Port expander CDE7
USER´S GUIDE

ISO 9001:2001

Contents

Symbols used

Danger – important notice, which may have an influence on the user's safety or the function of the device.

Attention – notice on possible problems, which can arise to in specific cases.

Information, notice – information, which contains useful advices or special interest.

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1. Safety instructions

Please observe the following safety instructions:

- The expander has to be used in accordance with all applicable international and national laws or any special regulations that may govern its use for particular applications and devices.
- Use only the original Conel company accessories. Thus you will prevent possible health risks and damage to the devices and ensure compliance with all relevant provisions. Unauthorised adjustments or use of unapproved accessories may result in damage to the expander and breach of applicable laws. Use of unapproved adjustments or accessories may lead to cancellation of guarantee, which has no effects on your legal rights.
- You are not allowed to open the expander.
- Voltage on the expander supply connector shall not be exceeded.
- Do not expose the expander to extreme conditions. Protect it from dust, moisture and heat.
- **It is recommended to create proper copy or backup of all the important settings saved in the device's memory.**

2. Description of the port expander CDE7

2.1. General

CDE7 is a data transmission device. Port expander is one elements of AGNES GPRS system. ARNEP protocol is implemented above the line layer. On its basis the modules create virtual private data network in where it can be transferred data between user devices via any protocols.

One may simply imagine the CDE7 module as a protocol converter between the user interfaces (including Ethernet). In fact the device is much more complicated, as it provides the user with possibility to communicate simply between all the systems.

Expander CDE7 is controlled by communication 32-bit microprocessor. It ensures, data transfer on serial user interfaces and a number of diagnostic and service features. CDE7 module in the basic version has six serial user interfaces. Two interfaces RS232 are solid, four user interfaces are optional (RS232, RS485, MBUS). Module CDE7 contains one Ethernet interface It is possible to set transfer parameters and communication protocol for each serial user interface separately. As a result you may communicate with various user interfaces using different communication protocols on serial interface.

2.2. Examples of possible applications

- Router in AGNES network
- Converter of communicate interfaces
- Function expansion about other inputs

2.3. Compatibility with other Conel company expanders

Regarding the communication and data transfers the CDE7 module is compatible with the older CDE6. This means it is possible to combine both types in one network and simply extend for example an existing network of CDE6 modules with new communication points using CDE7 modules. CDE7 provides some features not included in the older CDE6 type.

2.4. Description of CD7 components

2.4.1. Control microprocessor

Thirty-two-bit microprocessor Freescale Coldfire with 128 Mbit SDRAM backup memory, 64 Mbit FLASH EEPROM memory and realtime circuit with reserve power supply makes for the basis of CDE7 control microprocessor. Software is based on realtime operating system that processes simultaneous tasks. Thus parallel operation of all external interfaces of the expander module is maintained.

To microprocessor are connected two solid serial interfaces RS232, four optional serial interfaces and Ethernet 10/100 Mbps interface.

In case other than RS232 interface device needs to be connected, e.g. RS485, it is possible to connect level converter to the serial port according to particular application. The microprocessor can control such external converter.

The microprocessor enables connection user devices through all interfaces at the same time. Ports are linked to RJ45 connectors marked PORT1 to PORT6 and ETH. All user interface signals are protected against overvoltage on the data cable.

A device with different communication protocol can be connected to each interface. The microprocessor may work as a protocol converter between separate serial user interfaces. A wide scale of CDE7 module features can be configured through any user interface using service software **[1]**.

The microprocessor further manages numerous functions of servicing, diagnostic and installation purposes. Data transfer statistics, separate serial port communications, power blackouts, voltage of the reserve supply, CDE7 temperature and some other important information – everything is recorded in the microprocessor's memory.

CDE7 settings are saved in FLASH EEPROM memory. Service SW RADWIN **[1]** is designed for CDE7 module configuration.

2.4.2. Solid hardware interface

Interface RS232 is solidly adjusted on port 1 and 2 (PORT1 and PORT2). Ethernet interface belongs among solid hardware interfaces.

2.4.3. Optional hardware interface

PORT3 – PORT6 on the CDE7 back panel provides for direct use of other HW interface than the standard RS232. It is due to the design of the interface as a separate module built inside CDE7. Thus you may use CDE7 module combined with other RS232 or with RS485, MBUS.

2.4.4. User interface protocols

There are some industrial protocols implemented on the serial user interface:

- ARNEP
- AT modem
- Linka-LINE
- MODBUS
- MODBUS-TCP
- RDS92 CONEL
- TCP-Port

On the ethernet port are implemented protocols:

- TCP port – Linka
- TCP port – Arnep
- TCP port – RDS92
- TCP port – AT modem
- TCP port – Modbus
- Agnep
- Net
- Modbus TCP-SL

New protocols, not supported by the expander yet, can be implemented according to the customer's needs. CDE7 module also enables the implementation of own user protocol directly by the customer.

2.5. Technical parameters

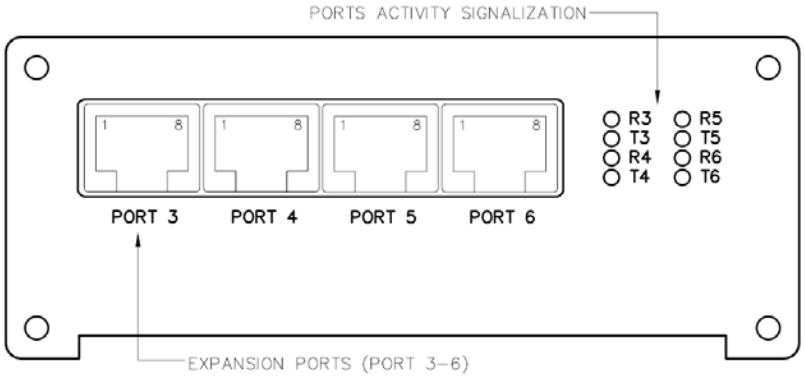
CDE 7		
Complies with standards	Power safety EMC	EN 60950-1:06 ed.2 ETSI EN 301 489-1 V1.6.1
Temperature range	Function Storage	-20 °C to +55 °C -40 °C to +85 °C
Supply voltage (car dashboard)		+10 to +30 V DC
Consumption		3,5 W
Dimensions		103 x 42 x 139 mm
Weight		350 g
Assembly		DIN 35 mm
User interfaces	PORT1- PORT2 PORT3 - PORT6 ETH	RS232 - connector RJ45 (300 b/s - 115 200 b/s) Connector RJ45 – possibility to configure discretionary interface through expanded modules,see above Ethernet 10/100 Mbps RJ45 connector

