Mobile Antennas for Cars and Portables

CAR

KATHREIN

Antennen · Electronic

The KATHREIN-Werke KG develops, manufactures and markets components and systems for antenna and communications technology.

Our ecological policy, followed for many years, and our product spectrum using mainly metal materials such as steel, aluminium, copper and brass and selected plastics help us reduce the pollution caused to the environment by manufacturing processes.

With much of the product range having a remarkably long service life, practical periods of use exceeding 15 years or more are possible and so our products make a significant contribution to protecting the environment.
The use of the materials mentioned above allows products no longer in use to be disposed of with high recycling rates. This also helps to reduce costs.

Realising its ethical responsibility for the environment and for further generations, the management has declared improved and systematic protection of the environment as a independent company goal.

68 – 174 MHz

(4 m band, 2 m band, PMR services)

380 – 470 MHz

(70 cm band, NMT 450, trunking systems, TETRA)

810 – 2170 MHz

(35 cm band, GSM 900, Natel C, NMT 900, AMPS, DoCoMo, PCN/GSM 1800, PCS, DCS 1800/1900, UMTS)

Antennas for portable radio sets

(68 – 470 MHz)

Accessories

coupler, cable, adapter

Frequency overview for mobile radio communication

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4 m band	68 – 87.5 MHz
Aircraft radio VHF	108 – 136 MHz
2 m band	146 – 174 MHz
Aircraft radio UHF	225 – 380 MHz
TETRA (Terrestrial Trunked Radio)	380 – 400 MHz
450 MHz frequency range	400 – 470 MHz
Trunking system	410 – 430 MHz
Chekker	410 – 430 MHz
Modacom	410 – 430 MHz
Mobitex	410 – 430 MHz
NMT 450	450 – 470 MHz
AMPS	824 – 896 MHz
DoCoMo	810 – 958 MHz
GSM 900	890 – 960 MHz
NMT 900	890 – 960 MHz
Natel C	890 – 960 MHz
TACS	890 – 950 MHz
ETACS	872 – 950 MHz
PCN / GSM 1800	1710 – 1880 MHz
DCS 1800	1710 – 1880 MHz
GPS	1575.42 ± 1.023 MHz
PCS	1850 – 1990 MHz
DCS 1900 / GSM 1900	1850 – 1990 MHz
UMTS	1900 – 2170 MHz

Which Type No. for which frequency?

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Type No.	4-m band	2-m band	380 – 410 MHz	410 – 430 MHz	440 – 470 MHz	890 – 960 MHz	1710 – 1880 MHz	GPS 1575 MHz	1900 – 2170 MHz	Car radio	Page
K 50 46 4	X	X								X	27
K 50 47 40 41	X	X								X	12, 13 14, 16 27
K 50 48 40 31	X	X									26, 27
K 50 48 40 41	X	X								X	26
K 50 49 4	X	X								X	26
K 50 50 20 31		X								X	25
K 50 50 20 41		X								X	25
K 50 51 2		X								X	25
K 50 53 4	X	X								X	16
K 50 54 4	X	X								X	17
K 50 55 2		X								X	18
K 50 55 20 31	X	X	X		X					X	16, 17 18, 30 31
K 50 55 20 41		X								X	18
K 50 56 20 1		X		X	X					X	24
K 50 65 2		X									15
K 50 65 42 1	X										12
K 50 65 42 2	X										13
K 50 66 42 1	X	X									14
K 50 70 2		X								X	24
K 50 70 20 3		X								X	24
K 51 12 40 1	X	X									22, 23
K 51 16 4	X	X									23
K 51 17 2		X									22
K 51 32 26		X									55
K 51 32 29		X									55
K 51 39 21 5		X									54
K 51 39 21 6		X									54
K 51 39 22 5		X									54
K 51 39 22 6		X									54
K 51 39 22 9		X									54
K 51 39 23 5		X									54
K 51 39 23 6		X									54
K 51 39 23 9		X									54
K 51 39 41 6	X										52
K 51 39 41 9	X										52
K 51 39 42 5	X										52
K 51 39 42 6	X										52
K 51 39 43 5	X										52

Which Type No. for which frequency?

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Type No.	4-m band	2-m band	380 – 410 MHz	410 – 430 MHz	440 – 470 MHz	890 – 960 MHz	1710 – 1880 MHz	GPS 1575 MHz	1900 – 2170 MHz	Car radio	Page
K 51 39 43 6	X										52
K 51 39 43 9	X										52
K 51 56 22	X	X									53, 56
K 51 56 26	X	X									53, 56
K 62 27 2		X								X	65
K 63 27 23			X	X	X	X	X			X	63
K 63 27 25				X	X	X					64
K 70 49 64						X	X				49
K 70 50 64				X		X					35, 48
K 70 52 64		X				X					20, 47
K 70 55 64						X	X		X		44
K 70 57 21 04 1			X	X						X	30
K 70 57 21 9				X						X	30
K 70 57 23 04 1					X					X	31
K 70 57 23 9					X					X	31
K 70 60 20		X				X				X	21, 46
K 70 70 20 3		X	X	X	X	X				X	19, 20 32, 33 34, 35 36, 48
K 70 70 21 01				X							33
K 70 70 22 01			X								32
K 70 70 23 01					X						36
K 70 71 21 01				X						X	33
K 70 71 22 01			X							X	32
K 70 71 23 01					X					X	36
K 70 77 20 3		X	X	X	X	X				X	19, 20 32, 33 34, 35 36, 48
K 70 77 21				X							33
K 70 77 22			X								32
K 70 77 23					X						36
K 70 78 21				X						X	33
K 70 78 22			X							X	32
K 70 78 23					X					X	36
K 70 83 23 20 1				X	X						41
K 70 83 64 01						X				X	50
K 71 14 21 01			X	X							38
K 71 14 23 01					X						39
K 71 16 20 3				X	X						40
K 71 16 20 11				X	X						40

Which Type No. for which frequency?

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Type No.	4-m band	2-m band	380 – 410 MHz	410 – 430 MHz	440 – 470 MHz	890 – 960 MHz	1710 – 1880 MHz	GPS 1575 MHz	1900 – 2170 MHz	Car radio	Page
K 71 16 21				X	X						40
K 71 17 21			X	X							38
K 71 17 23					X						39
K 71 32 26				X	X						58
K 71 32 29				X	X						58
K 71 53 21 6				X							59
K 71 53 21 9				X							59
K 71 53 23 6					X						59
K 71 53 23 9					X						59
K 71 54 23 6					X						59
720 895	X	X									14
726 131		X								X	19
726 556					X						57
726 637		X								X	19
731 247				X							57
737 477	X	X				X					62
737 539		X				X				X	20, 47
737 637				X		X					35, 48
737 692		X				X	X				21, 46
738 356		X				X				X	21, 46
506 10001											34
506 10004											28, 37 45

How to find your antenna?

In this catalogue, the antennas are listed according to frequency ranges and, within a range, according to product families:

- Roof mount antennas (for example "Euroline", slanted antenna)
- Stick-on antennas ("Screenfix®")
- Magnet mount antennas
- Rear mount antennas
- Caravan antennas

Technical information

1. Tuning

- Some of the mobile antennas for cars have to be tuned to match the operating frequency. Instructions on tuning are to be found in the mounting instructions of the antenna. We recommend the usage of a measuring instrument for the fine-tuning of the matching of the antenna.
- Narrow-band antennas, are marked by three dots which specify the frequency range, for example 143 ... 174 MHz. They have to be tuned.
- Broadband antennas are marked by a hyphen which specifies the frequency range, for example 450 – 470 MHz. They do not need to be tuned.

2. Impedance

- The standardized impedance for mobile radiocommunication is 50 Ω.

3. Maximum load (if not indicated otherwise):

68 – 87.5 MHz	146 – 174 MHz	400 – 470 MHz	790 – 960 MHz	1700 – 1900 MHz	1900 – 2170 MHz
100 W	80 W	50 W	30 W	10 W	2 W

(at 50 °C ambient temperature)

4. The car antennas featured in this catalogue are designed for vehicles with metal body-work. If the electrical counterweight for the antenna is missing, then a piece of metal, metal foil or metal mesh of approx. 1 x 1 wave-length, e. g. 0.7 m x 0.7 m for the 70 cm bandwidth, can be used as a substitute. Durable and good-quality earth contact is of great importance for ensuring trouble-free operation. The antenna bases are generally designed for metal thicknesses of up to 1.5 mm. All antennas and also the special antenna bases for each type of vehicle are supplied with comprehensive installation instructions.

5. Common technical terms for connectors and adapters:
   connector (m) marks a male connector type
   plug (f) marks a female connector type

Warnings


Caution

For safety reasons magnet mount antennas should only be fixed onto a parked vehicle. Otherwise, the antenna could come off when your vehicle suffers a sudden impact (even at low speed)!


Caution

We recommend to remove the whip of the antenna each time before you enter a car-wash in order to avoid damages to the vehicle and to the antenna!


Caution

The tip protection of the whip always must be mounted for safety reasons. Replace any missing tip protection immediately.

Car radio AM/FM reception

In many cases the mobile car antenna can be used simultaneously as an AM/FM reception antenna. This avoids drilling a second bore hole into the car body work. In any case an additional frequency coupler is required for the connection of the two sets. Generally, we recommend a minimum length of whip of 500 mm for VHF reception and a minimum length of whip of 800 mm for the reception of long, medium, short and ultrashort waves.
Information on broadcasting reception capability is given for each antenna.

Product families

Please note that the whips of the different product families cannot be interchanged!

Euroline antennas

The Euroline family uses the antenna base K 70 77 20 3 (Ord. No. 510 006), which can be combined with whips from 144 up to 960 MHz. This enables an easy changing of the frequency range or exchanging with a combined whip without having to change the antenna base.
Low-noise whips are available for all frequencies except of the 2 m band.

Slanted roof mount antennas

The family of slanted roof mount antennas uses the antenna base 737 692 (Ord. No. 510 261). This base can be exchanged with the factory-mounted broadcasting reception antenna and can be mounted into a standard square hole.

Rear mount antennas

A rear mount antenna is the classic type of a built-in antenna.
Simultaneous operation of radio communication and broadcasting reception is always possible. The two sets then have to be connected to a coupler.

Screenfix® antennas

The stick-on antennas of the Screenfix® family can be applied to all vehicle screens up to a thickness of 6 mm. Please take care that the screens do not have vaporized metallic coatings and that the heating wires or broadcasting reception antennas which may be integrated in the screen do not cross the so-called coupling area. Best electrical performance is obtained if the antenna is mounted as close as possible to the upper edge of the screen. The antenna can be removed from the screen and reinstalled.

Magnet mount antennas

The magnet mount antennas are designed for the temporary operation of a radio set in a vehicle. They should not remain mounted permanently (please note the warnings!).
As the bases of K 51 16 4, K 51 17 2, K 71 17 21 and K 71 17 23 vary in electrical features, the whip of one of these antennas cannot be used together with a base of a different antenna.

