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Problems using our products are most likely to be caused by unsuitable combinations of radio components or improper installations.

2 Safety precautions:

Make sure that:

- ... your motor is suppressed by at least two, better three, ceramic capacitors of 10 ... 100nF / 63 ... 100V.
Extra suppression can also be achieved using filters with coils.
- ... your receiver and its antenna are at least 3cm away from the motor, the speed controller and the high current cables.
- ... all high current cables are as short as possible. Maximum length between flight pack and speed controller: 20cm, between speed controller and motor: 12cm.
- ... all high current cables longer than 5cm are twisted, especially the motor cables.
- ... half of the receiver antenna is routed along the fuselage (in a boat above the waterline!) with the other half outside in a vertical position. On an aircraft model part of the antenna may hang down freely, but be careful not to step on it!

1 CE-Certification:

The products described in this manual are manufactured in accordance with all specific and mandatory European CE guidelines:

EMI 89/336/EEC, 91/263/EEC and 92/31/EEC.

The products have been tested according to these norms:

EMI-emissions: EN 50 081-1:1992

EMI-resistance: EN 50 082-1:1992 or EN 50 082-2:1995

Design and construction of our products comply with the requirements for safe operation.

EMI emissions were tested under realistic conditions, i.e. using suitable motors and operating at 75% power settings, close to the maximum allowed currents. Testing at full power and/or using resistors instead of motors will not create maximum emission levels.

Further testing is done to ensure adequate EMI-resistance against emissions from other devices. The HF signals used for these tests are similar to those produced by mobile telephones or RC transmitters.

Again, our products are tested under realistic conditions for the most dangerous situation: Exposed to the field of a powerful Tx, the motor must not start while working on the model.

3 General Warnings:

Electric motors with propellers are dangerous objects which require due care for safe operation. Keep away from the danger zones when the battery-pack is connected.

The CE-Certificate on the speed controller is not a permit for careless handling!

Technical defects of an electrical or mechanical nature may result in unintended motor runs and/or loose parts may cause serious personal injuries and/or property damage.

Every time you use your propulsion system - before turning on the Rx -, make sure that:

- a) no one else is using the same frequency (identical channel number)
- b) your transmitter is turned on and the throttle stick is in STOP position.



Also to be considered:

c) Electronic equipment is sensitive to humidity. Speed controllers which have got wet may not function properly even after thorough drying.

d) Protect the speed controller against mechanical loads.

e) The **mcf 31/43** are not protected against reverse polarity (+ pole changed with -pole) and incorrect connection of your **battery pack** to the **motor leads** of the controller will almost certainly cause irreparable damage.

f) Use only compatible connectors. A 2mm pin in a 2.5mm socket will not provide reliable contact. The same applies for 2mm gold pins in 2mm tin sockets.

g) Regularly check the wiring of your RC-components for loose wires, oxidation, or damaged insulation, especially when using BEC.

h) The **mcf 31/43** are exclusively designed for RC-models. Their use in man carrying aircraft is prohibited.

i) Never disconnect your flight pack while the motor is still running. The speed controller may suffer damage.

j) Never leave your flight pack connected while the model is not in use. Never charge it while connected to the speed controller.

k) Ensure that your electric motor is properly suppressed.

l) Check receiver performance via range tests (Tx-antenna retracted, motor running in mid range). Speed controllers with BEC are generally more sensitive to electromagnetic noise than those with opto-couplers.

m) Usage in RC-Helicopters: Always disconnect the flight pack before turning off the Rx. A running gyro may provide sufficient voltage and create unwanted signals to cause uncontrolled motor runs.

n) Warning: The **mcf 31/43** contains monitoring circuits. Their effectiveness depends on a fully functional speed controller. In case of a short within the throttle transistor, neither the Stop signal from the Tx nor the current limitation nor the temperature monitoring circuits can stop the motor.

o) Note: Be reminded that the monitoring circuits can not detect every abnormal condition. For example: Short circuits between motor wires or operations above the nominal controller current limit. As the maximum current of a cold **mcf 31/43** far exceeds the initial motor current, a continuous current close to the peak value can not be detected in those speed controllers without decreasing current limitation. Current reduction due to a blocked air screw will only occur if the motor current far exceeds the current limit value of the speed controller, i.e.: A stall current of only 20A would not be considered abnormal by an 80A controller.

p) Limits of Liability: As we can not control and ensure the proper usage of our products, Schulze Electronic GmbH can not be held liable for losses, damage or costs due to improper usage or during incidents caused by the operation of radio-controlled models.