2.6. Expander power supply

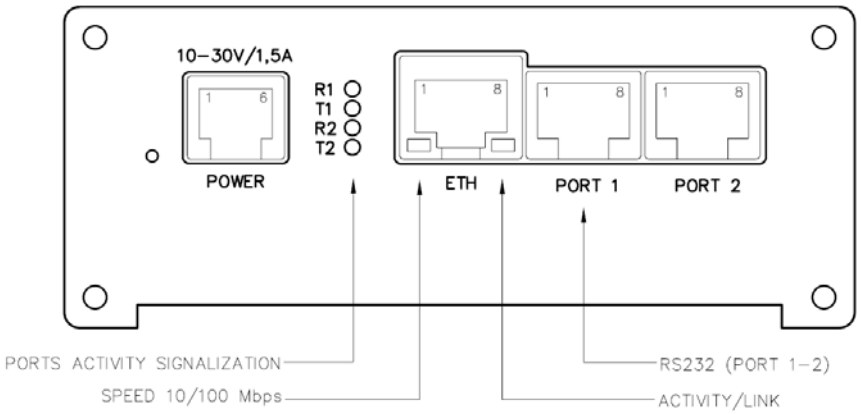
CDE7 needs DC power supply +10 – +30 V. The energy consumption is 3,5 W. It is necessary for proper function to ensure peak current of 1,5 mA from the supply.

2.7. Users interfaces (connectors)

There are four connectors RJ45 (PORT3 to PORT6) located on the back panel. There is a possibility to configure the port's interfaces, see above.



There are two RJ45 connectors (PORT1 and PORT2), interface RS232 and one RJ45 connector (Ethernet) located on the front panel. PWR connector is used for supply adapter connection.

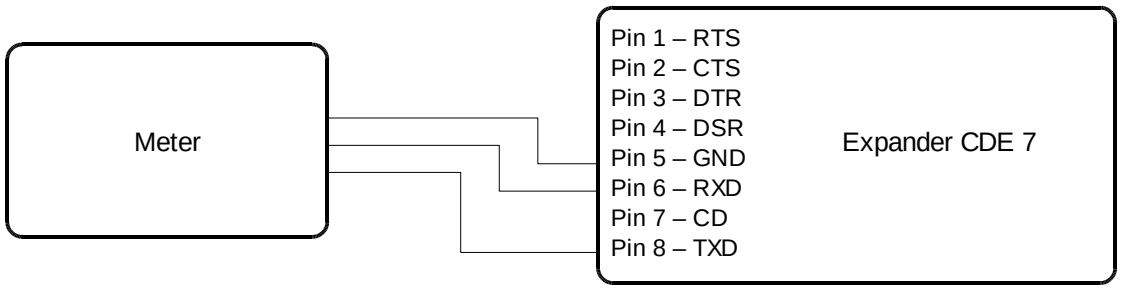


2.7.1. PORT 1 and PORT 2 connectors for RS232 (stand also for PORT 3 - PORT 6)

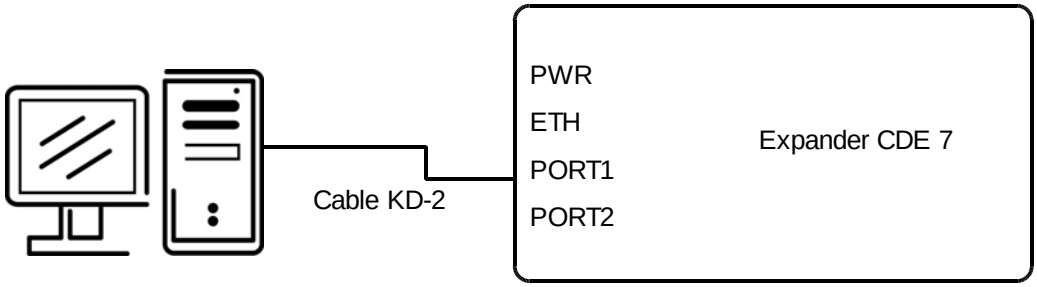
Panel socket RJ45 (RS232 – DCE - Data Communication Equipment).

Pin number	Signal mark	Description	Data flow direction
1	RTS	Request To Send	Input
2	CTS	Clear To Send	Output
3	DTR	Data Terminal Ready	Input
4	DSR	Data Set Ready – connected to +4 V through 330 Ohm	Output
5	GND	GROUND – signal ground	
6	RXD	Receive Data	Output
7	CD	Carrier Detect	Output
8	TXD	Transmit Data	Input

Circuit example of the meter with expander CDE 7:

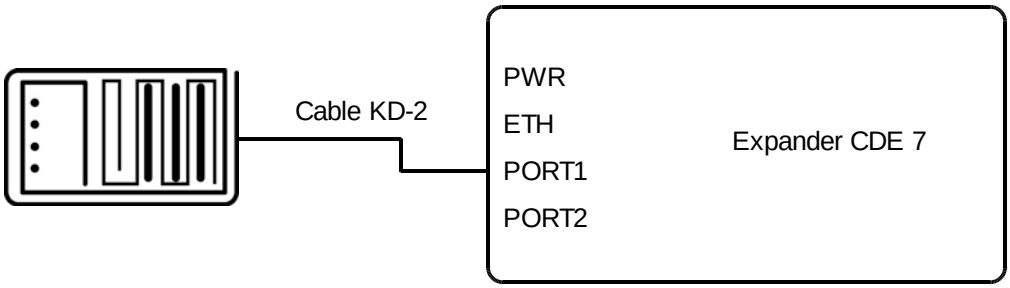


Circuit example of the PC with expander CDE 7 (possibility to use the all RS232 ports):



- the cable KD2 is connected to the PC serial port (example. COM1)

Circuit example of the expander CDE 7 to equipment with full-value RS232 interface (possibility to use the all RS232 ports):



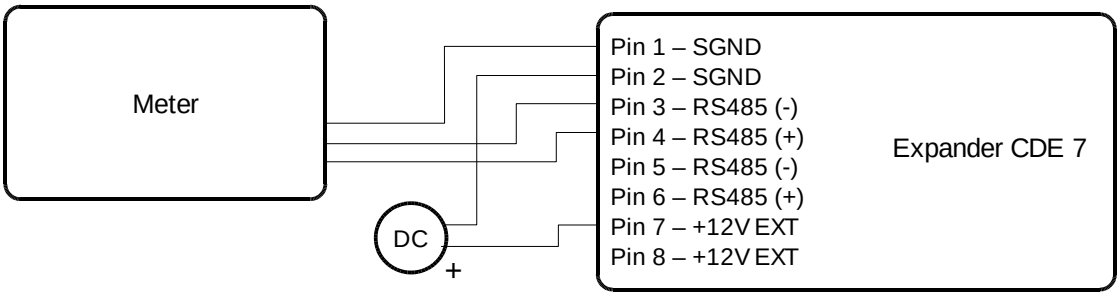
2.7.2. Connection of PORT3 - PORT6 connectors for RS485G

Panel socket RJ45

Pin number	Signal mark	Description	Data flow direction
1	GND	Signal and supply ground	
2	GND	Signal and supply ground	
3	TxRx-	RS485 B (-)	Input/Output
4	TxRx+	RS485 A (+)	Input/Output
5	TxRx-	RS485 B (-)	Input/Output
6	TxRx+	RS485 A (+)	Input/Output
7	+12V EXT	External supply +12V	
8	+12V EXT	External supply +12V	

Beware! External supply is just for moduls PORT3 to PORT6 – RS485G

Example of port circuitry:



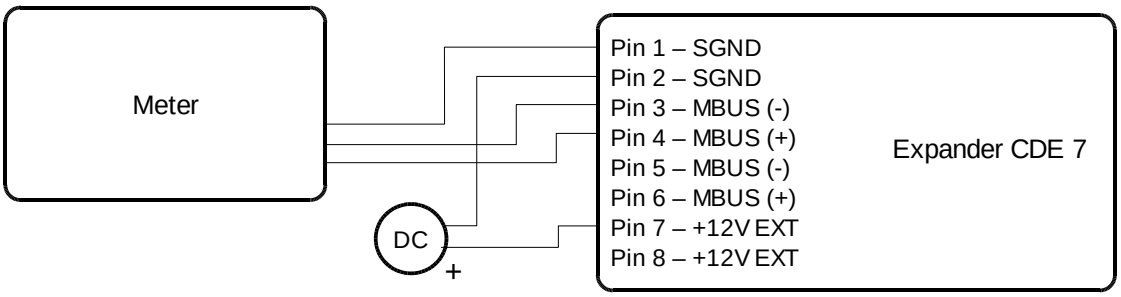
2.7.3. Connection of PORT3 - PORT6 connectors for MBUS

Panel socket RJ45

Pin number	Signal mark	Description	Data flow direction
1	SGND	Signal and supply ground	
2	SGND	Signal and supply ground	
3	TxRx-	MBUS B (-)	Input/Output
4	TxRx+	MBUS A (+)	Input/Output
5	TxRx-	MBUS B (-)	Input/Output
6	TxRx+	MBUS A (+)	Input/Output
7	+12V EXT	External supply +12V	
8	+12V EXT	External supply +12V	

Beware! External supply is just for MBUS.

Example of circuitry:



2.7.4. Connection of power supply connector PWR

Panel socket RJ12

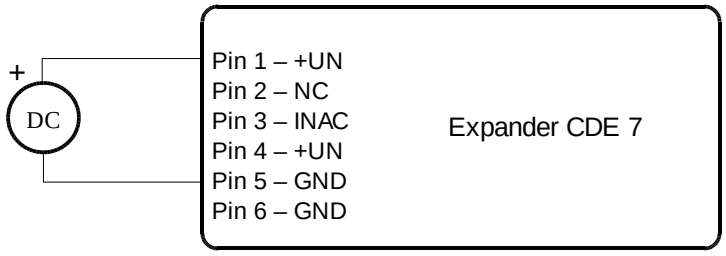
Pin number	Signal mark	Description	Data flow direction
1	+UN	Positive pole of DC supply voltage (10 to 30 V)	
2	NC	Not connected	
3	INAC	Network supply presence check. Range 0 – 38 V	Input
4	+UN	Positive pole of DC supply voltage (10 to 30 V)	
5	GND	Negative pole of DC supply voltage	
6	GND	Negative pole of DC supply voltage	

Note: Clamps 1-4 (+UN) and 5-6 (GND) are in the expander connect for bigger current overload. There is a possibility to use INAC (NAP230) signal on the power supply connector, for monitoring AC voltage presence for power supply (could be functional just in case accumulator power supply backup)

