

# First-class convenience



*ten* **Haaft**®

Innovative Mobile Technology





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## Convenience at the touch of a button!

*Satellite reception or solar energy generation - our products offer great convenience of operation at the touch of a single button.*

## Travelling the world - feeling at home wherever you are.

Admittedly, a holiday trip should offer more interesting thrills than watching TV. However, at times, you may feel like relaxing in front of the TV, and then you deserve total ease of control. The best TV show is only half the fun if you have to balance of a roof top or struggle through the pages of a user manual. Most of all, poor reception quality may quickly spoil your good holiday mood. Watching TV while travelling can be as convenient as at home.

In order to meet this requirement, our systems are easy to operate, efficient and fully automatic. This type of intelligent satellite reception is what we call "innovative technology for your convenience". Enjoy TV and radio without any constraints. After all, you're on vacation!

ten Haaft innovations result in a design and styling concept of comprehensive quality, fully in line with the environment and enhancing travelling convenience. Accordingly, the product design plays a key role and has been in the focus of our team of engineers and designers: Attention to detail, high-quality materials and tried-and-proven quality components. All external parts are made of stainless steel, aircraft aluminium or Luran S, an extremely weather-resistant plastic specifically developed for outdoor use.





*Your decision for a ten Haaft® satellite or solar system is not only a decision for a reliable product of a reputable manufacturer, but also a decision for experience and service, intelligent technology and high quality!*

## Convenience day and night

ten Haaft® products are known for their safety, high performance and simple operation. All systems operate at the touch of a single button and are readily at your disposal day and night.

In addition to the proven and convenient satellite-reception system, ten Haaft offers intelligent solar systems that automatically track the sun during the day. Replicating nature, and assisted by GPS technology, our solar modules ensure an optimal position relative to the sun and thus a maximum solar yield.

The resulting independence from a mains power supply gives you even more freedom in your choice of location. This is a benefit much appreciated by our customers.

The logic result of our research and development efforts is the SamYSolar<sup>+</sup>, a space-saving and integrated system combining satellite and solar technology. This GPS-controlled system either follows the course of the sun or provides reliable satellite reception even in remote areas - all at the touch of a button.

# Oyster®

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# CARO®

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# Cosmo®

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Weight: approx. 14 kg

Available in two antenna sizes:  
 Ø 65 cm = Reception range 2  
 Ø 85 cm = Reception range 3



Weight: approx. 14 kg

Available in antenna size:  
 50x50 cm = Reception range 1



Weight: approx. 12 kg

Available in antenna size:  
 Ø 65 cm = Reception range 2

## Reception ranges

- ASTRA 2 A
- ASTRA 2 D

The reception ranges indicated represent the approximate core ranges. Outside these ranges, reception may be possible, but programme variety may be limited.

### Reception range 1



### Reception range 2



## SamY® Vision

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## SamYSolar+®

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## SunMover®

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Weight: approx. 15 kg

Available in two antenna sizes:  
Ø 54 cm = Reception range 1  
Ø 64 cm = Reception range 2



Weight: approx. 24 kg

Available in antenna size:  
Ø 64 cm = Reception range 2



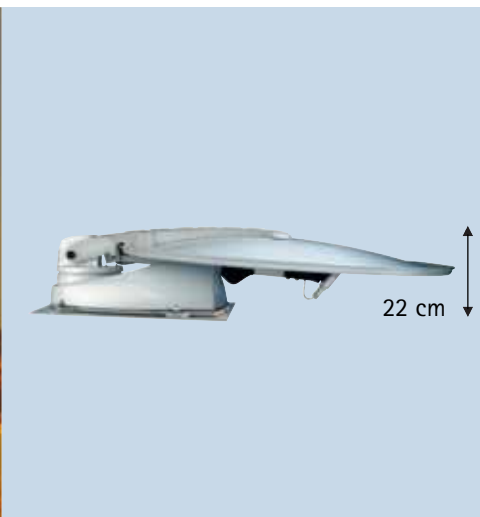
Weight: approx. 24 kg

### Reception range 3



**ASTRA 2 A** transmits all important Sky programmes in the United Kingdom, Ireland, Spain, France, Germany, Denmark, Italy and parts of Eastern Europe (Oyster 85 will be recommended for journeys beyond the British Island).

**ASTRA 2 D** transmits all important Freesat programmes in the United Kingdom, Ireland and Iceland (Oyster 85 will be recommended for journeys beyond the British Island).



Reception range 2  
(65-cm antenna dish)

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## Oyster® Digital

*The Oyster® Digital satellite system is easy to operate and provides a full range of programmes at utmost convenience.*

*Wide reception range and brilliant image definition combined with fully digital satellite aiming ensure the reception of your favourite programmes in remote locations such as the Canary Islands or Greece.*



### First-class convenience

If you travel to the remote reaches of the world and appreciate satellite reception at the highest level of convenience, the Oyster® Digital is your system of choice.

The 65-cm or 85-cm antenna dish of the Oyster® system provides TV and radio programmes throughout Europe, in Northern Africa and the Middle East. Also, the system is very tolerant against adverse reception conditions in poor weather. This is due to the large size of the antenna dishes, which significantly influences number and reception quality of programmes.

The name Oyster describes the main feature: When closed, the precious internal parts are protected like a pearl in its shell. When open, you can enjoy the benefits - on your TV screen. The intelligent software accelerates the readiness for reception of radio and TV programmes.

The Oyster® system is available in two versions / models:

#### Oyster® Digital CI

The convenient variant with digital CI receiver for all those who desire maximum operating convenience by remote control.

