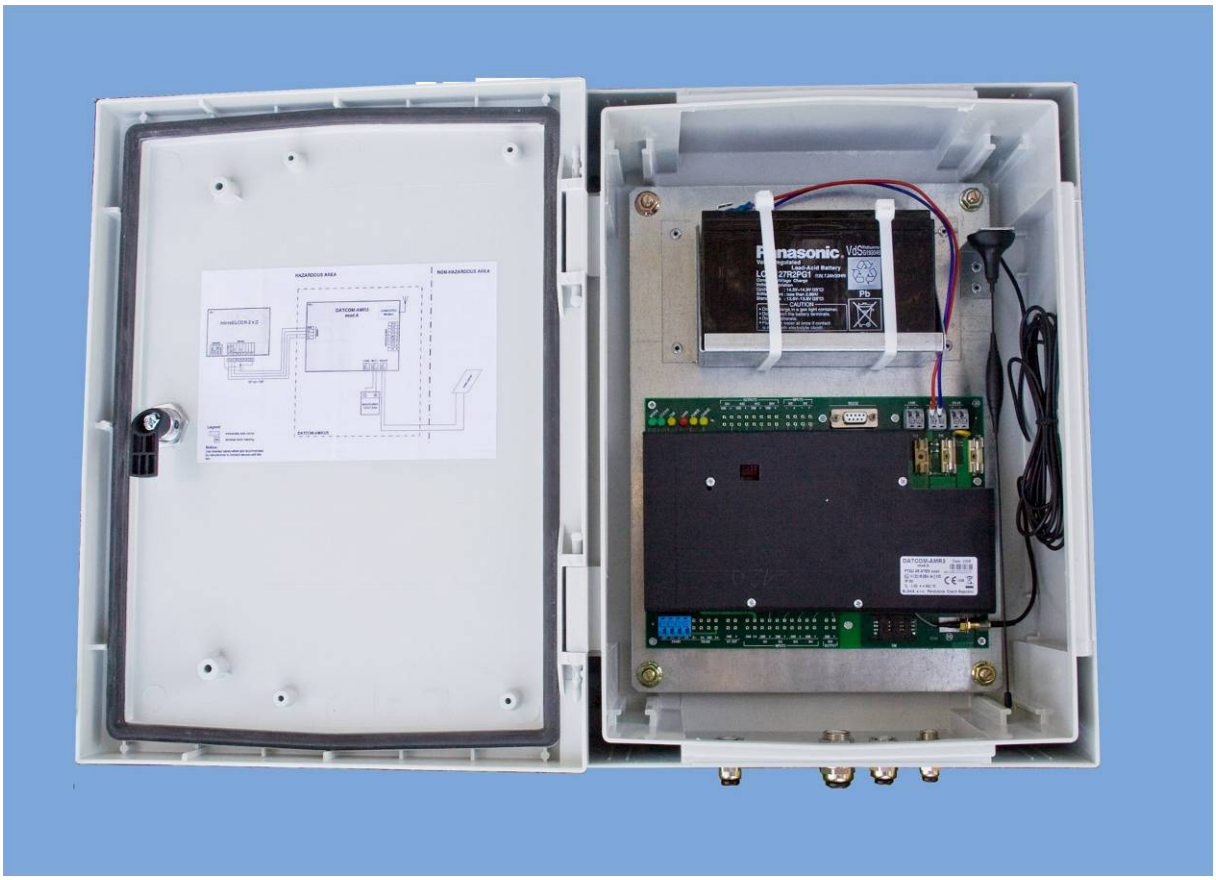
Automatic Meter Reading
DATCOM-AMR3/S

Technical specification
Instructions for use and assembly



Rev. 0

September 2008

Contents

Attachments:

EC-Type Examination Certificate FTZÚ 08 ATEX 0269X, DATCOM-AMR3/S

1 Product Identification

Product: DATCOM-AMR3/S
Automatic meter reading

Producer: ELGAS, s.r.o.
Ohrazenice 211, 533 53 Pardubice

2 Equipment Description

DATCOM-AMR3/S automatic meter reading system is determined for remote data transfer from decoders of microELCOR-2, ELCOR-2 types etc. and their alternative types. The equipment is placed in a resistant plastic box. The box's primary element is a GPRS communication board marked DATCOM-AMR3, which supplies all necessary functions for the communication with a connected decoder integrated with a GSM/GPRS modem. The box is also fitted with a power accumulator and a GSM aerial. The DATCOM-AMR3/S equipment is approved for operation in an explosion risk medium (ZONE2) and has been issued an EC model approval.

Notice:

The box is designed for operation in an explosion risk medium, ZONE2 type (see [5]). Therefore it is needed to follow safety standards and steps specified in these instructions during the assembly, operation and maintenance.

The box should not be used in a ZONE1 medium.

The box is not intended for power supply; all devices are fed by a service-free leaded enclosed cell. The cell is a part of the box and is charged there, too. Charging cell's energy is through a solar panel. The solar panel is placed outside the explosion risk medium and is connected to the box with a cable. Cell charging is managed with a control unit, which is a part of the DATCOM-AMR3 transceiver. The control unit protects the cell against deep discharge; in fatal cell voltage drop the load is disengaged.