4 Usage Range:

mcf 43-110bo: Optocoupler equipped speed controller covering a very wide range of 6 - 32 cells and is recommended for all purposes with short-term peak loads. Can be programmed for currents up to 130A.

mcf 43-75bo: Similar to the mcf 43-110bo, for 6 - 32 cells, for all applications without extreme loads. Can be programmed for currents up to 90A.

mcf 43-70be: For those who want to save the weight of a separate receiver battery, this controller for 6-12 cells is equipped with a high-current BEC system capable of providing enough power for 4-6 servos. Can be programmed for currents up to 90A.

mcf 31-47be: Equipped with high-current BEC system and suitable for 6-12 cells, this controller is ideal for small to medium models. Can be programmed for currents up to 60A.

mcf 31-47bo: Similar to the mcf 31-47be but with opto-coupler and an increased voltage range from 6-16 cells. Can be programmed for currents up to 60A.

mcf 31-52bo: Opto-coupler equipped speed controller for 10-24 cells for medium sized models. Can be programmed for currents up to 60A.

Warning: Using BEC in combination with high performance electric motors can drastically increase the risk of electromagnetic interference between motor and receiver because of the direct electrical connection.

Using 6-7 cell battery packs can also indirectly restrict maximum currents. High motor currents may cause a sufficient drop in voltage to activate the **mcf 31/43** low-voltage monitoring circuit. The motor current will be reduced in order not to endanger the minimum voltage for the **mcf 31/43** and the BEC system.



5 Characteristics:

Forget everything you knew about speed controllers. The **mcf 31/43** series defines the new standards of the future. If not perfect than at least as close as you can get.

The range covers nearly every type of electric powered model: airplanes, helicopters and even racing-boats (although missing the waterproof sealing of the d40 and d50 series, the excellent efficiency makes water cooling unnecessary in most cases).

One of the highlights is the integrated current (torque-) control feature which gives you the option to choose between two different types of motor control.

The **mcf 31** differs from the **mcf 43** by its smaller size, weight and lower max. performance.

Also the control is slightly less sensitive because the smaller size dictated a reduction in electronic components. The **mcf 31/43** series benefits from the experience of more than 10 years in speed controller design and development:

- High-current / low-drop BEC system (**mcf...e** only) for more constant voltage under high loads.
Enough power for 4-6 servos (depending on servo type and number of cells).
- Increased voltage range from 6-32 cells; peak voltage protection up to 55V (**mcf 43...o** only)!
- No initial spark when connecting the battery pack (longer life for your connectors)!
- Internal voltage booster (**mcf 43** only) without inductive EMI.
- EMI shielding which also protects the electronic components against mechanical loads.
- Soldering points of the power cables well within the circuit board for added protection against premature wear of the cable endings during frequent use.

Full microprocessor control provides:

- Long-term and thermal durability.
- Compatibility with all RC-systems with simple Set-up procedure.
- Teach-In of three throttle stick positions: Brake, Neutral and Full Power, i.e. Brake position can differ from Neutral position to allow optional windmilling.
- Modification of characteristics to meet operational requirements.
- No potentiometers for increased reliability and resistance to vibrations.
- Two control modes: Conventional Speed Control or Torque Control.
- Temperature overload cut-off with reset (Auto-On) by moving stick in Power-Off position.
- Automatic deep discharge monitoring based on the number of cells and actual loads or fixed 5V low-voltage detection.
- Super BEC system: 5.2V and 2.5A peak current or opto-coupler.
- Multi-purpose capability: From gliders with folding props to helicopters without brake.