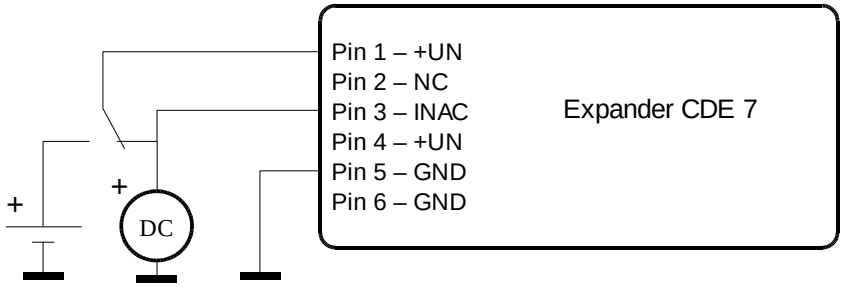
Beware – it is impossible to link 230 v supply voltage directly to input INAC (NAP230)!

Example of circuitry:

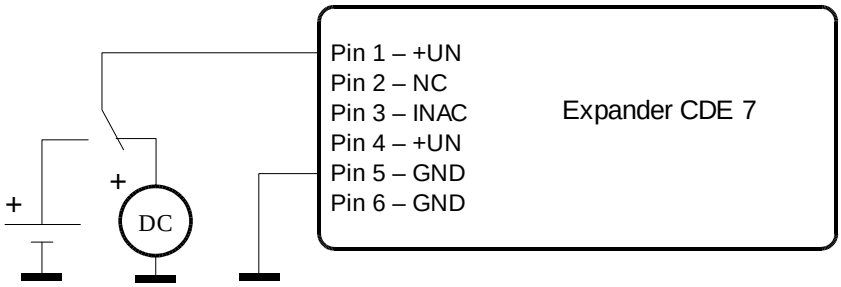
DC powered



DC powered with backup battery and with monitoring of power supply present



DC powered with backup battery without monitoring of power supply present



2.7.5. Connection of connector ETH

Panel soket RJ45.

Pin number	Signal mark	Meaning
1	TXD+	Transmit Data – Positive pole
2	TXD-	Transmit Data – Negative pole
3	RXD+	Receive Data – Positive pole
4	DNC	---
5	DNC	---
6	RXD-	Recieve Data – Negative pole
7	DNC	---
8	DNC	---

ATTENTION! Port ETH is not POE (Power Over Ethernet) compatible!

2.8. Technical parameters (PORT3 - PORT6)

- for product Expansion port MBUS

Name of product	Expansion port MBUS	
Power supply	Voltage	10,8 .. 15,6 V
	Supply power	max. 30 W
Environment	Operating temperature	-20 .. +55 C
	Storage temperature	-20 .. +85 C
Standards	Emission	EN 55022/B
	Immunity	ETS 300 342
	Safety	EN 60950
M-Bus specifications (EN 1434)	Max. devices (each 1,5 mA)	30
	Max. operating bus current	60 mA
	Overcurrent detection	100 mA
	Short circuit endurance	permanent
	Bus voltage mark	36 .. 43 V
	Bus voltage space	24 .. 31 V
	Max. total cable length (300Bd, 200nF/km)	1000 m

Information about short-circuit on wiring of bus M-BUS is possible to find out in VF statistics for port COM wickedly state of signal DTR. Level 1 indicates correct activity of the bus, level 0 informs about a short-circuit on the bus.

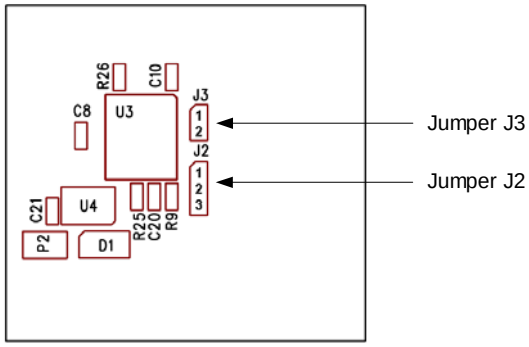
- for product Expansion port RS232

Name of product	Expansion port RS232	
Power supply	Internal	...
Environment	Operating temperature	-20 .. +55 C
	Storage temperature	-20 .. +85 C
Standards	Emission	EN 55022/B
	Immunity	ETS 300 342
	Safety	EN 60950
RS232 specifications (EN 1434)	Max. operating bus current	15 mA
	Max. bit rate	230400 bps
	Max. overvoltage	±30 V
	Max. total cable length (300Bd, 200nF/km)	20 m

- for product Expansion port RS485G

Name of product	Expansion port RS485G	
Power supply	Voltage	10,8 .. 15,6 V
	Supply power	max. 30 W
Environment	Operating temperature	-20 .. +55 C
	Storage temperature	-20 .. +85 C
Standards	Emission	EN 55022/B
	Immunity	ETS 300 342
	Safety	EN 60950
	Isolation	EN 60747
Bus RS485 specification (EN 1434)	Max. devices (each 1,5 mA)	256
	Max. data rate	38400 bps
	Overcurrent detection	250 mA
	Short circuit endurance	permanent
	Max. total cable length (300Bd, 200nF/km)	1200 m

External or internal PORT(3-6)-RS485G power supply could do with J2 and J3 connection. If is required external power supply, must be pins 2-3 linked through jumper J2 and jumper J3 must be open. Internal supply is made 1-2 pins connection on jumper J2 a jumper J3 connection. Jumper location is on the picture below. (module PORT-RS485G from TOP side).



Module PORT(3-6)-RS485G from TOP side

2.9. Module status indication

Status indication is indicated through thirteen diodes (LED). The five diodes are situated on the front side and eight diods are on the back panel side. Green diode serves to indicate expander status and is marked by letter P (Power). The other diodes indicate the interface status (reception or data transmission).

