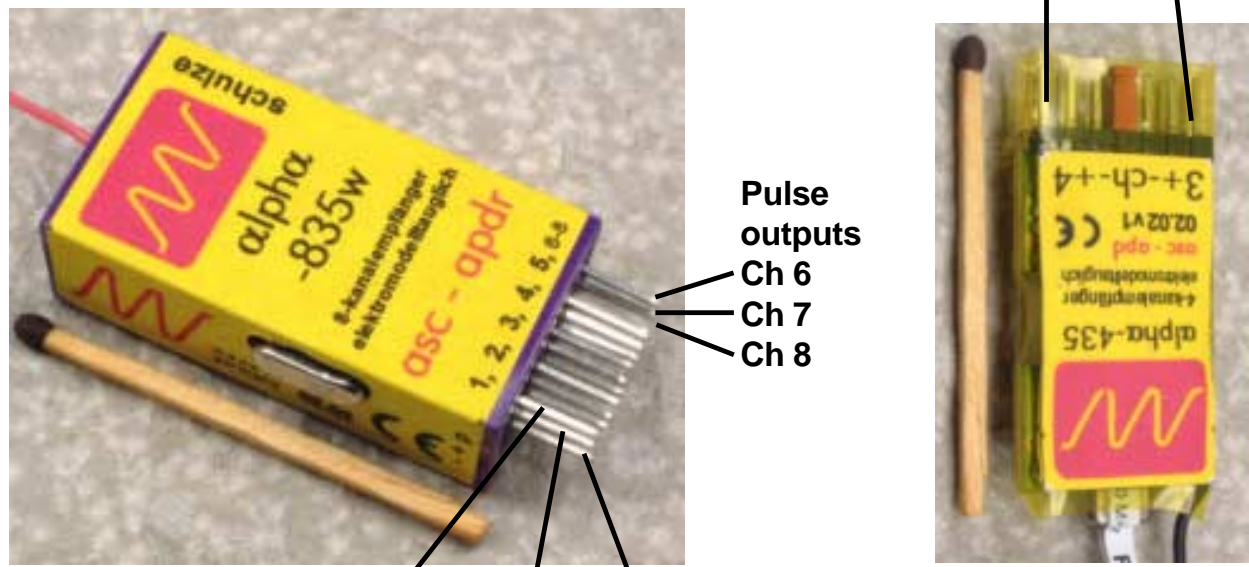


Manufacturer	Pulse(Ch1)	4.8V(+)	GND(-)
Graupner/JR	orange	red	brown
Futaba	white	red	black
Multiplex	yellow	red	black

Pulse Ch1 and Ch2
 += 4.8V, -= GND
 Pulse Ch4 and Ch3



Pulse (Ch 1) 4.8V(+) GND(-)

Dear customer,

the alpha series are ultra-compact, lightweight FM-PPM-radio control receivers designed specifically to satisfy the increasingly stringent demands of modellers concentrating on electric-powered models.

The special signal analysis process carried out by the alpha-8 also makes this receiver an interesting option for RC cars.

Its narrow-band RF section provides unrestricted use at 10 kHz channel spacing, even when adjacent channels are operating.

The **schulze** name on a receiver means not only that it is manufactured to **schulze quality standards** in our own production facility, but also that its performance satisfies the **schulze requirements** we have laid down for electric flight applications.

Its micro-processor controlled signal analysis stage suppresses interference and noise on the selected channel to a unique extent, in a similar way to a PCM receiver.

A successful fusion of high-end design with small dimensions, light weight and low cost.

Note:

For optimum results we recommend that you only use genuine **schulze** crystals.

We offer no guarantee that crystals of other makes will work properly. Our receivers usually work correctly with other crystals, but you may encounter range loss and interference when an adjacent channel is in use.

A **range check** is generally advisable in any case, but is **absolutely essential if you use non-Schulze crystals.**

Contents

Chapter	Subject	Page
1	Special features	3
2	Ensuring safe, trouble free operation	4
3	Intended applications	4
4	Interference detection and monitor displays	5
5	Installing and connecting the receiver, auxiliary cables	5
6	Legal matters	7
7	Specifications	8

1 Special features

The **asc** (automatic signal strength control - automatic regulation of received signal amplification) ensures optimum close-range and long-range reception.

The receiver automatically reduces the gain of powerful received signals, thereby avoiding the risk of overloading the aerial input stage, which always has unwanted side-effects.