58-300 MHz

4 m band / 2 m band / PMR services

Roof mount antennas
Magnet mount antennas
Rear mount antennas

11

Roof mount antenna
74 … 87.5 MHz

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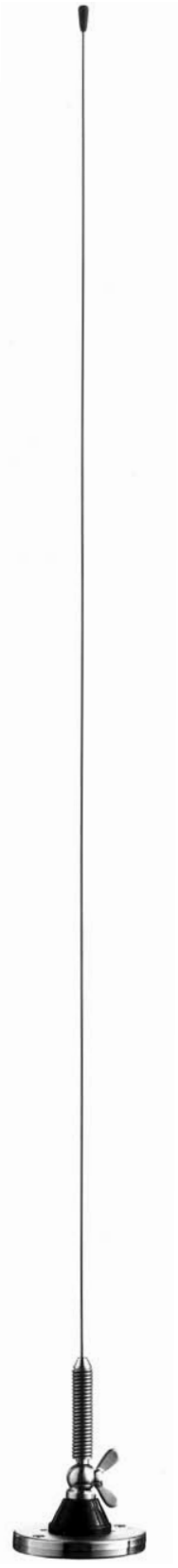

K 50 65 42 1

- **Antenna for duplex operation.**
- **Cable clamping connection.**

Type No. K 50 65 42 1 Ord. No. 510 329	74.215 – 77.655 MHz/ 84.015 – 87.455 MHz, 0 dB gain (ref. to quarter-wave whip), length 1010 mm (must not be changed).
Connection	Clamping device for a cable RG 058 within the tuning case.
Maximum load	20 W (at 50 °C ambient temperature)
Tuning	By means of two trimmers the antenna can be fine-tuned to optimum voltage standing wave ratio in the given frequency range.
Location of mounting	Car roof with 30 – 50 cm Distance to the rear end of the roof.
Mounting hole	In bore hole 12 mm diameter.
Built-in depth	12 mm
Max. diameter at base	38 mm
Material	Whip and spring: Stainless steel. Swivel-joint parts: Chromium-plated brass. Tuning case: Nickel-plated brass. Base: Weather resistant plastic.
Contents of delivery	Whip, base, tuning box.
Accessories	Protection cover K 66 01 7 (Ord. No. 510 401) for the tuning box with clamping device.

Components	Type No.	(Ord. No.)
Whip	K 50 47 40 41	(510 300)
Swivel-joint screw*	K 66 00 6	(510 154)
Tip protection	K 66 01 9	(510 159)

* butterfly bolt, philips screw and locking washer

Roof mount antenna
74 ... 87.5 MHz

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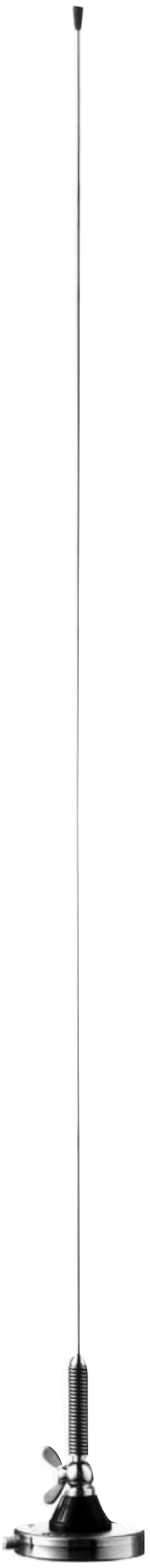
- **Antenna for duplex operation.**
- **Connection M11 x 1.**

Type No. K 50 65 42 2 Ord. No. 510 330	74.215 – 77.655 MHz/ 84.015 – 87.455 MHz, 0 dB gain (ref. to quarter-wave whip), length 1025 mm (must not be changed).
Connection	M11 x 1
Maximum load	20 W (at 50 °C ambient temperature)
Tuning	By means of two trimmers the antenna can be fine-tuned to optimum voltage standing wave ratio in the given frequency range.
Location of mounting	Car roof with 30 – 50 cm Distance to the rear end of the roof.
Mounting hole	In bore hole 12 mm diameter.
Built-in depth	16 mm
Max. diameter at base	38 mm
Material	Whip and spring: Stainless steel. Swivel-joint parts: Chromium-plated brass. Tuning case: Nickel-plated brass. Base: Weathering resistant plastic.
Contents of delivery	Whip, base, tuning box.
Accessories	Connector M11 x 1: K 62 10 0 for RG 213 K 62 05 1 for RG 058 K 62 05 5 minicrimp adapter
Components	Type No. (Ord. No.)
Whip	K 50 47 40 41 (510 300)
Swivel-joint screw*	K 66 00 6 (510 154)
Tip protection	K 66 01 9 (510 159)

* butterfly bolt, philips screw and locking washer



K 50 65 42 2

Roof mount antenna
74 – 87.5 MHz / 167.5 – 174 MHz

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Antennen · Electronic

K 50 66 42 1

- **Antenna for duplex operation in the 2 m band and the 4 m band.**

Type No. 720 895 Ord. No. 510 494	2 m b.: 167.5 – 169.5 MHz / 172 – 174 MHz, transmit in low band 4 m b.: 74.215 – 77.655 MHz/ 84.015 – 87.455 MHz 0 dB gain (ref. to quarter-wave whip) in both ranges, length 915 mm (must not be changed) 2 connectors for RG 058
Type No. K 50 66 42 1 Ord. No. 510 335	2 m b.: 167.5 – 169.5 MHz / 172 – 174 MHz transmit in low band 4 m b.: 74.215 – 77.655 MHz/ 84.015 – 87.455 MHz 0 dB gain (ref. to quarter-wave whip) in both ranges, length 915 mm (must not be changed) 2 connectors for RG 213
Connection	M11 x 1
Tuning	By means of two trimmers the antenna can be fine-tuned to optimum voltage standing wave ratio in the given frequency range.
Maximum load	20 W in both ranges (at 50 °C ambient temperature)
Decoupling	> 30 dB
Location of mounting	Car roof with 30 – 50 cm Distance to the rear end of the roof.
Mounting hole	In bore hole 12 mm diameter.
Built-in depth	16 mm
Max. diameter at base	38 mm
Material	Whip and spring: Stainless steel. Swivel-joint parts: Chromium-plated brass. Tuning case: Nickel-plated brass. Base: Weather resistant plastic.
Contents of delivery	Whip, base, tuning box, 2 connectors.

Components	Type No.	(Ord. No.)
Whip	K 50 47 40 41	(510 300)
Connector M11 x 1		
for RG 213	K 62 10 0	(510 133)
for RG 058	K 62 05 1	(510 132)
Swivel-joint screw*	K 66 00 6	(510 154)
Tip protection	K 66 01 9	(510 159)

* butterfly bolt, philips screw and locking washer

Roof mount antenna
146 – 174 MHz

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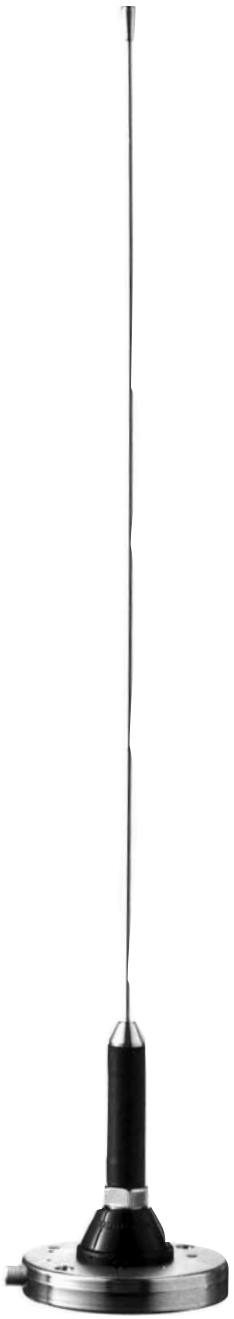
- **Broadband antenna.**

Type No. K 50 65 2 Ord. No. 510 325	146 – 174 MHz, 0 dB gain (ref. to quarter-wave whip), length 534 mm (must not be changed)
Connection	M11 x 1
Tuning	The antenna has already been tuned. Subsequent tuning is only necessary if the mounting location differs from the one specified in the mounting instructions.
Maximum load	50 W (at 50 °C ambient temperature)
Mounting	Into bore hole 12 mm diameter with a minimum distance of 50 cm to the edge of the roof.
Counterpoise area	At least 2 m x 2 m.
Built-in depth	16 mm
Max. diameter at base	38 mm
Material	Whip: Stainless steel. Spring: Stainless steel, vulcanized into neoprene. Tuning case: Nickel-plated. Base: Weather resistant plastic.
Contents of delivery	Whip, base, tuning box, connector, antenna wrench.
Components	Type No. (Ord. No.)
Whip	K 50 65 20 1 (510 326)
Connector M11 x 1	K 62 05 1 (510 132)
Antenna wrench	K 66 30 1 (510 160)



K 50 65 2

Roof mount antenna
62 ... 300 MHz / Car radio AM/FM

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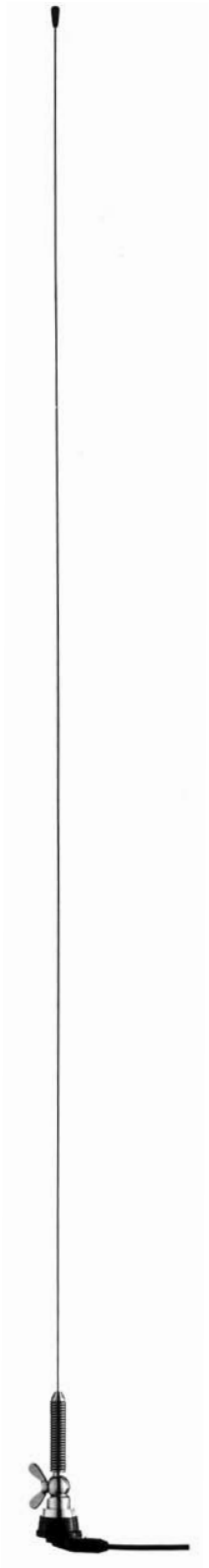

K 50 53 4

Type No. K 50 53 4 Ord. No. 510 314	With spring, 62 ... 300 MHz, 0 dB gain (ref. to quarter-wave whip), supply length 1285 mm
Connection	Fixed cable RG 058-PE, 5 meters long, without radio set connector.
Maximum load	100 W (at 50 °C ambient temperature)
Tuning	By shortening the whip (please note mounting instructions).
Mounting	In bore hole (24 mm diameter) from the external side of the car body.
Built-in depth	14 mm
Max. diameter at base	38 mm
Material	Whip and spring: Stainless steel. Swivel-joint parts: Chromium-plated brass. Base: Weather resistant plastic.
Contents of delivery	Whip, base with cable, philips screw.
Accessories	For AM/FM reception (VHF) the coupler K 62 27 4 (Ord. No. 510 431) is required.

Components	Type No.	(Ord. No.)
Whip	K 50 47 40 41	(510 300)
Base	K 50 55 20 31	(510 142)
Swivel-joint screw*	K 66 00 6	(510 154)
Tip protection	K 66 01 9	(510 159)

* butterfly bolt, philips screw and locking washer

Roof mount antenna
64 ... 300 MHz / Car radio AM/FM

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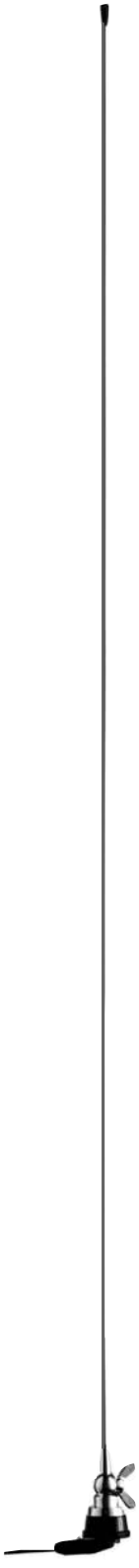
Type No. K 50 54 4 Ord. No. 510 317	Without spring, 64 ... 300 MHz, 0 dB gain (ref. to quarter-wave whip), supply length 1235 mm
Connection	Fixed cable RG 058-PE, 5 meters long, without radio set connector.
Maximum load	100 W (at 50 °C ambient temperature)
Tuning	By shortening the whip (please note mounting instructions).
Mounting	In bore hole (24 mm diameter) from the external side of the car body.
Built-in depth	14 mm
Max. diameter at base	38 mm
Material	Whip and spring: Stainless steel. Swivel-joint parts: Chromium-plated brass. Base: Weather resistant plastic.
Contents of delivery	Whip, base with cable, philips screw.
Accessories	For AM/FM reception (VHF) the coupler K 62 27 4 (Ord. No. 510 431) is required.