Communication through ETHERNET interface is indicated by two diodes, situated on ETHERNET connector.

Colour	Description	Meaning
GREEN	P	Flashes once a sec……..proper function Lights permanently……...fault Off……..…..no DC supply, loading OS in progress
RED	R1	Data receiveing on port 1
RED	T1	Data transmiting on port 1
RED	R2	Data receiveing on port 2
RED	T2	Data transmiting on port 2
RED	R3	Data receiveing on port 3
RED	T3	Data transmiting on port 3
RED	R4	Data receiveing on port 4
RED	T4	Data transmiting on port 4
RED	R5	Data receiveing on port 5
RED	T5	Data transmiting on port 5
RED	R6	Data receiveing on port 6
RED	T6	Data transmiting on port 6
Ethernet interface		
GREEN		Lights ..... communication 100Mbit/s Off ….....communication 10Mbit/s
YELLOW		Lights …..... .proper interface connection Flashes …..... interface communication

2.10. Measuring CDE7 signals

2.10.1. Measuring the supply voltage

Another three signals are measured in CDE7. The first is called NAP12 (DC SUPLY), it is an internal one and describes supply voltage on CDE7 brackets. The measuring range is 0 to 38 V. The supply voltage value has an effect over CDE7 function – in case the value is out of measuring range, is recorded in CDE7 statistics.

The second one is internal and measures stabilized CDE7 supply voltage 3.3 V. The measuring range is 0 to 20 V. The supply voltage value has an effect over CDE7 function – in case the value is out of measuring range, is recorded in CDE7 statistics.

The second one is NAP230 (AC SUPLY) linked to the supply connector (see the supply connector description). The measuring range is 0 to 38 V. The signal is protected against overvoltage by a protection element that blocks voltage in excess of 36 V. NAP230 is designed for measuring of network supply voltage presence. The change of the value is recorded in CDE7 statistics as a failure and rise of supply voltage 230 V.

Current supply voltage values can be read from configuration program.

Beware – it is impossible to link 230 V supply voltage directly to the input!

Signal name	Measuring range [V]	Resolution [bit]
NAP12	0 to 38	10
3.3V	0 to 3.6	10
NAP230 (INAC)	0 to 38 overvoltage 36 V blocked	10

2.10.2. Measuring internal CDE7 temperature

To ascertain proper function, temperature is measured inside CDE7. In case the temperature is out of measuring range, is recorded in CDE7 statistics. Current temperature values can be read from configuration program.

Signal name	Measuring range [°C]	Resolution [bit]
TEP	-40 to+120	10

2.11. Setting CDE7 parameters

Configuration and service SW RADWIN is designed for the module setup. The software is created for MS WINDOWS 95/98/ME/2000/XP platforms. Service cable is designed for CDE7 with PC connection. After service cable (data cable KD-2 and jump service SEPRO) is connected to any serial user interface RS232 and service SW runs on a connected PC it is possible to

execute not just all the needed CDE7 settings, but service interventions in the data network as well.

2.11.1. Service cable

CDE7 – PC connection cable with DCR and GND signals connected at 100 Ohm. It is made from normal data cable KD-2 by adding service interconnection SEPRO. It is necessary to interconnect all eight signals between CDE7 and PC. See RJ45 connectors' description.

Service cable

Service interconnection SEPRO

2.12. Standard accessories

1. RJ12 supply connector for supply voltage cable.
2. Three RJ45 connectors for data cables and CIO connection.
3. Compliance certificate.
4. Complaint procedure.
5. Warranty.
6. User manual