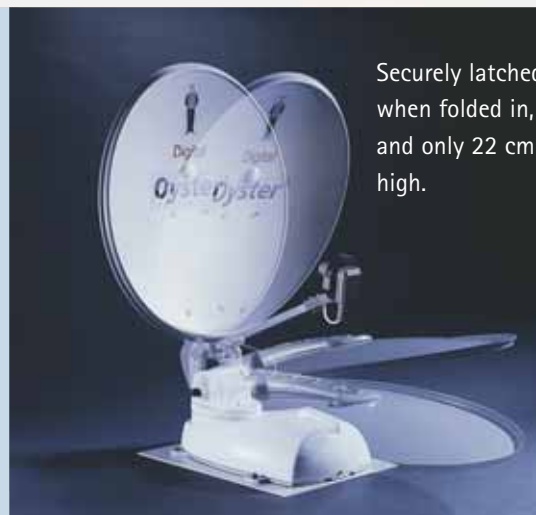
#### Oyster® Vision

The receiver-independent variant with a separate operator unit which allows you to connect any receiver of your choice. (see pages 14 - 15).



Reception range 3  
(85-cm antenna dish)

### Swivel-head technology\*



Securely latched when folded in, and only 22 cm high.

## Features

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- 65-cm or 85-cm antenna dish for optimal reception range
- Digital satellite search
- Fully automatic search within 30 - 60 seconds (typically)
- High-performance digital receiver with integrated electronic control
- CI card-slot system: 2 CI slots for encrypted programmes (module and card not included)
- On-Screen-Display: simple and convenient control of all functions via on-screen menus: preset TV and radio programmes (selectable languages: DE, GB, NL, FR, IT, ES, PT, SE, NO, FI, DK, CZ, GR, PL).
- 5000 station presets / channels (3500 TV / 1500 radio)
- Teletext integrated in digital receiver
- EPG: integrated electronic programme guide for information on current programme and programme overview.
- TV-set volume-control by Oyster® remote control.
- Satellite mouse with channel display for concealed installation of receiver in a storage compartment.
- OBSC system: automatic satellite swap at programme change.
- Multiple audio and video inputs and outputs (including Dolby Digital)
- Automatic retraction at vehicle start
- High-quality craftsmanship and durable materials
- Height: approx. 22 cm
- Weight: approx. 14 kg
- 3-year warranty and reliable service
- Options
  - HDCI: Receiver with 80 GB hard disc for approx. 40 hours of recording time for your favourite TV shows, time-shift function for viewing programmes while recording, 2.5" shock- and vibration-proof hard disk, 2 CI slots for encrypted programmes (module and card not included).
  - DVB-T: Receiver with integrated DVB-T tuner for digital terrestrial reception. (DVB-T antenna not included).
- \*Swivel-head technology: Only the head swivels, the antenna body stays fixed.
- Aerodynamic, water-repellent design: low air-resistance, no freezing in winter.
- Space-saving assembly
- Latching swivel-axle when system is retracted: no wear of mechanical parts.

Specifications are subject to change without notice.

## Digital CI receiver



### Digital CI receiver (Standard equipment with all digital systems)

To allow convenient mobile reception of encrypted programmes (e.g. NL, AT, CH), the Oyster® Digital receiver is equipped with two CI slots (module and card not included). Access cards are available from the programme providers of the corresponding countries if proof of residence is provided.

- Dimensions: 27.2 x 6.3 x 15.5 cm (W x H x D)
- Specifications: 12/24 Volt digital receiver with 5000 channels
- Equipment: remote control and satellite mouse with channel display
- 2 CI slots for decoder modules

## Digital HDCI receiver



Rear view

### Digital CI receiver with hard disk

With the digital hard-disk receiver, ten Haaft has created a system of unsurpassed convenience for unlimited mobility! To make sure that you won't miss your favourite TV show the new hard-disk receiver has a recording capacity of up to 40 hours.

In addition, the receiver is equipped with a time-shift function that allows you to watch a show from its beginning while it is still being recorded.

This digital satellite receiver is available in combination with the ten Haaft satellite systems with integrated electronic control and also as an option with a receiver-independent system (option 5000 HDCI) - creating mobile satellite systems of utmost convenience and luxury.

## Features

- HD: 80 GB capacity - equivalent to approx. 40 hours of recording time
- Time-shift viewing
- 2.5" hard disk- shock- and vibration-proof for mobile use
- CI: system with two CI slots for Common-Interface modules for encrypted programmes (module and card not included)
- DVB-T: integrated DVB-T tuner (DVB-T antenna not included).
- Low noise level
- On-screen display: simple and convenient operation via on-screen display (selectable languages: DE, GB, NL, FR, IT, ES, PT, SE, NO, FI, DK, CZ, GR, PL).
- 5000 station presets (3500 TV / 1500 radio)
- Teletext integrated in digital receiver
- EPG: Electronic Programme Guide
- Volume-control of TV via receiver remote control
- Multiple video and audio connections, including Dolby Digital, Scart-Video (Cinch), Y/C (Hosiden), RGB and YUV (Cinch), audio L/R (Cinch), digital audio SPDIF (Cinch: PCM, AC3, dts, Dolby 5.1), modulator output (IEC).
- Satellite mouse with channel display for concealed installation of receiver in a storage compartment
- 12/24 V operation
- Extremely low power consumption (12.5 W in operation, 0 W in standby mode)
- Dimensions: 27.2 x 6.3 x 15.5 cm (W x H x D)

Specifications are subject to change without notice.

## SKEW Option



### SKEW

For optimal reception at the limits of the reception ranges in South-Western and South-Eastern regions, the LNB may have to be rotated in order to compensate the polarisation deviation - or SKEW angle - caused by the earth's curvature.

The SKEW option provides a fully automatic adjustment of the LNB in order to obtain maximum reception range. The Oyster® system automatically detects the direction into which the LNB must be rotated and performs the adjustment by means of an electric motor.