Components	Type No.	(Ord. No.)
Whip	K 50 48 40 41	(510 304)
Base	K 50 55 20 31	(510 142)
Swivel-joint screw*	K 66 00 6	(510 154)
Tip protection	K 66 01 9	(510 159)

* butterfly bolt, philips screw and locking washer



K 50 54 4

Roof mount antenna
143 ... 174 MHz / Car radio AM/FM

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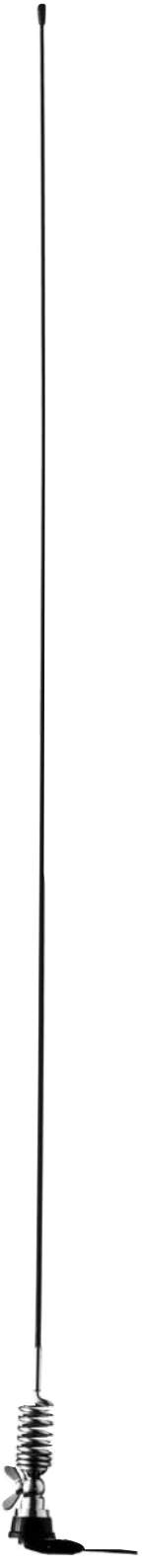

K 50 55 2

Type No. K 50 55 2 Ord. No. 510 318	143 ... 174 MHz (as a shortened whip also from 47 ... 90 MHz) 2 dB gain (ref. to quarter-wave whip), supply length 1270 mm,
Connection	Fixed cable RG 058-PE 5 meters long, without radio set connector.
Tuning	By shortening the whip (please note mounting instructions).
Maximum load	K 50 55 2: 20 W (at 50 °C ambient temperature)
Mounting	In bore hole (24 mm diameter) from the external side of the car body.
Built-in depth	14 mm
Max. diameter at base	38 mm
Material	Whip: Fiberglass Spring: Stainless steel. Swivel-joint parts: Chromium-plated brass. Base: Weather resistant plastic.
Contents of delivery	Whip, base with cable.
Accessories	For AM/FM reception the coupler K 62 27 2 (Ord. No. 510 400) is required.

Components	Type No.	(Ord. No.)
Whip	K 50 55 20 41	(510 319)
Swivel-joint screw*	K 66 00 6	(510 154)
Tip protection	K 66 01 4	(510 158)
Base	K 50 55 20 31	(510 142)

* butterfly bolt, philips screw and locking washer

EuroLine antenna
144 ... 300 MHz / Car radio AM/FM

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Type No. 726 637 Ord. No. 510 280	144 ... 300 MHz 0 dB gain (ref. to quarter-wave whip), supply length 550 mm
Connection	Minicrimp (male)
Tuning	By shortening the whip (please note mounting instructions).
Maximum load	80 W (at 50 °C ambient temperature)
Mounting	Into bore hole 18^{+1} mm diameter from the external side of the car body. Into bore hole 14 – 19 mm diameter from the inner side of the car body.
Built-in depth	13 mm
Max. diameter at base	32 mm
Material	Metal parts are made of brass and stainless steel. All visible parts are black chromium-plated.
Contents of delivery	Whip, base, antenna wrench.
Accessories	For AM/FM reception (VHF) the coupler K 62 27 2 (Ord. No. 510 400) is required.

Components	Type No.	(Ord. No.)
Whip	726 131	(510 279)
Base	K 70 77 20 3	(510 006)
Base with 5 mtr. cable	K 70 70 20 3	(510 005)
Tip protection	K 66 01 9	(510 159)
Antenna wrench	K 66 30 2	(510 161)

726 637

EuroLine antenna
146 ... 174 MHz / 890 – 960 MHz

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K 70 52 64

- **Antenna for simultaneous operation of a 150 MHz radio set and a 900 MHz mobile phone.**
- **Can also be used as a combined whip for 890 – 960 MHz mobile phone and AM/FM reception.**

Type No. K 70 52 64 Ord. No. 510 775	146 ... 174 / 890 – 960 MHz 0 dB gain (ref. to quarter-wave whip) in both ranges, low-noise, supply length 520 mm
Connection	Minicrimp (male)
Maximum load	146 ... 174 MHz: 30 W 890 – 960 MHz: 10 W (at 50 °C ambient temperature)
Mounting	Into bore hole 18^{+1} mm diameter from the external side of the car body. Into bore hole 14 – 19 mm diameter from the inner side of the car body.
Built-in depth	13 mm
Max. diameter at base	32 mm
Material	Metal parts are made of brass and stainless steel. All visible parts are black chromium-plated.
Contents of delivery	Whip, base, antenna wrench.
Accessories	For the simultaneous operation of a 150 MHz and a 900 MHz radio set the coupler 737 477 (Ord. No. 510 272) is required. For the operation of a 900 MHz radio and simultaneously an AM/FM car radio the coupler K 63 27 23 (Ord. No. 510 258) is required.

Components	Type No.	(Ord. No.)
Whip	737 539	(510 271)
Base	K 70 77 20 3	(510 006)
Base with 5 mtr. cable	K 70 70 20 3	(510 005)
Tip protection	K 66 01 9	(510 159)
Antenna wrench	K 66 30 2	(510 161)

Slanted roof mount antenna
144 ... 174 MHz / 890 – 960 MHz

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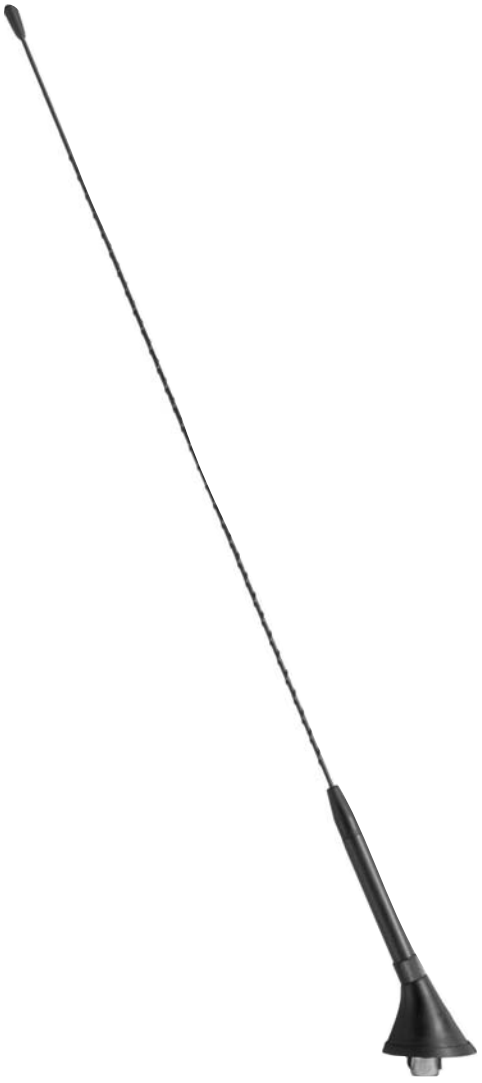
Antennen · Electronic

- **Antenna for simultaneous operation of a 150 MHz radio set and a 900 MHz mobile phone.**
- **Can also be used as a combined whip for 890 – 960 MHz mobile phone and AM/FM reception.**

Type No. K 70 60 20 Ord. No. 510 769	144 ... 174 / 890 – 960 MHz, 0 dB gain (ref. to quarter-wave whip) in both ranges, supply length 535 mm
Connection	Minicrimp (lateral/male)
Tuning	By shortening the whip (please note mounting instructions).
Maximum load	144 ... 174 MHz: 30 W 890 – 960 MHz: 10 W (at 50 °C ambient temperature)
Mounting	Into square hole 15 mm x 15 mm.
Inclination	68°
Built-in depth	13 mm
Max. diameter at base	40 mm x 44 mm (oval)
Material	Metal parts are made of aluminum and stainless steel. Weather resistant plastic.
Contents of delivery	Whip, base.
Accessories	For the simultaneous operation of a 150 MHz and a 900 MHz radio set the coupler 737 477 (Ord. No. 510 272) is required. For the operation of a 900 MHz radio and simultaneously an AM/FM car radio the coupler K 63 27 23 (Ord. No. 510 258) is required.
Components	Type No. (Ord. No.)
Whip	738 356 (510 402)
Base	737 692 (510 261)
Tip protection	K 66 01 9 (510 159)



K 70 60 20

Magnet mount antenna
143 ... 174 MHz

KATHREIN
Antennen · Electronic

K 51 17 2

Type No. K 51 17 2 Ord. No. 510 352	143 … 174 MHz (as shortened whip also from 47… 90 MHz) 2 dB gain (ref. to quarter-wave whip), supply length 1380 mm
Connection	Cable RG 058-PE 4 meters long
Tuning	By shortening the whip (please note mounting instructions).
Maximum load	80 W (at 50 °C ambient temperature)
Mounting	By attaching the antenna to a steel surface of at least 1 m^2 extension that should be as even as possible. Magnetic adhesive force: Approx. 200 N.
Max. diameter at base	95 mm
Material	Whip: Stainless steel. Swivel-joint parts: Chromium-plated brass. Magnetic base in shock-resistant plastic housing. Neoprene protection cover for the adhesive surface of the magnetic base.
Contents of delivery	Whip, base, cable, protection cover.

Components	Type No.	(Ord. No.)
Whip	K 51 12 40 1	(510 349)
Swivel-joint elements*	K 66 00 3	(510 153)
Protection cover	K 66 01 2	(510 156)
Cable	K 62 24 7	(510 148)
Tip protection	K 66 01 9	(510 159)

* butterfly nut, bolt and locking washer

Danger

Use of antenna on stationary vehicle:
The magnet may lift off from vehicle even at slow speed collision.

Magnet mount antenna
58 ... 300 MHz

KATHREIN
Antennen · Electronic

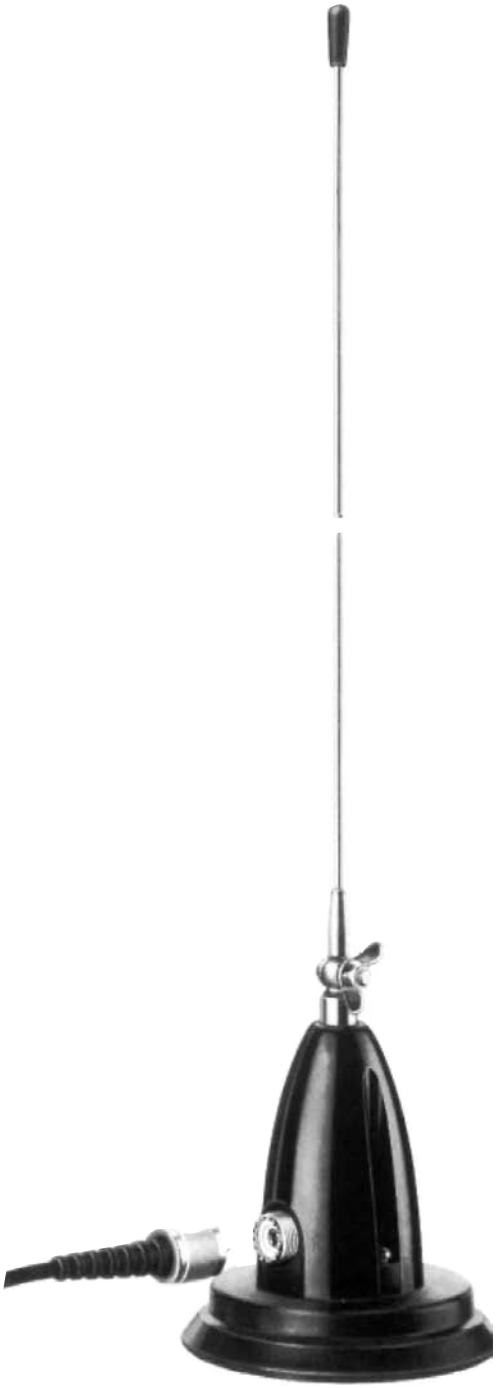
Type No. K 51 16 4 Ord. No. 510 351	58 ... 300 MHz, 0 dB gain (ref. to quarter-wave whip), supply length 1380 mm
Connection	Cable RG 058-PE 4 meters long
Tuning	By shortening the whip (please note mounting instructions).
Maximum load	80 W (at 50 °C ambient temperature)
Mounting	By attaching the antenna to a steel surface of at least 1 m^2 extension that should be as even as possible. Magnetic adhesive force: Approx. 200 N.
Max. diameter at base	95 mm
Material	Whip: Stainless steel. Swivel-joint parts: Chromium-plated brass. Magnetic base in shock-resistant plastic housing. Neoprene protection cover for the adhesive surface of the magnetic base.
Contents of delivery	Whip, base, cable, protection cover.

