

User manual

ADA-401WA

Addressable RS-485/RS-422 to 1-WIRE Converter



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1. GENERAL INFORMATION

Thank you for your purchase of **CEL-MAR Company** product. This product has been completely tested and is covered by a two year warranty on parts and operation from date of sale.

If any questions or problems arise during installation or use of this product, please do not hesitate to contact Technical Support at +48 41 362-12-46 or e-mail support@cel-mar.pl.

1.1. WARRANTED INFORMATION

ADA-401WA converter is covered by a two year warranty from date of sale. In case of being damaged it will be repair or the damaged component will be replace. The warranty does not cover damage caused from improper use, materials consumption or any unauthorized changes. If the product does not function (is damaged), or not operate in accordance with the instructions, will be repaired.

All warranty and no warranty repairs must be returned with paid transport and insuring to the **CEL-MAR Company**.

CEL-MAR Company under no circumstances won't be responsible for ensuing damage from improper using the product or as a result of random causes: the lightning discharge, the flood, the fire and the like.

CEL-MAR Company is not be held responsible for damages and loss including: loss of profits, loss of data, pecuniary losses ensuing from using or the impossibility of using this product.

In specific cases **CEL-MAR Company** discontinue all warranties and in particular do not follow the user manual and do not accept terms of warranty by the user.

1.2. GENERAL CONDITIONS FOR SAFE USE

The device should be installed in a safe and stable places (eg, electroinstallation cabinet), the powering cable should be arranged so as not to be exposed to trampling, attaching, or pulling out of the circuit.

Do not put device on the wet surface.

Do not connect devices for nondescript powering sources,

Do not damage or crush powering wires.

Do not make connection with wet hands.

Do not adapt, open or make holes in casings of the device!

Do not immerse device in water or no other liquid.

Do not put the fire opened on device sources: candles, an oil lamps and the like.

Complete disable from the supply network is only after disconnecting the power supply circuit voltage.

Do not carry out the assembly or disassembly of the device if it is enabled. This may result to short circuit and damage the device.

The device can not be used for applications that determine human life and health (eg. Medical).

1.3. CE LABEL



The CE symbol on the device CEL-MAR means compatibility with electromagnetic compatibility Electromagnetic Compatibility Directive **EMC 2014/30/WE**.

Declaration of Conformity is delivered with purchased converter.

1.4. ENVIRONMENTAL PRESERVATION



This sign on the device inform about putting expended device with other waste materials. Device should send to the recycling. (In accordance with the act about the Electronic Appliance Expended from day 29 of July 2005)

1.5. SERVICE AND MAINTENANCE

ADA-401WA converter does not require the servicing and maintenance.

Technical support is available at number +48 41 362-12-46 in 8.00-16.00, from Monday to Friday or e-mail support@cel-mar.pl.

1.6. PACK CONTENTS

ADA-401WA converter; User Manual; CE declaration; resistors: $R_t=120\Omega$ (2 pcs.); CD with ADAConfig software.

2. PRODUCT INFORMATION

2.1. PROPERTIES

- Possibility of creating network on the basis of RS485 bus with addressable node to which are being connected 1-WIRE devices,
- RS-485 conversion to 1-WIRE,
- Converted signals: RX, TX,
- Possibility of operating on MicroLAN bus,
- Possibility of programming EPROM memory on the 1-WIRE bus (version -2-x-x),
- Baud rate of RS-485 bus – up to 230.4 kbps,
- Standard baud rate of 1-WIRE bus up to 16.3 kbps,
- Overdrive baud rate of 1-WIRE bus up to 142 kbps,
- External power supply 10 - 30 VDC stable with power min. 3W,
- 1kV= or 3kV= galvanic isolation between RS-485 interface and power supply,
- 3kV= optoisolation in signal channel between RS-485 and 1-WIRE interface,
- Connection RS-485 interface via screw joint,
- Connecting 1-WIRE bus and power supply via screw terminal,
- Implemented short circuit protection and over-voltage protection on RS-485 interface line,
- Implemented protection against power supply reverse connection,
- Casing compatible with DIN 43880 standard– mounting in typical electro-installation unit,
- Casing adapt to rail mounting according to Dinas EN 50022 standard,
- Casing dimensions (W x H x L) 53mm x 90mm x 62mm,

2.2. DESCRIPTION

The industrial addressable RS-485 converter to 1-WIRE ADA-401WA enables on basis of the RS485 bus to build the network with addressable node, to which it is possible to connect a lot of devices with the 1-WIRE interface so as: arrangements for the measurement of the temperature, clocks of the real time, the EPROM memory, A/C converters, for and the like. Applying ADA-401WA converter as addressable node for the 1-WIRE bus increase the distance up to 1200m between 1-WIRE devices and the computer with the monitoring software or other the MASTER type device. This distance can be increased for another 1200m by using ADA-4040 repeater.

The DS2480B system provide conversion from 1-WIRE interface to RS-485 interface in ADA-401WA and the converter of TTL levels on RS-485. It's exempt the user from go into details of the enough complicated 1-WIRE protocol.

Applying the additional RS-485 converter to RS-232 ADA-1040 or USB to RS-485 ADA-I9140 enables to monitor and/or to control the 1-WIRE negotiations through the RS-232 interface or USB in the computer of the class equipped with the PC into the appropriate software. CEL-MAR Company gives the materials to creating software on the basis of ADA-401WA converters.

ADA-401WA is equipped with screw terminal for twisted connection of 1-WIRE and RS-485 bus, as well as for connecting the power supply.

Over-voltage protection on each RS-485 line was made on base over-voltage LEDs and fuses.

It is possible to connect 32 ADA-401WA devices operating in linear topology to RS-485 bus. It is possible to connect other 32 converters by applying ADA-4040 repeater.

ADA-401WA is adapted for powering permanent tension from the outside source which value should contain oneself around from the 10V up to the 30V and was delivered from power pack about the power of 2W min. Converter has Implemented protection against opposite polarization of power supply.