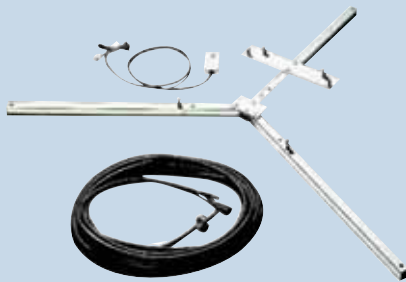
## TWIN-LNB Option



### TWIN-LNB

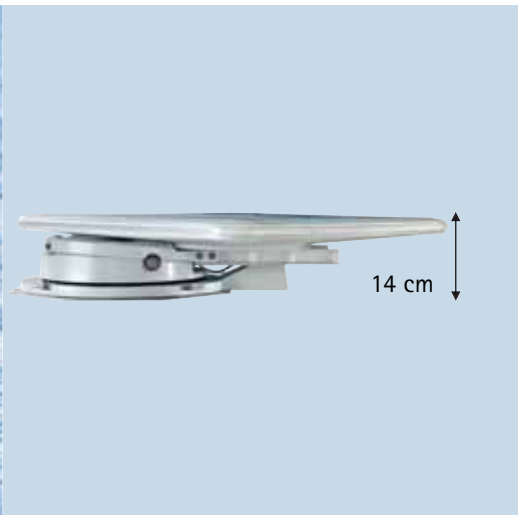
This option provides 2 connections for the convenient operation of a second receiver (analogue or digital), e.g. in the sleeper compartment. The TWIN-LNB allows to different programmes to be viewed using the Oyster® and a second receiver (second receiver not included in standard TWIN-LNB option).

## Ground kit Accessory



### Ground kit

If reception is impaired e.g. by a tree, the Oyster® can be removed from the roof and can be set up on the ground. The ground kit comprises a durable stand for stability even on uneven ground. A 15-metre extension cable (also available separately) provides sufficient clearance to the obstacle. An alarm system installed at the receiver provides anti-theft protection by sounding a horn inside the vehicle. The system can also be connected to the vehicle's signal horn.



Reception range 1

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## CARO® Digital

*The elegant 50 x 50 cm antenna of the CARO® system is only about 14 cm high.*

*With its low profile and space requirements, the CARO® system is the right choice for applications where mounting space is limited.*



## CARO® - just switch it on and watch TV: at the touch of a button!

The innovative technology of the elegant and durable CARO® satellite system is the result of more than 15 years of experience in the development and production of fully automatic satellite systems.

Ingenious and practical details characterise the automatic satellite system with the presumably lowest profile worldwide:

- Support arm for additional resistance against strong winds
- Automatic latching of pivot shaft in rest position
- Durable external unit made of cast aluminium only rotates when open, thus requiring only minimal pivot radius on the roof.

The CARO® system is available in two versions / models:

### CARO® Digital CI

The convenient version with digital CI receiver for all those who desire maximum operating convenience by remote control.

### CARO® Vision

The receiver-independent version with a separate operator unit which allows you to connect any receiver of your choice. (see pages 14 - 15).



Rear view of the CARO® antenna: Manual SKEW-angle adjustment for maximum reception range

## CARO® Digital



This highly convenient version of the digital CI receiver is equipped with an integrated electronic control system - the ideal choice for those who desire ultimate operating convenience by remote control and on-screen guidance. Encrypted programmes can be received by inserting corresponding decoder modules and access card into the CI slots provided.

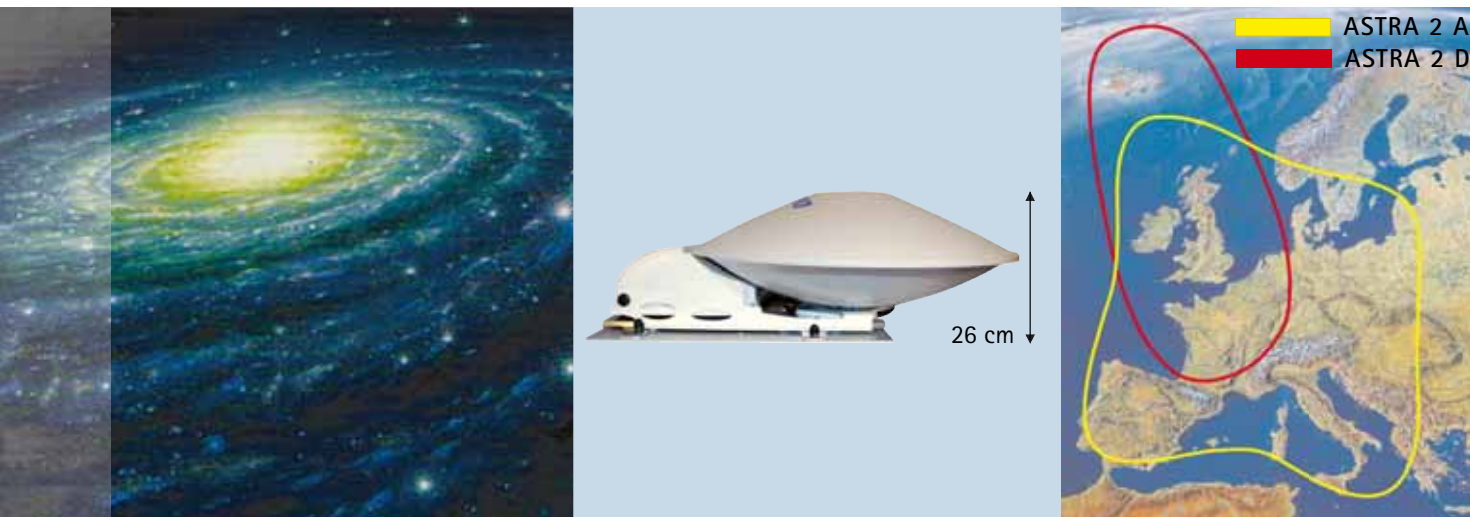
Dimensions: 27.2 x 6.3 x 15.5 cm (W x H x D)

Connections: Scart, Video (Cinch), Y/C (Hosiden), RGB and YUV (Cinch), audio L/R (Cinch), digital audio SPDIF (Cinch: PCM, AC3, dts, Dolby 5.1), modulator output (IEC).