Components	Type No.	(Ord. No.)
Whip	K 51 12 40 1	(510 349)
Swivel-joint elements*	K 66 00 3	(510 153)
Protection cover	K 66 01 2	(510 156)
Cable	K 62 24 7	(510 148)
Tip protection	K 66 01 9	(510 159)

* butterfly nut, bolt and locking washer

Danger

Use of antenna on stationary vehicle:
The magnet may lift off from vehicle even at slow speed collision.



K 51 16 4

Rear mount antenna
144 ... 174 MHz / Car radio AM/FM

KATHREIN
Antennen · Electronic

K 50 70 2

Type No. K 50 70 2 Ord. No. 510 336	144 ... 174 MHz, 2 dB gain (ref. to quarter-wave whip), supply length 1235 mm
Connection	M11 x 1
Tuning	By shortening the whip (please note mounting instructions).
Maximum load	20 W (at 50 °C ambient temperature)
Mounting	In bore hole 12 mm diameter.
Built-in depth	32 mm (connector included)
Max. diameter at base	26 mm
Material	Whip: Fiberglass. Spring: Stainless steel. Swivel-joint parts: Chromium-plated brass. Base: Weather resistant plastic.
Contents of delivery	Whip, base, antenna wrench.
Accessories	For AM/FM reception (VHF) the coupler K 62 27 2 (Ord. No. 510 400) is required.

Components	Type No.	(Ord. No.)
Whip	K 50 56 20 1	(510 322)
Base	K 50 70 20 3	(510 337)
Antenna wrench	K 66 30 1	(510 160)
Tip protection	K 66 01 4	(510 158)

Rear mount antenna
143 ... 174 MHz / Car radio AM/FM

KATHREIN
Antennen · Electronic

Type No. K 50 51 2 Ord. No. 510 311	143 … 174 MHz, (as shortened whip also from 47 – 90 MHz), 2 dB gain (ref. to quarter-wave whip), supply length 1325 mm
Connection	M11 x 1
Tuning	By shortening the whip (please note mounting instructions).
Maximum load	80 W (at 50 °C ambient temperature)
Mounting	In bore hole 12 mm diameter.
Built-in depth	32 mm
Max. diameter at base	38 mm
Material	Whip and spring: Stainless steel. Swivel-joint parts: Chromium-plated brass. Base: Weather resistant plastic.
Contents of delivery	Whip, base, connector.
Accessories	For AM/FM reception the coupler K 62 27 2 (Ord. No. 510 400) is required.

Components	Type No.	(Ord. No.)
Whip	K 50 50 20 41	(510 310)
Base	K 50 50 20 31	(510 309)
Connector M11 x 1	K 62 05 1	(510 132)
Swivel-joint screw*	K 66 00 6	(510 154)
Tip protection	K 66 01 9	(510 159)

* butterfly bolt, philips screw and locking washer

K 50 51 2

Rear mount antenna
64 ... 300 MHz / Car radio AM/FM

KATHREIN
Antennen · Electronic

K 50 49 4

Type No. K 50 49 4 Ord. No. 510 307	without spring, 64 ... 300 MHz, 0 dB gain (ref. to quarter-wave whip), supply length 1225 mm
Connection	M11 x 1
Maximum load	100 W (at 50 °C ambient temperature)
Tuning	By shortening the whip (please note mounting instructions).
Mounting	In bore hole 12 mm diameter.
Built-in depth	32 mm
Max. diameter at base	38 mm
Material	Whip and spring: Stainless steel. Swivel-joint parts: Chromium-plated brass. Base: Weather resistant plastic.
Contents of delivery	Whip, base, connector.
Accessories	For AM/FM reception (VHF) the coupler K 62 27 4 (Ord. No. 510 431) is required.

Components	Type No.	(Ord. No.)
Whip	K 50 48 40 41	(510 304)
Base	K 50 48 40 31	(510 303)
Swivel-joint screw*	K 66 00 6	(510 154)
Tip protection	K 66 01 9	(510 159)
Connector	K 62 05 1	(510 132)

* butterfly bolt, philips screw and locking washer

Rear mount antenna
62 ... 300 MHz / Car radio AM/FM

KATHREIN
Antennen · Electronic

Type No. K 50 46 4 Ord. No. 510 298	with spring, 62 ... 300 MHz, 0 dB gain (ref. to quarter-wave whip), supply length 1275 mm
Connection	M11 x 1
Maximum load	100 W (at 50 °C ambient temperature)
Tuning	By shortening the whip (please note mounting instructions).
Mounting	In bore hole 12 mm diameter.
Built-in depth	32 mm
Max. diameter at base	38 mm
Material	Whip and spring: Stainless steel. Swivel-joint parts: Chromium-plated brass. Base: Weather resistant plastic.
Contents of delivery	Whip, base, connector.
Accessories	For AM/FM reception (VHF) the coupler K 62 27 4 (Ord. No. 510 431) is required.

Components	Type No.	(Ord. No.)
Whip	K 50 47 40 41	(510 300)
Base	K 50 48 40 31	(510 303)
Swivel-joint screw*	K 66 00 6	(510 154)
Tip protection	K 66 01 9	(510 159)
Connector	K 62 05 1	(510 132)

* butterfly bolt, philips screw and locking washer

K 50 46 4

Multiline antenna
Telephone GSM900/1800, GPS and 68 – 300 MHz

KATHREIN
Antennen · Electronic

- **Multi-functional antenna with active GPS function and Extension option with TETRA/2m radiator.**
- **Power supply for GPS via phantom feed.**

Type no. 506 10004 Order no. 506 10004	
GSM900/1800 antenna	
Frequency range	890 – 960 / 1710 – 1880 MHz
Gain (typical)	0 dB (ref. quarter-wave whip)
VSWR transmit/receive	≤ 2.0
Impedance	50 Ω
Max. power	GSM900: 8 W GSM1800: 2 W (at 20 °C ambient temperature)
Cable connection	Minicrimp (FME) pin
GPS antenna / amplifier	
Frequency range	1575.42 ±1.0 MHz
Antenna gain (90° elevation)	5 dBi
Axial ratio (90° elevation)	3 dB
Polarization	Circular RHCP
Amplifier gain (20 °C)	Typ. 30 dB (LNA and patch)
Noise figure (20 °C)	Typ. 1.95 dB
Impedance	50 Ω
VSWR	≤ 1.5
Supply voltage	3.0 to 5.0 V (phantom power via the center conductor)
Cable connection	SMA (pin)
Optional radiator	
Max. length	1120 mm
Max. loading	25 W
Impedance	50 Ω
Frequency range	68 – 600 MHz
Cable connection	Minicrimp (FME) socket
Dimensions	
L x W x H	108 mm x 80 mm x 60 mm
Downtilt (optional radiator)	90°
Installation depth	14 mm
Drill hole for mounting	19 mm diameter
Starting torques	
SMA – plug	0.9 Nm
FME/SMB – plug	2.0 Nm
Fastening nut	7.0 Nm

Attention — Remove optional radiator before entering car wash systems!

Individual accessories

Description	**Order no.**	
(Optional radiator)		
Multiline radiator 380 – 445 MHz	506 10005	
Multiline radiator 380 ... 480 MHz colinear	506 10006	
Multiline radiator 68 ... 300 MHz	506 10007	
Cabel 5 m, SMA (socket) / SMB (socket)	507 10003	

380-470 MHz

TETRA / Trunking System / 70 cm band / NMT 450

Roof mount antennas
Magnet mount antennas
Rear mount antennas

Roof mount antenna
380 ... 430 MHz / Car radio AM/FM

KATHREIN
Antennen · Electronic

K 70 57 21 9

Type No. K 70 57 21 9 Ord. No. 510 173	380 ... 400 MHz: 2 dB gain 406 ... 430 MHz: 4 dB gain (ref. to quarter-wave whip), length 600 mm
Connection	Fixed cable RG 058, 5 meters long, without radio set connector.
Maximum load	50 W (at 50 °C ambient temperature)
Tuning	By moving the tuning disk (note mounting instructions).
Mounting	In bore hole 24 mm diameter.
Built-in depth	14 mm
Max. diameter at base	38 mm
Material	Whip: Stainless steel. Parts of the swivel-joint and tuning disk: Chromium-plated brass. Base: Weather resistant plastic.
Contents of delivery	Whip, base, allen key.
Accessories	For AM/FM reception the coupler K 63 27 23 (Ord. No. 510 258) is required.

Components	Type No.	(Ord. No.)
Whip	K 70 57 21 04 1	(510 172)
Base for K 70 57 21 9	K 50 55 20 31	(510 142)
Swivel-joint screw*	K 66 00 6	(510 154)
Tip protection	K 66 01 4	(510 158)

* butterfly bolt + philips screw + locking washer

Roof mount antenna
440 ... 470 MHz / Car radio AM/FM

KATHREIN
Antennen · Electronic

Type No. K 70 57 23 9 Ord. No. 510 178	440 … 470 MHz, 4 dB gain (ref. to quarter-wave whip), length 540 mm
Connection	Fixed cable RG 058, 5 meters long, without radio set connector.
Maximum load	50 W (at 50 °C ambient temperature)
Tuning	By moving the tuning disk (note mounting instructions).
Mounting	In bore hole 24 mm diameter.
Built-in depth	14 mm
Max. diameter at base	38 mm
Material	Whip: Stainless steel. Parts of the swivel-joint and tuning disk: Chromium-plated brass. Base: Weather resistant plastic.
Contents of delivery	Whip, base, allen key.
Accessories	For AM/FM reception the coupler K 63 27 23 (Ord. No. 510 258) is required.

Components	Type No.	(Ord. No.)
Whip	K 70 57 23 04 1	(510 175)
Base for K 70 57 23 9	K 50 55 20 31	(510 142)
Swivel-joint screw*	K 66 00 6	(510 154)
Tip protection	K 66 01 4	(510 158)

* butterfly bolt + philips screw + locking washer

K 70 57 23 9

EuroLine antenna
380 – 406 MHz / Car radio AM/FM

KATHREIN
Antennen · Electronic

K 70 77 22 K 70 78 22

- **Antenna for the digital trunking system TETRA.**
- **4 dB gain antenna, also usable as combined whip for 380 – 406 MHz / AM/FM reception.**
- **4 dB gain antenna in low-noise version**.

