

AC150-A3 – GSM/GPRS/UMTS MODULE

Technical description



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i. About the Technical description

This Technical description contains information about the AC150-A3 GSM/GPRS/UMTS (2G/3G) communication module, its key features, functionalities, and installation procedure. It is intended for a technical audience, who are responsible for the product and its integration into the system.

ii. Reference documents

- Iskraemeco's general terms and condition
- User manual of the host meter/communication device
- Technical description of antenna coupler

iii. Versioning

Date	Version	Update		
16.01.2018	1.00	nitial version of the document		
18.05.2018	1.01-RC1	 In chapter 2. AC150-A3 COMMUNICATION MODULE, additional safety information were added 		
		In chapter 5. TECHNICAL CHARACTERISTICS, dual-band characteristics were updated with maximum transmitting power		
15.06.2018	1.02	Chapter 4.2. SIM card installation: changed 2 nd NOTE (ATTENTION)		

iv. Definitions, Acronyms and Abbreviations

Abbreviation	Explanation			
Accessory	device supplementing a main device or apparatus, but not forming part of it, that is needed for its operation or to confer on it specific characteristics			
APN	Access Point Name			
AT command	ATtention; AT commands are instructions used to control a modem.			
BER	Bit ERor			
DC	DC rated voltage			
DCS	Digital Cellular System			
ESD	ElectroStatic Discharge			
ETSI	European Telecommunications Standards Institute			
GPRS	General Packet Radio Service			
HAN	Home Area Network			
HES	Head End System			
Host device	device/product, to which one or more modules is/are connected to / mounted on			
I _{max}	maximum current			
IP	Internet Protocol			
JEDEC	Joint Electron Device Engineering Council			
LAC	Local Area Code			
LAN	Local Area Network			
LCD	Liquid Crystal Display			
MHz	MegaHertz			
Module	physical device (separate unit) performing additional function (e.g. communication) to the host device			
OVC	Over Voltage Category			

Abbreviation	Explanation			
PCB	Printed Circuit Board			
PCS	Personal Communications Service			
PDP	Packet Data Protocol			
PIN	Personal Identification Number			
PPE	Personal Protective Equipment			
UC	Utilization Category			
UMTS	Universal Mobile Telecommunications System			
WAN	Wide Area Network			
WEEE	Waste Electrical and Electronic Equipment Directive			

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1. SAFETY INFORMATION

Safety information used in this Technical Description is described with the following symbols and pictograms:



DANGER: for a possibly dangerous situation, which could result in severe physical injury or fatality – attention to a high risk hazards.



WARNING: attention to a medium risk hazards.

CAUTION: for a possibly dangerous situation, which could result in minor physical injury or material damage - attention to a low risk hazards.



Operating instruction: for general details and other useful information.

All safety information in this Technical Description describes the type and source of danger; it is possible consequences and measures to avoid the danger.

All safety information written in this document applies to the module.

1.1. Responsibilities

The owner of the meter/module is responsible to assure that all authorized persons who work with the meter read and understand the parts of this User manual, and Installation and maintenance manual that explains the safe handling with the meter.

The personnel must be sufficiently qualified for the work that will be performed. The installation personnel must possess the required electrical knowledge and skills, and must be authorised by the utility to perform the installation procedure.

The personnel must strictly follow the safety regulations and operating instructions, written in the individual chapters in this document, and the Installation and maintenance manual.

The owner of the meter/module responds specially for the protection of the persons, for prevention of material damage and for training of personnel.

1.2. Safety instructions

1.2.1. Handling and mounting

At the beginning of installation at the metering point, the module should be carefully taken out of the box where they were packed. This should prevent the module from falling as well as any other external or internal damage to the device and personal injuries. Should such an incident occur despite all precautions the module may not be installed at the metering point as such damage may result in different hazards. In such case, the module needs to be sent back to the manufacturer for examination and testing.



DO NOT OPEN THE MODULE COVER!

Opening of the module might result in defects and damages. In such a case, the warranty is not valid.

\triangle

CAUTION: The edges of the seals, sealing wires as well as some edges under (removed) terminal cover are sharp!

4

DANGER: In case of any damage inside the meter/module (fire, explosion...) do not open the meter/module.

CAUTION: The meter/module may be used only for the purpose of measurement for which it was produced. Any misuse of the meter/module will lead to potential hazards.



WARNING: Safety measures should be observed at all times. Do not break the seals or open the meter/module at any time!