- 5 different brake settings: Immediate Stop (FAI competition), Dynamic strong Brake (competition and normal use), Soft Brake and Intermittent Brake (for geared drives) and No Brake (fixed props, heli).
- Very high initial currents decreasing linear within 1.2s after leaving neutral stick position of Tx.
- 10 softstart settings: 63ms (FAI competition) to 1.5s (Scale-model).
- Adjustable current limitation, to use all protective functions with smaller motors.
- Power-On Reset to avoid unintended motor starts when connecting the battery pack.
- Auto-On or Manual-On (with external Activation Button for extra safety).
- High efficient 2kHz frequency switching.
- Very sensitive speed control (resolution: over 100 steps)
- Electronic security to prevent **mcf 31/43** from malfunction and loss of data via watchdog and voltage supervisor IC's.
- Twin LED to help programming and to indicate Power settings.
- Motor used for acoustic feedback during programming and to indicate „Ready“.
- Top quality and state of the art electronics for troublefree operation.
- Supplied with lightweight high flexibility silicone cables.
- Optional use of a voltmeter for extra precise max. current adjustments.
- Optional reading data from **mcf...**, modifying it and programming it back to the **mcf...** directly via PC by **carsoft**.

mcf 31/43 series: You don't have to look any further !

Note:

After the motor is turned off by the **mcf 31/43** due to temperature overload or low-voltage detection, it can be re-started after the throttle stick has been in the Power-Off positions (Neutral or Brake) for about 1s (even in Manual-On mode!).



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6 Monitoring and Safety Circuits:

Current monitoring: Current monitoring will limit the current in case of a stalled motor. Motors with current consumptions above the specified current limit will not reach Full Power. The throttle indicator LED will remain at half intensity. With a maximum current exceeding 150A, a cold **mcf 43-75bo** or **mcf 43-110bo** will most probably surpass the performance of the battery.

Temperature monitoring: Temperature monitoring will reduce the motor current in two steps before a complete stop is required. After cooling off, the motor may be re-started after the throttle stick has been in Power-Off positions for about 1s.

Note: In case there is a short circuit between the motor windings or motor cables, the monitoring circuits may not act fast enough. Immediately turn off the motor to avoid permanent damage to the speed controller.

Low-voltage monitoring: This feature will automatically reduce motor power when the battery voltage has dropped to 5.5V. Below 5.5V the motor is turned off. You have to verify (model on the ground) how much longer you can move the controls because there are many parameters which effect this time: number and type of cells, number and type of servos, motor current and control habits. It is recommended to turn off the motor as soon as the low-voltage monitoring circuit starts to reduce power. To re-start the motor the throttle stick must have been in Power-Off positions for about 1s.

Lost Rx-signal detection: If receiver signal is lost, the **mcf 31/43** will hold the last received signal for 100ms after which it will turn off the motor.

Watchdog: Irregular conditions detected by the watchdog will cause short interrupts during operation.

7 External Manual-On Button:

Note: Protect three-pin plug against short circuits!

Connect the external Manual-On button to the 3-pin plug. If Manual-On is selected, a short push (less than 1s) on the button will deactivate the mcf 31/43, independent from throttle stick position. The Manual-On button can also be used as Program-Button.

Warning: With the throttle stick in Power-Off positions (Neutral or Brake), pressing the button for more than 2s will activate the mcf 31/43!

8 Tx-Programming for Helicopters:

Steps to be followed before programming the **mcf 31/43** as described in next chapter.

For a stationary hover an electric helicopter requires usually 75-85% of available power.

As trim travels or settings on the transmitter are often limited, it is recommended to offset the neutral position (hover position) by changing the throttle end point adjustments to 150% (Power-Off) and 50% (Full Power). This little trick will enable you to use the full trim range for the final set-up.

9 Programming:

The **mcf 31/43** can be programmed on two levels, **Basic Mode** and **Feature Mode**, to suit your requirements.

In **Basic Mode** functions are set up to throttle stick positions.

In **Feature Mode** the characteristics of the **mcf 31/43** can be modified.

Using the **flysoft**-program and an interface chord (**prog-adapt**), settings can also be changed directly with a PC.

Procedures to enter program modes:

To enter **Basic Mode** the program button needs to be pressed while connecting the flight pack. This operation requires "3 hands" to avoid unintended stick movements.