DATCOM-AMR3 module also serves as a safe separation of sparking-safe digital outputs of the decoder from other communication circuits. It is also in charge of conversion of an RS485 communication interface of the connected decoder to an RS232 interface for communication via an integrated communication modem.

The specified cell type (see further) complies with the requirements of the safety standard [1] for operation in an explosion risk medium ZONE 2 (see [5]). Therefore no adjustments or changes in the connection that are not approved of by the producer are admissible. For the supply of cables from the decoder and the solar panel, the box is fitted with cable inlets.

Due to minimizing of current take-off from the cell, DATCOM-AMR3 module internal firmware helps control the connecting and disconnecting of modem supply. The modem is then connected in time intervals adjustable in DATCOM-AMR3 parameters.

DATCOM-AMR3 module is parameterized by means of SW TELVES from a PC computer. A PC computer is connected in a D-Sub9 connector of the DATCOM-AMR3 module.

Note:

To configure the device via a PC computer you need to use a computer with battery feeding (e.g. notebook), which must not be connected to an electric distribution network. A machine safety requirement states that maximum voltage connected to the machine cannot exceed Um=60V (see EC-Type Examination Certificate FTZÚ 08 ATEX 0269X).

When setting remote data transfer you need to aptly select parameters (especially modem connection transfer relation frequency and length) with regard to the capacity of used feeding accumulator and possibly also the lifetime of the internal battery of the connected decoder.

Main parts of the box:

- GPRS DATCOM-AMR3 transceiver
- Service-free leaded enclosed cell (VRLA), Panasonic
  Recommended type are e.g. LC-R127R2PG, LC-R1212PG etc. The capacity of a used integrated accumulator according to ČSN EN 60079-15 cannot exceed a value of 25 Ahr.