It must be consulted in all cases where symbol $\angle \bullet \Delta$ is marked in order to find out the nature of the potential hazards and any actions, which have to be taken to avoid them.

The module and the meter installation procedure are described in the Installation and maintenance manual. For safety reasons, the following instructions should be followed.



See complete Technical Description for detailed technical features of the module and its intended use.



Only a properly connected meter/module can measure correctly! Every connection error could result in a financial loss for the power company!

1.2.2. Meter/module installation procedure



The installer must consult and comply with local regulations and read the installation instructions written in the Installation and maintenance manual before installation.

This Installation and maintenance manual provides the instructions for installing meters and modules. The document provides a short overview of the meter, details of device installation and set-up, installation considerations, and health and safety considerations.

The installer will be considered as a public face by both the power company and its customers. The installer shall adopt the highest standards of behaviour and be respectful to clients and members of the public.

Before the beginning of the installation procedure, check if the metering point is correctly prepared for meter installation. The metering point must always be left clean and in order.

The work location shall be defined and clearly marked. Adequate working space as well as means of access and lighting shall be provided at all parts of an electrical installation on, with, or near which any work activity is to be carried out.

Where necessary, safe access to the work location shall be clearly marked.

The metering point must not be exposed to running water or fire.

Meter/module installation may not be performed by unauthorised and untrained personnel. Such persons are not allowed to cut the seals and open the terminal or meter cover as contact with the live parts of the meter is dangerous for life.



CAUTION: The installer is expected to fully understand the risks and safety issues involved in electrical installations. The installer shall be aware at all times of the potential hazard of electrical shock and shall exercise due caution in completing the task!

Tools, equipment, and devices shall comply with the requirements of relevant National or International Standards where these exist. Tools, equipment, and devices shall be used in accordance with the instructions and/or guidance provided by the manufacturer or supplier.

Any tools, equipment, and devices provided for the purpose of safe operation of, or work on, with, or near electrical installations shall be suitable for that use, be maintained, and be properly used.

Personnel shall wear clothing suitable for the locations and conditions where they are working. This could include the use of close-fitting clothing or additional PPE (personal protective equipment).



CAUTION: The installer must be correctly equipped with personal protection equipment (PPE) and use the appropriate tools at all times during the installation.

Working procedures are divided into three different procedures: dead working, live working, and working in the vicinity of live parts. All these procedures are based on the use of protective measures against electric shock and/or the effects of short-circuits and arcing.



The installer must be informed if the national legislation permits the work on the installation under voltage – live work, and must follow the rules of legislation.



Depending on the kind of work, the personnel working in such conditions shall be instructed or skilled. Live working requires the use of specific procedures. Instructions shall be given how to maintain tools, equipment, and devices in good working order and how to verify them before working.



This subclause deals with the essential requirements ("the five safety or golden rules") for ensuring that the electrical installation at the work location is dead and secure for the duration of the work.

This shall require clear identification of the work location. After the respective electrical installations have been identified, the following five essential requirements shall be undertaken in the specified order unless there are essential reasons for doing otherwise: disconnect completely (1.), secure against re-connection (2.), verify that the installation is dead (3.), carry out earthing and short-circuiting (4.), and provide protection against adjacent live parts (5.).

1.2.3. Module maintenance

No maintenance is required during the module's lifetime. The implemented metering technique, built-in components, and manufacturing procedures ensure high long-term stability of meters and the modules. Therefore, no recalibration is required during entire meters lifetime.



In case the service of the module is needed, the requirements from the meter installation procedure must be observed and followed.

Cleaning of the module is allowed only with a soft dry cloth. Cleaning is allowed only in upper part of the module. Cleaning is forbidden in the back and side sites of the module. Cleaning can be performed only by the personnel responsible for meter/module maintenance.



CAUTION: Never clean soiled meters/modules under running water or with high-pressure devices. Penetrating water can cause short circuits. A damp cleaning cloth is sufficient to remove normal dirt such as dust. If the meter/module is more heavily soiled, it should be dismounted and sent to the responsible service or repair centre.

Visible signs of fraud attempt (mechanical damages, presence of a liquid, etc.) must be regularly checked. The quality of seals and the state of the terminals and connecting cables must be regularly checked.

If there exists a suspicion of incorrect operation of the meter/module, the local utility must be informed immediately.



After the end of the meter's/module's lifetime, the meter/module should be treated according to the Waste Electric and Electronic (WEEE) Directive!

