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model electronics

DUPLEX 2.4 GHz

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III/2010

JETIBOX COMPATIBLE

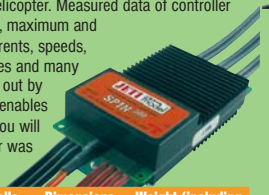
SPIN CONTROLLERS FOR BRUSHLESS MOTORS

The SPIN controller family for brushless (AC) motor control are able to operate with all types of batteries like NiCd, NiMH, Li-Po, Li-Ion and LiFe (A 123). Due to their numerous adjustment possibilities they are preferred for all airborne applications including helicopters and belong to the usual equipment of top pilots.
In the course of development of new brushless motor controllers we were eager to fulfill most user requirements and at the same time offer a product with simple handling properties and high comfort.
All controllers comprise a new type of voltage regulator for receivers and servos, the so called switch mode BEC with a voltage of 5,5 V. By application of this unit a way was opened for BEC systems even in models with higher cell numbers. It must also be taken into account that the number of servos became independent of the level of the supply voltage.
Adjustment of the SPIN controller family is carried out via the JETIBOX. By connection of the SPIN controllers and the JETIBOX a new system is formed which allows optimum set-up of any type of drive.

Controller Type	Sustained Current [A]	Number of Battery Cells NiXX/LiXX/Voltage	Max. Current BEC [A]	Max. Number of Servos	Dimensions [mm]	Weight (including cables) [g]
SPIN 11	11	5–12/2–4/5–17V	2,5	6	32 x 23 x 6	12
SPIN 22	22	5–12/2–4/5–17V	2,5	6	32 x 23 x 7	26
SPIN 33	33	5–14/2–5/5–21V	3	7	42 x 23 x 7	32
SPIN 44	44	5–18/2–6/5–26V	5	8	52 x 25 x 10	44
SPIN 55	55	5–24/2–8/5–34V	5	8	52 x 25 x 12	60
SPIN 66	70	5–18/2–6/5–26V	5	8	52 x 25 x 12	56

SPIN OPTO

These controllers comprise a receiver voltage supply with complete galvanic separation of the driving system and hence a minimum receiver interference. This, of course, induces the necessity of a separate battery supply for the receiver and servos.
SPIN controllers can be easily programmed without a computer – all you need is a JETIBOX. SPIN controllers are also able to store operational data and by this means you are in a position to check and set adjustments of your model airplane or helicopter. Measured data of controller temperatures, maximum and minimum currents, speeds, motor runtimes and many other parameters become stored and can be read out by the JETIBOX directly after flight termination. This enables you to change your adjustments and fly again – you will immediately see results. Fine tuning of your motor was never easier.



Controller Type	Sustained Current [A]	Number of Battery Cells NiXX/LiXX/Voltage	Dimensions [mm]	Weight (including cables) [g]
SPIN 44 OPTO	44	6–18/2–6/6–26	52 x 25 x 10	35
SPIN 48 OPTO	48	14–30/4–10/12–42	52 x 25 x 12	45
SPIN 66 OPTO	70	6–18/2–6/6–26V	52 x 25 x 12	45
SPIN 75 OPTO	75	14–30/4–10/12–42	52 x 25 x 15	55
SPIN 77 OPTO	77	14–36/4–12/12–50	65 x 55 x 17	110
SPIN 99 OPTO	90	14–36/4–12/12–50	65 x 55 x 17	110
SPIN 125 OPTO	125	14–36/4–12/12–50	65 x 55 x 25	120
SPIN 200 OPTO	170	24–40/6–14/18–59	63 x 120 x 27	326
SPIN 300 OPTO	220	24–40/6–14/18–59	63 x 120 x 27	360

Advance PRO
FOR BRUSHLESS MOTORS

These controllers contain a sum of experiences accumulated during many years of development work on our motor control equipment.
The Advance PRO controllers comply with all ambitious expectations of users and in connection with the new programming card ProgCard PRO they come up to these expextations.
Several controllers of this family are equipped with BEC voltage control systems for receivers and servos. Controllers with the labelling SB contain switch mode BEC voltage regulators with a voltage of 5,5 V.