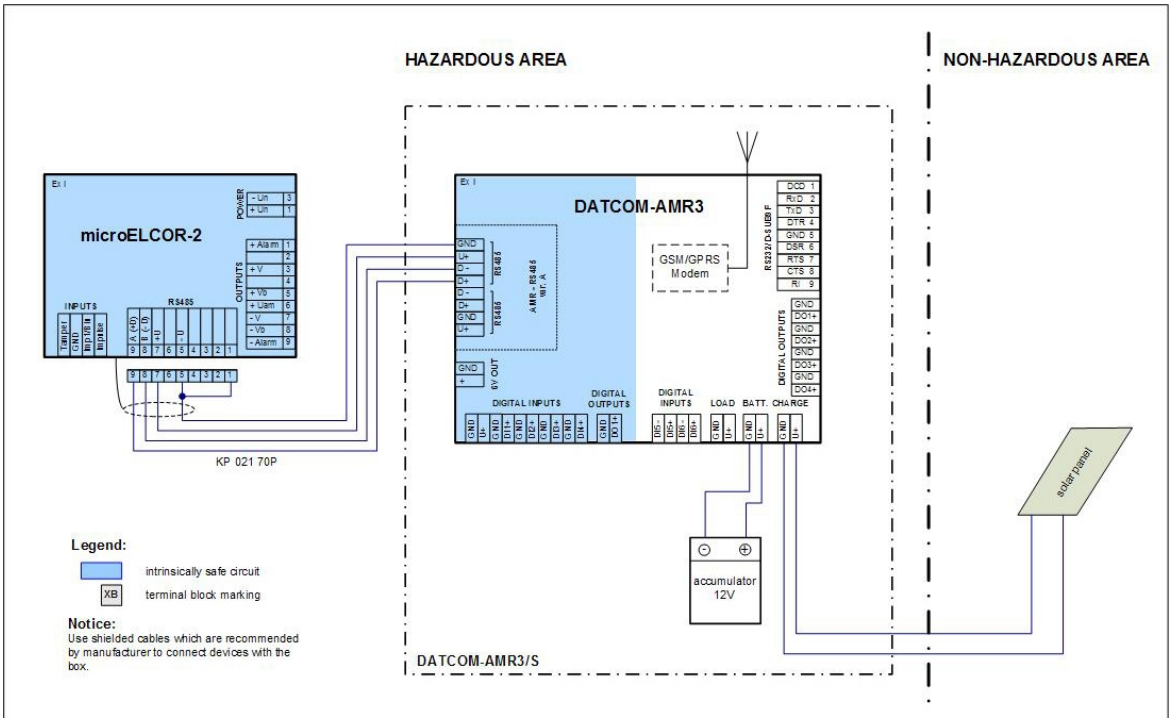


Fig. 1 Example of connection between DATCOM-AMR3/S and microELCOR-2 decoder

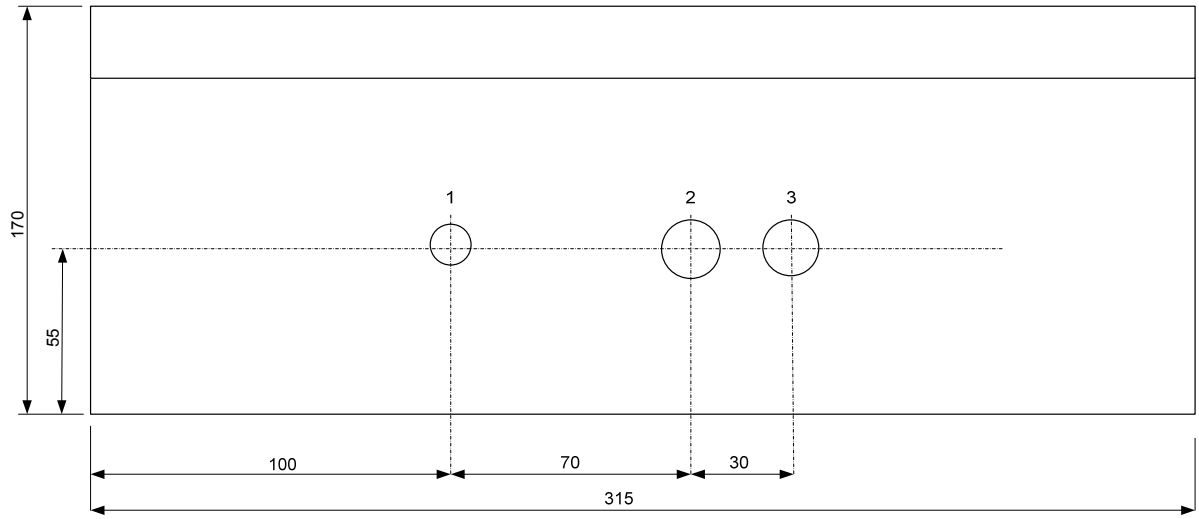
3 Equipment Assembly

DATCOM-AMR3/S equipment is supplied without a connected accumulator and solar panel. Due to the transport the accumulator may be supplied separately, too. The equipment box is therefore also supplied without assembled cable outlets. The SIM card is not a part of the delivery and so it is not a part of the fitting of the DATCOM-AMR3 panel holder.

3.1 Cable Outlet Assembly

The pre-drilled holes in the bottom of the box are fitted with metal cable outlets (part of the bag with outfit) according to the diameter of the drilled holes. Cable outlets are fitted with rubber sealing in the lower nut fitted to the bottom from outside. Inside the box a metal nut is mounted to the outlet and tightened with a spanner. A correctly installed cable outlet ensures a prescribed protection IP65.

In case of cable outlets specified for cables with sparking-safe signals, a blue plate needs to be fitted to the lower nut of the outlet during assembly. This marking identifies an outlet for a cable with sparking-safe safety circuits. An example of layout and determination of cable outlets are shown in the Fig. below.



Cable entries:

No.	size	type	comment	cable diameter
1	PG7-blue	HSK-M	cable with intrinsically safe circuit, communication with EVC	3 - 6.5 mm
2	PG11	HSK-M	reserve (modem antenna)	5 - 10 mm
3	PG9	HSK-M	solar panel inlet	4 - 8 mm

Fig. 2 Cable outlets

3.2 Accumulator Assembly

The equipment must be fitted only with a prescribed accumulator type. Place the accumulator in a sheet holder so that the electric outlets of the accumulator are placed at the top left facing the modem in the installed box. The accumulator is mechanically held in the holder with the help of a plastic tightening strip (a part of the fittings). Pass the inlet cables to the accumulator under the tightening strip so that after the strip is tightened, the cables with Faston clips cannot randomly fall out of the accumulator contact.

Do not connect cable inlets to the accumulator for the time being.

Note:

In case that the accumulator has not been used for more than three months, it needs to be charged before the use. The accumulator is equipped with a safety valve and should not be charged in an "upside down" position.

Important:

The equipment should not be connected to a solar panel, if the feeding accumulator is electrically disconnected.

Fig. 3 Securing accumulator and its inlets

3.3 Box Assembly

The box is intended to be hung on the wall. Recommended cable types to connect the box with other devices are shown in the table.

For the connection of the cabling there are clips in the device in the vicinity of which the signals are described in form of a printed circuit board and which are led to the given terminal. Before connecting the cables it is first needed to place cups on the conductor endings and press them by means of pliers recommended by the cup producer. Conductors ended with cups can be inserted into clips with no use of a tool; when taking out the conductor slightly press the clip lug and gently take out the conductor. In case of strong pressing on the clip lug the conductor can be pressed with a contact bar to the other clip side and its take-out is worsened!!!

Shielded cables need to be used for the correction functioning of the machine and its protection against outer disturbance. At the same time it is needed to follow the principles of *installing the shielding to avoid the creation of earth loops.*

At SRO cables the temperature resistance given by the producer is within –5°C - +45°C. The producer Lappkabel Stuttgart states for its Unitronik LiYCY products resistance for movable inlets within –5°C - + 70°C and for fixed inlets –30°C - +80°C. These values also specify temperature conditions for the equipment assembly.