2. AC150-A3 COMMUNICATION MODULE

The exchangeable communication module is not standalone device and it can operates only as inserted module in the AM500 meters series or other Iskraemeco compatible host devices. Communication module has integrated GSM/GPRS/UMTS modem and it is intended for data transferring over 2G and 3G mobile networks. It is constructed to be inserted or removed (replaced) to/from the meter/host device. It operates automatically after it is inserted in Iskraemeco host devices, which support the AC150-A3 module.



NOTE

Operating module emits radio frequency radiation. When the module is in operation, keep at least 12 cm separation distance between the module (built-in) antenna and the human body, but not for longer time as it is needed.



NOTE

The communication module can be inserted/removed in full host-device's operational state.



Figure 1: Example of AC150-A3 2G/3G module

2.1. Module appearance

The 2G/3G communication module can be inserted on the top of the meter or in the module area of host device. When the module is fitted on it, it should be covered by meter's communication module cover or host-device cover.

The 2G/3G module has embedded holder (different types) for the SIM card. For more instructions about inserting SIM card, see chapter 4.2. SIM card installation.



Figure 2: Example of AC150-A3 module



Figure 3: Example of AC150-A3 module – bottom view



Figure 4: Example of fitted communication module in the meter

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2.2. Dimensions



Figure 5: Overall and fixing dimensions of AC150-A3

2.3. Nameplate

Basic data and type designation of the module can be found on the nameplate. Module nameplate (Figure 6) is laser printed on the front side of the module housing.



Figure 6: AC150-A3 (2G/3G) module nameplate

2.3.1. Type designation

Product type designation can be found on the module's nameplate, which is located on front side of the module (see Figure 1 and chapter 2.3. Nameplate). In Table 1, explanation of the module type designation can be found.

Example: AC150-A3.01

	Α	С	1	50	-	A 3	•	0	1
Program									
A: Advanced Communication device									
Series									
1: Communication module									
Family									
50: Compatible with AM500 series meter, AC7	50, /	AC5	50						
Separator: - (minus)									
Communication technology									
A3: GSM/GPRS and UMTS (2G/3G)									
Separator: . (dot) *									
Generation *									
09: Generation of the device									
Version within the generation *									
19: Version related to re-approval									

* Type designation of the 1st-generation product is written without generation (and version within generation). *Table 1: Type designation*

2.4. Block diagram



Figure 7: 2G/3G communication module – block diagram

2.5. P* communication module concept

P* communication module concept is based on interface that provides hot plug insertion of various communication modules in two placeholders for WAN (LAN) and HAN. Meter / host device side of communication interface provides power to communication module and communication profile to support setup of the communication module over standard and custom set of AT commands.

2.6. Power supply

Power supply for the module is provided by the host device via the P* interface with a DC rated voltage of 20 V and a rated current of 100 mA.

Consumption depends on signal strength and type of communication. Maximum total power delivered to the communication module is 3 W.

2.6.1. Backup power supply - optional

Optionally, the module can be equipped with backup power supply circuit. It ensures redundant power supply (up to 40 seconds of available time after power outage) to the module and host device in a case of power outage of host-device power supply.

The circuit enables Push on Power down feature (Last Gasp), which is managed by the host device and is described in the host device documentation.

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	\sim

NOTE

Charging of backup power supply starts after primary power supply is re-established. It takes up to 60 minutes to fully charge the backup power supply.

2.7. Module connection

Connection reference number IS16148 is printed on the nameplate of the module (see the Figure 6). Pinout, pin designation of the P* module, and reference number of connection can be found in the Figure 8.



Figure 8: Pinout of the AC150-A3 module and reference number of connection (IS16148)

3. MAIN MODULE FUNCTIONALITIES

AC150 communication modules are field exchangeable communication modules (for meters of AM500 family or other Iskraemeco compatible host devices) which are based on P* interface between module and host device. P* interface is Iskraemeco proprietary specification, which is used as a universal communication interface for various communication modules supporting different communication technologies.

Logical interface to P* communication modules is based on well-known AT commands. This means that all the information related to detecting and identifying module, diagnosing, connecting, and disconnecting the network, etc. are retrieved from the communication module via dedicated AT commands.

The GSM/GPRS/UMTS drivers running over P* provides the following services:

- modem initialization,
- registration to mobile network,
- GSM/GPRS/UMTS network diagnostic,
- CSD call management (GSM),
- packet oriented data transfer (GSM/GPRS/UMTS),
- SMS functionality.