Basic data of the Advance Pro

Type	Sustained Current [A]	Input Voltage [V]	BEC Voltage [V]	Max. BEC Current [A]	Dimensions [mm]	Weight [g]
Advance 08 Pro	8	5–15	5,0	2	28 x 17 x 5	2/6
Advance 12 Pro	12	5–15	5,0	2	28 x 17 x 7	4/9
Advance 18 Pro	18	5–15	5,0	2	33 x 23 x 9	11/21
Advance 18 Pro SB	18	5–15	5,5	2,5	33 x 23 x 9	11/21
Advance 30 Pro	30	5–15	5,0	2	44 x 26 x 9	15/28
Advance 30 Pro SB	30	5–15	5,5	3	44 x 26 x 9	15/28
Advance 40 Pro	40	5–15	5,0	3	53 x 26 x 10	18/35
Advance 40 Pro Opto	40	5–25,2	–	–	53 x 26 x 9	18/35
Advance 40 Pro SB HS	40	5–25,2	5,5	5	53 x 26 x 10	18/35
Advance 70 Pro	70	5–15	5,0	3	53 x 26 x 13	20/38
Advance 70 Pro SB HS	70	6–25,2	5,5	5	53 x 26 x 13	20/38
Advance 70 Pro Opto	70	5–25,2	–	–	53 x 26 x 11	20/38
Advance 77 Pro Opto	77	6–42	–	–	53 x 26 x 14	22/40
Advance 90 Pro Opto	90	12–50	–	–	65 x 55 x 17	110

ECO FOR ALL BRUSHLESS MOTORS OPTIMIZED UNIVERSAL CONTROLLER

These controllers have gained high popularity due to their reliability and easy handling. All controllers of the ECO family contain a powerful BEC receiver power supply and they are equipped with all standard safety provisions as well as with an automatic motor timing set-up. Setting of the ECO controller family has been greatly simplified and is executed by a shorting plug directly at the controller. Further characteristics are evaluated automatically. ECO controllers operate with NiCd, NiMH, Li-Pol and Li-Ion batteries.

Controller Type	Sustained Current [A]	Number of Battery Cells NiXX/LiXX/Voltage	Dimensions [mm]	Weight (including cables) [g]
ECO 08	8	- / 2-3 / 5-12,6 V	27 x 17 x 5	7 / 10
ECO 12	12	6-10 / 2-3 / 5-12,6 V	32 x 23 x 6	6 / 10
ECO 18	18	6-10 / 2-3 / 5-12,6 V	32 x 23 x 7	11 / 21
ECO 25	25	6-10 / 2-3 / 5-12,6 V	32 x 23 x 8	15 / 28
ECO 40	40	6-12 / 2-3 / 5-14,4 V	50 x 23 x 8	35 / 43

SENSOR 3000

This Controller is intended for controlling and regulating purposes of brushless (BLDC) as well as direct current (DC) motors. With aid of the JETIBOX there exists the possibility to carry out a data readout of the CAR Sensor 3000 controller, which have been non-stop collected during operation.

Basic data of the CAR Sensors 3000

Dimensions [mm]	Weight (including cables)	Sustained Current / max. 30 s	Input Voltage	Number of Battery Cells
41 x 31 x 37	80 g	60 A / 100 A	3 - 9 V	1-2 LiXX / 4-7 NiXX
BEC Voltage	**Max. BEC Current**	**Max. Temperature**	**Programming**	**On State Resistance [Ω]**
5,4 V	5 A	100° C	JETIBOX	2 x 0,00055

JES CONTROLLERS FOR BRUSHED MOTORS

A controller for brushed motors with automatic set-up to arbitrary transmitters and with soft start brake. All controllers contain a powerful BEC receiver current supply and they are equipped with all standard safety provisions. Setting of the controller has been greatly simplified and is executed by a shorting plug directly at the controller.