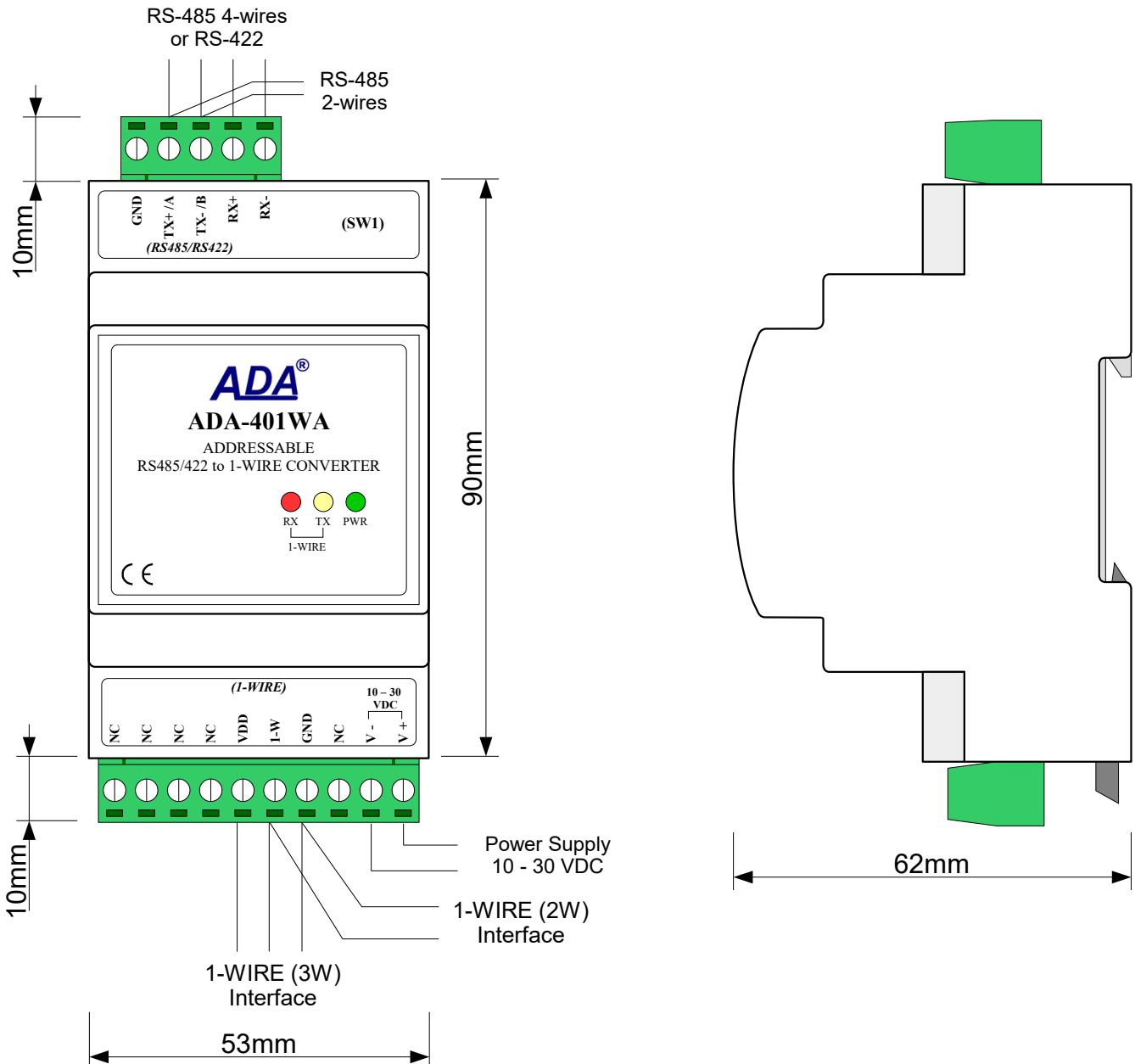


Fig. 1. View of ADA-401WA

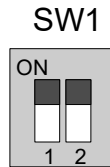


Fig 2. View of SW1 micro-switch sections

2.3. APPLICATION

ADA-401WA converter can be used in all kind of local systems based on MicroLAN networks such as: the registration of the temperature, the monitored access, steering the functioning of air-conditionings of both the heating, the remote control and the supervision, in alarm, fire systems and the like much moved away from monitoring center. A market of alarm systems is one of most quickly developing at present markets, which MicroLAN is being used among others for linking in of sensors with the alarm head office, where in place a few or of a dozen or so wires will only be enough 3. In such applying does MicroLAN prevent the possibility of cheating through clenching or incising the line and at the same time provides with the alarm system easiness of the automatic configuration and the reconfiguration of the alarm system during the work. Much also leading test procedures which disabled elements of the system are helping to eliminate is simpler than in standard solutions.

2.4. MICROLAN – NETWORKS WITH 1-WIRE CHIPS

The creators of 1-WIRE chips of new generation foresee the possibility of building networking systems with their use. With the standard system of data transmission addressing for 1-WIRE, the protocol used to exchange data is inherently network protocol. The data transmission addressing lies in the fact that each 1-WIRE chip has a unique, 8-bytes code saved in the internal ROM memory. The manufacturer guarantees that this code is unique and relevant only to that audio chip.

2.5. CONVERSION OF 1-WIRE TO RS-485 STANDARDS

Because of the fairly complex 1-WIRE protocol, ADA-401WA converter is equipped with a microprocessor, which make easy access to 1-WIRE from a serial RS-485 bus. Communication with device connected to 1-WIRE is sending/receiving the appropriate command via RS485 interface. Additional description all commands and communication are described in technical documentation DS2480B driver available on manufacturer web page http://www.maxim-ic.com/quick_view2.cfm/qv_pk/2923 or [CEL-MAR](#). Additional commands used by ADA-401WA are described in section ADDITIONAL COMMANDS.

2.6. ISOLATION

Converter ADA-401WA has 2-way, 1kV= or 3kV= galvanic isolation (depend on version, described in section VERSIONS).