Reliable operation when adjacent channels are in use is a fundamental requirement as far as we are concerned. For this reason we employ **narrow-band filters** which provide safe operation using the standard 10 kHz channel spacing.

When a receiver is operated close to its range limit it is particularly vulnerable to interference. These are the signs: **The servos start to jitter** under certain circumstances they may run against their mechanical stops and overload the receiver power supply. If the model is electric-powered, **the motor may burst into life** and make the interference even worse - which of us has not experienced that at launch or on the landing approach when the receiver aerial is poorly positioned?

A crash is simply inevitable.

At the development stage we also placed considerable importance on the **digital post-processing (apd, apdr)** applied to the received signal for this very reason.

Our techniques allow the receiver to detect interference, **suppress** it, and replace the invalid signal by previously received valid values (similar to PCM techniques). The signals passed to the servos always lies within normal limits, and the servos are usually able to process them without problem.

The servo jitter which occurs when the signal is weak is greatly reduced. Some conventional PPM receivers are so bad in this respect that we were obliged to program a suitable filter for our **future** heli speed controllers to avoid them responding with fluctuations in rotor head speed.

If interference persists, the receiver switches off the servo signals completely. Under certain circumstances the servos may then be moved back towards neutral by aerodynamic pressure.

Every time you switch on the system **the receiver counts the channel signals** in order to ensure that a receiver signal with the incorrect number of channels is not passed to the servos.

If a PCM transmitter on the same RF channel is switched on, it will not cause the servos connected to an alpha receiver to jitter (that does not mean that you can use the channel twice).

That was a brief description of the advantages provided by **apd** technology. **apdr** technology goes one stage further: **It can generate (r = restoration)** either the actual transmitted signal (suppressing a glitch caused, say, by an electric motor) or a signal close to the original signal. This it does by **analysing the interference** contained in the received signal.

CAUTION: all this sophistication is no guarantee for problem-free flying.

If you fly close to the range limit, or even at close range if the aerial is poorly positioned, a problem may arise which the receiver automatically corrects, leaving you unaware that there ever was a problem. That is why we have also installed a **reception quality indicator LED**.

2 Ensuring safe, trouble-free operation

Please also remember that ...

... **your** (brushed!) motor is suppressed by at least two, better: three, ceramic capacitors of 10 to 100nF / 63 to 100V.

... **your** receiver and the aerial must be at **least 3 cm (>1") away** from motor, speed controller and high-current cables. For example, the magnetic fields around the high-current cables can cause interference to the receiver.



... **all** high-current cables must be as short as possible. Maximum length between speed controller and motor should not exceed 12 cm (5"), between flight pack and speed controller is not allowed more than 20 cm (8").

... **all** high-current cables longer than 5 cm (2") must be twisted together. This applies in particular to the motor power cables, which are very powerful sources of radiated interference.

... **in model cars or boats:** (if you do not use a short aerial) half of the receiver aerial's length should be deployed near the receiver, the other half should be threaded into a small tube mounted upright.



The aerial must never be fitted in a tube which is pushed into a metal holder (a very popular solution in RC cars!).

... **in model aircraft:** half of the receiver aerial's length should be routed along the fuselage, the other half should be allowed to trail freely (take care not to tread on it). Do not attach the end of the aerial to the fin!

... **in helicopters** where the receiver is located in the nose, run the receiver aerial forward for about half its length, then out of the cabin,

and slip it in a sleeve which terminates at the rear skid bar. If the receiver is located in the rear part of the chassis: slip the aerial into the sleeve (mentioned above) from the rear.

TIP: mount the gyro **on the tail boom**, close to the rotor axis, as this helps to prevent the tail oscillating.

Every time you intend to use the power system - before you turn on the receiver - **make sure that ...**

... **no** one else is using the same frequency (identical channel number).

... **your** transmitter is switched on and the throttle stick is (as a rule) in the STOP position (exceptions see operating instructions of your speed controller)).

Carry out a range check before each flight. Ask an assistant to hold the model aircraft and set the throttle stick to the half throttle position. Collapse the transmitter aerial. Walk away from the model to the distance stated by the RC system manufacturer (this might be a distance of about 50-60 m = 200'). Make sure that you still have full control of the system at this range.

As a general rule: receiver interference is more likely to occur when using a controller with BEC system, as these units do not feature an opto-coupler with its optical link.

The CE symbol is your guarantee that the unit meets all the relevant interference emission and rejection regulations when it is in use. If you encounter problems operating the future controller, please note that many problems are due to an unsuitable combination of receiving system components, or an inadequate installation in the model.