## Features

- Digital satellite aiming
- Fully automatic aiming within 30 - 60 seconds (typically)
- High-performance digital receiver with integrated electronic control
- CI card-slot system: 2 CI slots for encrypted programmes (module and card not included)
- On-screen display: simple and convenient control of all functions via on-screen menus: preset TV and radio programmes (selectable languages: DE, GB, NL, FR, IT, ES, PT, SE, NO, FI, DK, CZ, GR, PL)
- 5000 station presets (3500 TV / 1500 radio)
- Teletext integrated in digital receiver
- EPG: integrated electronic programme guide for information on current programme and programme overview.
- TV-set volume control by CARO remote control.
- Satellite mouse with channel display for concealed installation of receiver in a storage compartment.
- OBSC system: automatic satellite swap at programme change
- Suitable for the usage till 60 degrees of latitude north
- Multiple audio and video inputs and outputs (including Dolby Digital)
- Automatic retraction at vehicle start
- High-quality craftsmanship and durable materials
- Height: approx. 14 cm
- Weight: approx. 14 kg
- 3-year warranty and reliable service
- Options
  - HDCI: Receiver with 80 GB hard disk for approx. 40 hours of recording time for your favourite TV shows, time-shift function for viewing programmes while recording, 2.5" shock- and vibration-proof hard disk, 2 CI slots for encrypted programmes (module and card not included).
  - DVB-T: Receiver with integrated DVB-T tuner for digital terrestrial reception. (DVB-T antenna not included).

Specifications are subject to change without notice.



Reception range 2

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## Cosmo® Digital

*The Cosmo® system is a new dimension of advanced satellite technology. The digital and fully automatic Cosmo® system literally catches the stars in the sky and enables you to conveniently receive TV programmes in your mobile home at the simple touch of a button.*

*Thanks to its compact and appealing design, the robust 60-cm Cassegrain antenna, protected against the elements by a full encapsulation, blends into its surroundings and provides an optimal TV reception.*

*No matter if you are in Southern Spain, France, Italy, Scandinavia or Greece, the Cosmo® system ensures superb satellite reception throughout Europe's major travel regions.*



## Cosmo® - a special way of satellite reception

The innovative technology of the extraordinary and elegant Cosmo® satellite system is the result of more than 15 years of experience in the development and production of fully automatic satellite systems.

Ingenious and practical details for mobile applications:

- To relief strain from the mechanical parts, the pivot shaft is securely latched when in rest position, thus preventing the mechanical parts from wearing.
- The encapsulated antenna dish protects the sensitive reception head (LNB) against wind and weather.
- The round Cassegrain antenna only rotates when unfolded and requires the world's presumably smallest actuation radius of a 60-cm antenna on the vehicle roof.

The Cosmo® system is available in two versions / models:

### Cosmo® Digital CI

The convenient version with digital CI receiver for all those who desire maximum operating convenience by remote control.

### Cosmo® Vision

The receiver-independent version with a separate operator unit for your free selection of a digital or analogue receiver. (see pages 14-15).

Rear view of the Cosmo® antenna:  
Manual SKEW-angle adjustment  
for maximum reception range



## Cosmo® Digital



### Digital-Receiver CI

This highly convenient variant of the digital receiver is equipped with an integrated electronic control system - the ideal choice for all those who desire ultimate operating comfort by remote control.

Also available with 80 GB hard disk (HDCI), Common-Interface (CI) slots for encrypted programmes and DVB-T tuner for digital terrestrial reception (T).

Dimensions: 27.2 x 6.3 x 15.5 cm (W x H x D)

Connections: Scart, Video (Cinch), Y/C (Hosiden), RGB and YUV (Cinch), audio L/R (Cinch), digital audio SPDIF (Cinch: PCM, AC3, dts, Dolby 5.1), modulator output (IEC).

## Features

- Digital satellite aiming
- Fully automatic aiming within 30 - 60 seconds (typically)
- High-performance digital receiver with integrated electronic control
- CI card-slot system: 2 CI slots for encrypted programmes (module and card not included)
- On-screen display: simple and convenient control of all functions via on-screen menus: preset TV and radio programmes (selectable languages: DE, GB, NL, FR, IT, ES, PT, SE, NO, FI, DK, CZ, GR, PL).
- 5000 station presets (3500 TV / 1500 radio)
- Teletext integrated in digital receiver
- EPG: integrated electronic programme guide for information on current programme and programme overview.
- TV-set volume-control by Cosmo® remote control.
- Satellite mouse with channel display for concealed installation of receiver in a storage compartment.
- OBSC system: automatic satellite swap at programme change.
- Multiple audio and video inputs and outputs (including Dolby Digital)
- Automatic retraction at vehicle start
- High-quality craftsmanship and durable materials
- Height: approx. 26 cm
- Weight: approx. 12 kg
- 3-year warranty and reliable service
- Options
  - HDCI: Receiver with 80 GB hard disk for approx. 40 hours of recording time for your favourite TV shows, time-shift function for viewing programmes while recording, 2.5" shock- and vibration-proof hard disk, 2 CI slots for encrypted programmes (module and card not included).
  - DVB-T: Receiver with integrated DVB-T tuner for digital terrestrial reception. (DVB-T antenna not included).

Specifications are subject to change without notice.

## Vision series



### Fully automatic digital satellites systems - independent of receiver

If you want to see the latest news from all over the world or you don't want to miss your favourite TV show even when travelling in far away regions, you'll need a flexible antenna harmonized to your personal demands. The various fully automatic satellite systems of the Vision series are all digital whereas their intelligent operator unit allows the connection of almost any receiver of your choice. Depending on your personal request you can either use a digital receiver with a wide range of reception or you use your existing analogue receiver.

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## Operator Unit



Operator Unit  
Dimensions: 12.5 x 6.7 x  
3.2 cm (W x H x D)



Control box

### Operator Unit

The fully automatic operator center located inside your vehicle is full of intelligent software. At the touch of a button, the antenna moves into the last reception position (LEM). If no image is received in this position, the automatic search function is started immediately. The illuminated display keeps you informed about the various functions. Special functions, e.g. a satellite swap or manual search, can be started by pressing one of the few and easily comprehensible buttons. The additional control box (20.0 x 3.0 x 11.2 (W x H x D), see picture) contains the complete system electronics and can be mounted out of sight in a storage compartment.