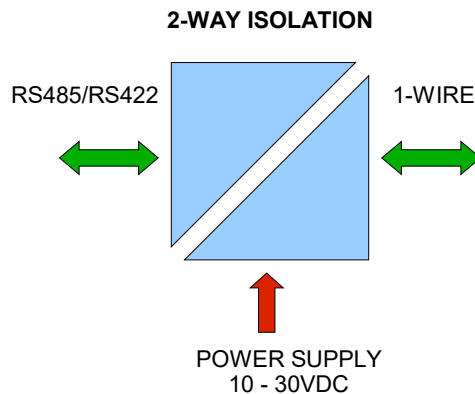


Fig. 3. Isolation diagram

3. INSTALLATION

This chapter will show how to connect ADA-401WA to PC, RS485/422 bus, 1-WIRE line and power supply and how to use it. To reduce disturbance from environment, it is recommended to:

- use multipair type shielded cables, which shield can be connected to the earthing on one end of the cable,
- use the suitable diameter cable for power supply on account of voltage drop,
- use the powering cable with a suitable section because of the voltage drops,
- use the interference eliminators for powering the converter,
- lay signal cables at a distance of not less than 25 cm away from power cables,
- not powering the converters form the power-circuit of devices generate large impulse disturbance like contactors, relays, inverters.

3.1. ASSEMBLING

ADA-401WA converter case is adapted to assembly on TS-35 (DIN35) rail. To install converter should mount device on the rail upper part of the case then press bottom part to hearing characteristic „Click” sound.

3.2. CONNECTION TO PC

ADA-401WA can be connected to RS232 port or USB of PC by the use of additional converter eg. RS232 to RS485 (ADA-1040) or USB to RS485 (ADA-I9140). The connection is made via RS485 bus or RS422 bus, as on the figure bellow.

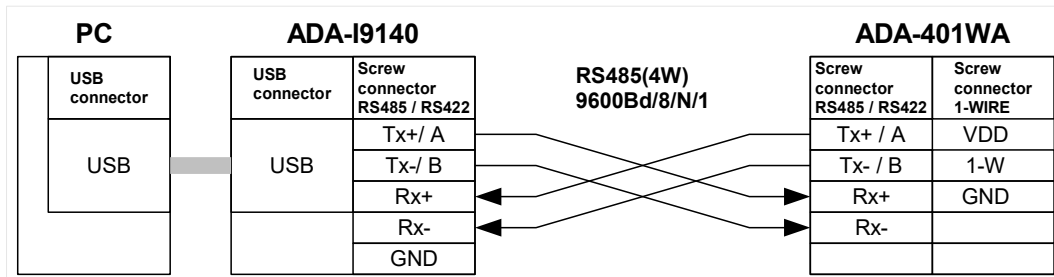


Fig. 4. 4-wire connection of ADA-401WA to PC by the use of USB to RS485/RS422 converter ADA-I9140

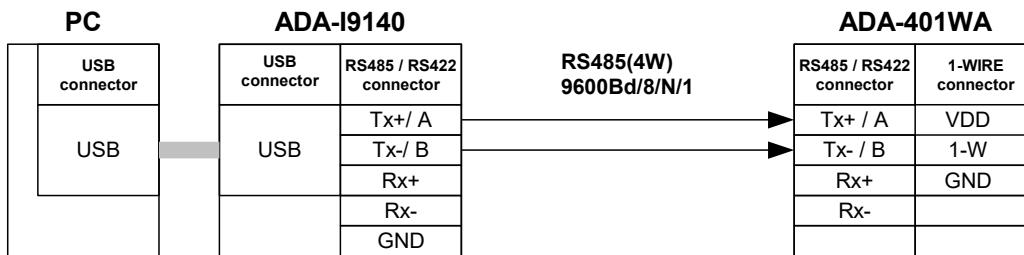


Fig. 5. 2-wire connection of ADA-401WA to PC by the use of USB to RS485/RS422 converter ADA-I9140

3.3. CONNECTION TO RS485/422 BUS

EIA-485 Standard allows to connect up to 32 devices to RS485 bus on the length of 1200m. In the purpose of connection more devices or extend the length of the bus should be used additional devices like separator / repeater eg. ADA-4040, ADA-4044H. Connection of RS485 bus to ADA-401WA converter is shown on figure below.