3 Intended applications

alpha-4:

A small receiver with „full range“.

The compact dimensions, low weight, automatic gain control and good separation characteristics of the receiving section make this receiver an excellent choice for **slow-fly models**, which are flown in a very confined space very close to several other transmitters.

It is also highly suitable for use in **park-fly models**, as they usually only require four receiver channels, and a short aerial can safely be used.

alpha 8:

A highly sensitive receiver with all-purpose characteristics suitable for every type of modelling application.

4 Interference detection and monitor displays

The digital signal processing eliminates the usual warning of interference, which takes the form of unexpected movements in the model, and to compensate for this we have fitted a **reception quality indicator** (glitch counter) LED.

The receiver counts the invalid transmitter signals it picks up, and informs you of the number of errors by a pattern of flashing:

- 1* flash = 1 glitch (2 to the power of 0)
- 2* flashes = 2 ... 3 glitches (2 to power of 1)
- 3* flashes = 4 ... 7 glitches (2 to power of 2)
- 4* flashes = 8...15 glitches (2 to power of 3)
- 5* flashes = 16...31 glitches (2 to power of 4)
- 6* flashes = 32...63 glitches (2 to power of 5)

7* flashes = 64...127 glitches (2 to power of 6)
The LED glows continuously if interference occurs more than 128 times.

We suggest that you experiment with various arrangements of your receiving system and power supplies in the model (receiver position, aerial position, receiver battery position, flight or drive battery position) and read off the glitch count after each test flight or test run. In this way you can establish the optimum installation of the components in your model by adopting the configuration which reduces the **glitch count to a minimum**.

The glitch counter is reset by switching off the receiver

5 Installing and connecting the receiver, auxiliary cables

5.1 Installing in the fuselage

We recommend hook-and-loop (Velcro) tape for fixing the receiver in the fuselage; packing it in foam rubber also works well.

Ensure that the reception quality indicator LED is visible.

alpha-4: we recommend that you apply a piece of tape over the crystal to ensure that it cannot slip out.

5.2 Aerial

Run the receiver aerial out of conductive fuselages (carbon) by the shortest possible route. The aerial must not be deployed close to cables, or parallel to steel wire or carbon fibre pushrods or linkages, or any other metallic components (e.g. helicopter chassis, or metal aerial supports).

If you have "excess range" (e.g. in slowflyers and car models) it is permissible to shorten the aerial in increments to a minimum of 40 cm (the above stated LED should remain off).

The ideal way to deploy a short aerial is to let it trail freely underneath the model aircraft. Never run it horizontally, either along the fuselage or in the wing.

See chapter 2 for more details about receiver positioning and aerial deployment.

5.3 Connecting the channels

5.3.4 alpha-4:

The four channels are connected in such a way that the signal wires in the servo cables face out.

Four channel sockets are available, and can be used, for example, for elevator, rudder, ailerons and BEC speed controller or receiver battery.

The receiver can be fed its operating voltage via any channel socket; just make sure that polarity is correct.

If you wish to use two separate aileron servos, they must be connected to the aileron channel using our Y-lead (**alpha-vkab**). An alternative arrangement is possible if the model has no rudder: you can program a mixer function in the transmitter (if your transmitter includes mixer facilities) so that the second aileron servo can be connected to the rudder channel; in this case no Y-lead is required.

If you need to use a particular function which your transmitter sends on, say, channel 5, you must re-program your transmitter in such a way that all the functions you need are transmitted on the first four channels.

5.3.8 alpha-8:

Preparation: the exposed pins of the **alpha-8w** are vulnerable, and there is a risk of short-circuit and bent contacts. For this reason you should isolate all superfluous contacts using old, redundant servo cables. Cut off the wires immediately behind the connector, and plug them into the vacant sockets.

The receiver's operating voltage can be fed to it via channel 1 ... 5 cable socket (check correct polarity!).

The first 5 channels (Ch1...Ch5) should be connected with the signal wires in the servo cables facing the centre of the receiver.

In order to keep the **alpha 8** as small as possible, only the signal for the **remaining three channels** (Ch6...Ch8) is present at the socket, i.e. not the operating voltage.

For example, if you need to use channels 1, 2, 3, 4 and 6, simply connect the servo for channel 6 to the channel 5 socket. However, first remove the signal wire (normally orange; Futaba: white) from the connector, push the contact into the rear position (Ch6) of an unused connector (from an old, redundant servo cable), and plug this into the last row of contacts on the receiver, marked 6-8 (see picture below).

