Programming Card ProgCard Advance Plus:
- the controller adjustment method with the aid of the programming card ProgCard Plus is identical with the method used with the ProgCard Pro, but at any rate it grants more adjustment alternatives of the controller

Note:
ProgCard Pro enables programming of all parameters of the controller **Advance Pro** and of basic parameters only of the controller **Advance Plus**

ProgCard Plus enables programming of all parameters of the controller **Advance Plus** but a restricted programming only of the controller **Advance Pro.**

We grant a warranty of 24 months from the date of purchase under the premise that the item has been operated in conformity with these instructions at the specified voltage and currents and that it does not show any signs of mechanical damage. The warranty voids if polarity of the controller has been reversed or if the controller came in touch with different chemicals or water.

A controller can also be damaged due to following reasons: Use of unsuitable connectors, low quality soldering joints (plugs), long cables between battery – controller – motor, a demagnetizated motor, phase interruption between motor and controller during operation.

The warranty service as well as the post warranty service is provided by the manufacturer. Wishing you many successful flights, yours truly:

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