Feature Mode can (almost) be entered during normal operation. The **mcf 31/43** must be in the "**Ready for Activation**" state.

"**General Reset**" will return the **mcf 31/43** to the factory setup, suitable for FAI competitions:

9.1) Basic Mode (Travel Adjust / Servo Reverse)

- 1) For Graupner/JR mc-18 / mc-20 RC-systems
- 2) Brake and Neutral at the same stick end position.
- 3) Full Power at the opposite stick end position.

9.2) Feature Mode

- 1) **Current limitation:** set for nominal value (lower value than technical data)
- 2) **Function principle:** speed control via voltage variation
- 3) **Acceleration:** set for minimum softstart
- 4) **Brake:** set for immediate stop
- 5) **Activation** of the mcf 31/43 power circuit: set for Auto-On
- 6) **Deactivation** of the power circuit: set for near 5V.



9.1) Basic Mode and "General Reset" (Throttle Stick Travel Adjustment):

- a) Switch on Tx and Rx, **mcf 31/43** powerless, i.e.: flight pack disconnected.
- b) Connect Program Button to the 3-pin plug of the **mcf 31/43**. When using the test-meter set (**tast-vm**) ensure that the brown wire is next to the negative flight pack wire, also see colour code on the label.
- c) Press and hold the Program Button and
- d) Connect the flight pack. For a "General Reset" the Program Button must be pressed for 40 seconds! If the travel adjustment for Graupner/JR suits your RC-system the "General Reset" programming can be finished by disconnecting the flight pack after 40 seconds.
- e) Release Program Button.
- f) Move throttle stick to position1 Brake position and press Program Button.
- g) Move throttle stick to position2 Neutral position** and press Program Button.
- h) Move throttle stick to position3 Full-Power position and press Program Button.
- i) Programming complete. To select Auto-On move stick to Power-Off positions (Neutral or Brake position).
- j) After 1 second the motor beeps and the **mcf 31/43** is activated.
To select Manual-On (Manual activation via separate activation button):
- k) Press activation button for more than 2 seconds.
After the motor beeps the **mcf 31/43** is activated.

[**] Usually the same stick position is used for Neutral and Brake. If position1 (Brake) is set between position2 and position3, the brake function is deactivated. If position2 (Neutral) is set between position1 and position3, windmilling is possible at Neutral position

9.2) Feature Mode (Programming the Characteristics of mcf 31/43):

(**Basic Mode** programming must be completed before entering **Feature Mode**)

- a) Switch on Tx and Rx.
- b) Ensure throttle stick is not in Power-Off position (not in Neutral and not in Brake position).
- c) Connect Program Button to the 3-pin plug of the **mcf 31/43**. When using the **tast-vm** ensure that the brown wire is next to the negative flight pack wire, also see colour code on the label.
- d) Connect flight pack. The **mcf 31/43** will not become activated. It will stay "**Ready for Activation**" ***.
- e) Choose function by pressing the Program Button for the given time periods (see next pages).

[***] **Note:** Two Procedures to get the **mcf 31/43** in the "**Ready for Activation**" condition:

- 1) Connect the flight pack while the throttle stick is not in the Power-Off positions (not in Neutral and not in Brake position).
- 2) If the **mcf 31/43** is activated, press the Program Button to deactivate while the motor is slowly running.
 - a) With Auto-On selected, it is not possible to deactivate the **mcf 31/43** with the throttle stick in the Power-Off positions. Pressing the Program Button for more than 2 seconds would automatically reactivate it. Therefore the **mcf 31/43** stays activated.
 - b) With Manual-On selected, it is possible and intended to deactivate the **mcf 31/43** in the Power-Off positions. Still, to change settings in **Feature Mode**, the throttle stick must not be in Neutral or Brake position, because the **mcf 31/43** would become activated by pressing the Program Button for more than 2 seconds.