If you wish to use more than 5 channels on

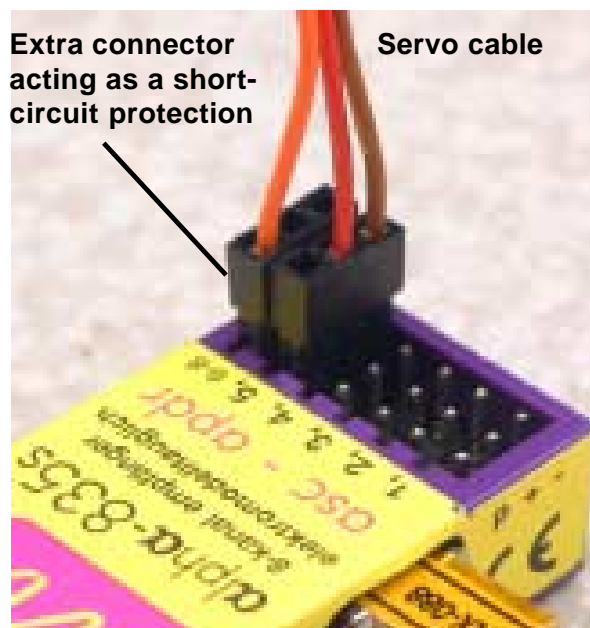
your alpha 8 receiver, you have to use **channel expansion cables**. These cables take the operating voltage from one of the output sockets 1 ... 5 and pass it to 2 servo plugs, like a Y-lead. The single orange (Futaba: white) cable end is plugged into the socket in such a way that the desired auxiliary channel signal (5, 6 or 7) can reach the servo when this socket is connected to the receiver (see picture below).

If you have a Graupner radio control system, the camber-changing flaps (on gliders) are assigned to channels 6 and 7. In most cases only a single four-pin connector is used for the wing servos, so no extra cables are required. The servo signals are passed to the wing servo connector via 2 wires of a normal servo cable connected to the Ch6-8 socket on the receiver. All four wing servos are wired in such a way that they receive their operating voltage via channels 2 and 5.

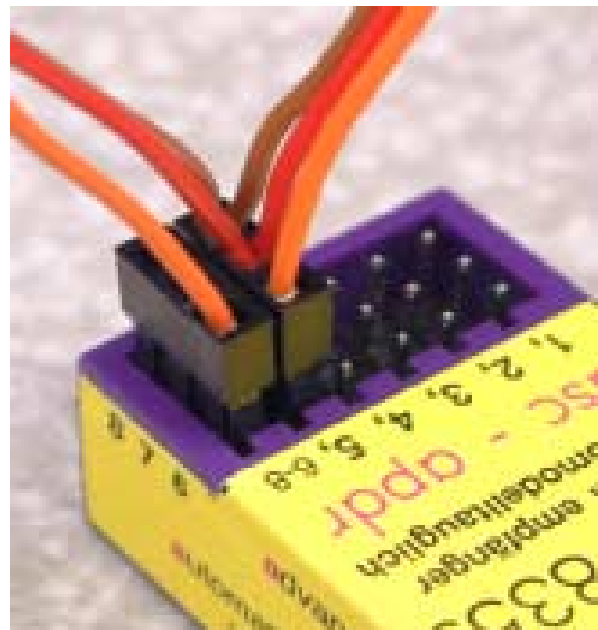
If your receiver lacks a vacant socket for an airborne voltage indicator, you can use a Y-lead to produce the necessary socket.

However, for safety reasons the receiver battery should be connected directly to a vacant receiver socket, and not via an intermediate cable.

Connecting a servo to Ch 6



Servos connected to Ch 5 and Ch 6 using the alpha-erw cable



7 Legal matters

7.1 Warranty conditions

All **schulze** receivers are 100% tested by using a test circuit especially developed for this use.

For optimum results we recommend that you only use genuine **schulze** crystals. We offer **no guarantee** that crystals of other makes will work properly. Our receivers usually work correctly with other crystals, but you may encounter range loss and interference when an adjacent channel is in use.

A **range check** is generally advisable in any case, but is **absolutely essential if you use non-Schulze crystals**.

If your unit develops a problem, please return it to **schulze** or to the importer.