2.13. Additional accessories

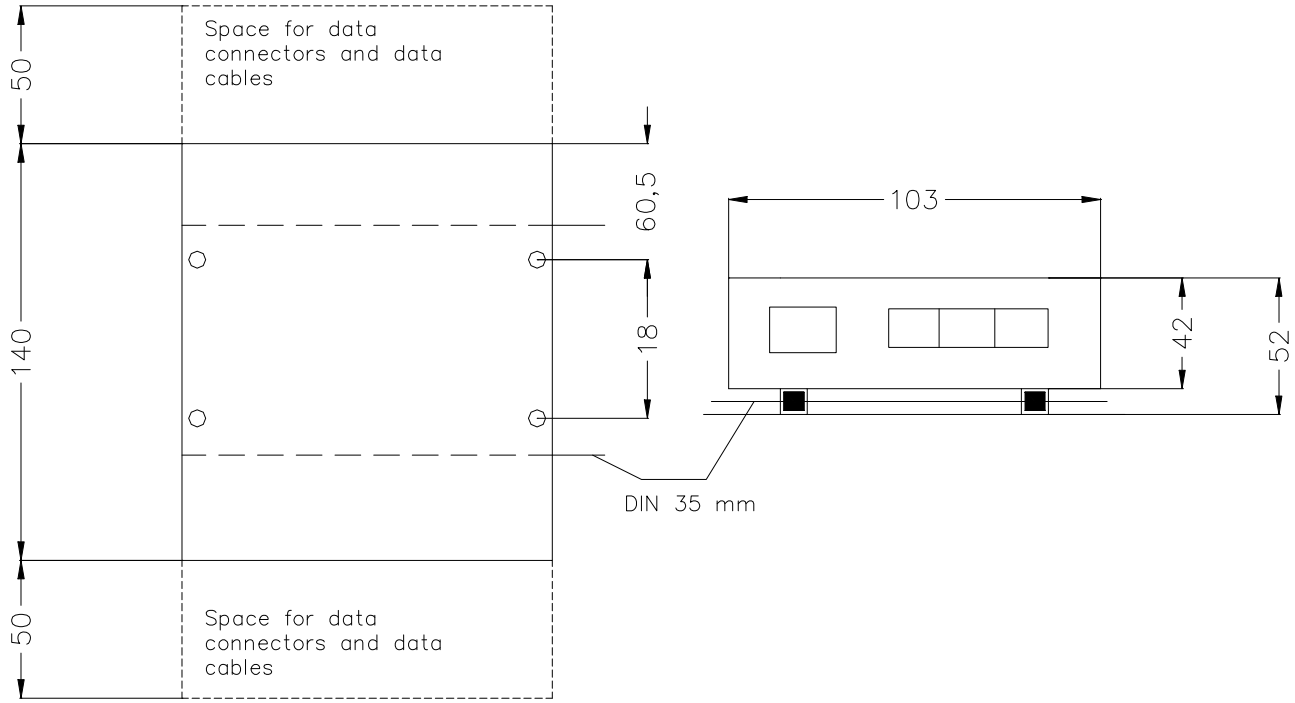
1. Power supply

2. Expansion ports
    - Expansion port RS232
    - Expansion port RS485G
    - Expansion port MBUS

2.14. Assembly procedure

DIN 35 mm rail assembly using plastic grips.

2.15. Mechanical external dimensions and mounting recommendations



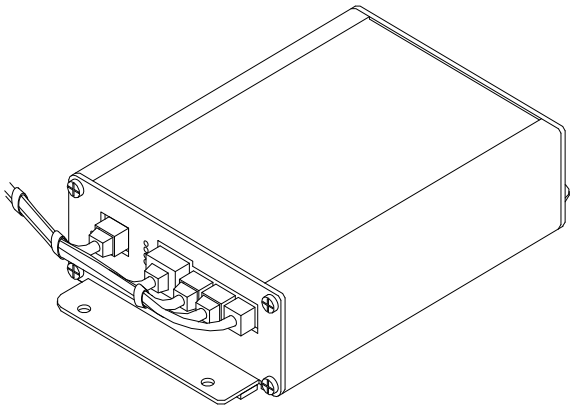
For the majority of applications with a built-in modem in a switch board it is possible to recognize two sorts of environments :

- nopublic and industry environment of low voltage with high interference,
- public environment of low voltage without high interference.

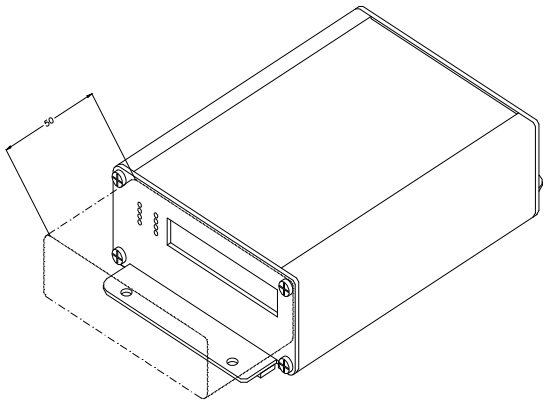
For both of these environments it is possible to mount modems to switch board, the following it is not need have no examination immunity or issues in connection with EMC according to EN 60439-1+A1.

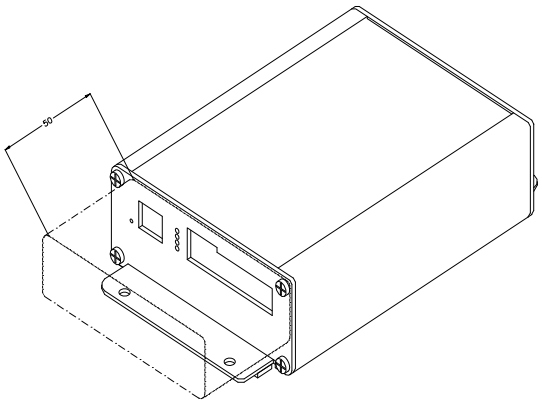
For compliance of EN 60439 - 1 + A1 specification it is necessary observe next assembly of the modem to the switch - board :

- for single cables we recommend to bind the bunch according to the following picture, for this use we recommend:
  - length of the bunch (combination of power supply and data cables) can be maximum 1,5 m, if length of data cables exceeds 1,5 m or in the event of, the cable leads towards the switch - board, we recommend to use fit over - voltage protectors (surge suppressors),
  - with data cables they mustn't carry cables with reticular tension ~ 230 V/50 Hz,
  - all signals to sensors must be twisted pairs.



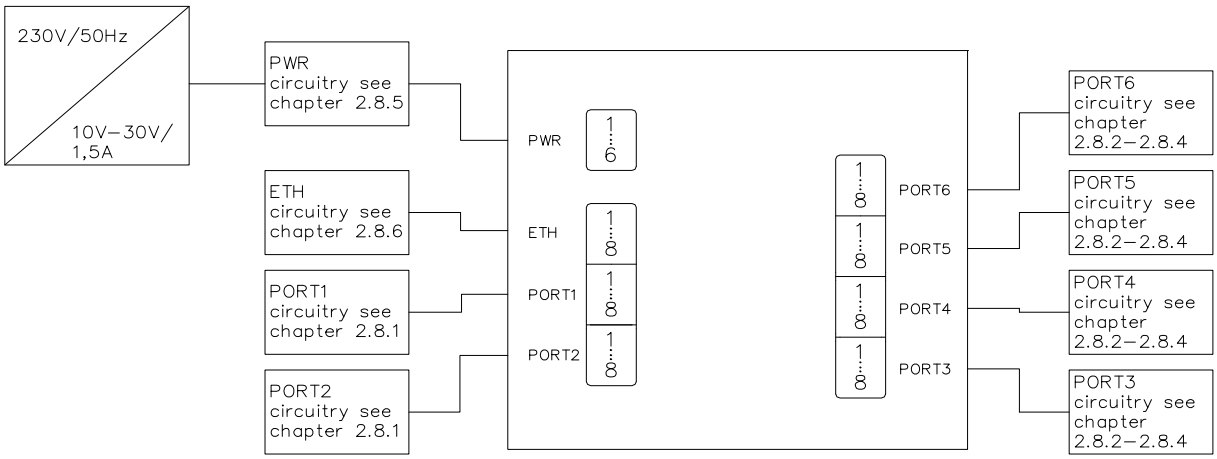
- sufficient space must be left before individual connectors for handling of cables,





- for correct function of the modem we recommend to use in switch - board earth-bonding distribution frame for grounding of power supply of modem, data cables and antenna,

- the circuit diagram of the modem is on the following pictures.