Type No. K 70 77 22 Ord. No. 510 750	380 – 406 MHz, 0 dB gain (ref. to quarter-wave whip), length 193 mm
Type No. K 70 78 22 Ord. No. 510 753	380 – 406 MHz, 4 dB gain (ref. to quarter-wave whip), low wind-noise, length 630 mm
Connection	Minicrimp (male)
Maximum load	50 W (at 50 °C ambient temperature)
Mounting	Into bore hole 18^{+1} mm diameter from the external side of the car body. Into bore hole 14 … 19 mm diameter from the inner side of the car body.
Built-in depth	13 mm
Max. diameter at base	32 mm
Material	Metal parts are made of brass and stainless steel. All visible metal parts are black chromium-plated.
Contents of delivery	Whip, base, antenna wrench.
Accessories	For AM/FM reception the coupler K 63 27 23 (Ord. No. 510 258) is required.

Components		Type No.	(Ord. No.)
Whip	for K 70 77 22	K 70 70 22 01	(510 751)
	for K 70 78 22	K 70 71 22 01	(510 754)
Base		K 70 77 20 3	(510 006)
Base with 5 mtr cable		K 70 70 20 3	(510 005)
Tip protection		K 66 01 9	(510 159)
Antenna wrench		K 66 30 2	(510 161)

EuroLine antenna
406 – 440 MHz

KATHREIN
Antennen · Electronic

- **4 dB gain antenna, also usable as combined whip for 406 – 440 MHz / AM/FM reception.**
- **4 dB gain antenna in low-noise version.**

Type No. K 70 77 21 Ord. No. 510 184	406 – 440 MHz, 0 dB gain (ref. to quarter-wave whip), length 180 mm
Type No. K 70 78 21 Ord. No. 510 756	406 – 440 MHz, 4 dB gain (ref. to quarter-wave whip), low wind-noise, length 590 mm
Connection	Minicrimp (male)
Maximum load	50 W (at 50 °C ambient temperature)
Mounting	Into bore hole 18^{+1} mm diameter from the external side of the car body. Into bore hole 14 … 19 mm diameter from the inner side of the car body.
Built-in depth	13 mm
Max. diameter at base	32 mm
Material	Metal parts are made of brass and stainless steel. All visible metal parts are black chromium-plated.
Contents of delivery	Whip, base, antenna wrench.
Accessories	For AM/FM reception the coupler K 63 27 23 (Ord. No. 510 258) is required.
Special feature	Whip K 70 70 21 01 is marked with the letter „K“

Components	Type No.	(Ord. No.)
Whip for K 70 77 21	K 70 70 21 01	(510 181)
Whip for K 70 78 21	K 70 71 21 01	(510 236)
Base	K 70 77 20 3	(510 006)
Base with 5 mtr cable	K 70 70 20 3	(510 005)
Tip protection	K 66 01 9	(510 159)
Antenna wrench	K 66 30 2	(510 161)

K 70 77 21

K 70 78 21

EuroLine antenna
380 – 410 / 890 – 960 MHz

KATHREIN
Antennen · Electronic

- **Antenna for the simultaneous operation of a Trunking system (380 – 410 MHz) and a 900 MHz mobile phone.**

506 10001

Type No. 506 10001 Ord. No. 506 10001	380 – 410 / 890 – 960 MHz 0 dB gain (ref. to quarter-wave whip) in both ranges, length 180 mm
Connection	Minicrimp (male)
Maximum load	15 W (at 50 °C ambient temperature)
Mounting	Into bore hole 18^{+1} mm diameter from the external side of the car body. Into bore hole 14 … 19 mm diameter from the inner side of the car body.
Built-in depth	13 mm
Max. diameter at base	32 mm
Material	Metal parts are made of brass and stainless steel. All visible metal parts are black chromium-plated.
Contents of delivery	Whip, base, antenna wrench.
Accessories	For the simultaneous operation of a TETRA/trunking system and a 900 MHz radio set, the diplexer K 63 27 25 (Order-No. 510 029) is required.

Components	Type No.	(Ord. No.)
Whip	506 10002	(506 10002)
Base	K 70 77 20 3	(510 006)
Base with 5 mtr cable	K 70 70 20 3	(510 005)
Antenna wrench	K 66 30 2	(510 161)

EuroLine antenna
410 – 430 / 890 – 960 MHz

KATHREIN
Antennen · Electronic

- **Antenna for the simultaneous operation of a 400 MHz radio set and a 900 MHz mobile phone.**

Type No. K 70 50 64 Ord. No. 510 773	410 – 430 / 890 – 960 MHz 0 dB gain (ref. to quarter-wave whip) in both ranges, length 180 mm
Connection	Minicrimp (male)
Maximum load	15 W (at 50 °C ambient temperature)
Mounting	Into bore hole 18^{+1} mm diameter from the external side of the car body. Into bore hole 14 … 19 mm diameter from the inner side of the car body.
Built-in depth	13 mm
Max. diameter at base	32 mm
Material	Metal parts are made of brass and stainless steel. All visible metal parts are black chromium-plated.
Contents of delivery	Whip, base, antenna wrench.
Accessories	For the simultaneous operation of a 400 MHz and a 900 MHz radio set the coupler K 63 27 25 is required (Ord. No. 510 029).
Special feature	Whip 737 637 is marked with the letter „L“

Components	Type No.	(Ord. No.)
Whip	737 637	(510 265)
Base	K 70 77 20 3	(510 006)
Base with 5 mtr cable	K 70 70 20 3	(510 005)
Antenna wrench	K 66 30 2	(510 161)

K 70 50 64

EuroLine antenna
440 – 470 MHz / Car radio AM/FM

KATHREIN
Antennen · Electronic

K 70 77 23 K 70 78 23

- **Gain antenna, also usable as combined whip for 440 – 470 MHz / AM/FM reception.**
- **4 dB gain antenna in low-noise version.**

Type No. K 70 77 23 Ord. No. 510 003	440 – 470 MHz, 0 dB gain (ref. to quarter-wave whip), length 180 mm
Type No. K 70 78 23 Ord. No. 510 001	440 – 470 MHz, 4 dB gain (ref. to quarter-wave whip), low-noise, length 550 mm
Connection	Minicrimp (male)
Maximum load	50 W (at 50 °C ambient temperature)
Mounting	Into bore hole 18^{+1} mm diameter from the external side of the car body. Into bore hole 14 ... 19 mm diameter from the inner side of the car body.
Built-in depth	13 mm
Max. diameter at base	32 mm
Material	Metal parts are made of brass and stainless steel. All visible metal parts are black chromium-plated.
Contents of delivery	Whip, base, antenna wrench.
Accessories	For AM/FM reception the coupler K 63 27 23 (Ord. No. 510 258) is required.

Components		Type No.	(Ord. No.)
Whip	for K 70 77 23	K 70 70 23 01	(510 109)
	for K 70 78 23	K 70 71 23 01	(510 111)
Base		K 70 77 20 3	(510 006)
Base with 5 mtr cable		K 70 70 20 3	(510 005)
Tip protection		K 66 01 9	(510 159)
Antenna wrench		K 66 30 2	(510 161)

Multiline antenna
Telephone GSM900/1800, GPS and 380 – 480 MHz

KATHREIN
Antennen · Electronic

- **Multi-functional antenna with active GPS function and Extension option with TETRA/2m radiator.**
- **Power supply for GPS via phantom feed.**

Type no. 506 10004
Order no. 506 10004

GSM900/1800 antenna	
Frequency range	890 – 960 / 1710 – 1880 MHz
Gain (typical)	0 dB (ref. quarter-wave whip)
VSWR transmit/receive	≤ 2.0
Impedance	50 Ω
Max. power	GSM900: 8 W GSM1800: 2 W (at 20 °C ambient temperature)
Cable connection	Minicrimp (FME) pin
GPS antenna / amplifier	
Frequency range	1575.42 ±1.0 MHz
Antenna gain (90° elevation)	5 dBi
Axial ratio (90° elevation)	3 dB
Polarization	Circular RHCP
Amplifier gain (20 °C)	Typ. 30 dB (LNA and patch)
Noise figure (20 °C)	Typ. 1.95 dB
Impedance	50 Ω
VSWR	≤ 1.5
Supply voltage	3.0 to 5.0 V (phantom power via the center conductor)
Cable connection	SMA (pin)
Optional radiator	
Max. length	1120 mm
Max. loading	25 W
Impedance	50 Ω
Frequency range	68 – 600 MHz
Cable connection	Minicrimp (FME) socket
Dimensions	
L x W x H	108 mm x 80 mm x 60 mm
Downtilt (optional radiator)	90°
Installation depth	14 mm
Drill hole for mounting	19 mm diameter
Starting torques	
SMA – plug	0.9 Nm
FME/SMB – plug	2.0 Nm
Fastening nut	7.0 Nm

Attention

Remove optional radiator before entering car wash systems!

Individual accessories

Description	Order no.	
(Optional radiator)		
Multiline radiator 380 – 445 MHz	506 10005	
Multiline radiator 380 – 480 MHz colinear	506 10006	
Multiline radiator 68 – 300 MHz	506 10007	
Cabel 5 m, SMA (socket) / SMB (socket)	507 10003	

Magnet mount antenna
380 – 435 MHz

KATHREIN
Antennen · Electronic

K 71 17 23

Type No. K 71 17 21 Ord. No. 510 192	380 – 400 MHz, 2.5 dB gain (ref. to quarter-wave whip), 400 – 435 MHz, 4 dB gain (ref. to quarter-wave whip), length 670 mm
Connection	Cable RG 058-PE, 4 meters long, without radio set connector.
Maximum load	50 W (at 50 °C ambient temperature)
Mounting	By attaching the antenna to a steel surface of at least 1 m^2 extension that should be as even as possible. Magnetic adhesive force: Approx. 200 N.
Max. diameter at base	95 mm
Material	Whip: Stainless steel. Swivel-joint parts: Chromium-plated brass. Magnetic base in shock-resistant plastic housing. Neoprene protection cover for the adhesive surface of the magnetic base.
Contents of delivery	Whip, base, cable.

Components	Type No.	(Ord. No.)
Whip	K 71 14 21 01	(510 190)
Swivel-joint screw*	K 66 00 3	(510 153)
Protection cover	K 66 01 2	(510 156)
Cable	K 62 24 7	(510 148)
Tip protection	K 66 01 4	(510 158)

* butterfly nut + bolt + locking washer

Danger

Use of antenna on stationary vehicle:
The magnet may lift off from vehicle even at slow speed collision.

Magnet mount antenna
435 – 470 MHz

KATHREIN
Antennen · Electronic

Type No. K 71 17 23 Ord. No. 510 010	435 – 470 MHz, 4 dB gain (ref. to quarter-wave whip), length 610 mm
Connection	Cable RG 058-PE, 4 meters long without radio set connector.
Maximum load	50 W (at 50 °C ambient temperature)
Mounting	By attaching the antenna to a steel surface of at least 1 m^2 extension that should be as even as possible. Magnetic adhesive force: Approx. 200 N.
Max. diameter at base	95 mm
Material	Whip: Stainless steel. Swivel-joint parts: Chromium-plated brass. Magnetic base in shock-resistant plastic housing. Neoprene protection cover for the adhesive surface of the magnetic base.
Contents of delivery	Whip, base, cable.

Components	Type No.	(Ord. No.)
Whip	K 71 14 23 01	(510 115)
Swivel-joint screw*	K 66 00 3	(510 153)
Protection cover	K 66 01 2	(510 156)
Cable	K 62 24 7	(510 148)
Tip protection	K 66 01 4	(510 158)

* butterfly nut + bolt + locking washer

Danger

Use of antenna on stationary vehicle:
The magnet may lift off from vehicle even at slow speed collision.