Cable type	*From where*	*When*	*Note 1*	*Note 2*
CMSM 2 x 0,75	Box, terminals CHARGE(SOLAR)/GND,U+	Solar panel connecting box		Solar panel connection
Unitronic LiYCY 4 x 0.34 (Lappkabel Stuttgart)	Sparking-safe terminals DATCOM-AMR3, mod A, terminals RS485	Decoder, sparking-safe interface RS485	Shielded cable	Decoder communication cable
Unitronic LiYCY 6 x 0.25 (Lappkabel Stuttgart) SRO 6.22 ČSN347761 (Kablo Velké Meziříčí)	Sparking-safe terminals DATCOM-AMR3, terminals INPUTS	Decoder, sparking-safe impulse outlets	Shielded cable	optional
Unitronic LiYCY 2 x 0.75 (Lappkabel Stuttgart)	Sparking-safe terminals DATCOM-AMR3, terminals 6V OUT	Decoder, external supply	Shielded cable	optional
Unitronic LiYCY 2 x 0.25 (Lappkabel Stuttgart) SRO 2.22 ČSN347761 (Kablo Velké Meziříčí)	Sparking-safe terminals DATCOM-AMR3, terminals OUTPUT/DO1	Decoder, sparking-safe digital outlet	Shielded cable	optional

Tab. 1 Recommended cable types

Notes:

1) Decoder shielded cable – do not connect shielding on the DATCOM-AMR3/S side, on the decoder side join the cable shielding with the decoder box in the cable outlet
2) Place aerial directly in the DATCOM-AMR3/S enclosed box. If the GSM aerial is placed outside the box, it has to be placed outside the ZONE2 environment.
3) Unengaged cable outlets have to be tightened with plug (IP65 protection rating needs to be kept)
4) In case of change of the accumulator always use the accumulator type prescribed in the documentation.

Special conditions for safe use [6]:

1. **DATCOM-AMR3/S telemetric box should not be installed in places exposed to solar radiation and in external conditions possibly leading to the creation of an electrostatic charge or in an environment with mechanical damage risk. The box must be opened only with the help of a damp cloth.**
2. **It is only permitted to use an accumulator specified by the producer.**
3. **The accumulator should not be disconnected when the solar panel is connected.**

The equipment needs to be mounted in compliance with technical conditions. In case of assembly in outer space it is apt to select a place with no direct sunlight.

3.3.1 Mechanical Assembly

a) Direct attachment

Pre-marked holes in the box bottom are drilled in a pitch of 475 x 200 with a Ø6.2 drill and through them the box is attached either directly to the wall with woodscrews 6 x 30 ČSN 021814 into dowels or screws M6 x 20 ČSN 021131 to steel construction. Under screw heads (woodscrews) insert a sealing plate to keep the box protection (see Fig. 4).

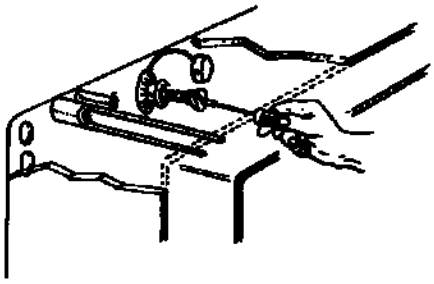


Fig. 4 Assembly "Direct Attachment"

b) Assembly through clips

Use the attached joining material to fit in metal clips in edge holes in the bottom of the box (see Fig. 5). Such a box can be attached on wall with woodscrews 6 x 30 ČSN 021816 into dowels and/or screws M6 x 20 ČSN 021131 in the steel construction.

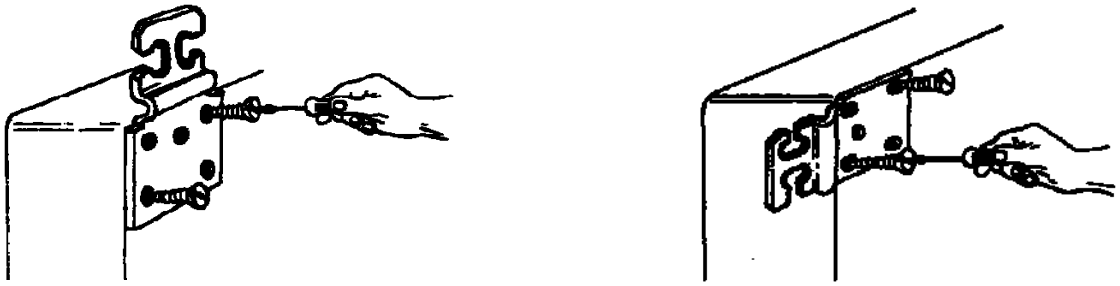


Fig. 5 Assembly through clips

3.4 Solar Panel Assembly

Solar panel assembly in the holder (see Fig. 6) is performed with two M6 screws through fan washers. Such pre-assembled holder with solar panel is fitted to 2“ tube (not part of the delivery) and an M8 screw helps arrest into position upon turning in the required direction. Solar panel tilt is then secured with the above stated M6 screws.