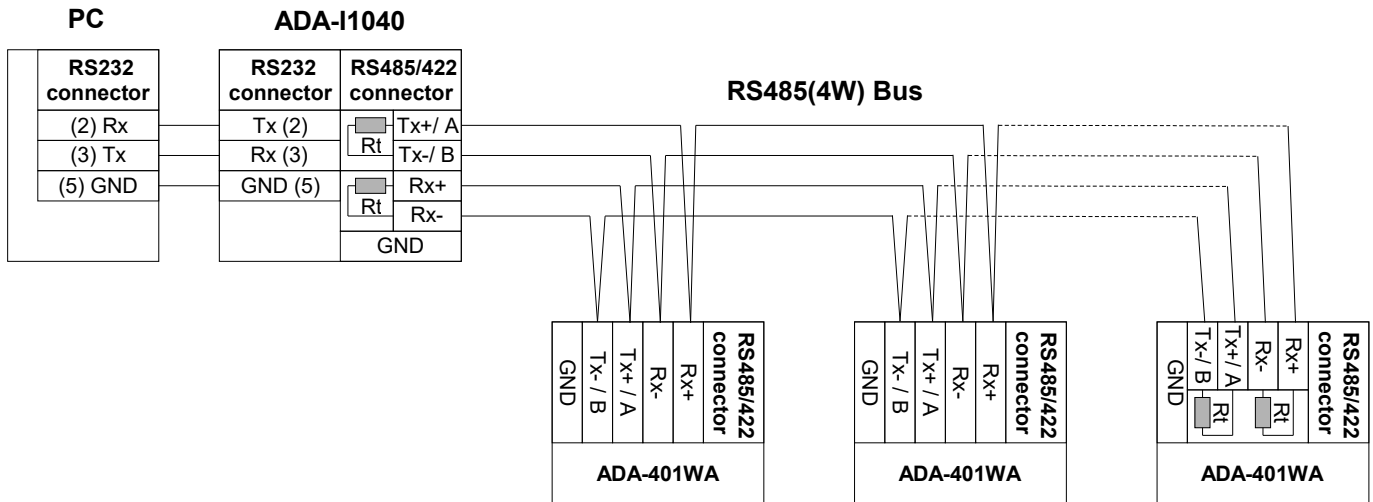


Fig. 6. Example connection of ADA-401WA to 4-wire RS485 Bus

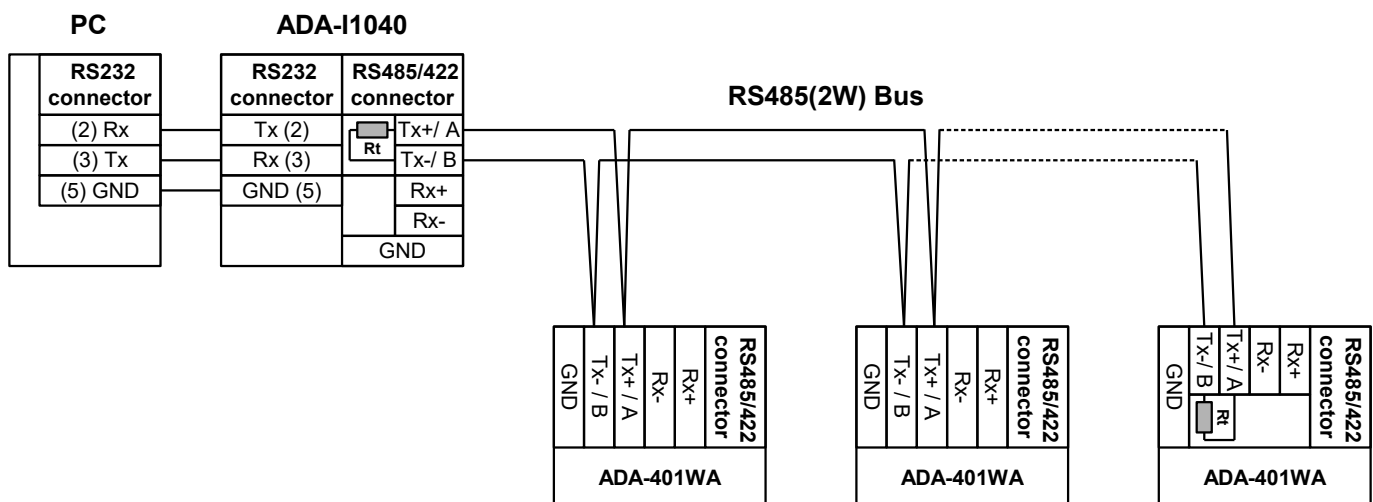


Fig. 7. Example connection of ADA-401WA to 2-wire RS485 Bus

3.3.1. LINE TERMINATION

The application of Line Termination (terminator) $R_t = 120 \Omega$ (ohms) will reduce electrical reflection in data line at high baud rate. It is not needed below 9600Bd. The Line Termination resistor should be used if the distance is over 1000m @ 9600Bd or 700m @ 19200Bd transmission, the resistor can be necessary if there are problems with the transmission correctness. Example connection of R_t to screw terminal block of RS485/422 interface ADA-401WA are shown on Fig. 6 & 7.

3.4. CONNECTION TO 1-WIRE NETWORK

3.4.1. CONNECTION 1-WIRE SENSORS

Way to link temperature sensor to ADA-401WA converter is shown on figure below.