K 71 17 21

Magnet mount antenna
410 – 470 MHz

KATHREIN
Antennen · Electronic

- **Broadband antenna.**

K 71 16 21

Type No. K 71 16 21 Ord. No. 510 009	410 – 470 MHz, 0 dB gain (ref. to quarter-wave whip), length 180 mm
Connection	Fixed cable RG 058-PE, 4 meters long with Minicrimp connector.
Maximum load	50 W (at 50 °C ambient temperature)
Mounting	By attaching it to steel surfaces of at least 0.5 m^2 extension that are as even as possible. Magnetic adhesion force: Approx. 100 N.
Max. diameter at base	73 mm
Material	Elastic, corrosion-resistant metal shaft in especially resistant plastic protective cover. Magnetic base in shock-resistant plastic housing with neoprene cover.
Contents of delivery	Whip, base, cable.

Components	Type No.	(Ord. No.)
Whip	K 71 16 20 11	(510 114)
Base	K 71 16 20 3	(510 191)
Cable, 4.0 mtr length	K 62 24 10	(510 041)
Protection cover	K 66 01 3	(510 157)

Danger

Use of antenna on stationary vehicle:
The magnet may lift off from vehicle even at slow speed collision.

Rear mount antenna
450 – 470 MHz / Car radio AM/FM

KATHREIN
Antennen · Electronic

- **Whip also fits on all special antenna bases.**
- **400 – 470 MHz.**
- **High gain.**

Type No. K 70 83 23 20 1 Ord. No. 510 118	450 – 470 MHz, 6 dB gain (ref. to quarter-wave whip), low-noise, length 880 mm
Connection	M11 x 1
Maximum load	25 W (at 50 °C ambient temperature)
Mounting	Into bore hole 12 mm diameter. A bendable section allows the levelling out of inclinations up to 20°.
Built-in depth	32 mm (connector included)
Max. diameter at base	35 mm
Material	Whip: Stainless steel and brass, black chromium-plated. Base: Weather resistant plastic.
Contents of delivery	Whip, antenna wrench.
Accessories	For AM/FM reception also the coupler K 63 27 23 (Ord. No. 510 258) is required.
Exceptional features	The whip K 70 83 23 20 1 fits on any special base of the frequency range 400 – 470 MHz

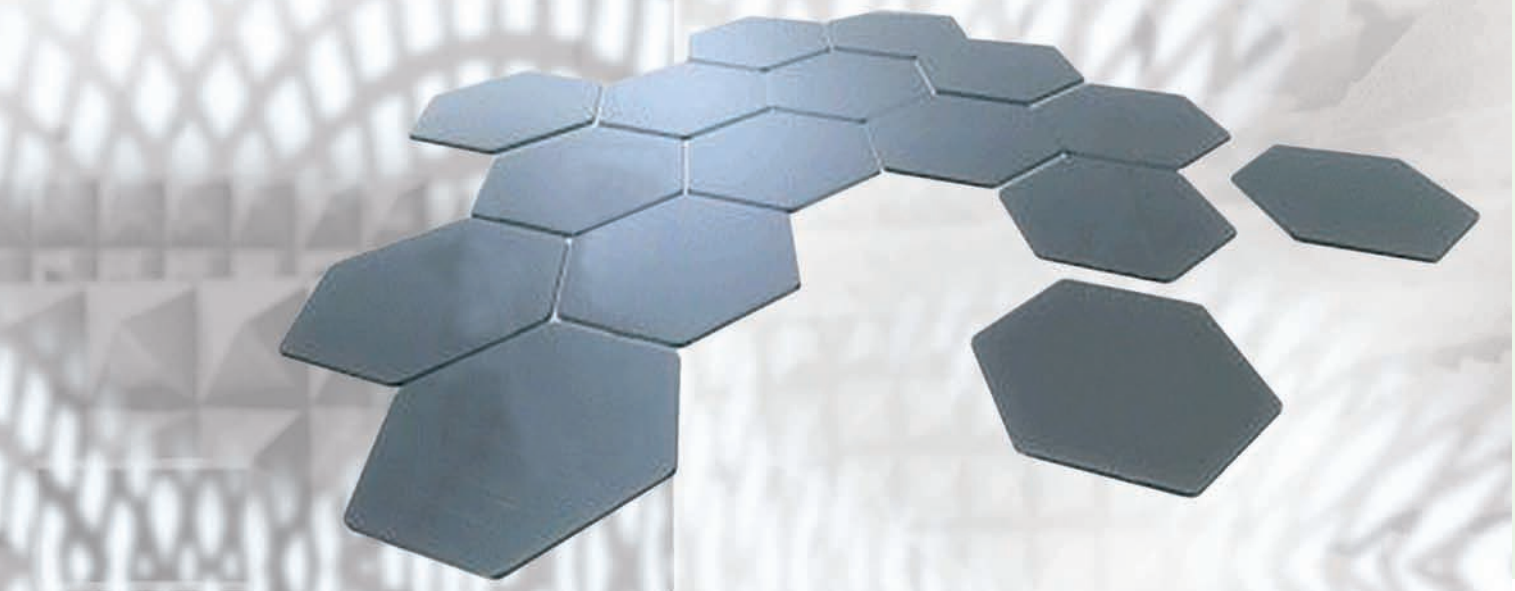
Accessories	Type No.	(Ord. No.)
Whip	K 70 83 23 20 1	(510 118)
Connector M11 x 1	K 62 05 1	(510 132)
Tip protection	K 66 01 9	(510 159)
Antenna wrench	K 66 30 1	(510 160)

K 70 83 23 20 1

Example for fitting aerial interface

810-2170 MHz

35 cm band / GSM 900 / Natel C / NMT 900 / DoCoMo
AMPS / PCN/GSM 1800 / PCS / DCS 1800/1900 / UMTS



Roof mount antennas
Stick-on antennas
Rear mount antennas

Multi roof mount antenna
810 – 2170 MHz

KATHREIN
Antennen · Electronic

- **One antenna only for world-wide application AMPS, DoCoMo, GSM 900/1800, PCS, DCS 1800/1900, UMTS).**
- **Made for future technologies, UMTS operation included.**
- **Excellent omni-directional pattern.**
- **Ultra broadband design with no tuning necessary.**

K 70 55 64

Type No. K 70 55 64 Ord. No. 510 934	
Frequency range	
AMPS	824 – 896 MHz
DoCoMo	810 – 958MHz
GSM 900	890 – 960 MHz
GSM 1800	1710 – 1880 MHz
GSM 1900	1850 – 1990 MHz
UMTS	1900 – 2170 MHz
	typ. 0 dB gain (ref. to quarter-wave whip), length 89 mm
Connection	Minicrimp (male)
Maximum load	
AMPS	3 W
DoCoMo	0.8 W
GSM 900	8 W
GSM 1800	2 W
GSM 1900	2 W
UMTS	2 W (at 50 °C ambient temperature)
Mounting location	Car roof recommended
Mounting	Into bore hole 18^{+1} mm diameter from the external side of the car body. Into bore hole 14 … 19 mm diameter from the inner side of the car body.
Built-in depth	12 mm
Max. diameter at base	32 mm
Antenna lenght	89 mm
Material	Weather resistant plastic parts; all visible metal parts are black chromium-plated.
Contents of delivery	Whip, base, antenna wrench.
Accessories	
Spare whip	Ord. No. 510 964

Multiline antenna
Telephone GSM900/1800, GPS and 380 – 480 MHz

KATHREIN
Antennen · Electronic

- **Multi-functional antenna with active GPS function and Extension option with TETRA/2m radiator.**
- **Power supply for GPS via phantom feed.**

Type no. 506 10004
Order no. 506 10004

GSM900/1800 antenna	
Frequency range	890 – 960 / 1710 – 1880 MHz
Gain (typical)	0 dB (ref. quarter-wave whip)
VSWR transmit/receive	≤ 2.0
Impedance	50 Ω
Max. power	GSM900: 8 W GSM1800: 2 W (at 20 °C ambient temperature)
Cable connection	Minicrimp (FME) pin
GPS antenna / amplifier	
Frequency range	1575.42 ±1.0 MHz
Antenna gain (90° elevation)	5 dBi
Axial ratio (90° elevation)	3 dB
Polarization	Circular RHCP
Amplifier gain (20 °C)	Typ. 30 dB (LNA and patch)
Noise figure (20 °C)	Typ. 1.95 dB
Impedance	50 Ω
VSWR	≤ 1.5
Supply voltage	3.0 to 5.0 V (phantom power via the center conductor)
Cable connection	SMA (pin)
Optional radiator	
Max. length	1120 mm
Max. loading	25 W
Impedance	50 Ω
Frequency range	68 – 600 MHz
Cable connection	Minicrimp (FME) socket
Dimensions	
L x W x H	108 mm x 80 mm x 60 mm
Downtilt (optional radiator)	90°
Installation depth	14 mm
Drill hole for mounting	19 mm diameter
Starting torques	
SMA – plug	0.9 Nm
FME/SMB – plug	2.0 Nm
Fastening nut	7.0 Nm

Attention

Remove optional radiator before entering car wash systems!

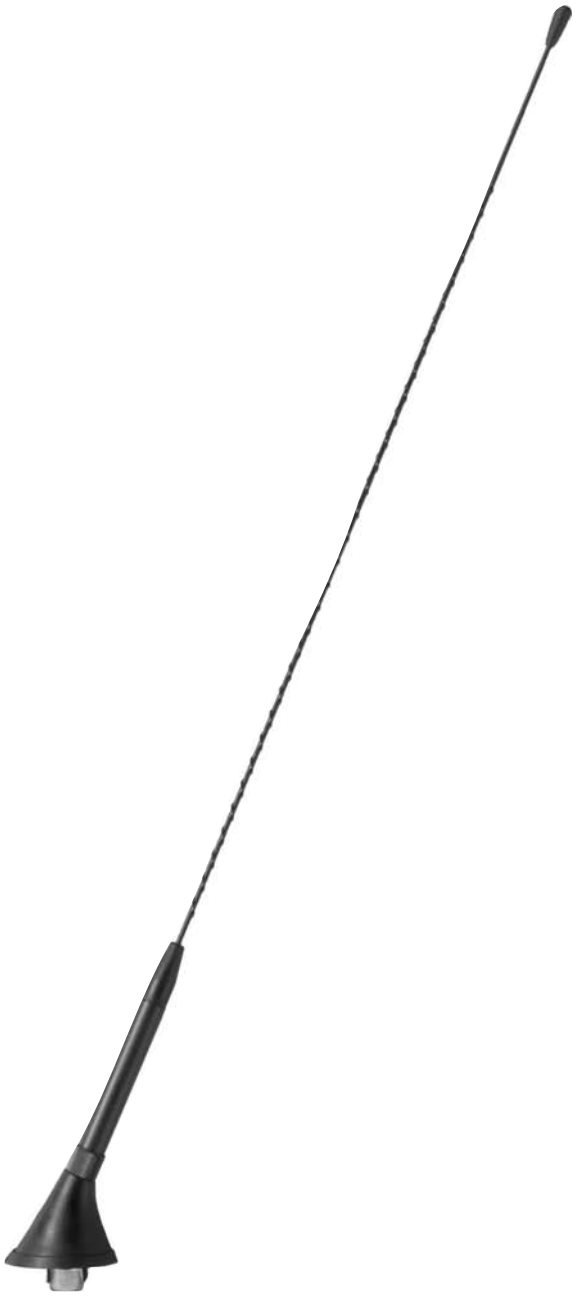
Individual accessories

Description	Order no.	
(Optional radiator)		
Multiline radiator 380 – 445 MHz	506 10005	
Multiline radiator 380 – 480 MHz colinear	506 10006	
Multiline radiator 68 – 300 MHz	506 10007	
Cabel 5 m, SMA (socket) / SMB (socket)	507 10003	

Slanted roof mount antenna
144 ... 174 / 890 – 960 MHz

KATHREIN
Antennen · Electronic

- **Antenna for simultaneous operation of a 150 MHz radio set and a 900 MHz mobile phone.**
- **Can also be used as a combined whip for 890 – 960 MHz mobile phone and AM/FM reception.**



K 70 60 20

Type No. K 70 60 20 Ord. No. 510 769	144 … 174 / 890 – 960 MHz, 0 dB gain (ref. to quarter-wave whip) in both ranges, supply length 535 mm
Connection	Minicrimp (lateral/male)
Tuning	By shortening the whip (please note mounting instructions).
Maximum load	144 … 174 MHz: 30 W 890 – 960 MHz: 10 W (at 50 °C ambient temperature)
Mounting	Into square hole 15 mm x 15 mm
Inclination	68°
Built-in depth	13 mm
Max. diameter at base	40 mm x 44 mm (oval)
Material	Metal parts are made of aluminum and stainless steel. Weather resistant plastic parts.
Contents of delivery	Whip, base.
Accessories	For the simultaneous operation of a 150 MHz and a 900 MHz radio set the coupler 737 477 (Ord. No. 510 272) is required. For the operation of a 900 MHz radio and simultaneously an AM/FM car radio the coupler. K 63 27 23 (Ord. No. 510 258) is required.