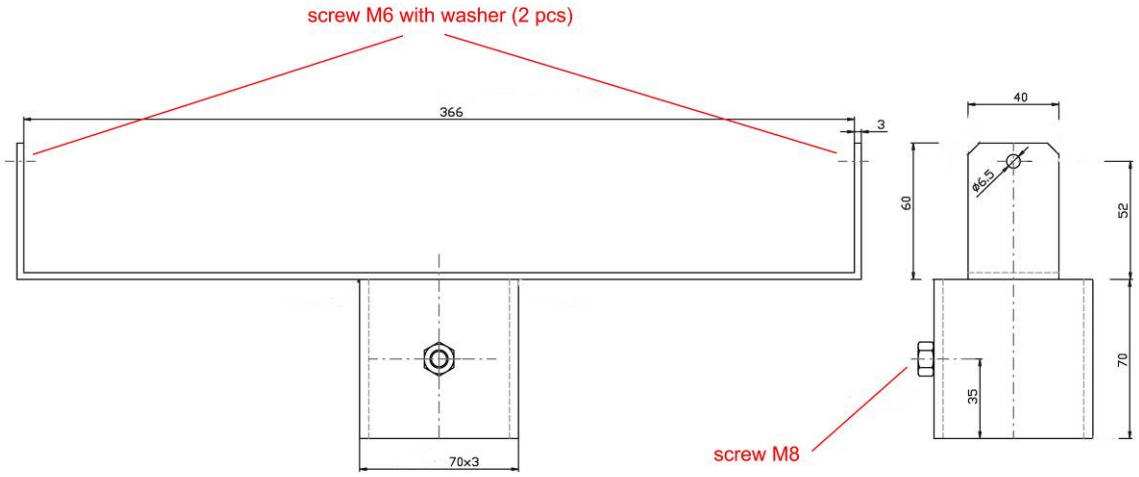


Fig. 6 Solar panel holder

Recommendations for solar panel assembly

Solar panel surface needs to be kept clean; otherwise its efficiency is reduced. Solar panel also needs to be installed so that it is not even partially shaded during the whole calendar year.

Optimal setting of panel direction and tilt depends on the seasons and geographical position of the place of installation. The least favourable conditions are in the winter period. For fixed position setting during the whole year it is recommended to set the solar panel tilt angle between 40° and 56° from the horizontal position for installation with the latitude of approx. 30°N (see Fig. 7).

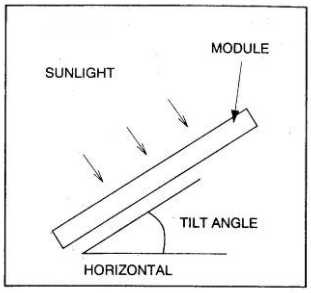


Fig. 7 Solar panel tilt

3.5 Connection of the Box with Other Devices

Communication cable from the decoder goes through the blue-marked cable inlet in the box to the RS485 terminals of the DATCOM-AMR3 module. Cable shielding on the side of DATCOM-AMR3/S is not connected, on the decoder side the shielding is connected with a connector sheet cover, and/or a decoder box. For individual cable conductors we recommend to end with pressed-in cups to connect in the DATCOM-AMR3 connecting box.

Solar panel input is connected in the CHARGE (SOLAR) terminals of the DATCOM-AMR3 transceiver. Before connecting a cable in the solar panel check accumulator connection and check the correctness of connection of the solar panel from the viewpoint of polarity.

Cable inlet No. 3 (PG11) serves as a reserve in case of need to place a GSM modem aerial outside the box e.g. in case of weak signal.

Note:
Should the aerial be placed outside the equipment box, it needs to be placed in a space of no explosion risk.

Note:
All unused cable inlets have to be blinded with cable seals during transport (part of the fittings). Also cables coming through cable inlets must be regularly sealed with tightened inlets. Protection rating IP65 of the box must remain intact.

4 Putting into Operation

4.1 Insertion of a SIM card for the modem

The modem SIM card can be inserted or exchanged both on the disconnected and connected equipment – modem (indication of modem connection or disconnection – see Table 2). SIM card is inserted in a plastic holder, which is placed in the right bottom part of the panel.

Before the insertion or removal of the SIM card, the holder (see Fig. 8) must first be mechanically released by moving the upper holder element to the right (1 – OPEN direction) and by tilting the whole upper element to the right (2). The correct orientation of the inserted SIM card is secured with a bevelled edge on both the card and the holder. After inserting the card by moving it in the holder's upper element (3), the holder must again be closed (4) and secured by moving the holder's upper element to the left (5 – LOCK direction).

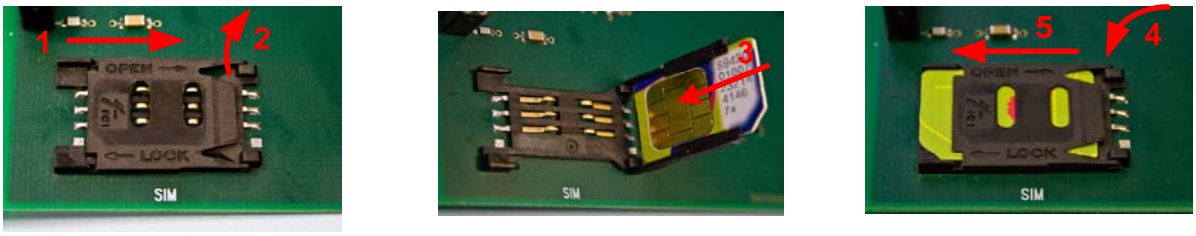


Fig. 8 Steps for the insertion of a SIM card

If the used SIM card has a PIN code protection, the PIN code needs to be entered in the equipment parameters by means of communication through a service interface. The correct functioning of the equipment upon the change of the SIM card can be find out by means of LED diode "Modem" signalling, see Table 2.

Note:

If there is a problem in the communication between the PC and the device through RS232 after the insertion of a SIM card with the modem ON, restart the machine feed (i.e. disconnection of the solar and the accumulator and their repeated connection in sequence according to 4.2).