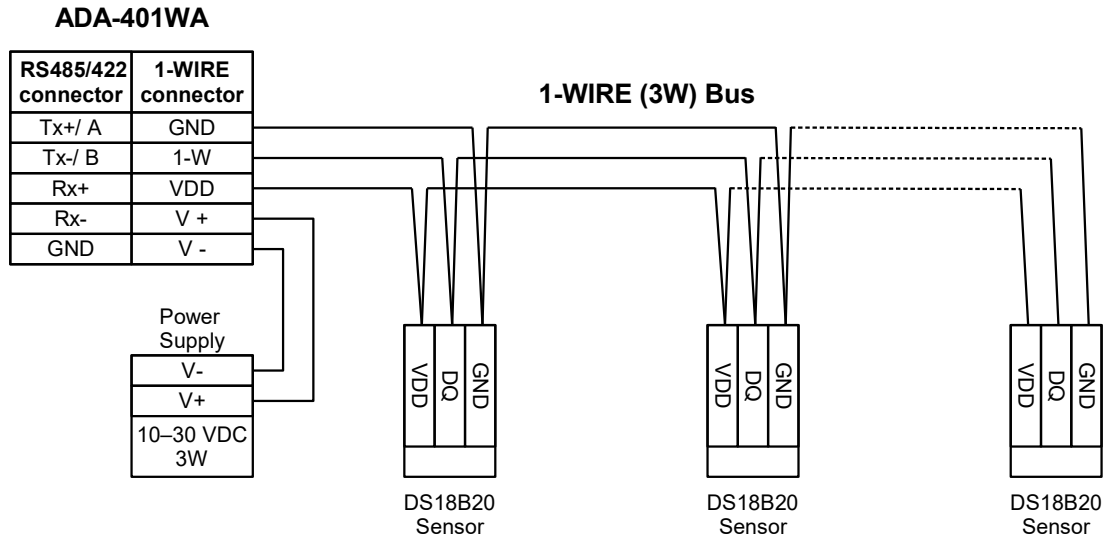


Fig. 8. Sensor connection to ADA-401WA converter by 3-wire 1-WIRE Bus

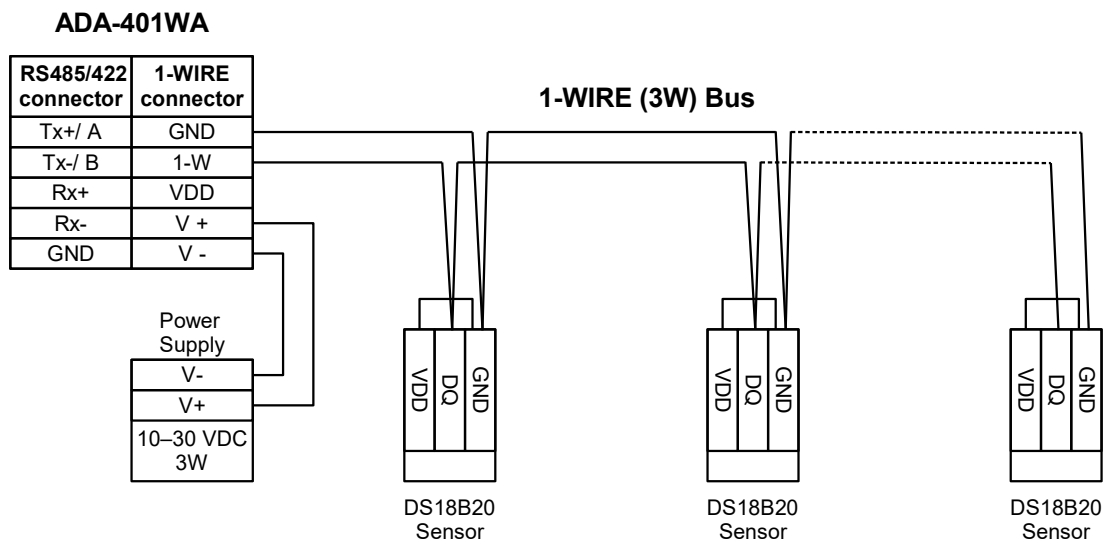


Fig. 9. Sensor connection to ADA-401WA converter by 2-wire 1-WIRE Bus

3.4.2. LIMITATIONS OF 1-WIRE BUS

The maximum length of 1-wire bus as layouts producer can be even 400m and the maximum number of sensors can be 500. However, when building the bus, remember that, each sensor is a shortening of 0,5 meters and 100 meters of cable causes additional capacity load data line 5nF increasing signal distortion.

1-WIRE bus length and number of sensors will be less and will depend on:

- used cables,
- topology connection,
- quality implementation of connections,
- interference from external electromagnetic fields.

RECOMMENDS:

- application of twisted cables UTP 4x2x0,5,
- powered converter with an individual power supply with good parameters, eg. DR-15-24,
- linear topology of 1-WIRE bus (sensors in a star topology can be converted to linear topology by using Passive 1-WIRE Bus Splitter ADA-DNB400),
- finishing 1-WIRE bus by sensor,
- connecting unused wires and screen cable to rail EP of electrical installation.

3.5. POWER SUPPLY

The power supply to ADA-40WA should be DC (regulated) from the scope 10 V= to 30V= and nominal power more then 3W eg. HDR-15-24. The power cable from DC power supplies to the device must not be longer than 3m. Observe the polarity, connect positive (+) of DC power supplies to V + and negative (-) end to V - terminal.

3.6. ACTIVATION

Converter can be powered after proper connection according to steps above. If connection was made properly green LED PWR on front panel of converter should light, if not check correctness of power connection. ADA401WA has the protection against power supply reverse connection. During correctness data transition via the converter the LEDs Tx and Rx should blinking.

LED	Description
PWR	Signalling of Power Supply
Rx	Signalling of data receiving through the ADA-401WA converter from 1-WIRE port.
Tx	Signalling of data transmitting from the ADA-401WA converter through 1-WIRE port

ATTENTION!

At baud rate above 19200 bps the LED's Tx, Rx will light weakly during data transmission.

4. CONFIGURATION

4.1. OPERATION MODE

All available adjusting the SW1 switch are shown in table below.

SW1- 1	SW1- 2	Mode
OFF	OFF	Run
ON	OFF	Device configuration
OFF	ON	Factory default
ON	ON	Emergency Firmware Update

Those modes can be set by use SW1 located by terminal block RS455/RS422. To set the switch section, should remove terminal cover marked as SW1 and make the appropriate settings by the use a small, flat screwdriver. Figure 1 present the location of two-position SW1 micro-switch inside ADA-401WA.

4.2. CONFIGURATION

The configuration of ADA-401WA converter can be made by the use of *ADAConfig* Software – CD selling with converter. To make the configuration, connect converter to computer (see pt. 3.2) and power supply. If after power, on the front panel is not lit green LED PWR, check the power connection (polarity). If the PWR LED lights, set the section of SW1 switch to configuration mode as in table below.

SW1-1	SW1-2
ON	OFF

In the configuration mode the yellow LED located by SW1 micro-switch will blink with frequency 1 Hz. Start the **ADAConfig Software** (fig. Below) and make the configuration of transmission parameters for RS485/422 interfaces and set his visible address from RS485 bus. Can be set also some of parameters the internal interface of converter, for communication with DS2480B circuit. First should be set the number of COM port for communication with the converter, then readout the configuration from ADA-401WA memory using the button **[Read converter configuration]** and make the proper changes of interface setting. If the option Addressing Converter will be set, on configuration window should be set proper converter address from range 1 - 255. If this option is disable the converter will operates as protocol converter RS485 to 1-WIRE.

In both cases, is possible to set additional transmission parameters for RS485/422 interface as below:

- baud rate on RS485/422 bus (kbps): 0.3, 0.6, 1.2, 1.8, 2.4, 4.8, 7.2, 9.6, 14.4, 19.2, 28.8, 38.4, 57.6, 76.8, 115.2, 230.4,
- number of data bites: 5, 6, 7, 8,
- control parity: no control, parity control, control of none parity,
- number of stop bits : 1, 2,
- frame spacing – range from 4 to 255 (time silence as frame's end),

Available parameters the internal interface of converter, for communication with DS2480B circuit.