Include a description of the problem. Before returning the unit for repair, please test it „one more time“ carefully with different crystals. If we find that the receiver is operating correctly, whether it is under warranty or not, we will make a charge for our lost time.

Warranty claims are processed according to our current General Conditions of Business, which are enclosed in our price list or our web page.

The warranty does not cover consequent damage or damage due to incompetent usage, such as: damage caused by mechanical load, moisture, short circuits or reverse polarity at the channel connectors.

One further note:

If a problem arises with a schulze device, send it straight back to us or our authorized representative (see catalogue); don't attempt to repair it!

This allows us to repair it as quickly as possible, as we can detect warranty defects without any doubt and thus keep costs low. You can also be certain that we will fit genuine replacement parts which are a perfect match to your device. (Very few hobby shops are equipped to analyze and repair surface-mount printed circuit boards.)

We reserve the right to refuse repair to units which have been modified or „improved“ by unauthorized „experts“. You also have the comfort of a properly repaired unit with a renewed warranty. The warranty period of repaired devices is applicable only to the repair. This period is shorter than the warranty period of a new product (See general conditions of business).

7.2 Liability limits / compensation

We at Schulze Elektronik GmbH are unable to monitor methods of installation and operation, and have no control over how you fit, use and maintain the devices we produce. For this reason we accept no liability for loss, damage or costs which arise from the incorrect or incompetent use of our products, or are connected with that use in any way.

In so far as the law allows, our obligation in respect of compensation, regardless of the legal grounds, is limited to the invoice value of that quantity of goods which was immediately involved in the event which caused the damage. This does not apply if legally binding regulations oblige us to accept unlimited liability in a particular case, or if deliberate or gross negligence can be proved on our part.

7.3 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 the following norms:

EMI-emissions:	EN 50 081-1:1992
EMI-resistance:	EN 50 082-1:1992 or EN 50 082-2:1995

The 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 close to the maximum allowed currents. The use of resistors instead of motors do not create maximum emission levels.

Further testing is carried out to ensure adequate EMI resistance against emissions from other apparatus. The RF signals used for these tests are similar to those produced by mobile telephones and RC transmitters.

We wish to point out again that our products are tested under realistic conditions for the most dangerous scenario: exposed to the field of a powerful transmitter, the motor must not start while you are working on the model.

Nevertheless: in the interests of safety always keep well clear of the propeller, just in case the motor should burst into life unexpectedly; hold on tight to the model!

8 Specifications

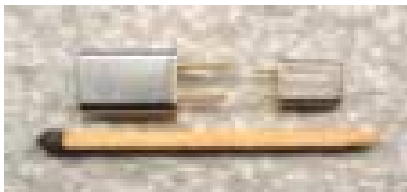
Receiver type:	single conversion
Operating mode:	FM / PPM
Channel separation:	10 kHz (narrow band)
Sensitivity about:	1 m aerial: 10 μ V
Intermediate frequency:	455 kHz
Current draw LED:	about additional 1 mA
Noise suppression:	digital-squelch
Channels alpha-8	8, 3 channels to be used by adapter cables
Case alpha-8	leightweight plastic 3,6 g (included in the table below)
Case alpha-4	heat shrinking tubes. crystal + 5 mm.
Aerial length	1 m, can be shorted by „too much range“ down to 40 cm.
Operating voltage range	4-5 cells = 4.8 ... 6 V nominal voltage = 3.6 ... 9 V min / max.

For optimum results we recommend that you only use genuine **schulze** crystals.

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A **range check** is generally advisable in any case, but is **absolutely essential if you use non-Schulze crystals.**

Order-term	Freq. [MHz]	Channel count	Size [mm]	Current [mA]	Weight w/o crystal [g]	Application	Servo-connectors
a-835w	35 (red)	5+3	49*21*13	8,5	13,5	Aircraft	horizontal
a-835s	35 (red)	5+3	41*21*13	8,5	13	Aircraft	vertical
a-840w	40 (green)	5+3	49*21*13	8,5	13,5	Air,Boat,Car	horizontal
a-840s	40 (green)	5+3	41*21*13	8,5	13	Air,Boat,Car	vertical



Normal crystal for alpha-8 Mini crystal for alpha-4
 Order term:
RX-###-n **RX-###-m**
 ### = channel number

alpha-erw



alpha-vkab

Application: e.g. supply of 2 elevator servos or one servo and a board voltage display.
 For safety reasons (additional contact resistance) the receiver battery should be connected preferably on the throttle channel if channels 1 ... 5 are used.