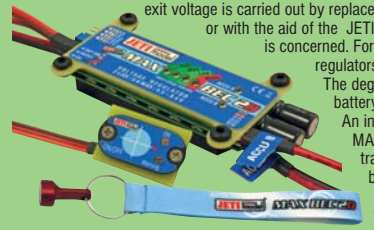
Controller Type	Sustained/ Peak Current*[A]	Number of Battery Cells NiXX/LiXX/Voltage	Max. BEC Current [A]	Max. Servo Number	Dimensions [mm]	Weight (including cables) [g]
JES 006	6/8	4-8/2/4-12 V	2	3	18x14x5	6
JES 012 plus	12/15	4-12/2-3/4-14,4 V	3	5	29x19x8	15
JES 020 plus	20/22	4-12/2-3/4-14,4 V	3	5	29x19x8	20
JES 030 plus	30/35	4-12/2-3/4-14,4 V	5	6	33x25x8	26
JES 045 plus	45/50	4-12/2-3/4-14,4 V	5	6	33x25x8	26

SP 06 SWITCHING OF AUXILIARY FUNCTIONS IN MODEL AIRPLANES, SHIPS AND VEHICLES

The SP 06 switch carries out switching of auxiliary functions in model airplanes, ships and vehicles, as for instance additional glow plug heating, switching different light systems a.s.o. The switching moment is indicated by flash up of a LED. The SP06 also offers the function of a reverse channel as known from many transmitters. The maximum long-term load of the switch are 6 A and it can be operated within a broad voltage range. Arbitrary voltages between 0,1 V and 15 V can be switched.

DPS40 (twin electric switch) and SPS20 (single electric switch) are electronic switches preferably assigned for switching of receiver / servo supply voltages. An outstanding advantage of electronic switches when compared to mechanical switches is generally their higher reliabilty and longevity, especially if vibrations are concerned.

MAXBEC



BEC circuits are assigned for current supply purposes of receivers and servos in models. In fact these circuits are voltage regulators with current limiting and heat protection devices. Adjustment of the exit voltage is carried out by replacement of shorting plugs (jumpers) or with the aid of the JETI Boxu as far as the MAX BEC 2D is concerned. For the current supply of MAX BEC regulators NiXX or Li-XX cells can be used. The degree of discharge of the connected battery is indicated by a built-in LED.
An integrated electronic switch of the MAX BEC comprises MOSFET power transistors which are operated either by a magnetic or a mechanical switch. Significant advantages of this switch are among others high power rating capacity, low current consumption in switched-off condition and due to a high degree of exit voltage filtration there appear no interference signals which may disturb functionality of the receiver.
SBEC is a switched voltage regulator which is distinguished by high efficiency and a broad range of input and output voltages. The SBEC is primarily assigned for electric powered models with power batteries serving as well for current supply purposes of receivers and servos via an external BEC circuit.

Basic Data	MAX BEC	MAX BEC 2	MAX BEC 2D	S BEC
Recommended Input Voltage	5,5 – 8,4V	5,5 – 8,4V	5,5 – 8,4V	5,5–42V
Max. Input Voltage	16V	16V	16V	45V
Number of Inputs [batteries]	1	2	2	1
Output Voltage	5,0V / 5,4V / 5,7V / 6,0V	5,0V / 5,4V / 5,7V / 6,0V	5,0–6,0V (step 0,1V)	5,0V/5,5V/ 6,0V/7,0V/8,0V
Peak Current	12 A	20 A	20A	12A
Rated Current	5 A	12 A	12A	5A
Quiescent Current	170 µA	170 µA	240 µA	170 µA
Max. Power Loss	7 W	20 W	20W	5W
Max. Temperature	130°C	130°C	130°C	130°C
Weight	25 g	85 g	85 g	30 g
Switch	mechanical	mechanical	magnetic	mechanical
Dimensions [mm]	50 x 25 x 10	100 x 29 x 16	100 x 29 x 16	48 x 28 x 10

EnLink 2RS

The ENLINK 2RS is an intelligent change-over switch for servo control signals. The ENLINK contains Schottky diodes, which at any moment provide servo current supply either from the main or standby receiver current supply. ENLINK 2RS is assigned for the connection to a system of two receivers, which are in a model connected in parallel (for instance a DUPLEX and a FM receiver, or two Duplex receivers). Also, ENLINK 2RS eliminates signal drop-outs of individual receivers. In case of total signal drop-out at both receiver inputs ENLINK 2RS passes over to a preadjusted mode and a servo Failsafe may be set up. With the aid of the JetiBox terminal it is possible to change parameters and adjust the behaviour of the ENLINK 2RS output. Also, with the aid of the JetiBoxu statistics of receiver input signal drop-outs during operation can be tracked.