- frame spacing – range from 4 to 255 (time silence as frame's end) characters. If the transmission is not correct, should be increased until the transmission will be correct (factory default 10 characters),
- spacing between bytes transmitted to DS2480B in milliseconds from 3 to 255 (factory default 3 ms).

After configuration the setting should be saved on converter memory by using button **[Write converter configuration]**.

Return to work in run mode is made by using SW1 switch (yellow LED blink OFF) as below.

SW1-1	SW1-2
OFF	OFF

The test of communication with the converter in installation with sensors can be made by the use of tempf.exe – can be download here>>> http://cel-mar.pl/software/tempf_2.06.zip .

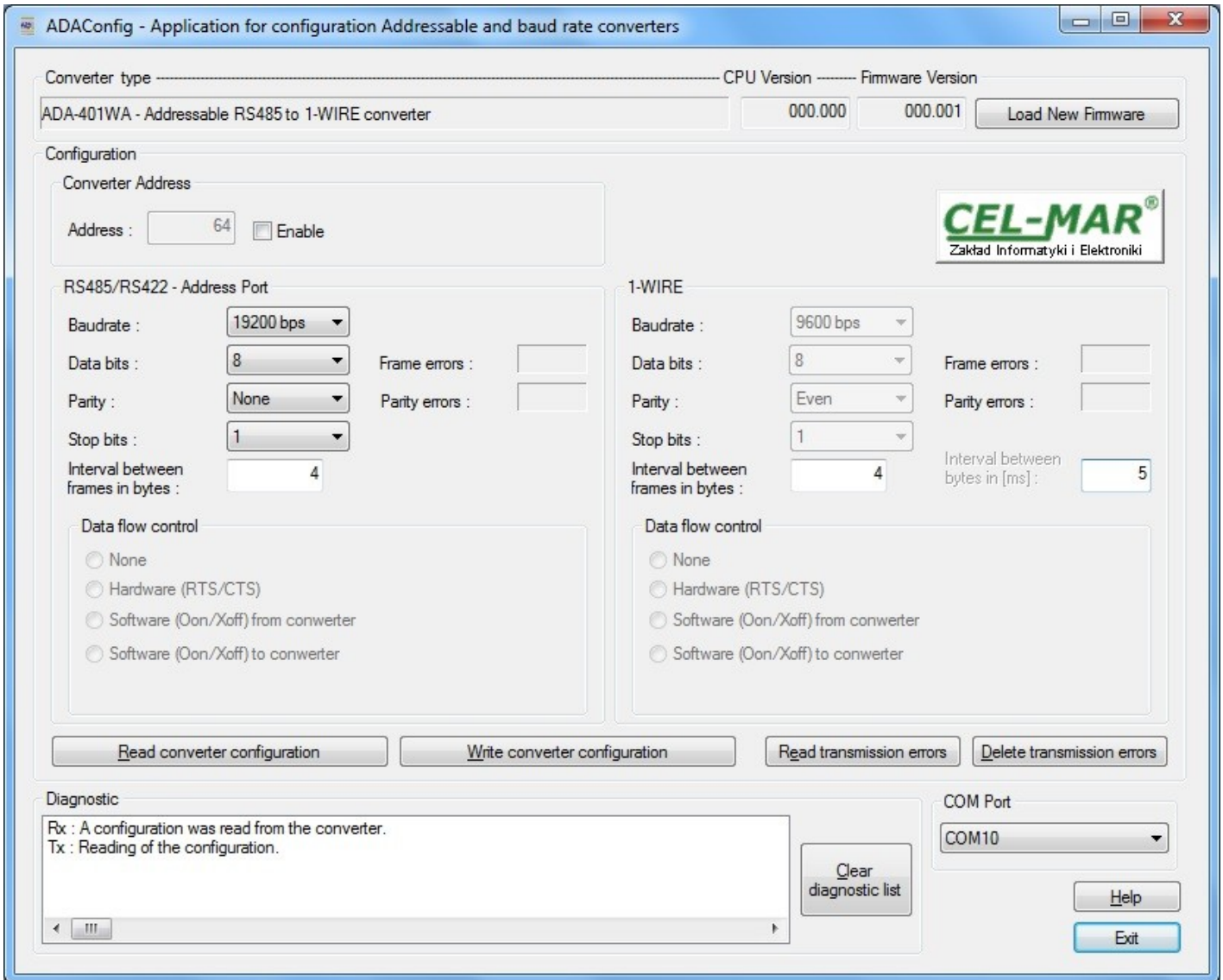


Fig. 10. View of ADAConfig software interface

4.3. DATA TRANSMISSION DIAGNOSTICS

To readout diagnostics should be set SW1 microswitch to the configuration mode (see pt. 4.1.). Correctness of transmission proceed on RS485/422 interface and 1-WIRE interface can be checked by readout the errors list by ADAConfig Software form the converter memory. Frames error counter will be increased, in case of: improper speed set compared to real speed of data transmission. Parity error counter will be count the errors which can arise in case of misrepresent bytes in transmitted sign. This counter will not works in case of disable control parity. To check those counters press the button **[Read transmission errors]**, and to delete (zeroing of counters in the memory of the converter) press **[Delete transmission errors]**. In case of parity errors or frame errors, should be checked the ADA-401WA converter's configuration and correctness connection of RS485 and 1-WIRE bus to the converter ports. After finishing the diagnostics, the SW1 micro-switch should be set to run mode by using SW1 switch (yellow LED blink OFF) as below.

SW1-1	SW1-2
OFF	OFF

The test of communication with the converter in installation with sensors can be made by the use of tempf.exe – can be download here>>> http://cel-mar.pl/software/tempf_2.06.zip .

4.4. FIRMWARE UPDATE

ATTENTION!!!

SOFTWARE VERSION 0004 AND HIGHER DO NOT WORK WITH CONVERTERS FROM THE CPU VERSION 1.0 AND 2.0. TO UPDATE SOFTWARE TO VERSION 0004 AND HIGHER IN CONVERTERS WITH VERSION 1.0 AND 2.0 CPU PLEASE CONTACT THE SERVICE.