Components	Type No.	(Ord. No.)
Whip	738 356	(510 402)
Base	737 692	(510 261)
Tip protection	K 66 01 9	(510 159)

EuroLine antenna
146 ... 174 / 890 – 960 MHz

KATHREIN
Antennen · Electronic

- **Antenna for simultaneous operation of a 2 m band radio set and a 900 MHz mobile phone.**
- **Can also be used as a combined whip for 890 – 960 MHz mobile phone and AM/FM reception.**

Type No. K 70 52 64 Ord. No. 510 775	146 … 174 / 890 – 960 MHz 0 dB gain (ref. to quarter-wave whip) in both ranges, low-noise, supply length 520 mm
Connection	Minicrimp (male)
Maximum load	146 ... 174 MHz: 30 W 890 – 960 MHz: 10 W (at 50 °C ambient temperature)
Mounting	Into bore hole 18^{+1} mm diameter from the external side of the car body. Into bore hole 14 … 19 mm diameter from the inner side of the car body.
Built-in depth	13 mm
Max. diameter at base	32 mm
Material	Metal parts are made of brass and stainless steel. All visible metal parts are black chromium-plated.
Contents of delivery	Whip, base, antenna wrench.
Accessories	For the simultaneous operation of a 150 MHz and a 900 MHz radio set the coupler 737 477 (Ord. No. 510 272) is required. For the operation of a 900 MHz radio and simultaneously an AM/FM car radio the coupler K 63 27 23 (Ord. No. 510 258) is required.

Components	Type No.	(Ord. No.)
Whip	737 539	(510 271)
Base	K 70 77 20 3	(510 006)
Base with 5 m cable	K 70 70 20 3	(510 005)
Tip protection	K 66 01 9	(510 159)
Antenna wrench	K 66 30 2	(510 161)

K 70 52 64

EuroLine antenna
410 – 430 / 890 – 960 MHz

KATHREIN
Antennen · Electronic

- **Antenna for the simultaneous operation of a PMR-radio set and a 900 MHz mobile phone.**

K 70 50 64

Type No. K 70 50 64 Ord. No. 510 773	410 – 430 / 890 – 960 MHz 0 dB gain (ref. to quarter-wave whip) in both ranges, length 180 mm
Connection	Minicrimp (male)
Maximum load	15 W (at 50 °C ambient temperature)
Mounting	Into bore hole 18^{+1} mm diameter from the external side of the car body. Into bore hole 14 ... 19 mm diameter from the inner side of the car body.
Built-in depth	13 mm
Max. diameter at base	32 mm
Material	Metal parts are made of brass and stainless steel. All visible metal parts are black chromium-plated.
Contents of delivery	Whip, base, antenna wrench.
Accessories	For the simultaneous operation of a 400 MHz and a 900 MHz radio set the coupler K 63 27 25 is required (Ord. No. 510 029).
Special feature	Whip 737 637 is marked with the letter „L“

Components	Type No.	(Ord. No.)
Whip	737 637	(510 265)
Base	K 70 77 20 3	(510 006)
Base with 5 m cable	K 70 70 20 3	(510 005)
Antenna wrench	K 66 30 2	(510 161)

Screenfix® antenna
890 – 960 / 1710 – 1880 MHz

KATHREIN
Antennen · Electronic

- **Onglass mounting avoids holes in the bodywork.**
- **Excellent electrical performance.**
- **Optimized EMI quality.**

Type No. K 70 49 64 Ord. No. 510 936	890 – 960 / 1710 – 1880 MHz typ. 0 dB gain (ref. to quarter-wave whip), length 100 mm
Connection	Cable RG 174, 1 m long (supplied) with Minicrimp connector.
Maximum load GSM 900 GSM 1800	 8 W 2 W (at 50 °C ambient temperature)
Mounting	Fixing to wind screens of shatter-proof or laminated glass, also tinted.
Thickness of glass	3 – 5 mm. Not for screens coated by vapour deposition technique or insulated glass.
Material	Metal parts: Stainless steel, diecasting alloy and brass in black plastic.
Performance	Highest gain will be achieved by mounting the antenna as close as possible to roof edge and not at more than 10° inclination from the vertical. Inclination compensation of whip by hinged section in the outer unit.

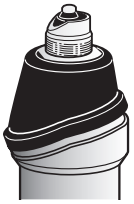
Components	Type No.	(Ord. No.)
Whip		(510 969)
External unit		(510 971)
Adhesive pads	K 66 02 0	(510 270)

K 70 49 64

Rear mount antenna
890 – 960 MHz / Car radio AM/FM

KATHREIN
Antennen · Electronic

K 70 83 64 01



Example for fitting aerial interface

- **Whip also fits on any special base 900 MHz.**
- **Good omnidirectional radiation pattern.**

Type No. K 70 83 64 01 Ord. No. 510 103	890 – 960 MHz, 4.5 dB gain (ref. to quarter-wave whip), low-noise, length 837 mm
Connection	The whip of the antenna K 70 83 64 01 (Ord. No. 510 103) fits on any special base 900 MHz
Maximum load	20 W (at 50 °C ambient temperature)
Material	Whip of coated stainless steel. Weather resistant plastic.
Contents of delivery	Whip with top protector, antenna wrench.
Components Antenna wrench Tip protection	Type No. (Ord. No.) K 66 30 1 (510 160) K 66 01 9 (510 159)

Antennas for portable radio sets

68 - 470 MHz

Miniflex antenna
68 ... 87.5 MHz

KATHREIN
Antennen · Electronic

- **Particularly short and elastic antenna.**
- **No sharp tips or edges.**

K 51 39 41 6

Type No. K 51 39 41 6 Ord. No. 510 373	68 – 75 MHz, TNC connector, length approx. 260 mm, ca. 80 g
Type No. K 51 39 41 9 Ord. No. 510 375	68 – 75 MHz, BNC connector, length approx. 260 mm, ca. 70 g
Type No. K 51 39 42 5 Ord. No. 510 377	74 – 81 MHz, M connector length approx. 235 mm, ca. 90 g
Type No. K 51 39 42 6 Ord. No. 510 378	74 – 81 MHz, TNC connector, length approx. 235 mm, ca. 80 g
Type No. K 51 39 43 5 Ord. No. 510 382	80 – 87.5 MHz, M connector length approx. 220 mm, ca. 90 g
Type No. K 51 39 43 6 Ord. No. 510 383	80 – 87.5 MHz, TNC connector, length approx. 220 mm, ca. 80 g
Type No. K 51 39 43 9 Ord. No. 510 451	80 – 87.5 MHz, BNC connector, length approx. 220 mm, ca. 70 g

Impedance	50 Ω
Maximum load	20 W (at 50 °C ambient temperature)
Polarization	Vertical
Electr. length	$\lambda/4$
Material	Whip: Elastic metal helix in particularly resistive plastic cover.
Colour	Black

Quarter-wave antenna
68 ... 87.5 MHz

KATHREIN
Antennen · Electronic

- **Very flexible, slim antenna.**

Type No. K 51 56 22 Ord. No. 510 386	UHF connector
Type No. K 51 56 26 Ord. No. 510 388	TNC connector
Frequency range	68 … 87.5 MHz
Tuning	By shortening the whip (please note mounting instructions)
Impedance	50 Ω
Gain	0 dB (ref. to quarter-wave whip)
Maximum load	20 W (at 50 °C ambient temperature)
Polarization	Vertical
Electr. length	$\lambda/4$
Weight	Approx. 50 g
Supply length	1050 mm
Material	Copper strand embedded in shock-resistant fiber glass. Connector: Black chromium-plated brass.
Exceptional features	Within the frequency range of 146 ... 174 MHz this antenna is a tuneable half-wave antenna with 5 dB gain (referring to the quarter-wave whip, decoupled from the radio set).

K 51 56 22

Miniflex antenna
146 ... 174 MHz

KATHREIN
Antennen · Electronic

- **Particularly short and elastic antenna.**
- **No sharp tips or edges.**

K 51 39 21 6

Type No. K 51 39 21 5 Ord. No. 510 357	146 – 156 MHz, M connector
Type No. K 51 39 21 6 Ord. No. 510 358	146 – 156 MHz, TNC connector
Type No. K 51 39 22 5 Ord. No. 510 362	154 – 165 MHz, M connector
Type No. K 51 39 22 6 Ord. No. 510 363	154 – 165 MHz, TNC connector
Type No. K 51 39 22 9 Ord. No. 510 365	154 – 165 MHz, BNC connector
Type No. K 51 39 23 5 Ord. No. 510 367	163 – 174 MHz, M connector
Type No. K 51 39 23 6 Ord. No. 510 368	163 – 174 MHz, TNC connector
Type No. K 51 39 23 9 Ord. No. 510 370	163 – 174 MHz, BNC connector

Impedance	50 Ω
Maximum load	20 W (at 50 °C ambient temperature)
Polarization	Vertical
Electr. length	$\lambda/4$
Length	Approx. 160 mm
Material	Whip: Elastic metal helix in particularly resistive plastic cover.
Colour	Black

Multiflex antenna
146 – 174 MHz

KATHREIN
Antennen · Electronic

- **Particularly short and elastic antenna.**
- **No sharp tips or edges.**

Type No. K 51 32 26 Ord. No. 510 354	TNC connector
Type No. K 51 32 29 Ord. No. 510 355	BNC connector
Frequency range	146 – 174 MHz
Impedance	50 Ω
Maximum load	20 W (at 50 °C ambient temperature)
Polarization	Vertical
Electr. length	$\lambda/4$
Weight	30 g
Length	420 mm
Material	Elastic whip in particularly resistive plastic cover. Connector: Black chromium-plated brass (for Ord. No. 510 354)
Colour	Black

K 51 32 25

Half-wave antenna
146 ... 174 MHz

KATHREIN
Antennen · Electronic

- **Decoupled antenna.**

K 51 56 22

Type No. K 51 56 22 Ord. No. 510 386	UHF connector
Type No. K 51 56 26 Ord. No. 510 388	TNC connector
Frequency range	146 ... 174 MHz
Tuning	By shortening the whip (please note mounting instructions).
Impedance	50 Ω
Gain	5 dB (ref. to quarterwave whip)
Maximum load	20 W (at 50 °C ambient temperature)
Polarization	Vertical
Electr. length	$\lambda/2$
Weight	Approx. 50 g
Supply length	1050 mm
Material	Copper strand embedded in shockresistant fiber glass. Connector: Black chromium-plated brass.

Miniflex antenna
406 – 428 MHz
440 – 470 MHz

KATHREIN
Antennen · Electronic

- **Very robust antenna.**

Type No. 731 247 Ord. No. 510 218	406 – 428 MHz, length 64 mm, approx. 22 g
Type No. 726 556 Ord. No. 510 217	440 – 470 MHz, length 61 mm, approx. 22 g
Connector	TNC
Impedance	50 Ω
Electr. length	$\lambda/4$
Maximum load	20 W (at 50 °C ambient temperature)
Material	Metal helix extrusion-coated. Connector: Black chromium-plated.