3) After 3s: Setting Current limitation and Function Principle; two steps a and b.
 🎵 **Red LED on, Green LED off.**

9.2.3 To change settings: Release Program Button, Red LED blinks, Green LED off.

Explanation of steps a and b. Programming Sequences start at 9.2.3.1.

a) Current Limitation: Setting the maximum continuous current:

- Settings:
1. With the throttle stick in Brake position the old value will be acoustically indicated. One 🎵 corresponds to 10A. (Also see Chapter 10: Control)
 2. With a voltmeter connected, the amp value can then be read on the display. Moving the throttle stick will vary this value. Stick travel from Neutral to Full Power corresponds to 0-100% current, i.e.: 0-47A for a 47A controller, 0-75A for a 75A controller.
 The **test volt-meter set** shows the amp value calibrated in tenths of the actual value. With the throttle stick in the appropriate position, press the Program Button to set the selected value.

b) Function Principle: Choosing Voltage Control (Standard) or Current Control:

- Steps:
- | | | | |
|-------------|------------------------------------|------------|------------------|
| first step: | Throttle stick on Neutral/Brake= | 0% power | keep old setting |
| second step | 🎵 Throttle stick in mid position = | 50% power | Voltage Control |
| third step | 🎵🎵 Throttle stick on Full Power = | 100% power | Current Control |

Note: In Voltage Control mode, the **mcf 31/43** provides twice the selected current for about 1.2 seconds at each start of the motor.

Programming Sequence:

- 9.2.3.1** Select Current Limitation as described under a),
 Press Program Button, 🎵 Red LED flickers, Green LED flickers.
- 9.2.3.2** Select Function Principle as described under b),
 Press Program Button, 🎵 Red LED blinks, Green LED blinks.
- 9.2.3.3** Move Throttle Stick to Power-Off positions, wait for 1s*,
mcf 31/43 is activated, 🎵 Red LED off, Green LED on.

6) After 6s: Setting Acceleration (Softstart); one step
 🎵 **Red LED off, Green LED on.**

- 9.2.6** To change settings: Release Program Button Red LED off, Green LED blinks.
 Settings: Power-Off (Neutral/Brake) old value
 10% power: 🎵 1.5s softstart
 100% power 10x 🎵 63ms softstart
 (Available values: 10% power=1500ms, 1250, 1000, 750, 500, 375, 250, 188, 125, 100% power=63 ms)
- 9.2.6.1** Set Acceleration (Softstart),
 Press Program Button, 🎵 Red LED blinks, Green LED blinks.
- 9.2.6.2** Move Throttle Stick to Power-Off positions, wait for 1s*,
mcf 31/43 is activated, 🎵 Red LED off, Green LED on.

9) After 9s: Setting Brake Characteristic; one step
 🎵 **Red LED blinks, Green LED off.**

- 9.2.9** To change settings: Release Program Button Red LED blinks, Green LED off.
 Settings: Power-Off: (Neutral/Brake) old value
 20% power: 🎵 no brake
 40% power: 🎵🎵 half brake
 60% power: 🎵🎵🎵 soft brake (smooth, for belt drive reductions)
 80% power: 4x 🎵 dynamic brake (exponentially increasing power, more smooth than below)
 Full Power: 5x 🎵 Immediate Stop for FAI competition (Secure spinner and prop!)
- 9.2.9.1** Select Brake Characteristic,
 Press Program Button, 🎵 Red LED blinks, Green LED blinks.
- 9.2.9.2** Move Throttle Stick to Power-Off positions, wait for 1s*,
mcf 31/43 is activated, 🎵 Red LED off, Green LED on.

[*] Wait 1s if **Auto-On** is selected or press Activation Button for 2-3s if **Manual-On** is selected.

Note: If the throttle stick is not moved into the Power-Off positions, the **mcf 31/43** will not become activated and the next function can be programmed. For example: Press the Program Button now for 9s to adjust the Brake Characteristic.