2.16. Product marking

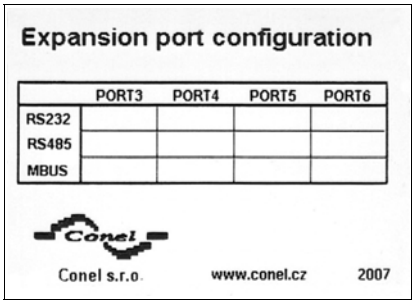
Trade marking	Type marking	Standard communicate interfaces	Aditional interfaces	Power supply
CDE 7	CDE-7	2 x RS 232, 1 x Ethernet	RS232, RS485, MBUS	+10 až +30 V DC

2.17. PORT3 to PORT6 marking

Trade marking	Type marking	Supply	Other
Expansion port RS232	XC-232	Internal from module CDE 7	
Expansion port RS485	XC-485	Internal from module CDE 7	Variation RS-485G demand external power supply 10,8-15,6 V
Expansion port MBUS	XC-MBUS	External 10,8 .. 15,6 V	

2.18. CDE7 production label

2.19. Production labels of interfaces PORT3 – PORT6



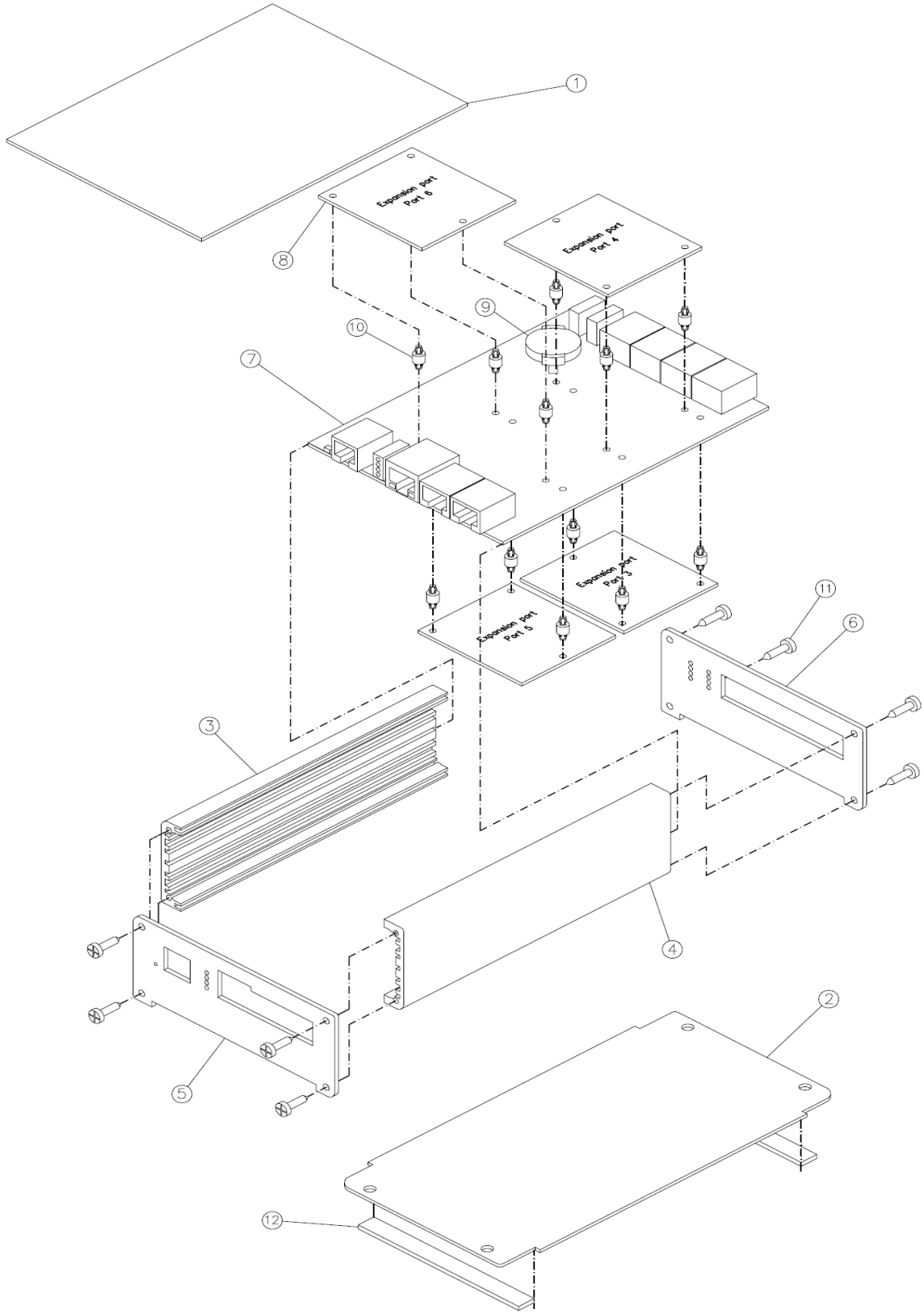
3. Expansion ports mounting

Attention! Expansion port include when the expander CDE 7 is switch off.

