

**Mini-PLC STG-850
Art. No. 0850-0850**

MANUAL



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SAFETY INSTRUCTIONS

This manual contains notices which you should observe to ensure your own personal safety, as well as to protect the product and the connected equipment. These notices are highlighted in the manual by a warning symbol and are marked as follows according to the level of danger:



Only qualified personnel should be allowed to install and work on this equipment. Qualified persons are defined as persons who are authorized to commission, to ground and to tag circuits, equipment and systems in accordance with established safety practices and standards.



Turn off the power supply before performing any wiring operations! Short circuits can be harmful, critical and can cause explosions and serious burns!



Please read this manual carefully and observe all safety instructions!

DESTINATED USE

The Mini-PLC is designed for universal measuring, controlling and regulating applications. It must not be used for life critical, medical or fail safe applications.

DISCLAIMER

BARTH Elektronik GmbH assumes no liability for usage and functionality of the Mini-PLC in case of disregarding this manual. The strict accordance of this manual is important since the installation methods, peripheral connections, usage and maintenance can not be controlled by BARTH Elektronik GmbH. Therefore BARTH Elektronik GmbH assumes no liability for any claim.

EYE SAFETY INFORMATION

Standard	Classification
IEC/EN 60825-1 (2007-03), DIN EN 60825-1 (2008-05) "SAFETY OF LASER PRODUCTS - Part 1: equipment classification and requirements", simplified method	Class 1
IEC 62471 (2006), CIE S009 (2002) „Photobiological Safety of Lamps and Lamp Systems“	Exempt
DIRECTIVE 2006/25/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 5th April 2006 on the minimum health and safety requirements regarding the exposure of workers to risks arising from physical agents (artificial optical radiation) (19th individual directive within the meaning of article 16(1) of directive 89/391/EEC)	Exempt

1 Product description

The picture below shows the BARTH® Mini-PLC STG-850 with the Connection Cable VK-16 (Art. No. 0091-0016). The Mini-PLC is shipped without any Connection Cables.



1.1 Features

- Tiny and super-flat CAN Logic Controller
- High-Performance 32 Bit ARM® Cortex®
- 6 analog Inputs 0 to 30 VDC, 12 bit ADC
- 4 digital Inputs
- Event Counter Input 25 kHz
- Pulse and Frequency Counter Input 40µs
- 8 Solid-State Power Outputs up to 1.5 A
- 1 PWM Output 16 Bit 2A 0 to 25 kHz
- CAN 2.0A/B and SAE J1939 Interface
- CANopen® Interface
- IrDA/SIR Interface
- TTL-232 3.3V Interface
- Comprehensive Fail Safe Functions
- Open Source ‚C‘ Programming
- ARDUINO® Programming
- Compatible with PG-65 Programmer
- Wide Operating Voltage Range 7 to 32 VDC
- Wide Operating Temp. Range -40 to +70°C
- Vibration resistant and rugged Sealing
- Engineered and manufactured in Germany

1.2 Applications

- Industrial / Building Automation
- Automotive and Maritime Technology
- Technical Education / University

1.3 General description

The tiny STG-850 extends the well established BARTH® Mini-PLC series with the most powerful 32 bit ARM® Cortex® Core and IrDA interface. As the top-of-the-range product the STG-850 features rugged CAN/CANopen® connectivity with Open Source ‚C‘ programming capability at lowest current consumption and the well-known small form factor. The 32 bit ARM® Cortex® core provides four high speed event, pulse and frequency counter inputs and one 16 bit PWM output combined with a precise internal voltage reference for the six analog inputs.

The automotive-qualified CAN2.0A/B/CANopen® interface is able to operate in noisy environment and allows the user to connect a variety of network components to the Mini-PLC. The STG-850 can be easily interfaced using the PG-65 Parameter Programmer to upload and download user-

specified program parameters. The STG-850 does not need any peripheral components to operate. Both inputs and outputs features highly integrated and rugged protection circuits to operate the Mini-PLC in really harsh environment. These outstanding features open up a variety of application fields in industrial, automotive and 12/24V battery-powered applications.

The Mini-PLC supports both graphical programming using miCon-L and 'Open Source' programming using ARDUINO® IDE or KEIL® MDK.

The STG-850 is also available as customer-tailored OEM version within 8 weeks.