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12) after 12s: **Setting Activation Mode and Low Voltage Cut-Off, two steps a) and b).** Red LED off, Green LED blinks

- 9.2.12 To change settings: Release Program Button Red LED off, Green LED blinks.
- a) Activation Mode (Auto-On or Manual-On via separate activation button):**
 Settings: Throttle stick on Power-Off = 0% power keep old setting
 Throttle stick in mid position = 50% power Manual-On
 Throttle stick on Full Power = 100% power Auto-On
- b) Low Voltage Motor-Off (with previous power reduction below 50%):**
 Settings: Throttle stick on Power-Off = 0% power keep old setting
 Throttle stick in mid position = 50% power Motor-Off determined by battery voltage and current.
 Throttle stick on Full Power = 100% power Motor-Off at 5V
- 9.2.12.1 Select Activation Mode as described under a),
 Press Program Button, Red LED flickers, Green LED flickers.
- 9.2.12.2 Select Low Voltage Motor-Off as described under b)
 Press Program Button, Red LED flickers, Green LED blinks.
- 9.2.12.3 Move Throttle Stick to Power-Off positions, wait for 1s*,
mcf 31/43 is activated, Red LED off, Green LED on.

15) After 15s: **Calibration control of the test-voltmeter set; no step, display function only.** Red LED off, Green LED off;

- 9.2.15 Release Program Button Red LED off, Green LED off.
The test-voltmeter should be in mid position, i.e. showing 0.5V.
- 9.2.15.1 Press Program Button, Red LED blinks, Green LED blinks.
- 9.2.15.2 Move Throttle Stick to Power-Off positions, wait for 1s*,
mcf 31/43 is activated, Red LED off, Green LED on.

[*] Wait 1s if **Auto-On** is selected or press Activation Button for 2-3s if **Manual-On** is selected.

Note: If the throttle stick is not moved into the Power-Off positions (Neutral and/or Brake), the **mcf 31/43** will not become activated and the next function can be programmed. For example: Press the Program Button now for 6s to set the Acceleration.

10 Setup Controls:

LED-Monitor

| | | |
|-------------|--------------------|--|
| red / green | blinking | "Ready for Activation" |
| green | flickering | Brake activated |
| green | variable intensity | Brightness reverse proportional to Motor Voltage |
| green | dark to bright | Full Power Position reached |
| red | continuously on | Temperature overload or Low-voltage switch-off |

LED-Monitor and Acoustic signals

| | |
|---|--|
| Red and continuous- after setup: | Insufficient stick travel between Power-Off and Full Power |
| During Programming in Feature Mode : | as described in previous chapters. |

Acoustic Signals

| | |
|---------|---|
| long | Indicates activation of speed controller |
| short | When pressing button in Feature Mode (not in Basic Mode) |
| several | When moving throttle stick from Power to Power-Off position in Feature Mode . Will indicate old settings. |

Voltmeter

Values displayed in **Feature Mode** only!
 With the throttle stick in Power-Off position, the old settings are displayed after the acoustic signals (not simultaneously). Moving the throttle stick will show available values selectable by pressing the **Program Button**.

11 Current (Torque) Control:

Selecting Torque-Control will automatically shift the programmed max. current value to the Full Power stick position.

The throttle stick will now proportionally control the motor current, i.e. stick in mid position = 50% of the programmed max. current (not 50% of the nominal value of the speed controller).



Initially motor control in torque-control mode does not differ from conventional speed control until the set current is reached and kept at this value. If a very high max. current was programmed, the change from conventional- to torque-control will take place before reaching Full Power, usually at mid position to allow for a smooth transfer. Back in the Power-Off position, torque-control will return to conventional control. To avoid unwanted control mode changes, move throttle trim towards Full Power.

Note: Extra smooth control can be achieved by selecting minimum acceleration = maximum softstart = 1.5s.

12 Installation Instructions

Using other than reverse polarity protected connectors will void your warranty. Suitable for up to 35A are Gold 2mm (with limitations), Gold 2.5mm or the green MPX 6-pin systems. For higher currents 4mm systems like the Conzelmann CT4 may be used (available as accessory).

Soldering instructions for mcf 31/43 cables to 4mm (CT4) connectors:

mcf battery+: feed red cable from the rear through the tighter red tube of the double housing, solder (female) socket and press it in*

mcf battery -: feed black cable from the rear through the wider tube of the double housing, solder (male) pin and press it in*

mcf motor +: feed red cable from the rear through the wider yellow tube of a split double housing**, solder pin and press it in*

mcf motor -: feed black cable through the wider yellow tube of a split double housing**, solder pin and press it in*

please use red housings at cables of accumulator pack and yellow housings at cables of your motor.