3.1. Communication module detection

The Communication modules are designed for be detected automatically. The modules may be exchanged either when the host device is not powered or during normal operation. If the communication module is replaced, the existing parameters will be automatically retrieved by the new communication module.

3.2. Communication module reset

In order to assure permanent communication capability without the need for human intervention, the module is constantly being monitored by the host device. In case that condition which would cause inability to communicate is detected, the module is being reset by the host device.

The reset is being triggered by a connection timeout, which is the time duration since the last successful communication between the HES (Head End System) and the meter. Connection timeout is parameter set by the object **0-0:128.20.30*255** in the meter (default value is 30 hours).

3.3. Firmware upgrade

The communication module supports firmware upgrade. The upgrade is managed by the host device and is described in its documentation. Firmware of the communication module is available in the **Firmware identification** (1-2:0.2.0*255) and **Firmware signature** (1-2:0.2.8*255) objects in the meter.



NOTE

Communication module Firmware signature is not supported by the meter/host device. The object itself is visible, however without any value.

3.4. Module configuration

Configuration of the module is performed from the host device with following parameters:

- \rightarrow <u>GPRS modem setup</u> (0-0:25.4.0*255)
 - **APN** (access point name of the network)
- $\rightarrow \underline{PPP setup} (0-0:25.3.0*255)$
 - Authentication protocol (in LCP options (link control protocol))
 - No authentication protocol is used
 - The PAP protocol is used
 - The CHAP protocol is used
 - The EAP protocol is used
 - **PPP authentication** (depending on selected **Authentication protocol**, different settings are displayed):
 - No-authentication
 - PAP protocol settings
 - o User name
 - o PAP password
 - CHAP protocol settings
 - o User name
 - Algorithm ID
 - CHAP with MD5 (default)
 - SHA-1
 - MS-CHAP
 - MS-CHAP-2
 - EAP protocol settings
 - o MD5 challenge
 - false
 - true
 - One time password
 - false
 - true

3.5. Connection management

A host device supports communication through GSM/GPRS/UMTS mobile networks. In order to be visible within a GSM/GPRS/UMTS network, the host device must establish connection to GSM/GPRS/UMTS network first. Using special connection management functionality, the host device can either be always connected to the GSM/GPRS/UMTS network or only on request.

Cellular connection management functionality is achieved through the implementation of parameters:

- Auto Connect is intended to control network connectivity (see Table 2)
- Auto Answer is intended for handling wake-up requests (see Table 3)

Name	Logical Name	Attribute	Description
Auto Connect	0-0:2.1.0*255	Mode	 Auto connect functionality is intended to control network connectivity and supports the following operating modes: Always ON: Host device is always connected to the IP network Always ON in time window: Host device is connected to the IP network during defined time window only. Always ON in time window with exception: Host device is connected to the IP network during defined time window. Out of time window host device connects to network when connect method is invoked. Wake up: Host device is usually disconnected and it connects to the network when connect method is invoked.

Name	Logical Name	Attribute	Description
		Repetitions	Maximum number of retrials in case of unsuccessful connection attempts.
		Repetitions delay	The time delay, expressed in seconds until an unsuccessful connection attempt can be repeated. If value is 0, repetitions delay is not specified.
		Calling window	Contains the time points when the window becomes active (Start Time), and inactive (End Time)

Table 2: Auto Connect attributes

Name	Logical Name	Attribute	Description
		Mode	 Defines the working mode of the modem line when the meter is auto answering Attribute value is enumerated: (0) line dedicated to the device, (1) shared line management with a limited number of calls allowed. Once the number of calls is reached, the window status becomes inactive until the next start date, whatever the result of the call, (2) shared line management with a limited number of successful calls allowed. Once the number of successful communications is reached, the window status becomes inactive until the next start becomes inactive until the next start date, (3) currently no modem connected, (20, 255) manufacturer specific modes
		Listening	Defines the time points when the communication window(s) become active (Start Time) and inactive (End Time)
Auto Answer	0-0:2.2.0*255	Status	 Status of the window - defined as: (0) <i>Inactive</i>. The device will manage no new incoming call. This status is automatically reset to active when the next listening window starts (1) <i>Active</i>. The device can answer to the next incoming call (2) <i>Locked</i>. This value can be set automatically by the device or by a specific client when this client has completed its reading session and wants to give the line back to the customer before the end of the window duration. This status is automatically reset to active when the next listening window starts
		Number of	This number is the reference used in modes 1 and 2.
		Number of rings	Defines the number of rings before the meter connects the module. Two cases are distinguished: The number of rings within the window defined by the attribute "In Window" and the number of rings outside the "Out of Window".
		List of callers	 Contains an optional list of calling numbers, which further limits the connectivity of the module based on the calling number. It also controls the acceptance of wake-up requests from a calling number. Each calling number in the list is associated with caller type, defined as: (0) <i>normal CSD call</i>; the modem only connects if the calling number matches this entry in the list. This is tested in addition to all other attributes, e.g. Number of rings, Listening window, etc. (1) <i>wake-up request</i>; calls or messages from this calling number are handled as wake-up requests. The wake-up request is processed immediately regardless of Number of rings.