4.2 Electric Connection and Line Protection

DATCOM-AMR3/S equipment is not equipped with a connector. DATCOM-AMR3 transceiver contains three glass tube fuses:

F11 – accumulator protection (BATT terminals)

F10 – solar panel feed protection (CHARGE (SOLAR) terminals)

F12 – protection of load connected to LOAD terminals

Because incorrect service could lead to the damage of electric circuits, it is always needed to keep the sequence of connection and disconnection of individual circuits as follows:

On connection you need to keep the following sequence:

1. Connect accumulator

2. Connect solar panel

If the accumulator has been replaced, **the disconnection/connection must be performed in the following sequence:**

1. Solar panel disconnection,
2. Accumulator disconnection
3. Exchange of accumulator
4. Accumulator connection
5. Solar panel connection

4.3 Equipment Switching ON

Upon checking polarity, make sure there is no explosive atmosphere present. The switching of the station ON is done by connecting the feed from the accumulator and solar panel in the prescribed sequence:

1. Accumulator connection
   - After connecting the feed, the charging control unit (part of the transceiver panel) makes an internal test (LED indication diodes light up) and LED diode CHARGE flashes indicating the solar panel connection. After finishing the test only a diode indicating the charging balance of the accumulator remains flashing.
2. Solar panel connection
   - LED diode CHARGE lights on the machine

In the following step the DATCOM-AMR3 machine needs to be set with the help of a PC with TELVES program [8].

5 Instructions for Use

The equipment needs no service. The machine activity is indicated by means of LED placed in the upper left part of the DATCOM-AMR3 panel and is accessible upon opening the box. The used accumulator is enclosed and under standard operational conditions it is gas resistant.

If the box is placed directly in the environment ZONE2, it is not permitted to open the box, should there be an explosive atmosphere.

Note:

Before opening the box in the environment ZONE2, make sure there is no explosive atmosphere present.

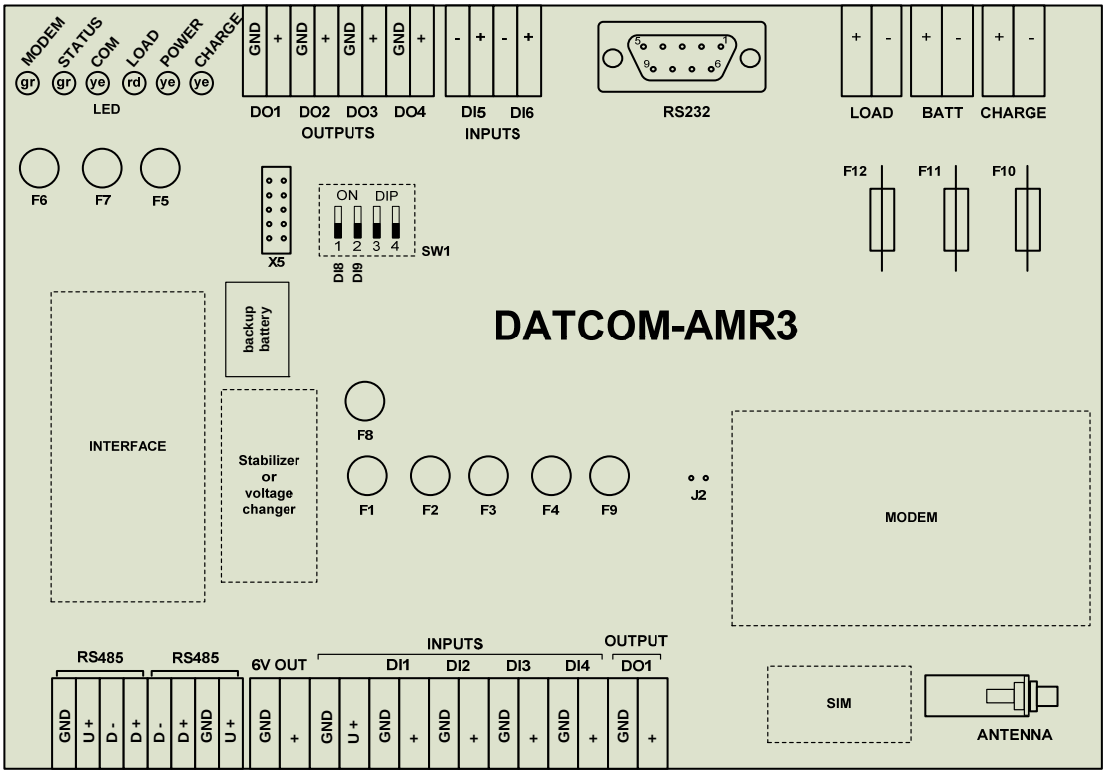


Fig. 9 Distribution of terminals and main DATCOM-AMR3 elements (full fitting)

Name	*Colour*	*LED condition*	*Description*
MODEM	Green	No light	Modem switched off
		Flashes with a per. of 1 sec	Modem service - modem logged on to the operator's network
		1x short flash With a period of 3 sec	Modem connected to the operator's network.
		2x short flash With a per. of 3 sec	Modem logged-on to GPRS.
STATUS	Green	No light	Machine with no feed
		1x short flash	Machine status OK. Status indication period by machine operation regime.[1)]
		5x short flash	Machine status Err or Wrn.[2)] Status indication period by machine operation regime.[1)]
COM	Yellow	Flashes	Communication with the machine via a modem or infra head.
LOAD	Red	ON	Load connection indication
POWER	Yellow	ON	Accumulator connection indication
CHARGE	Yellow	ON	Accumulator charging indication

Tab. 2 LED indication diodes of DATCOM-AMR3 transceiver

[1)] Should the machine be in the economic mode (disconnected modem), the status is indicated with a period of 1 minute. Should the machine be in the working mode (connected modem), the status is indicated with a period of 1 second.