POWER ION BATTERIES

Power Ion batteries have convincingly shown their promising position as safe, unproblematic and long durability current source for model applications.
As a standard we deliver battery packs with 2S1P, 2S2P, 3S1P, 3S1P (triangle or flat) and 3S2P wiring. On special order we produce cell combinations up to 10S5P. All types of POWER ION cells comprise an outside diameter of 18 mm and a length of 65 mm.

POWER ION Batteries	Rated Capacity [Ah]	Voltage of Charged Battery [V]	Sustained/ Peak Current (30 sec.) [A]	Charge Current [A]	Weight of One Cell
POWER ION 1100 – standard type	1,1	4,1	11 / 16	3	41
POWER ION 1300 – high current	1,3	4,1	19 / 25	3	44
POWER ION 1600 – high capacity	1,6	4,2	10 / 16	2	44

DUPLEX 2.4 GHz System
DUPLEX 2.4 GHz System

The DUPLEX System has been developed for model remote control purposes in the open 2.4 GHz Band. It is not merely a matter of replacement of the classical radio control equipment working in the 35 MHz Band (also 40 MHz etc.), as a matter of fact there had to be developed a complex product system for unproblematic remote control, surveillance and online transmission of information (acoustical or on screen) showing operational conditions on board of models. Interference problems as well as frequency selection problems belong to the past now and thanks to real time transmission of telemetric data from the model.

Real Time Transmission of Telemetric Data

One of the great advantages of the DUPLEX-System is its full ability to support bidirectional communication. All receivers and transmitter modules of the DUPLEX- System are adapted to the requirements of real time wireless data transmission. For instance in its basic configuration an arbitrary combination of transmitter and receiver already can transmit actual values of receiver supply voltages.

Receivers R12, R14 and R18 are offered with high power servo supply connectors. Thanks to the high quality MPX high power supply connectors and a current distributing PC-board in the receiver neither heating up nor voltage loss occurs and reliability is increased in comparison with classic JR connectors.
There is also a variant of R6 and R8 receivers available with power supply connectors labelled EPC (External Power Connector).

receivers

Technical Data	DUPLEX R4	DUPLEX R4C (R4C mini)	DUPLEX R5 (R5 indoor)	DUPLEX R6	DUPLEX R6F/G (R6G) indoor	DUPLEX R7 (R7 indoor)	DUPLEX R8	DUPLEX R10	DUPLEX R12	DUPLEX R14	DUPLEX R18	DUPLEX RSat	DUPLEX RSat2
Dimensions [mm]	35x20x7	35x23x13	42x20x8	45x24x12	38x20x6	44x20x7	50x30x12	50x28x13	50x28x13	62x38x16	62x38x16	27x20x4	35x23x6
Weight	5 g	8 g (7 g)	5 g (4 g)	11 g	3 g	6 (5,5 g)	15 g	20 g	22 g	30 g	30 g	4 g	10 g
Antenna Length [mm]	2x 100	1x 200 (internal antenna)	2x 100 (2x 45)	2x 100	30	2x 100 (2x 45)	2x 200	2x 200	2x 400	2x 400	2x 400	2x 200	2x 200
Number of Channels	4	4	5	6	6	7	8	10	12	14	18	PPM 16	PPM 16
Operation Temperature [°C]	-10 to + 85	-10 to + 85	-10 to +85	-10 to +85	-10 to +85	-10 to +85	-10 to +85	-10 to +85	-10 to +85	-10 to +85	-10 to +85	-10 to +85	-10 to +85
Supply Voltage	3,2 - 8,4 V	3,2 - 8,4 V	3,2 - 8,4V	3,2 - 8,4V	3,2 - 8,4V	3,2 - 8,4V	3,2 - 8,4V	3,2 - 8,4V	3,2 - 8,4V	3,2 - 8,4V	3,2 - 8,4V	3,2 - 8,4V	3,2 - 8,4V
Average Current	39 mA	40 mA	40 mA	46 mA	40 mA	40 mA	45 mA	30 mA	30 mA	40 mA	40 mA	35 mA	35 mA
Real Time Transmission of Telemetric Data	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Programming	JETIBOX	JETIBOX	JETIBOX	JETIBOX	JETI BOX	JETI BOX	JETIBOX	JETIBOX	JETI BOX	JETI BOX	JETI BOX	JETI BOX	JETI BOX
Support of a Satellite Receiver	–	–	–	–	–	–	–	–	✓	✓	✓1 SAT in the package	–	–
Maximum Output Power	6 dBm	6 dBm	6 dBm	20 dBm	6 dBm	6 dBm	20 dBm	20 dBm	20 dBm	20 dBm	20 dBm	6 dBm	20 dBm
Receiver Sensitivity	-98 dBm	-98 dBm	-98 dBm	-100 dBm	- 98 dBm	- 98 dBm	-106 dBm	-106 dBm	-106 dBm	- 106 dBm	- 106 dBm	- 98 dBm	- 106 dBm