## Features

### Features of all systems:

- Fully automatic satellite aiming
- Receiver-independent with user-friendly control unit and multiple languages: DE, GB, FR, NL, IT, ES, SE, DK, NO, PT and FI
- All digital and analogue receivers commonly used (in Europe) can be used for satellite aiming. Even receivers integrated in TV sets or provider-specific digital set-top boxes can be used!
- LEM technology: Last Elevation Memory for reduced search times (antenna searches at the elevation angle of last reception)
- System is mounted on ball bearings
- Weather-proof design
- Automatic retraction at vehicle start
- High-quality craftsmanship and durable materials
- Quality „Made in Germany“
- 3-year warranty and reliable service

## Accessories

for Oyster® Vision, CARO® Vision,  
Cosmo® Vision, SamY® Vision

### High-performance digital receivers

D5000	Digital receiver
D5000 CI	Digital receiver with 2 CI slots for encrypted programmes*
D5000 DVB-T	Digital receiver with DVB-T tuner**
D5000 CI+DVB-T	Digital receiver with 2 CI slots for encrypted programmes* and DVB-T tuner**
D5000 HDCI	Digital hard-disk receiver with integrated 80 GB hard-disk and 2 CI slots for encrypted programmes*
D5000 HDCI+DVB-T	Digital hard-disk receiver with integrated 80 GB hard-disk and 2 CI slots for encrypted programmes* and DVB-T tuner**

\*Module and card not included

\*\*DVB-T antenna not included

Specifications are subject to change without notice.

## Oyster® Vision



### Oyster® Vision –

The tried-and-proven Oyster® system with 65-cm or 85-cm antenna with an optimal reception range in a receiver-independent version. An especially durable system with swivel-head technology for the highest requirements.

Height: approx. 22 cm

Weight: approx. 14 kg

## CARO® Vision



### CARO® Vision –

The elegant 50 x 50 cm flat antenna of the CARO® system is only about 14 cm high. Thanks to its low profile and little space requirement, the CARO® system is the right choice for applications with limited mounting space.

Height: approx. 14 cm

Weight: approx. 14 kg

## Cosmo® Vision



### Cosmo® Vision –

Thanks to its compact and appealing design, the robust 60-cm Cassegrain antenna, protected against the elements by a full encapsulation, blends into its surroundings and provides an optimal TV reception. The Cosmo® system ensures a reliable satellite reception throughout Europe's major travel regions.

Height: approx. 26 cm

Weight: approx. 12 kg

## SamY® Vision



### SamY® Vision –

The new digital generation of the proven SamY® system is now available with offset antenna dish sizes of 54 and 64 cm to ensure reception across Europe.

The new design makes this system extremely flexible.

Height: SamY 54 / SamY 64 - approx. 23 cm

Weight: approx. 15 kg

Further details: page 16-17



## SamY® Vision

### SamY® Vision

*Fully automatic satellite reception made easy: The SamY® Vision, available in two antenna dish sizes of 54 and 64 cm, is a low-cost compact satellite system. The new concept is most flexible and hence not only ideal for mobile homes, but also for camper trailers.*

Reception range 1  
SamY® Vision 54

### Digital and receiver-independent.

If you wish to stay up-to-date with all the news from around the world or you do not want to miss your favourite TV show even when travelling in remote regions, you will want a flexible antenna that is tuned to your personal needs. The SamY® Vision system featuring an intelligent operator unit is completely independent of a receiver and is available in two antenna dish sizes, allowing the system to be precisely matched to individual requirements.

Receiver-independent: the system with its separate control unit can be connected to almost any receiver commonly used in Europe. You are free to use the system with your own digital or analogue receiver. The two antenna dish sizes of 54 and 64 cm ensure optimal reception ranges.



SamY® Vision 54



SamY® Vision 64



Reception range 2  
SamY® Vision 64



Operator unit  
Dimensions: 12.5 x 6.7 x 3.2 cm  
(W x H x D)

Control box

### Operator unit

The compact and dynamically styled operator unit is mounted inside your vehicle. It forms the intelligent link between satellite system and receiver and features an illuminated display, indicates all functions in either DE, GB, FR, NL, IT, ES, SE, DK, FI and PT. The touch of a button is enough - the clever system then automatically finds the satellite of your choice.

## Features

- Fully automatic satellite search
- Receiver-independent with user-friendly operator unit for 12/24 V operation (selectable languages: DE, GB, FR, NL, IT, ES, SE, DK, NO, PT and FI)
- All digital and analogue receivers used in Europe can be used for satellite search. Even receivers integrated in TV sets or provider-specific digital set-top boxes can be used!
- LEM technology: Last Elevation Memory for reduced search time (antenna searches at the elevation angle of last reception)
- Automatic retraction at vehicle start
- High-quality craftsmanship and durable materials
- Height: SamY® 54/SamY® 64: approx. 23 cm
- Weight: only approx. 15 kg
- Quality „Made in Germany“
- 3-year warranty and reliable service

### SamY® Vision Accessories

D5000	Digital receiver
D5000 CI	Digital receiver with 2 CI slots for encrypted programmes*
D5000 DVB-T	Digital receiver with DVB-T tuner**
D5000 CI+DVB-T	Digital receiver with 2 CI slots for encrypted programmes* and DVB-T tuner**
D5000 HDCI	Digital hard-disk receiver with integrated 80 GB hard-disk and 2 CI slots for encrypted programmes*
D5000 HDCI+DVB-T	Digital hard-disk receiver with integrated 80 GB hard-disk and 2 CI slots for encrypted programmes* and DVB-T tuner**

\*Module and card not included      \*\*DVB-T antenna not included

Specifications are subject to change without notice



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## SunMover®

*The SunMover® revolutionises mobile solar technology. A specifically designed 75-Wp solar module, mounted onto a compact motorised pan-and-tilt unit, is combined with GPS control for maximum energy yield.*

### SunMover® = pure solar energy.

The SunMover® is an intelligent and GPS-controlled solar system which automatically tracks the sun's path during the day. It is equipped with a specifically designed 75-Wp solar module which is always perfectly aimed at the sun - hence providing optimal energy yield.