[*] For correct installation of connectors we recommend to use a parallel vice and a hammer.
Damage to the socket during installation can be avoided by leaving a single pin inserted.

[**] The cut-off tighter housing halves are used to insulate the sockets soldered to the motor cables.
If motors with integrated sockets are used, the leftover housing halves are replaced by yellow heat shrink tubing.

Whenever possible the motor should be directly soldered to the motor cables (red and yellow of the mcf 31/43). Keep the length of the cables short to reduce EMI emissions!

To change the direction of motor rotation simply swap the motor cables. Never reverse the battery cables!

Avoid excessive heat built-up of packing the mcf 31/43. Fix it with Velcro! Do not pack in foam rubber.

13 Warranty:

All mcf 31 and/or mcf 43 have been examined carefully before the delivery under working conditions with accumulators and a motor. If you should have reason for complaint, please send the device back to us with a clear error description. The text "No 100% function" is not enough! Test the mcf 31/43 carefully once more before returning it. If our tests show no problem with your device, you have to pay the costs of our testing. This applies whether the device was sent back within the time of warranty or later.

Hint: If you have a problem with a device of ours, please send it directly back to us without previously solering it in. This way the results of repair are the fastest, the costs remain low and guarantee errors are recognized without doubt. Then you can be sure too, that only original parts will be inserted (We have already had bad experiences with alleged service stations). Previous repairs outside of our firm and/or by improper repair can no longer be estimated. A repair of such devices may possibly be refused by us.

14 Technical Data:

| Item Type | Current [A] | Ni-Cd [Cells] | Dimensions [mm] | Weight [g] | Cables [mm ²] | RDSon [mΩ] | Losses [mV/10A] | Brake [mΩ] | Comments |
|-------------|--------------|---------------|-----------------|------------|---------------------------|------------|-----------------|------------|--------------------|
| mcf31-47be | 47(60)/95 | 6-12 | 41 x 31 x 11 | 21-55 | 2.5 | 3.3 | 32 | 10 | BEC 5.2V/2.5A peak |
| mcf31-47bo | 47(60)/95 | 6-16 | 41 x 31 x 11 | 21-55 | 2.5 | 3.3 | 32 | 10 | Opto-coupler |
| mcf31-52bo | 52(60)/105 | 10-24 | 41 x 31 x 11 | 21-55 | 2.5 | 2.7 | 36 | 8 | Opto-coupler |
| mcf43-70be | 70(90)/140 | 6-12 | 52 x 31 x 11 | 33-65 | 4.0 | 2.5 | 24 | 3.3 | BEC 5.2V/2.5A peak |
| mcf43-75bo | 75(90)/150 | 6-32 | 52 x 31 x 11 | 33-65 | 4.0 | 2 | 24 | 5.3 | Opto-coupler |
| mcf43-110bo | 110(130)/180 | 6-32 | 52 x 31 x 11 | 33-65 | 4.0 | 2 | 24 | 2.6 | Opto-coupler |

Temperature overload at about 110 °C, Switching Frequency about 2.0 kHz

Current: Nominal Current (increased Current) / Maximum Current:

All mcf 31/43 can be operated at Full Power and Nominal Current for the time period of a 2Ah (1Ah for mcf43-110bo) battery discharge cycle. The Maximum Current is the peak value. This value decreases linearly with the Nominal Current value within 1.2s after motor start. If you will set 30A for Nominal Current, Maximum Current will be 2x30A=60A.

Current limitations are slightly effected by temperature and can be a bit higher if the mcf 31/43 is cold and lower, if the mcf 31/43 is warm.

RDSon, Brake: Internal full speed on Resistance of the transistors, calculated from data sheets.

Losses: Typical figures measured at 13V, 30A and 25°C controller temperature.

Measured using pin needles between battery (-) and motor (+) close to the controller circuit board.

tast-vm test-voltmeter set: Program Button in combination with a litte analog voltage meter to display the currents to be programmed.

flysoft PC-Software to read out data, modify data and program it back to mcf 31 & mcf 43 bit-accurate.

prog-adapt active programming adapter (PC <-> mcf 31 & mcf 43) with three cables.