[2)] Should there be any problem with the equipment, this state is then indicated with warning flashing – five short flashes per second. Warning flashing in the working mode (connected mode) is shown as undisturbed flashing with a period of 200ms. The exact cause of the warning flashing needs to be learnt by communicating with the machine through a service interface or via the GSM/GPRS network. For the list of causes see 5.1.

5.1 List of Causes for LED "Status" Warning Flashing

Warning flashing is activated both in case of machine error (Err) and in case of machine warning (Wrn). The exact cause needs to found out via a PC or SW Telves.

No.	*Cause*	*Possible causes, elimination*	*Machine status*
E0	Error in the firmware control sum	Firmware replay	Err
E1	CRC leader error (bootstrap)	FLASH memory error, repair in ASS needed	Err
E2	CRC machine parameters error	Save repeated parameters	Err
E3	RAM machine memory error	RAM memory error, repair in ASS needed	Err
E4	FLASH machine memory error	FLASH memory error, repair in ASS needed	Err
E5	Full setting archive	Machine is working, but no machine parameter can be changed – erase setting archive in ASS	Err
E7	Error of machine communication with connected device	Check cabling or the correctness of setting of communication parameters (speed, protocol, etc.)	Err
E8	Error in the connected device	Eliminate the error in the device (see the relevant manual)	Err
E10	Error in the calculation of the compressibility table due to input parameters	Gas composition repair	Err
E11	No option of calculating compressibility due to the limitation of used standard or nonexistence of the calculated table	E11 is eliminated by eliminating E10	Err
E12	Error in the control sum in the battery	Change LP-04	Err
W0	Warning report	Meter failure, set the status of the relevant counter Other cause – ASS needs to be	Wrn

		contacted	
W1	Supply battery capacity dropped under 10%	Warning of the coming end of battery lifetime LP-04	Wrn
W2	Battery communication error	May influence the correctness of data of the reported lifetime of the supply battery	Wrn

Tab. 3 List of error reports

5.2 Integrated Accumulator Charging Regulator

Function:

The regulator protects the accumulator against overcharging from the solar cell and against deep discharge with the connected load. The charging characteristics include several statuses.

Safety function:

To protect the battery against excessive discharge, the regulator releases load, if the battery is threatened by deep discharge.

Protection against short-circuit:

Regulator has an integrated electric fuse, which releases the load in case of short-circuit.

Solar cell polarity inversion:

Electric fuse protects the regulator, if the solar cell is attached with inversed polarity.

Battery polarity inversion:

If the battery is by mistake connected with inversed polarity, the integrated electric fuse protects the regulator.

Warning:

Should the battery be connected with inversed polarity, the voltage on load terminals is also inversed. The load connection to the regulator terminals may be dangerous.

Note

In case that the accumulator is discharged for some reasons, the regulator disconnects the load (i.e. disconnects the station). In that case the discharged accumulator needs to be changed for a charged one within a fortnight.

6 Technical Parameters

Mechanical parameters	
- Box type	ARIA 43
- Environment operational temperature	-10 °F to +140 °F (-20 °C to +60 °C)
- Box dimensions:	315 x 415 x 175 mm (no cable inlets and lock)
- Weight (including the accumulator)	7.8 kg
- Box covering	IP 65
Explosion protection	
- Non-explosion marking	II 3G (2)G Ex nA [ia] IIA T3
- ES certificate of type testing	FTZÚ 08 ATEX 0269X
- Um maximum value	60 V
Accumulator charging solar control unit	
- Nominal voltage	12 V
- Accumulator protection against deep discharge	Yes
- Boost voltage	14.5 V (VRLA aku)
- Equalization voltage	14.8 V (VRLA Aku)
- Float voltage	13.7 V (VRLA Aku)
Feed (connection of a 12V accumulator)	
- Connection	2 conductors-grey terminals 2.5 mm^2
- Description of terminals	BATT (+,-)
- Supply voltage extent	10.5 -15 V
- Accumulator type	Enclosed leaded cell VRLA, Panasonic (Type LC-R127R2PG1, LC-RA1212PG, etc.)
Charging (solar panel connection)	
- Connection	2 conductors-grey terminals 2.5 mm^2
- Description of terminals	CHARGE(SOLAR) (+,-)
Load	
- Connection	2 conductors-grey terminals 2.5 mm^2
- Description of terminals	LOAD (+,-)
- Output voltage	10.5 – 15 V
- Maximum current	1 A
Interface RS485 (sparking-safe)	
- Connection	4 conductors – blue terminals 1.5 mm^2
- Description of terminals	RS485 (GND, U+, D+, D-)
- Maximum communication speed	38.4 kBd
- Maximum cable length	100 m[1)]
- Sparking-safety parameters	- see chapter 7
Decoder feeding source (sparking-safe)	
- Connection	2 conductors – blue terminals 1.5 mm^2
- Description of terminals	6V OUT (GND,+)
- Empty voltage	Typical 6.5 V
- Cable maximum length	30 m[1)]
- Sparking-safety parameters	- see chapter 7
Digital inputs (sparking-safe)	