The average yield is equivalent to that of about three fixed horizontal 75-Wp solar modules. The SunMover® system thus saves a lot of space on the vehicle roof and is very easy to operate by simply pressing a button.

The enhanced yield of the SunMover® system is even greater in winter (up to factor 7). During the winter months, the sun is always low over the horizon, and horizontally positioned modules only generate a minimal yield, accordingly.





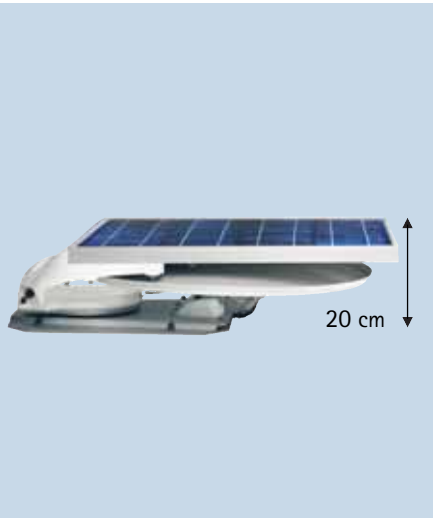
SunMover operator unit  
Dimensions: 12.5 x 6.7 x 3.2 cm (W x H x D)

### GPS

Why GPS? The term GPS (Global Positioning System) is usually associated with navigation systems. But what has a solar system to do with a navigation system? Usually, nothing. However, the SunMover® system uses GPS data to determine the precise position of the system, date and time. Using this information, the SunMover® system calculates its precise position relative to the sun. Even on cloudy days the solar module is then aimed directly at the sun and provides maximum yield.

## Features

- Intelligent solar system with polycrystalline 75-Wp solar module to automatically track the sun during the day
- Operator unit with illuminated display in DE, GB, FR, NL, IT, ES, SE, DK, FI and PT
- Automatic opening at dawn and retraction at dusk (optional)
- Automatic retraction at vehicle start
- GPS control with continuous transfer of date, time, sun position and vehicle position. This ensures an optimal position relative to the sun and a constant maximum energy yield
- Suitable for the usage till 60 degrees of latitude north
- Low space requirements due to single solar module
- Convenient operation: push-button control, enhanced mobility
- Yield advantage: The self-tracking 75-Wp solar module provides a yield equivalent to about three single horizontal 75-Wp modules (measured over the period of one year in Germany, depends from season and weather)
- Low power consumption of motor unit - less than 1 % of the yield
- High-quality craftsmanship and durable materials
- Height: approx. 17 cm
- Weight: approx. 24 kg
- Quality „Made in Germany“
- 3-year warranty and reliable service



Reception range 2

# SamYSolar<sup>+</sup>

*The SamYSolar<sup>+</sup> system is the ingenious combination of two applications: solar power generation and satellite reception. This system provides high performance in two ways: in satellite mode, its GPS-controlled 50-Wp solar module provides a high energy yield, while in satellite mode, the system's 65-cm offset antenna dish provides a large reception range.*

## SamYSolar<sup>+</sup> = pure mobility

This development (patent pending) combines the convenience of an automatic satellite system with the energy yield of a self-tracking solar module into one integrated unit.

The GPS-controlled system either automatically tracks the course of the sun or uses its 65-cm offset antenna to provide reliable satellite reception even in remote areas and all at the touch of a button.

The SamYSolar<sup>+</sup> system is equipped with a 50-Wp solar module that is always perfectly aimed at the sun and hence provides optimal energy yield.

This is equivalent to about three fixed horizontal 50-Wp single modules. The SamYSolar<sup>+</sup> system means least possible space requirements at high mobility and convenience.



Rear view of the SamYSolar<sup>+</sup>-antenna



Operator unit  
SamYSolar<sup>+</sup> control unit  
Dimensions: 12.5 x 6.7 x 3.2 cm (W x H x D)

## GPS

Why GPS? The term GPS (Global Positioning System) is usually associated with navigation systems. But what has a solar system to do with a navigation system? Usually, nothing. However, the SamYSolar<sup>+</sup> system uses GPS data to determine the precise position of the system, date and time. Using this information, the SamYSolar<sup>+</sup> system calculates its precise position relative to the sun. Even on cloudy days the solar module is then aimed directly at the sun and provides maximum yield.

## Features

- Intelligent solar system with 65-cm offset antenna and 50-Wp solar module mounted on the rear.
- Combined solar-satellite operator unit with illuminated display in DE, GB, FR, NL, IT, ES, SE, DK, FI and PT
- Satellite mode with digital satellite search, independent of receiver, allowing all analogue or digital receivers as well as provider-supplied digital set-top-boxes to be used.
- Satellite reception or, alternatively, solar operation at the touch of a button
- Automatic opening at dawn and retraction at dusk (optional, in solar mode)
- Automatic retraction at vehicle start
- GPS control with continuous transfer of date, time, sun position and vehicle position, thus ensuring an optimal aiming at the sun and hence an optimal energy yield.
- Weather-proof design
- Low space requirements due to single solar module
- Convenient operation: push-button control, enhanced mobility
- Yield advantage: The self-tracking 50-Wp solar module provides a yield equivalent to about three single horizontal 50-Wp modules (measured over the period of one year in Germany, depends from season and weather)
- Low power consumption of motor unit - less than 1 % of the yield.
- Quality „Made in Germany“: High-quality craftsmanship and durable materials
- Height: approx. 20 cm
- Weight: approx. 24 kg
- 3-year warranty and reliable service

### SamYSolar<sup>+</sup> accessories

D5000	Digital receiver
D5000 CI	Digital receiver with 2 CI slots for encrypted programmes*
D5000 DVB-T	Digital receiver with DVB-T tuner**
D5000 CI+DVB-T	Digital receiver with 2 CI slots for encrypted programmes* and DVB-T tuner**
D5000 HDCI	Digital hard-disk receiver with integrated 80 GB hard-disk and 2 CI slots for encrypted programmes*
D5000 HDCI+DVB-T	Digital hard-disk receiver with integrated 80 GB hard-disk and 2 CI slots for encrypted programmes* and DVB-T tuner**