Set SW1 micro switch to configuration mode as in table below.

SW1-1	SW1-2
ON	OFF

In the configuration mode the yellow LED will blink with frequency 1Hz. Press a button **[Load New Firmware]** to change the software delivered by manufacturer. The Select File window will open (fig. below) and select the *.bin file then click **[Open]** - software will be load to *ADAConfig* buffer storage and will be checked. If the *ADAConfig* not detect errors in loaded file, change converter software. Process of updating is visualized by *ADAConfig* in use Progress Window and after proper changing confirmed by correct message.

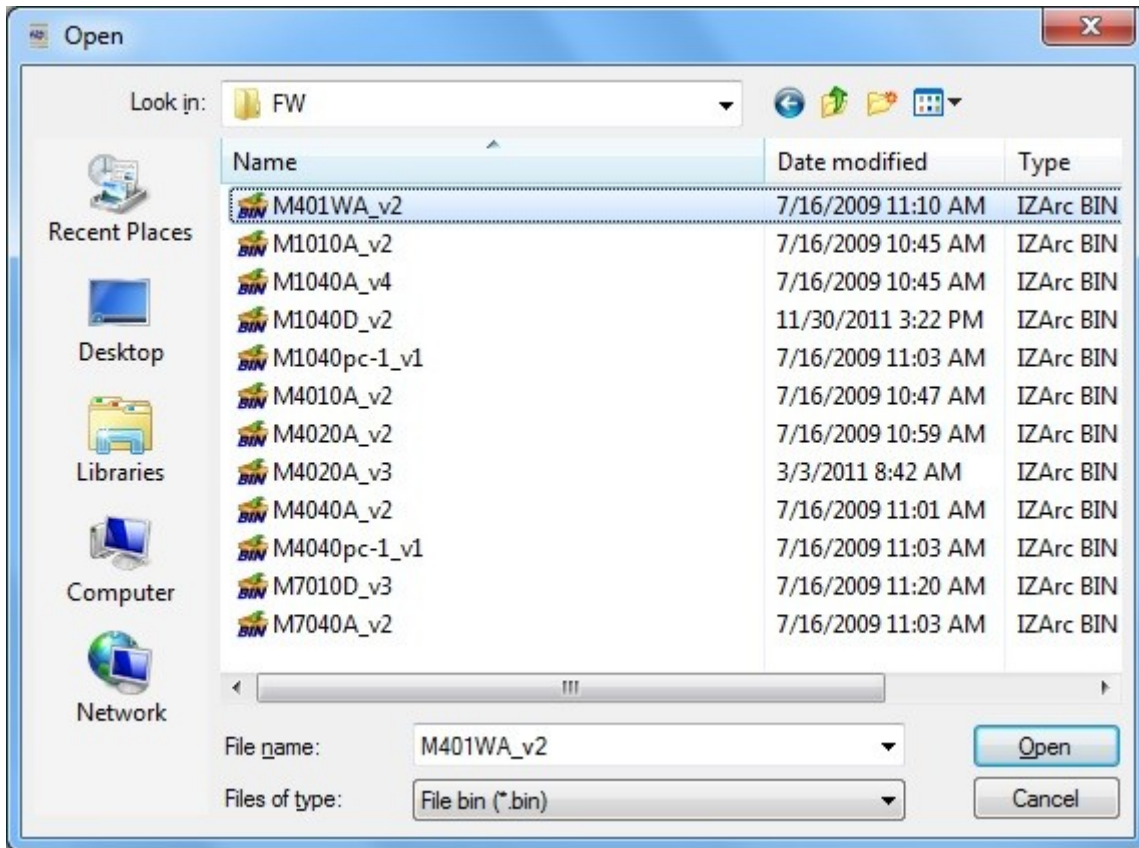


Fig. 11. Selection of firmware file

During loading software the yellow LED located beside SW1 micro-switch will blinks, showing data flow to the converter. If the software was loaded correctly yellow LED will be blink again with frequency 1 Hz. After that set micro switch SW1 to run mode as shown in the table below.

SW1-1	SW1-2
OFF	OFF

The yellow LED will be OFF.

4.5. EMERGENCY FIRMWARE UPDATE

In case of the unsuccessful update of the converter software, try again according to description in point FIRMWARE UPDATE. If the update is still incorrect use emergency firmware update. Set SW1 microswitch mode as in the table below.

SW1-1	SW1-2
OFF	ON

After micro-switch setting, should be restarted the ADA-401WA, by turning OFF and then ON the power supply. The yellow LED will light continuously and the converter will be in Emergency Firmware Update mode. Now follow the description in point FIRMWARE UPDATE.

ATTENTION!
AFTER SUCCESSFUL UPDATING SET SW1

SW1-1	SW1-2
OFF	OFF

The yellow LED will be OFF.

4.6. FACTORY DEFAULT

In case of faulty functioning the ADA-401WA as:

- no communication in the configuration mode,
- transmission errors on the RS485/422 bus,
- transmission errors on the 1-Wire bus,

can be restored the factory default setting in the internal registers of converter.

Factory default

<i>Parameters</i>	<i>RS485/RS422 Interface</i>	<i>1-WIRE Interface</i>
Addressing converter - Available	Disable	
Addressing converter - Address	64 – disable	
Baud rate	9600bps	standard
Number of data bits	8	---
Parity control	non	---
Stop bit	1	---
Interval between frames in characters	4	10
Interval between bytes [ms]	---	3

To restore the factory default setting, set SW1 microswitch mode as in the table below

<i>SW1-1</i>	<i>SW1-2</i>
OFF	ON

Disconnect the power and after while connect again. After that, will be loaded the factory default setting.

After this operation should return to run mode by setting micro- switch section of SW like in table below.

<i>SW1-1</i>	<i>SW1-2</i>
OFF	OFF

The yellow LED will be OFF.