15 Programming Examples:

(Basic Mode programming must be completed.)

1) Task description: Change acceleration setup to 1s softstart:

- Turn on the transmitter and the receiver.,
- Throttle stick must not be in Neutral / Brake position.
- Connect **Program Button** with the **mcf 31/43**;
- Connect flight battery pack,
the **mcf 31/43** will not become activated,
it will be in **Ready for Activation** condition,
i.e. both LEDs will blink alternately.
- Press **Program Button** for 6s:
After 3s ♪, Red LED on, Green LED off.
After +3s ♪, Red LED off, Green LED on.
- Release **Program Button**.
Green LED starts to blink very fast, and the **mcf 31/43**
is ready for **Softstart Mode Setup**.
- Move throttle stick to 30% power position.,
According to **Chapter 9.6.**: 1000 ms, i.e. 1 second.
- Press **Program Button** (short press).
Red LED and Green LED will blink alternately,
i.e. the **mcf 31/43** is **Ready for Activation**.
- Programming is complete. To check programming, move
throttle Stick into Power-Off position and wait for about 1s.
The **mcf 31/43** will become activated,
♪ Red LED off, Green LED on.
- Hold Model firmly and ensure safety distance from pro-
peller. Move throttle stick quickly into Full Power position.
The motor should reach Full Power within 1s.
- Move throttle stick into Brake position.
Motor stops, check completed.

2) Task description: Change acceleration setup to 60ms softstart:

Follow all steps as described under 1) except step g).
For max. acceleration = min. softstart the throttle stick must be
moved to Full Power during step g).

3) Task description: Setting Current Limitation to 20A:

- Turn on the transmitter and the receiver.,
- Throttle stick must not be in Neutral / Brake position.
- Connect **Program Button** with the **mcf 31/43**;
- Connect flight battery pack,
the **mcf 31/43** will not become activated,
it will be in **Ready for Activation** condition,
i.e. both LEDs will blink alternately.
- Press **Program Button** for 3s:
After 3s ♪, Red LED on, Green LED off.
- Release **Program Button**.
Red LED starts to blink very fast, and the **mcf 31/43**
is ready for **Current Limitation Setup**.
- Move throttle stick to 40% power position
(50A controller type, e.g. **mcf 31-47be**),
or to 20% power position
(100A controller type, e.g. **mcf 43-110bo**).
If the **tast-vm** is used it will show: 2 = 200mV = 20A.
- Press **Program Button** (short press).
Red and Green LED are flickering, i.e. the **mcf 31/43**
is ready for **Control Mode Setup**.

- To keep the old control mode the throttle stick must be in
Power-Off position (Neutral / Brake).
If the **tast-vm** is used, it will show:
10 = 1V = 100% Power = conventional Voltage Control.
- Press **Program Button** (short press).
Red LED and Green LED will blink alternately,
i.e. the **mcf 31/43** is **Ready for Activation**.
- Programming is complete. To check programming, move
throttle Stick into Power-Off position and wait for about 1s.
The **mcf 31/43** will become activated,
♪ Red LED off, Green LED on.
- Hold Model firmly and ensure safety distance from pro-
peller Move throttle stick slowly into Full Power position.
A motor which would normally draw 50A will now run
with less than half power as the current is limited to 20A
- Move throttle stick into Brake position.
Motor stops, check completed.

16 Accessories / Connections:

Each **mcf 31/43** comes with a small circuit board carrying a
micro button for programming.

A combined Manual-On / **Program Button** with a 15cm lead for
fuselage installation is available separately (**ptaster**).

Also available is the **test-voltmeter set (tast-vm)**, a programming
tool with button and mini voltmeter for visual indication.

Instead of using the **tast-vm** a commercial voltmeter can be used
to show the programmed values. Range to be set for 2V max.

You can adjust **mcf 31/43** with **flysoft**, a program for Your
laptop computer. All programming possibilities you find in this
user manual are possible. Plus the possibility to read out program-
med data from the **mcf 31/43** (to modify them) and then program
it back to it.

The cable to link PC and **mcf 31/43** is our **prog-adapt**
(programming adapter). It is an active one with three connectors to
connect receiver and speed controller.