\*Module and card not included

\*\*DVB-T antenna not included

Specifications are subject to change without notice

## General information about satellite technology

### History of satellite technology

The satellite age began with the launch of Sputnik 1 on October 4, 1957. Although Sputnik 1 burnt up on re-entry into the earth's atmosphere after 3 months in orbit, the first telecommunications and TV transmitting satellite was launched soon after in 1962. In 1983, the first directly receivable TV satellite was put in service over Europe. Direct satellite reception only became popular in the early 1990'ies. Today, approximately 50 satellites provide Europe with TV and radio channels. Modern satellites weigh up to 5 tons and have huge solar panels to generate the power for their up to 36 transponders. New satellites have a transmitting power of up to 150 W per transponder. In addition to the solar generators, the satellites are equipped with batteries which ensure uninterrupted operation during eclipses (i.e. when the satellite passes through the earth's shadow). The lifecycle of a satellite is designed to be approximately 12 years. At the end of this period, the solar cells, batteries and the transmission booster will have deteriorated to a point where they can no longer be used. Usually, the fuel for the steering jets has also been depleted by then, and the satellite can no longer be kept in position. The last bit of fuel is then used to propel the satellite from its orbit in order to make space for a successor.

### ASTRA

ASTRA I is a satellite constellation positioned at 19.2° east and is the most important satellite system for the German-speaking part of Europe. Since the launch of ASTRA 1A in December 1988, 10 individual satellites have been grouped directly side-by-side in this position, with 6 satellites still being in operation today. All ASTRA satellites are privately owned by SES in Luxembourg. In the beginning all signals to the satellites were transmitted via the headquarters of SES in Betzdorf, Luxembourg, nowadays many TV companies maintain their own uplink stations. The signals transmitted from earth are converted to another frequency, amplified and then sent back to earth. Since 1998, SES has been operating a second orbital position at 28.2° east, known as ASTRA II. At the moment it comprises 4 satellites. This position mainly broadcasts channels for the British market. Meanwhile, SES is operating the satellites Astra 3 and Astra 4 in different orbital positions and for different target groups.

### EUTELSAT

EUTELSAT is a multinational organisation which was established in 1977. The first EUTELSAT I F1 satellite was launched into orbit in June 1983. Today, the EUTELSAT organisation operates numerous satellites in different orbital positions. The most commonly known position is

13° East, where 3 brand-new satellites are co-positioned under the name HOTBIRD. EUTELSAT also operates several satellites under the name AtlanticBird serving the French-speaking region.

### Co-Positioning

Today, it is common practice to position several satellites in close proximity, appearing from earth as a single satellite. These satellites are operated under one common name such as ASTRA I or HOTBIRD and are identified by index numbers or letters. The co-positioned satellites are located in a cube with an edge length of only 40 km. Of course, the satellites must not collide with other, as this would cause terminal damage and effectively destroy them. This is why the exact position of each satellite is constantly monitored and adjusted with the aid of steering jets.

### Footprint

From their position in orbit, geostationary satellites have a „view“ of almost half of the earth, but the available energy is not sufficient to completely cover this area with receivable signals. In accordance with economic considerations, the signals are focussed on certain regions, forming what is called the satellite's „footprint“. Satellite operators are often quite cautious about the official footprint data they publish, which is why it is often possible to receive a good signal well beyond the limits of the indicated footprint with the aid of a high quality reception system. In reality, the footprints are not as uniform as shown in the graphics, especially not along the edges, which can be rather „ragged“. In such areas, trial and error is the only way to determine if signals can be received.

### Orbital position or satellite position

The satellites are positioned in geostationary or geosynchronous orbit at an altitude of approx. 36,000 km precisely over the equator. At this specific altitude, they permanently retain their position above the same spot on earth. The longitude of this position is hence used to differentiate between the satellites. ASTRA I at 19.2° East is hence approximately right over the town of Mbandaka in Congo. However, the degree value does not directly relate to the orientation of the antenna toward the satellite.

### Transponders

Modern satellites have up to 36 transponders. One transponder can either carry one analogue or up to 12 digital TV channels. The output of current transponders is up to



150 W, but does decrease over the years. The transponder outputs of older satellites is sometimes less than 50 W. In principle, "old" analogue transponders can still be used digitally, but their range of channels is generally smaller than that of newer transponders, and their footprint is narrower.

## Transmission systems

### Analogue technology

Until recently, analogue transmission technology was the standard for TV and radio broadcasting. The main drawback of analogue technology is the fact that only one TV and four radio channels can be transmitted by one transponder at a time. ASTRA 1 currently still uses around 40 analogue transponders, but their number will decrease over the next few years. Analogue transponders on ASTRA 1 have a significantly lower range than digital transponders.

### Digital technology

Today, and even more so in the future, digital transmission technology will play the predominant role in satellite TV. The basic benefit to the programme providers is the fact that several channels can be transmitted on a single transponder, whereby the allocation can be freely selected. Instead of 12 TV channels, broadcasters can also choose to have just radio stations or a mixture of TV and radio. Internet data transmissions and any other types of data service are also possible. As well as additional flexibility, this also offers considerable economic benefits for broadcasters.

### Transponder stream

The combined total of all digital data transmitted on a transponder is referred to as a "transponder stream". This includes the individual TV and radio channels. The transponder stream is what the receiver actually receives. The frequently published frequency, polarisation and symbol rate data always relate to a transponder stream.

### Bandwidth

For analogue transponders, the bandwidth is set to approx. 27 MHz. Digital transponders can be operated at almost any bandwidth. This makes it possible to operate older, weaker transponders with a reduced bandwidth and still obtain a wider range. Furthermore, a single transponder can carry several independent low-bandwidth signals (transponder streams), an option which is used most commonly by broadcasting vehicles. As a general rule, broadband signals (MCPC - Multiple Channel Per Carrier)

tend to be used to supply signals to end customers, while signals with lower bandwidths (SCPC - Single Channel Per Carrier) are mostly used for relay transmissions, so-called „feeds“. ASTRA 1 almost exclusively transmits MCPC signals suitable for direct reception.