JETIBOX and JETIBOX mini

The JETIBOX is an universal communication instrument which is able to expand the applicability of all products labelled with the „JETIBOX compatible" logo. Thanks to vivid presentation of values and simple parameter adjustment methods only now the system can be exploited to its full capacity.

MUI 30, MUI 50, MUI 75, MUI 150 and MUI 200

These modules are on board instruments for measurements of current, voltage and consumed battery capacity.

- Voltages from 0 up to 60 V with recording of minimum and maximum values.
- Currents from 0 up to 30 A / 50 A / 75 A / 150 A / 200 A with recording of the maximum value.
- Consumed battery capacity [mAh].
- In flight motor runtime.

MGPS

The MGPS Module detects the exact location of the model in space. Furthermore the distance from the start position as well as the rate of climb and rate of descent can be measured. At the same time the flying altitude and the flying speed can be determined.

MT 125 and MT 300

These modules represent exact temperature measuring instruments.

- MT 125 comprises two sensors with a range of -55°C up to 125°C
- MT 300 comprises two sensors with a range of -40°C up to 300°C

Advantages

- operation without crystals - no necessity to consider frequencies
- it is not necessary to buy a new transmitter
- simple and reliable pairing of receivers and transmitters (unrestricted number of receivers for each transmitter)
- insensitiveness to interference allows safe operation even within areas with high interference levels
- digital data transfer ensures undistorted data transmission up to the model
- maximum reliability
- bidirectional communication between receiver and transmitter
- real time telemetric data transfer allows at all times to follow up the on board model situation
- high receiver sensitivity and transmitter power ensure control range up to visual range
- possibilty to increase the number of channels up to 16 by application of two receivers
- two receiver antennas ensure an undisturbed model control at every position and eliminate at the same time formation of so called dead spots caused by signal reflection
- acoustic signalling showing receiver state (condition of the receiver current supply, transmission quality etc.)
- the DUPLEX-System enables simultaneous operation of several receivers with a single transmitter, the so called interception (cloning)
- clear data presentation and simple parameter adjustment with the aid of the JETIBOX
- Failsafe with defined transfer time lag before switching to the preset channel exit values
  - any arbitrary receiver exit can be related to any arbitrary transmitter channel
  - all receivers allow the use of mixers, channel reverse, ATV and delay settings for every receiver channel output even with the simplest type of transmitter.

Transmitter modules

Basic Data	DUPLEX TU2	DUPLEX TF	DUPLEX TG/TGi/ TGi2/TGs	DUPLEX TMe	DUPLEX TMp
Dimensions [mm]	55x29x9	59x37x20	60x44x21	65x28x16	65x28x16
Weight	15 g	40 g	50 g	30 g	30 g
Antenna	2 dBi	2 dBi	2 dBi	2 dBi	2 dBi
Acoustic Signal	✓	✓	✓	✓	✓
Max. PPM-Channels	16	16	16	16	16
Operation Temperature	-10 to +85	-10 to +85	-10 to +85	-10 to +85	-10 to +85
Supply Voltage	3,5 - 16 V	3,5 - 16 V	3,5 - 16 V	3,5 - 16 V	3,5 - 16 V
Average Current	38 mA	38 mA	38 mA	38 mA	38 mA
Max. Power Output	20 dBm	20 dBm	20 dBm	20 dBm	20 dBm