- Number of inputs	4
- Connection	2 conductors – blue terminals 1.5 mm^2
- Description of terminals	INPUTS – DI1, DI2, DI3, DI4 (+, GND)
- Input type	Binary, NF impulse (SW configurable
- Output voltage	6.5 V type (INPUTS – GND, U+ terminals) -the voltage is aimed for feeding galvanized separated output circuits of the connected equipment – e.g.ELCOR-2
- Cable maximum length	30 m[1)]
- Sparking-safety parameters	- see chapter 7
Digital output (sparking-safe)	
- Number of outputs	1
- Connection	2 conductors– blue terminals 1.5 mm^2
- Description of terminals	OUTPUT – DO1 (+, GND)
- Output type	Open collector
- Output options	Binary, NF impulse (SW configurable)
- Maximum recommended cable length	30 m[1)]
- Maximum voltage	7.9 V
- Maximum current	11 mA
- Sparking-safety parameters	- see chapter 7
Digital outputs	
- Number of outputs	4
- Connection	2 conductors – grey terminals 1.5 mm^2
- Description of terminals	OUTPUT – DO1, DO2, DO3, DO4 (+,GND)
- Output type	Open collector
- Output options	Binary, NF impulse (SW configurable)
- Maximum recommended cable length	30 m[1)]
- Maximum voltage	30 V
- Maximum current	100 mA
- Maximum resistance in closed state	10 R
Digital inputs	
- Number of inputs	2
- Connection	2 conductors – grey terminals 1.5 mm^2
- Description of terminals	INPUTS – DI5, DI6, (+, GND)
- No-load voltage	3 V
- Short-circuit current	3 uA
- Maximum cable length	30 m
Interface RS232	
- Connection	2 conductors – connector D-Sub9 (TXD,RXD)
- Communication speed	38,4 kBd (fixed)
- Maximum recommended cable length	30 m
Communication – integrated modem	
- Modem type	Enfora Enabler-IIG (or equivalent)
- Connection type	GSM/GPRS
- Modem feed	Program connecting and disconnecting control

[1)] Cable induction and capacity (depending on the used length and cable type) must be in compliance with non-explosion system parameters.

7 Sparking Safety Parameters

1. Non-sparking-safe feed and inputs/outputs (grey terminals DO1-DO4, DI5, DI6, BATT, CHARGE(SOLAR), LOAD and RS232 interface connector)

U_m = 60 V*

* The voltage cannot be derived from the network!

2. Sparking-safe source (6V OUT terminals)

Uo = 7,9 V; Io = 112 mA; Po = 325 mW

	IIC	IIB
Co	5 uF	80 uF
Lo	2 mH	7 mH

3. Sparking-safe digital inputs, digital output, RS485 communication (terminals INPUTS, OUTPUT, RS485)

Uo = 7,9 V

Io = 112 mA (3 mA for terminals DI1, DI2, DI3, DI4)

Po = 325 mW (6 mW for terminals DI1, DI2, DI3, DI4)

	IIC	IIB
ΣCo	5 uF	80 uF
ΣLo	2 mH	7 mH

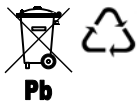
Ui = 7,9 V; Pi = 675 mW; Ci = 3,8 uF; Li = 0 uH

Safety note to the module application

All these three groups of sparking-safe terminals (digital inputs, digital outputs and RS485 communication) are from the viewpoint of non-explosiveness regarded as one sparking-safe circuit (have common input/output parameters). Therefore it is needed to consider the non-explosiveness of the whole system when connecting the machine to any grade of sparking-safe terminals (i.e. all three groups of terminals).

4. Ambient Temperature

Ta = -20°C to +60°C



Battery used in the device belongs to the category of hazardous waste. Used battery may be returned to the producer.

8 Literature

[1] ČSN EN 60079-0 : 2004, Elektrická zařízení pro výbušnou plynnou atmosféru – Část 0: Všeobecné požadavky

[2] ČSN EN 60079-15 : 2004, Elektrická zařízení pro výbušnou plynnou atmosféru – Část 15: Typ ochrany „n“

[3] ČSN EN 60079-14 : 1999, Elektrická zařízení pro výbušnou plynnou atmosféru – Část 14: Elektrická instalace v nebezpečných prostorech (jiných než důlních)

[4] ČSN EN 60529 : 1993, Stupně ochrany krytem (krytí – IP kód)

[5] ČSN EN 60079-10 : 1997, Elektrická zařízení pro výbušnou plynnou atmosféru – Část 10: Určování nebezpečných prostorů

[6] EC-Type Examination Certificate FTZÚ 08 ATEX 0269X, DATCOM-AMR3/S

[7] DATCOM-AMR3, Technický popis, Návod k obsluze

[8] TELVES.exe, Elgas, s. r. o., software dodáván s přístrojem

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