4.7. OPERATION

ADA-401WA addressable converter operates as node for 1-WIRE network. Each node can be addressed and connected to RS485 bus and enable to communication of many fragmented of 1-WIRE networks with remote monitoring system e.g. temperature.

It is possible to extend the length of RS485 bus about additional segments:

- 1200m by adding ADA-4040 RS485 repeaters,
- 2500m by adding fibre-optic to RS485 ADA-7040 converters.

On RS-485 bus a protocol frame for 1-WIRE devices connected to ADA-401WA converter should be created as follows:

<i>ADDRESS OF ADA-401WA</i>	<i>FRAME OF DS2480B DRIVER 1-WIRE BUS</i>
-----------------------------	---

Where:

ADDRESS OF ADA-401WA CONVERTER
FRAME OF DS2480B DRIVER 1-WIRE BUS

- address byte from the scope 1-255,
- bytes sequence contains DS2480B driver frame of 1-WIRE bus or additional orders for ADA-401WA.
This sequence can not be longer than 950 bytes.

ADA-401WA converter with fixed addressing constantly listens for frames on RS485 bus. If received frame contains byte of address equal to converter address then another bytes of frame are received up to silence on RS-485 bus equal to 'space between frames in signs'. If frame is received correctly, the address byte is deleted and transmitted over as typical to the driver of the 1-WIRE DS2480B bus. In case of errors in received frame, it isn't transmitted to the DS2480B driver. In this case should be send the previous frame. The frame received from device connected to 1-WIRE port is being tested of transmission errors and in case of their missing converter adds address to beginning of frame and send it to RS-485 bus. Frame containing errors isn't being transmitted to RS485 port. Converter receive only 950 characters and in case of transmitting of frames containing more than 950 bytes is ignoring them.

ADA-401WA was equipped with separate buffers for RS485 port and 1-WIRE therefore converter can operate at full duplex mode on RS-485 4-wire bus.

4.8. ADDITIONAL COMMANDS

ADA-401WA has implemented additional commands, which can be used in software development and there are as follow:

<i>Command</i>	<i>CODE [HEX]</i>	<i>Description</i>
BREAK	C1-C1-C1	BREAK commend replaces the standard issue of BREAK signal on the Tx line of RS232 interface (driver DS2480B reset). In order to implement reset and calibration DS2480B driver must be sent to ADA-401WA sequence of bytes described in the Code column.

4.8.1. EXAMPLE OF USE BREAK COMMAND

Send to ADA-401WA converter bytes sequence :

[HEX:] 01 C1 C1 C1

where [HEX] :

- 01 - address of ADA-401WA
C1 C1 C1 - BREAK command for reset and automatic calibration of DS2480B driver

5. VERSIONS

ADA-401WA -				
Electronic versions:				
Without possibility of programming the memory of 1-WIRE interface	1			
With possibility of programming the memory of 1-WIRE interface	2			
Galvanic isolation:				
1kV=		2		
3kV=		3		
Terminal & Terminal Cover:				
Cover without inlets, screw terminal block			1	
Cover with inlets, screw terminal block			2	
Cover without inlets, plug-in screw terminal block			3	

Order example:

Product Symbol: **ADA-401WA-1-2-3**

- 1 – without possibility of programming the memory of 1-WIRE interface,
2 – galvanic isolation 1kV=,
3 – cover without inlets, plug-in screw terminal block,

6. SPECIFICATION

TECHNICAL DATA		
Transmission Parameters		
Interface	RS-485	1-WIRE
Connector	screw terminal, wire max. \varnothing 2,5mm ²	screw terminal, wire max. \varnothing 2,5mm ²
Line length	1200m	up to 300m – for ds18b20 sensors
Maximum number of connected device	32	up to 100 ds18b20 sensors
Maximum baud rate	up to 230,4 [kbit/sek]	standard: 0 do 16,3 kbps, overdrive: 0 do 142 kbps,
Transmission line	Twisted cable 2-pair , UTP Nx2x0,5 (24AWG), shield inside large interferences STP Nx2x0,5(24AWG).	Twisted cable 1-pair or 2-pair , UTP Nx2x0,5 (24AWG), shield inside large interferences STP Nx2x0,5(24AWG).
Transmission type	EIA-485, CCITT V.11.	1-WIRE signal
Standards	<ul style="list-style-type: none"> • PWR – green LED power supply • RX - red LED data receiving from 1-WIRE interface • TX - yellow LED data transmission through 1-WIRE interface 	
Electrical Parameters		
Power requirements	10 - <u>24</u> – 30 V DC	
Power Cable	Recommended length of power cable – up to 3m	
Power	3W	
Protection from reverse power polarization	YES	
Galvanic Isolation	1kV DC or 3kV DC - between power circuit and RS485/422 signal line	
Optoisolation	3kV - between signal line 1-WIRE and RS-485/422	
Electromagnetic compatibility	Resistance to disruptions according to the standard PN-EN 55024. Emission of disruptions according to the standard PN-EN 55022.	
Safety requiring	According to the PN-EN60950 norm.	
Environment	Commercial and light industrial.	

Environmental Parameters	
Operating temperature	-30 ÷ 60°C
Humidity	5 ÷ 95% - non-condensing
Storage temperature	-40 ÷ 70 °C
Casing	
Dimensions	53mm x 90mm x 62 mm
Material	PC/ABS
Degree of casing protection	IP40
Degree of terminal protection	IP20
Weight	0,10 kg
According to standard	DIN EN50022, DIN EN43880
Location during work	Free
Mounting method	On the rail compliant with DIN35 / TS35 standard.

Dear Customer,

Thank you for purchasing **CEL-MAR Company** products.

We hope that this user manual helped connect and start up the **ADA-401WA converter**. We also wish to inform you that we are a manufacturer of the widest selections of data communications products in the world such as: data transmission converters with interface RS232, RS485, RS422, USB, Current Loop, Fibre-Optic Converters and Ethernet or Wi-Fi.

Please contact us to tell how you like our products and how we can satisfy you present and future expectation.

CEL-MAR sp.j.

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