### Symbol rate

The symbol rate is an important figure to know, as it must be entered correctly into the receiver to ensure a successful channel scan if specific channels are to be searched. The higher the symbol rate, the higher the bandwidth, and the more channels can be transmitted on one transponder. However, digital technology allows many other ways to configure the transponder stream in addition to the symbol rate. Some providers use this to squeeze a higher number of channels onto one transponder, which results in poor image quality, low range and an increased error rate.

### Digital reception range

The range of each the individual transponders varies slightly. This is sometimes used deliberately to focus the signal onto one area, sometimes this occurs more or less by chance. In addition to the transmitting power, the satellite also plays a role, as does the transponder stream configuration and the signal bandwidth. It is therefore normal for some channels to be received at the edges of the footprint, while other channels cannot be received there. Of course, modern automatic systems only scan digitally and therefore locate satellites from locations in which only few channels can still be received. Systems using an analogue search give away several hundreds of km of range.

### Interference on digitally received broadcasts

Normally, the TV image collapses almost instantly if the signal strength is insufficient. Interference usually manifests itself in the form of blocky/pixelated images or frozen images. This usually indicates that the signal strength is too weak. Other possible causes can include transmitter errors or an overload of the transponder stream. HOTBIRD often transmits channels which are affected by noticeable interference despite having a very powerful signal.

### Clear view of the satellite

A clear view of the satellite is the key prerequisite for good reception. Buildings within the signal beam always block reception. Trees may, in rare cases, allow the signal to pass through unhindered, but this is not reliable. The geographic location also needs to be taken into account, as the signal is received at a much flatter angle the further north the system is operated. In very northerly

regions, the curvature of the earth can cause even topographic obstructions like mountains to prevent reception of satellite channels.

### Antenna size

The larger the antenna is, the larger the reception range will be for a given transponder, and the more tolerant the system will be to poor weather. Damaged, i.e. dented or warped antenna dishes reduce the range significantly. High-quality LNBs show their increased capacity only at the limits of the footprint. Even in the centre of a footprint, e.g. in Germany, satellite operators recommend a minimum size for the satellite dish in order to ensure good reception even in poor weather.

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## Receiver

### Analogue

Analogue receivers are still being used in large numbers, but we do not recommend purchasing a new one. Apart from England all other countries transmit exclusively digitally.

### Digital (DVB, FTA)

The digital TV standard is often also called „DVB“, which stands for Digital Video Broadcast. In this context, the abbreviation „FTA“ is also used, meaning „Free To Air“. FTA programmes are non-encrypted, free programmes. These terms are often found on digital receivers. In addition to TV reception, digital receivers also provide DVB radio programmes. Digital satellite receivers are sometimes also called „DVB-S“ receivers, where „S“ stands for „satellite“. Meanwhile, first tests are being performed with the DVB extension „DVB-S2“, also called „8PSK“, which is supposed to provide even more programmes or to enhance reception quality. DVB-S2 requires specific receivers, which are currently not easily available.

### Digital CI

Most European countries encrypt (encode) their digitally broadcast channels. To receive such channels either a provider-specific receiver or a receiver with a Common Interface (CI) is required. CI receivers equipped with decoder modules and corresponding smart-cards can receive the programmes encrypted with most of the available encryption methods. External decoder boxes which were common with analogue systems are not compatible with digital TV.

### Common Interface (CI)

CI receivers have 1 or 2 slots for decoder modules. Different modules are required depending on the country and the pay-TV provider. The CI receiver is hence only a platform which facilitates the usage of additional decoder modules. The reception of different pay-TV packages is only possible with CI receivers.

### CI-Module

CI modules are sometime also referred to as „CA“ modules, whereby „CA“ stands for „Conditional Access“. When used together with the corresponding smart card (access card), the modules decode encrypted programmes. Some modules are only capable of decoding a single system (e.g. Viaccess), while others may be compatible with multiple systems. The CI module needs to be inserted into the Common Interface slot. Generally, each country or provider requires a different module. For further information please contact the programme providers.

### Smartcards

Smartcards are available at specialist dealers or directly from the programme providers. Smartcards are usually subject to a charge, and national regulations (residence, nationality) may apply.

### Satellite information

The variety of digital TV and radio stations broadcast across Europe is not only great, but also subject to constant change. Any printed channel list will hence often be outdated by the time it is published. Major channels can usually be received without changes for long periods, but smaller-scale channels, often providing highly interesting programmes, are often launched and then disappear from the satellite rather quickly. There are numerous printed publications covering the topic of satellite TV. However, the Internet is usually more up-to-date. The websites [www.lyngsat.com](http://www.lyngsat.com) and [www.satcodx.com](http://www.satcodx.com) list the channels available from all directly receivable satellites. These data can be input into the receiver's scan function so new channels can be received.

### Terrestrial digital TV (DVB-T) and digital cable TV (DVB-C)

Terrestrial TV is also due to be converted from analogue to digital technology by the year 2010. However, the DVB-T network does not yet provide full coverage. Coverage is being widened all the time, but it is already clear that complete coverage of a country will not be possible. The desired reception of terrestrial digital TV signals with a small antenna stick at the back of the receiver can only be realised in the direct vicinity of the transmitters. The major disadvantage to clients is the range - national DVB-T will

of course only be provided in the respective country. TV and radio stations of other countries cannot be expected to invest enormous sums into the broadcast of „foreign“ channels.

Digital TV has almost become the standard in many national cable networks and can hence be received at many camping sites. This is not much of a benefit though, as the channel variety is much smaller than that available by satellite. The same problem of coverage that applies to DVB-T also exists here as well, as cable operators are not likely to feed foreign channels into their networks.

Furthermore, DVB-T, DVB-C and DVB-S always require separate receivers which are different for each system. In principle, DVB-T and DVB-C cannot match the number of channels and the reception range available with digital satellite TV (DVB-S).





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