After unscrewed four screws (position 11) on the front head (position 5) and remove the motherboard B-CDE-7 (position 7) the expansion port PORT3 - PORT6 (position 8) connect to expander B-CDE-7 motherboard (position 7) from both sides. Every expansion port is mounted to motherboard by the help of three distant columns (position 10). After expansion ports mounting, motherboard move and front head mount the box is screwed by the help four screws (position 11).

Parts list and description

Part	Description	Number
1	CDE 7 box top part	1
2	CDE 7 box bottom part	1
3	CDE 7 side profile	1
4	CDE 7 side profile	1
5	CDE 7 front head	1
6	CDE 7 rear head	1
7	B-CDE-7 motherboard	1
8	Expansion ports (RS232, RS485 and or MBUS)	up to 4
9	CR2032 battery cell	1
10	Distance column for expansion ports mounting to motherboard	up to 12
11	Screws for box completation	8
12	Double sided glue tape	2


1
8
Expansion port
Port 6
Expansion port
Port 4
9
10
7
Expansion port
Port 3
Expansion port
Port 5
11
6
3
4
5
2
12

4. Links to related products of the manufacturer

Related products and materials with a reference can be found on the manufacturer's website – Conel company:

www.conel.cz

4.1. Program

RADWIN – the software provides for creation, installation and administration of AGNES system GPRS data networks.

5. Reference

[1] Conel s.r.o.: *RADWIN Programme for control AGNES*, 2008

6. Product disposal instructions

The WEEE (Waste Electrical and Electronic Equipment: 2002/96/EC) directive has been introduced to ensure that electrical/electronic products are recycled using the best available recovery techniques to minimise the impact on the environment. This product contains high quality materials and components which can be recycled. At the end of it's life this product MUST NOT be mixed with other commercial waste for disposal. Check with the terms and conditions of your supplier for disposal information.

7. Complaints procedure

Dear customer,

The product you have purchased had passed manufacturer's tests and its functions had been checked by our technician before sale. In case any defect shows up during the guarantee period that prevents normal use we ask you to follow the Complaints procedure when registering your claim.

To make a possible complaint procedure easier please make sure when taking over the product your vendor has duly filled in all the relevant parts of the warranty, including date, seal and signature.

This complaints procedure relates to the purchased products. This complaints procedure does not relate to the services provided.

Guarantee period of the products

Guarantee period of 24 months from the date of purchase is provided for the device, source, antenna, data cable and possible accessories. The date of purchase is at the same time date of takeover.

Registering a claim

It is necessary to register your claim at the vendor where the subject of the complaint has been purchased. The customer shall present duly filled warranty and the complete subject of the complaint. Subject of the complaint shall be presented in a condition adequate to that at the moment of purchase.

Caution!

The vendor is not responsible for keeping default settings or data saved in the subject of the complaint.

The customer is obliged to clarify the defect or how it is displayed and what claim he intends to register.

Processing the complaint

The vendor shall provide a free remedy depending on particular conditions, or replace the subject of the complaint for a new product, or settle the matter in another manner in compliance with the Civil Code and the Act on consumer's protection.

As of the moment the claim is registered by the customer and the subject of the complaint is taken over by the vendor the guarantee period stops running. The guarantee period continues on the date of takeover of the repaired subject of the complaint or replaced faultless product by the customer, or should it not be taken over on the date the customer is obliged to take over the repaired or replaced product. In case the vendor replaces the subject of the complaint for a new product (including IMEI replacement) the original subject of the complaint becomes property of the vendor and the new product becomes property of the purchaser. Since takeover of the new product a new guarantee period starts. In the cases when the vendor settles the matter after agreement with the customer by replacement of the subject of the complaint for a faultless product the new guarantee expires.

1. After 12 months since the replaced product was taken over by the customer.
2. On the date when the original guarantee period (subject of the complaint) would have expired should it not have been replaced, whichever comes first.

3. The claim is deemed unsubstantiated when the defect is not found by the vendor processing the complaint or the defect is not covered by the guarantee under Article 3 of the procedure.
4. In case the claimed defect is not found and functionality is proven to the customer, the customer is obliged to pay demonstrable cost related to expert assessment of the claimed defect.
5. In case defect is found when processing the complaint that is not covered by the guarantee (extra-warranty repair), the vendor shall inform the customer and the customer shall inform the vendor whether he/she wishes to have the defect repaired for the price set. A protocol shall be made on exact conditions of the extra-warranty repair and signed by both the customer and the vendor. Should the customer not require remedy through an extra-warranty repair under the conditions, the device shall be returned to him/her after he/she pays the demonstrable cost of expert assessment.

The guarantee does not cover defects incurred due to

1. Mechanical damage (fall and the like).
2. Use of inadequate, or not recommended sources and other accessories.
3. Connection of the product with non-standard accessories.
4. Installation or use of the product conflicting with the Manual or use for other purposes than usual for this type.
5. Improper manipulation, or an intervention of unauthorised person or other service than authorised by the manufacturer.
6. Effects of natural forces (flood, fire etc.) or other local phenomena (storm, overvoltage and the like).
7. Storage under unauthorised temperatures.
8. Operation in a chemically aggressive environment.

Other conditions

The fact that the subject of the complaint does not conform to parameters set for other similar product types shall not be considered a fault. To assess whether it is a case of covered fault the parameters stated in the technical documentation for the product are decisive.

The guarantee expires in any case of changes to the subject of the complaint, or damaged or otherwise unreadable serial number.

8. Warranty

Device type	
Serial number	
Guarantee period (months)	
Vendor	
Date of purchase	
Seal of the vendor	

	1	2	3	4	5
Date of complaint registration					
Complaint protocol number					
Date of reception of the device in repair shop					
Date of finished repair					
Number of repair sheet					
Warranty repair	YES - NO	YES - NO	YES - NO	YES - NO	YES - NO
New serial number of the device (IMEI)					
Notes					
Seal of the repair shop					