1.4 Programming options

The Mini-PLC STG-850 supports two programming options. As standard the Mini-PLC features full graphical programming capability using the miCon-L Software Suite.

Without learning a difficult programming language the BARTH® Mini-PLC can be easily programmed using simple and vivid graphical function blocks. This block design meets graphical standards of the latest graphical programming languages. The miCon-L software suite features CAN2.0A/B programming, simulation and test in one unique software design tool. The flexible programming option offers a variety of possibilities in industrial applications.

Programming the STG-850 follows using the USB port of your PC with installed miCon-L software suite and the VK-16 USB Connection Cable. The miCon-L Software supports full simulation and visualisation operation modes. miCon-L provides a variety of visualisation blocks and interactive elements to control and debug the Mini-PLC.

As a second programming option the STG-850 provides fully Open Source design using the powerful KEIL® µVision® Software Suite. For everyone who is familiar with C-Programming, this option opens up a variety of hardware-oriented features in a realtime environment with powerful debugging features.

1.5 Delivery content

- BARTH® Mini-PLC STG-850
- 3x Connectors for Mini-PLC

2 Installation

2.1 Mounting



The Mini-PLC must be installed and wired by a trained technician who knows and complies with both the universally applicable engineering rules and the regulations and standards that apply in specific cases.

Fastening the STG-850 follows using either the integrated mounting holes for screws or the holes for cable ties. The cable tie installation method is recommended for fastening the Mini-PLC on wiring harness, tubes or other mechanical parts.



The IrDA window of the Mini-PLC must not be covered for proper and reliable infrared communication.

Take care to meet the environmental conditions of the Mini-PLC.

2.2 Wiring

2.2.1 Overview

The tables and graphic below show the connection of the BARTH® Mini-PLC STG-850.

X1 connector: power supply and CAN pins

1	+VDD	positive supply terminal
2	GND	ground terminal
3	CANH	CAN high terminal
4	CANL	CAN low terminal

X2 connector: input pins

1	IN1	analog / digital input
2	IN2	analog / digital input
3	IN3	analog / digital input
4	IN4	analog / digital input
5	IN5	analog / digital input
6	IN6	analog / digital input
7	IN7	digital input / counter
8	IN8	digital input / counter
9	IN9	digital input
10	IN10	digital input

X3 connector: output pins

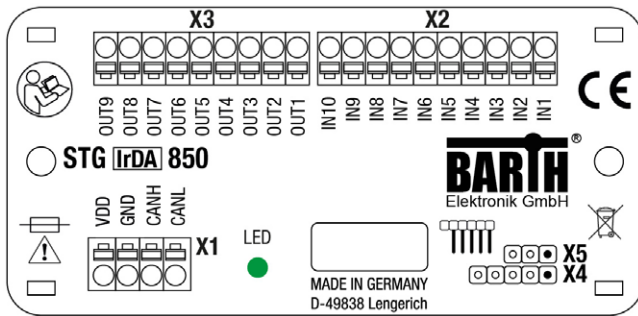
1	OUT1	highside output
2	OUT2	highside output
3	OUT3	highside output
4	OUT4	highside output
5	OUT5	highside output
6	OUT6	highside output
7	OUT7	highside output
8	OUT8	highside output
9	OUT9	lowside output / PWM

X4 connector: Open Source ISP (via VK-35)

1●	+3V3	positive power supply (Pin 1)
2	GND	ground terminal
3	SYS_SWDIO	system data IO
4	SYS_SWCLK	system clock
5	SYS_RESETN	system reset (inverted)

X5 connector: USB/232 interface (via VK-16)

1●	GND	ground terminal
2	TX	3V3 TTL TX terminal
3	RX	3V3 TTL RX terminal



The voltage at any input must not exceed 32VDC referred to ground (GND). Higher voltages or reverse voltage lower than -32VDC may cause irreversible damage of the Mini-PLC!

The 10-pole connector X2 contains the inputs of the Mini-PLC. While IN7 to IN10 are pure digital inputs, IN1 to IN6 provide both digital or analog (0-30V) functionality. The voltage range for all inputs may not exceed 32 VDC. All inputs refer to GND.

Please refer to the appendix for detailed electrical specification of the inputs.

2.2.2 Connecting the power supply

The STG-850 features an outstanding wide supply voltage range from 7 to 32 VDC at lowest current consumption. So the Mini-PLC can be integrated within battery supplied 12V or 24V DC systems (cars, trucks, battery powered cars, forklifts and digger, for example).