Table 3: Auto Answer attributes

3.6. Network diagnostic

The network diagnostic attributes are retrieved from the module by the host device. Module diagnostics are covered by attributes stated in Table 4.

Name	Logical Name	Attribute	Description
		Operator	Name of connected mobile operator and active technology:
			• 0 2G - GSM
			• 23G - UMTS
		Status	Indicates the registration status of the modem.
			Attribute value is enumerated:
			(0) Not registered,
			 (1) Registered, home network,
			• (2) Not registered, but MT is currently searching a new operator to
			register to
			• (3) Registration denied,
			• (4) Unknown,
			• (5) Registered, roaming
			• (6) (255) reserved.
		Current circuit	Indicates the current circuit switched status. Enumerated attribute
		switched status	Values:
			• (0) Inactive, (4) In complete coll
			• (1) Incoming call,
			• (2) Active
S			• (3) (255) reserved.
nosti			Since CSD is not supported in AMS50 meters, the Current circuit
		Packet switched	Indicates the packet switched status of the modem. Enumerated
ag	0-0:25.6.0*255	status	attribute values:
ē			• (0) Inactive,
Σ			• (1) GPRS,
S S			• (2) EDGE,
U			• (3) UMTS,
			• (4) HSDPA.
			• (5) LTE.
			• (6) CDMA
			• (7) (255) reserved
			Packet switched status will display value other than "(0)-Inactive" when
			active PDP context is established with the corresponding mobile
			network.
		Cell information	Represents the cell information with Cell ID, LAC (Local Area Code),
			Signal Quality, BER (Bit error) information
			Signal quality values:
			• 09 – poor (please reposition the device of use external antenna)
			• $1017 - 1011$
			• $1024 - 9000$
			 2051 – EXCENENT 00. not known, or not detectable
		Adiagont galla	39 - HOL KNOWN, OF NOT DETECTABLE Personnets error of information for paichbour calls. For each call. Call
		Aujacent cells	In and Signal Quality are presented
		Capture time	Holds the date and time when the data have been last captured.

Table 4: Network diagnostic attributes

3.7. Short message service (SMS)

The module supports SMS service, which is used for GSM/GPRS/UMTS Wake-up functionality. Incoming SMS can trigger the Wake-up procedure (establishing PDP context). The configuration of the Wake-up functionality is done from the meter and described in its documentation.

4. INSTALLATION PROCEDURE



WARNING!

Electro Static electricity can harm some parts of the module/host device. To prevent electro static damage:

- Discharge static electricity from your body before handling with the module. You can do so by touching an unpainted grounded metal surface.
- Do not touch the electrical components and connector of the communication module with bare hands due to the ESD susceptibility of the communication module! Use the gloves (ESD, fine cotton...) – see also the recommendation for SIM card handling.



NOTE

Please, do not remove module's PCBs from the plastic PCB cover!

Meter / host device comprises module area, which allows insert, remove, and replace exchangeable modules.

The following steps represent the procedure of assembling the communication module.

For removing the module, follow reverse procedure.

Conceptually removing/inserting of modules is the same for single-phase and three-phase meter or other Iskraemeco compatible host devices.



WARNING

Only authorised personal should open the module cover or host device cover.



WARNING

Because of the general safety issues, it is recommended that host device is unplugged from the electricity network before inserting/removal of module- or host device cover and communication modules.



DANGER

Only modules in original plastic housing can be inserted. It is live hazardous to insert only module PCB.