Transmitter/Module	TU2	TF	TG/TGi2	TGi	TGs	TMe	TMp
Futaba: 7U, 8U, 8J, 9C,9Z, FN, T10C, 3PK, 3PJ, FC-18+, FC-28	✓	✓	–	–	–	–	–
Futaba: FC-16, FC-18 JUNIOR, T6EXHP, FX-18, FX-14, T6EXA	✓	–	–	–	–	–	–
Hitec: Optic 6, Eclipse 7, Prism 7, Aggressor CRX/SRX	✓	✓	–	–	–	–	–
Hitec: Laser 4, Laser 6, Flash 5, Optic 6 sport	✓	–	–	–	–	–	–
Graupner/JR: X-347, X-388, X-9303, MX-22, X-3810 ADT, PCM-10S, PCM-10X, PCM-9X, PCM-9XII	✓	–	✓	–	–	–	–
Graupner/JR: FM-6014, MC-17/18/20/24	✓	–	–	✓	–	–	–
Graupner: MC-10/12/14/15/16/19/22, MC-16/20, MX-12, MX-16s Graupner/JR: X-2610, XP6102FM	✓	–	–	–	–	–	–
Graupner: MX-24s	✓	–	–	–	✓	–	–
Multiplex: EVO 7, 9, 12	✓	–	–	–	–	✓	–
Multiplex: Profi 3000, 4000	✓	–	–	–	–	–	✓
Multiplex: Cockpit SX	✓	–	–	–	–	–	–
Other transmitters	✓	–	–	–	–	–	–

Complementary modules and equipment which enable an easy follow up of important operational data during flight. The measured values can be directly transmitted with the aid of the 2.4 GHz DUPLEX System from the model to the transmitter and interpreted by the JETIBOX inclusive acoustic signals.

USB Adapter

Products marked by the logo USB Support can be connected with the aid of the USB adapter to a PC. Using the computer you may readout measured data and update firmware.

MU 3

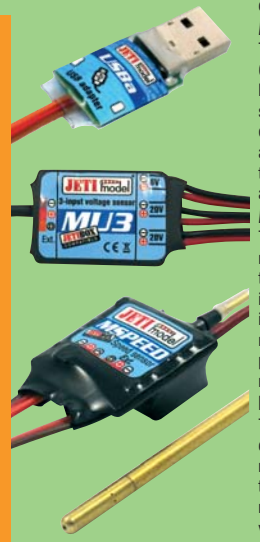
The module MU 3 precisely measures three independent voltages. It comprises an input with a range of 0 up to 5 V and two inputs with ranges of 0 up to 15 V.

MSpeed

MSPEED is a sensor measuring the model airspeed in relation to the speed of the surrounding air. It consists of a static Pitot tube and a relative pressure sensor connected to the tube by silicone tubing.

Accessory

SWTU2 and Voice 1 -optional accessory for the TU2 module
SWTU2: assembly set for the assembly of transmitter modules Duplex TU2 if switching between two modules is required.
Voice 1: assembly set for the connection of an external siren and a headphone exit to the DUPLEX TU2 module.



MVARIO

The MVario Module measures the rate of climb, rate of descent and the relative altitude. It records the maximum altitude, the maximum rate of descent and the maximum rate of climb (in m/s). Thanks to the connection between the MVario Module and the DUPLEX System signalling of the model rate of climb and rate of descent can be transposed to acoustic signals.

MULI6s

This module measures voltages of single cells (up to 6) in the battery during discharge. The sensor must be connected to the battery via the battery (balancer) service connector. Within the sensor menu there exists the possibility to set a single cell low voltage alert signal including an acoustic signal from the transmitter module. MULI6s also records maximum and minimum voltage values of all single cells.

MRPM and MRPM-AC

These modules are intended for motor speed measurements of all motor types. In the MRPM Module the measurement itself is executed by an optical sensor, in the MRPCM-AC Module by connecting the module itself to a brushless electric motor. Both MRPM modules measure the actual rpm and the actual propeller output power. Also here values of maximum speed and maximum propeller output power become recorded.

EXPANDER E4

The modules E4 are used to expand the number of connecting places for further telemetric sensors. In this mannner it becomes possible to connect up to 4 sensors to a DUPLEX receiver. The expander can be set in a manner which enables the JETIBOX to show measured values of concern simultaneously.

DUPLEX 2.4 GHz System
accessories for the DUPLEX System
accessories for the DUPLEX System