Turn off the power supply before performing any wiring operations!



False electrical connection, voltage reversal or disregarding the electrical specifications may cause irreversible damage of the Mini-PLC!

Connect the supply voltage of 7 to 32 VDC to the 4-pole terminal X1 of the Mini-PLC. Wire the positive supply to the '+VDD' marked connection. The negative (ground) will be wired to the 'GND' connection. All terminals are carried out as plugable spring terminal connectors for a wire gauge of 0.25 to 1.5mm².



Ensure correct power supply voltage range and polarisation! External fusing of 6A max. is mandatory! Disregarding may cause irreversible damage of the PLC!

2.2.3 Connecting the inputs

You can connect sensors, switches or buttons to the inputs. The sensors may be temperature, flow, pressure, photo-electric sensors or proximity switches, for example.

Features of IN1 to IN10

- IN1 to IN6 are selectable analog/digital inputs
- IN7 and IN8 are digital or event counter inputs up to 25kHz
- IN9 and IN10 are standard digital inputs
- Wide input voltage range 0 to 32VDC
- IN1 to IN6 are 0 to 10/30 V compatible (12 bit)
- Comprehensive integrated protection circuits
- Outstanding electromagnetic compatibility (EMC)
- Electrostatic discharge protection (ESD)

Due to the pull-down resistors integrated in the Mini-PLC any switch (NO/NC) can simply be connected between the positive supply (VDD) of the Mini-PLC and the desired input.

2.2.4 Connecting the outputs

Depending on load type and current the Mini-PLC is able to drive electric loads directly without any additional driver or protection circuit. The Mini-PLC provides 4 digital solid-state highside outputs and 1 solid-state lowside switch.

Features of OUT1 to OUT8

- Rugged solid-state highside switch up to 1.5A
- Switching up to 100Hz
- Paralleling permissible up to 6A
- Short circuit protection and current limitation
- Fast demagnetization of inductive loads
- Stable behaviour at undervoltage
- Comprehensive integrated protection circuits
- Outstanding electromagnetic compatibility (EMC)
- Electrostatic discharge protection (ESD)

Features of OUT9

- 2A Solid state lowside switch with PWM capability
- 16 bit PWM resolution from DC to 25kHz
- Comprehensive integrated protection circuits
- Outstanding electromagnetic compatibility (EMC)
- Electrostatic discharge protection (ESD)

The 9-pole connector X3 contains the digital outputs of the Mini-PLC. While OUT1 to OUT8 are overload-protected highside switches, OUT9 is carried out as lowside switch with PWM capability.

A logical HIGH within miCon-L will switch the Mini-PLC's supply voltage at OUT1 to OUT8, while OUT9 switches lowside (GND).



The total current sourced by OUT1 to OUT8 must not exceed 6A! Avoid reverse voltage at any output higher than the Mini-PLC's supply voltage!



If you use C-Programming take care of not switching OUT1 to OUT8 higher than 100Hz ! Rise and fall times of the output driver IC will cause higher power-losses resulting in heat dissipation.

Please refer to the appendix for detailed electrical specification of the outputs.

2.2.5 Connecting the CAN interface

The X1 connector of the Mini-PLC contains the CAN-specific pins ,CANH' and ,CANL'.



The voltage at CANH or CANL must not exceed -32 or +32 VDC referred to ground (GND). Higher voltages may cause irreversible damage of the Mini-PLC!

There is no termination resistor (120R) integrated in the Mini-PLC. Please add a 120R resistor at both ends (2) for CAN bus termination.

2.2.6 Connecting the programming interface

Both X4 and X5 connectors ensure programming of the STG-850. For graphical miCon-L programming the X5 connector is reserved for application communication via the Connection Cable VK-16 (BARTH® Art. No. 0091-0016). If you choose the Open Source Programming Option, use the X4 connector for programming and debugging via the Connection Cable VK-35 (BARTH® Art. No. 0091-0035). In this case the X5 connector can be used as TTL232 UART interface within your application.

3 Graphical programming

Without learning a difficult programming language the Mini-PLC STG-850 can be easily programmed using simple and vivid graphical function blocks. This block design meets graphical standards of the latest graphical programming languages. The miCon-L software suite features programming, simulation and test in one unique software design tool. The flexible CAN programming option offers a variety of possibilities in industrial, automotive and maritime applications. CAN programming has never been easier!