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4.1. Assembling the communication module

1. Unscrew the sealing screws of module cover.



Figure 9: Inserting communication module - step 1

2. Remove the module cover – slide it out from the base meter (Figure 10).



Figure 10: Inserting communication module – step 2

3. Insert the communication module – slide it on the base meter until pins are not fully inserted in the insertion guides (see the Figure 11).



NOTE

Please, do not remove module's PCBs from the plastic PCB cover!





Figure 11: Inserting communication module – step 3

4. Reattach the module cover – slide it on the base meter (Figure 10).



Figure 12: Inserting communication module – step 4



5. Screw the sealing screws of module cover.



Figure 13: Inserting communication module – step 5

6. Seal the module cover screws if needed.

4.2. SIM card installation



NOTE

SIM card installation procedure is intended for GSM/GPRS/UMTS (2G/3G) module only!

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ATTENTION

To meet the performance, reliability and life span requirements of the metering environment, industrial grade SIM card in accordance to JEDEC, GSM, and ETSI standards must be used.

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IMPORTANT

SIM card PIN

Before installing SIM card in the module, request for PIN of SIM card must be disabled.



RECOMMENDATION

SIM card handling

Do not touch the metal part of a SIM card (see the Figure 15) neither the connector of the SIM-card holder (see the Figure 14) with bare hands! They can be damp or wet.

When you are going to touch a SIM card or the SIM-card holder (e.g. during inserting of a SIM card into the holder), use gloves (ESD, fine cotton...) to protect the metal parts of contact with damp/liquid.

In a long term, it can cause a corrosion and consequently a malfunction of the SIM card.



NOTE

SIM cards delivered from the mobile operator can be of "IMEI SIM lock" type. Once the SIM card is inserted in host device and the device is powered up, the SIM card is locked to this particular device. In a case, someone would try to remove this SIM card and use it in another device (even in a mobile phone), the authentication will not pass due to the security measure.

When communication module (Figure 14) will be used in the host device, a SIM card (Figure 15) needs to be installed in the module for establishing successful communication,



On the bottom side of the module, there is the SIM-card holder (see the Figure 14). A SIM card (for example, see the Figure 15) must be properly inserted that successful communication can be established.



Figure 14: Bottom side of the communication module with SIM-card holder



Figure 15: Example of an industrial-grade SIM card

For properly inserting the SIM card into the module, follow procedure described below and recommendations.

4.2.1. Inserting SIM card into SIM-card holder of Push-Push type

- 1. If host device is already connected to electricity network, there is no need to disconnect the voltage.
- 2. Remove module/device cover and the communication module (see user manual of host device).
- 3. Orient (SIM card chip is faced down) and insert SIM card into protective metal shield. Push it to the end of the shield until click.





Figure 16: Inserting SIM card into SIM-card holder of Push-Push type



NOTE

For removing SIM card out of the (Push-Push) SIM-card holder, push a SIM card in the same way as it was inserted; it will be ejected out of the holder.

- 4. Install the communication module back on the meter/host device.
- 5. Put the communication module cover on the meter / device cover on the host device.



CAUTION!

Do not insert incorrectly oriented SIM card into protective metal shield! **Do not** leave not enough inserted SIM card!

4.3. Disassembling the module

For disassembling the module, follow reverse procedure of assembling, which is described in the chapter *4.1.* Assembling the communication module.

5. TECHNICAL CHARACTERISTICS

5.1. AC150-A3 GSM/GPRS/UMTS (2G/3G) module

- Shielded modem
- Dual band UMTS:
 - B8 (900 MHz) maximum transmitting power (+15.6 dBm),
 - B1 (2100 MHz) maximum transmitting power (+20.1 dBm)
- Dual band GSM:
 - E-GSM (900 MHz) maximum transmitting power (+25.6 dBm),
 - DCS (1800 MHz) maximum transmitting power (+28.4 dBm)
- 1.8 V / 3.0 V SIM interface
- SIM/USIM support
- GPRS Class 12
- Push on Power down (Last gasp)

5.2. Power consumption

Consumption depends on signal strength and type of communication; it is max. 3 W in communication mode with low signal.

5.3. Environment conditions

Temperature ranges:

- operation: -40 °C to +70 °C
- storage: -40 °C to +85 °C

Air humidity: max. 95%

Module IP protection class:

- Unplugged no protection.
- Plugged according to the IP protection class of host device.

Owing to periodic improvements of our products, the supplied products can differ in some details from information stated in this document.

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