731 247
726 556

Multiflex antenna
400 – 470 MHz

KATHREIN
Antennen · Electronic

- **Slim and highly elastic antenna.**
- **No sharp tips or edges.**

K 71 32 25

Type No. K 71 32 26 Ord. No. 510 194	TNC connector
Type No. K 71 32 29 Ord. No. 510 195	BNC connector
Frequency range	400 – 470 MHz
Impedance	50 Ω
Maximum load	20 W (at 50 °C ambient temperature)
Polarization	Vertical
Electr. length	$\lambda/4$
Weight	35 g
Maximum length	165 mm
Material	Elastic whip in particularly resistive plastic cover. Connector: Black chromiumplated brass (for Ord. No. 510 194)
Colour	Black

Gainflex antenna
406 – 430 MHz
440 – 470 MHz

KATHREIN
Antennen · Electronic

- **Shortened half-wave antenna.**
- **Decoupled from the radio set.**
- **4 dB Gain.**

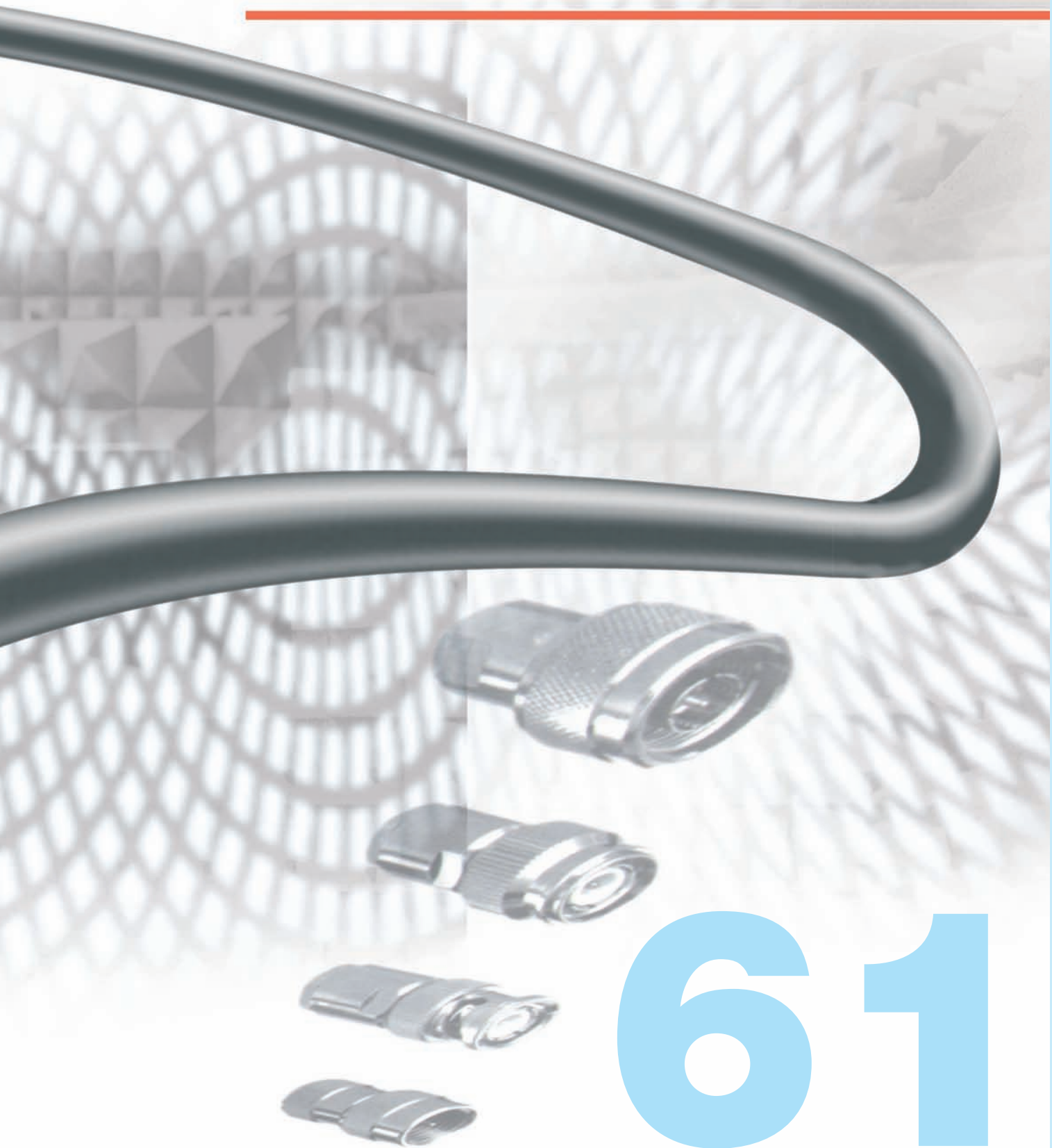
Type No. K 71 53 21 6 Ord. No. 510 076	406 – 430 MHz, TNC connector, length 330 mm, approx. 55 g, without joint
Type No. K 71 53 21 9 Ord. No. 510 078	406 – 430 MHz, BNC connector, length 330 mm, approx. 55 g, without joint
Type No. K 71 53 23 6 Ord. No. 510 079	440 – 470 MHz, TNC connector, length 300 mm, approx. 50 g, without joint
Type No. K 71 53 23 9 Ord. No. 510 081	440 – 470 MHz, BNC connector, length 300 mm, approx. 50 g, without joint
Type No. K 71 54 23 6 Ord. No. 510 085	440 – 470 MHz, TNC connector, length 295 mm, approx. 50 g, with joint
Impedance	50 Ω
Gain	4 dB (ref. to quarter-wave whip)
Maximum load	20 W (at 50 °C ambient temperature)
Swivelling range of the joint	Continuous ±125°
Material	Highly elastic, corrosion-proof metal shaft in particularly resistive black plastic cover. Connector: Black chromium-plated brass. Insulant: Polycarbonate.

K 71 53 23 6

K 71 54 23 6

Accessories

Coupler, cable, adapter



61

Antenna coupler
68 – 174 / 890 – 960 MHz

KATHREIN
Antennen · Electronic

- **Coupler for the simultaneous operation of a 2 m band radio set and a 900 MHz radio set.**

737 477

Type No. 737 477 Ord. No. 510 272	68 – 174 / 890 – 960 MHz
Connection	Minicrimp (male)
VSWR	< 1.25 in both ranges
Transmission loss	< 0.3 dB in both ranges
Maximum load	68 – 174 MHz: 50 W 900 MHz: 10 W (at 50 °C ambient temperature)
Dimensions	29 mm / 87 mm / 58 mm

Antenna coupler
0.15 – 240 MHz / 380 – 2000 MHz

KATHREIN
Antennen · Electronic

- **Versatile coupler for the simultaneous operation of a radio set and a broadcasting receiver with a single antenna.**
- **Particularly flat housing.**

Type No. K 63 27 23
Ord. No. 510 258

Frequency range:	
radio	380 – 2000 MHz
broadcasting	0.15 – 240 MHz (incl. DAB K5 – K12)
Connections:	
car radio	M10 x 0.75 (male)
radio	Minicrimp (male)
antenna	Minicrimp (male)
Impedance:	
car radio (VHF)	150 Ω
radio	50 Ω
VSWR radio	1.5 (typ.)
Transmission loss	
radio	< 1 dB
Stop band attenuation	> 45 dB
Maximum load:	
380 – 400 MHz	15 W
400 – 470 MHz	20 W
470 – 2000 MHz	15 W
	(at 50 °C ambient temperature)
Weight	70 g
Dimensions	13.4 mm / 60 mm / 41 mm

K 63 27 23

Antenna coupler
380 – 470 / 890 – 960 MHz

KATHREIN
Antennen · Electronic

- **Coupler for the operation of a 450 MHz and a 900 MHz radio set.**

K 63 27 25

Type No. K 63 27 25
Ord. No. 510 029

Frequency range:	380 – 470 / 890 – 960 MHz
Connection	Minicrimp (male)
VSWR	< 1.25 in both ranges
Transmission loss	< 0.3 dB in both ranges
Stop band attenuation	> 30 dB
Maximum load: 410 – 470 MHz 890 – 960 MHz	 15 W 10 W (at 50 °C ambient temperature)
Dimensions	29 mm / 87 mm / 58 mm

Antenna coupler
146 – 174 MHz / Broadcasting reception

KATHREIN
Antennen · Electronic

- **Coupler for the operation of a radio set and a broadcasting receiver with a single antenna.**

Type No. K 62 27 2 Ord. No. 510 400	
Frequency range:	
radio	146 – 174 MHz
car radio	Long, medium, short waves and VHF
Connection:	
car radio	Clamping device for broadcasting connecting cable (see accessories)
radio	Clamping device for cable RG 058 or RG 213
antenna	Clamping device for cable RG 058 or RG 213
VSWR radio	< 1.25
Transmission loss	< 0.3 dB
Stop band attenuation	> 40 dB (between radio branch and broadcasting reception branch)
Maximum load	85 W (at 50 °C ambient temperature)
Dimensions	41 mm / 97 mm / 86 mm

K 62 27 2

Minicrimp adapter
HF connectors M11 x 1
Minicrimp connecting cable

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Minicrimp adapter

Type No. K 62 18 0
Ord. No. 510 042
N (m) / Minicrimp (m)

Type No. K 62 18 1
Ord. No. 510 043
TNC (m) / Minicrimp (m)

Type No. K 62 18 2
Ord. No. 510 044
BNC (m) / Minicrimp (m)

Type No. K 62 18 6
Ord. No. 510 045
Mini-UHF (m) / Minicrimp (m)

Type No. K 62 18 8
Ord. No. 510 047
BNC (m) / Minicrimp (m)

Type No. K 62 05 5
Ord. No. 510 241
M11 x 1 / Minicrimp (m)

Type No. K 62 18 9
Ord. No. 510 141
Mini-UHF (m) / Minicrimp (m)

Type No. K 62 18 4
Ord. No. 510 048
Minicrimp (m) / Minicrimp (m)

Type No. K 62 18 5
Ord. No. 510 049
Minicrimp connector (f) for cable RG 058-PE

Type No. K 62 19 5
Ord. No. 510 244
Minicrimp connector (f) for cable RG 174

Connector with thread M11 x 1 for coaxial cable

Type No. K 62 05 1
Ord. No. 510 132
for cable RG 058
Angle connector M11 x 1 with clamp

Type No. K 62 10 0
Ord. No. 510 133
Angle connector M11 x 1 for cable RG 213

Minicrimp connecting cable

RG 058-PE

Attenuation per meter 900 MHz: 0.55 dB, 1800 MHz: 0.85 dB, 2050 MHz: 1.20 dB
(both cable ends with Minicrimp (female))

Length / mm	510 mm	1470 mm	2420 mm	3380 mm	4280 mm	5000 mm
Type No.	**K 62 24 11**	**K 62 24 12**	**K 62 24 13**	**K 62 24 14**	**K 62 24 15**	**K 62 24 17**
Ord. No.	510 030	510 031	510 032	510 033	510 034	510 035

„Low-loss“ Cable

Attenuation per meter 900 MHz: 0.3 dB, 1800 MHz: 0.45 dB, 2050 MHz: 0.65 dB
(both cable ends with Minicrimp (female))

Length/ mm	2500 mm	3500 mm	5000 mm
Type No.	**K 62 24 22**	**K 62 24 18**	**K 62 24 19**
Ord. No.	510 747	510 259	510 260

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