3.1 Software download

BARTH® supplies a free software license download package for Microsoft® WINDOWS® which includes:

- Virtual COM port driver for USB connection
- miCon-L Software Suite
- Sample Programs for BARTH® Mini-PLC

Please download the latest software package from:
www.micon-l.de

3.2 Virtual COM port driver installation

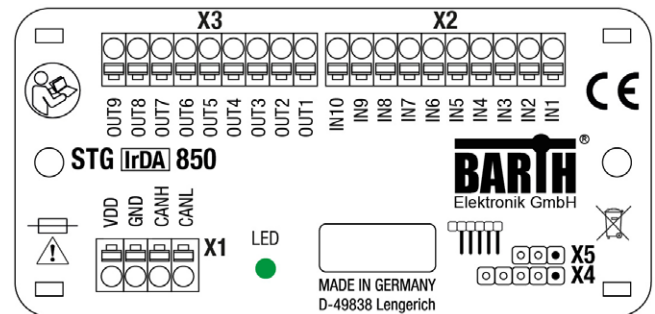
Before you connect the Mini-PLC to the PC you have to install the virtual USB-/COM-port driver (folder ,USBdriver') from the software download package. Please follow the instructions of the SETUP routine.

3.3 miCon-L Software Installation

Now install the miConL software suite from the ,miCon-L' folder. Select your language file and follow the setup instructions of miConL.

3.4 Connecting the Mini-PLC

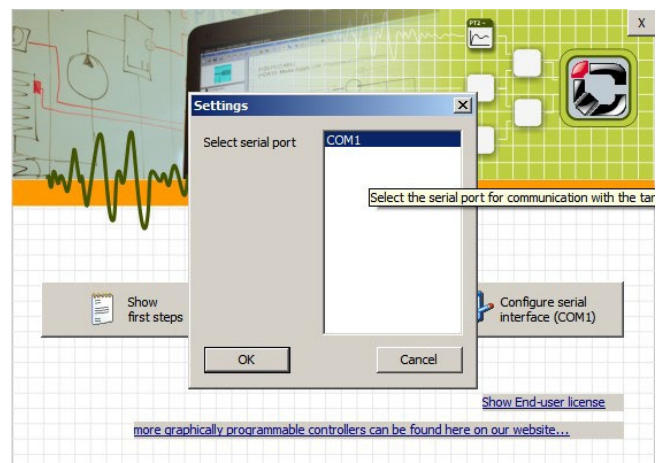
To operate the STG-850, first establish proper power supply connection to the X1 connector.



For programming and PC connection the USB connection cable VK-16 (BARTH® Art. No. 0091-0016) and a PC with installed Windows operating system are mandatory. For Mini-PLC connection please use the 3-way X5 terminal.

3.5 First steps in miCon-L

Establish the PC connection using the VK-16 connection cable and run miConL. For choosing the correct virtual COM-Port please click the right button (configure serial interface) located on the main menu page and confirm the added virtual COM-Port used by the STG-850.



4 Open source programming

The STG-850 can also be programmed as Open Source Mini-PLC using the powerful KEIL® µVision® Software Suite. For everyone who is familiar with C-Programming this option opens up a variety of hardware-oriented features in a realtime environment with powerful debugging features.



Please note that an once Open Source programmed Mini-PLC can not be graphical programmed afterwards! The miCon-L runtime will be overwritten and has to be factory-reinstalled!

4.1 Software download

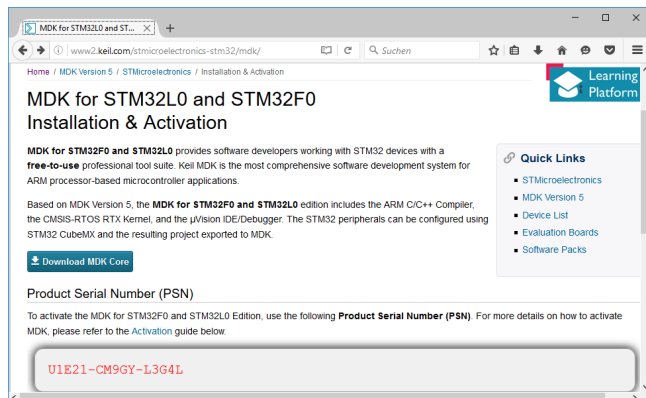
In the first step please download the KEIL® µVision® Software Suite from:

<http://www2.keil.com/stmicroelectronics-stm32/mdk>

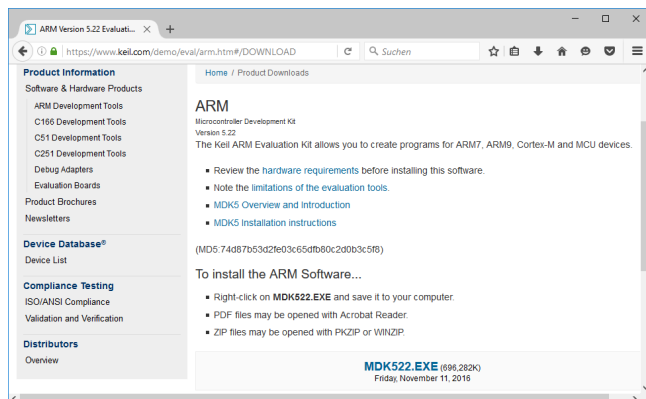
All product-related software packages are available from:

<https://www.barth-elektronik.com/en/download.html>

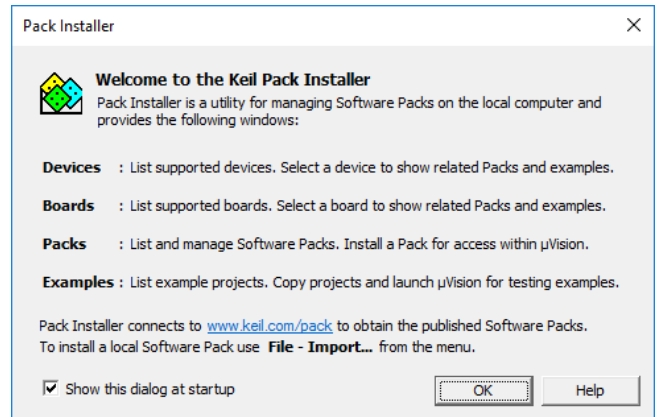
The packages includes free and ready-to-use sample programming templates. Each template refers to the specific hardware design and contains all required port connections. To create your own project simply modify or extend one of the following programming templates. Please login or register for free Downloadcenter access. Now first install the KEIL® µVision® Software Suite:



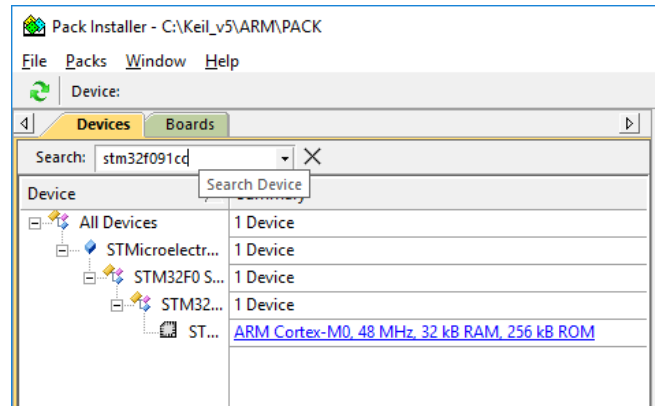
Please follow the software setup instructions.



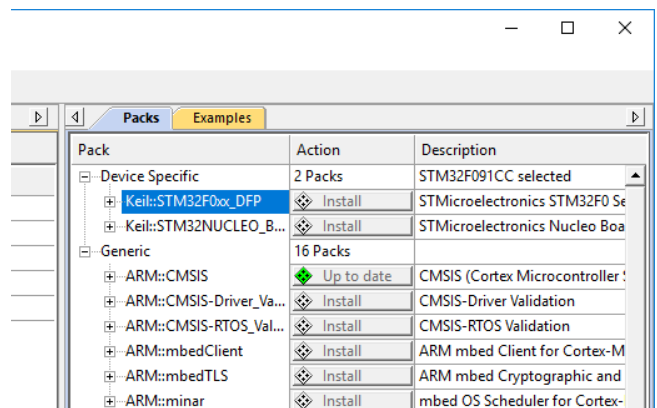
After successful software installation the Pack Installer will be launched:



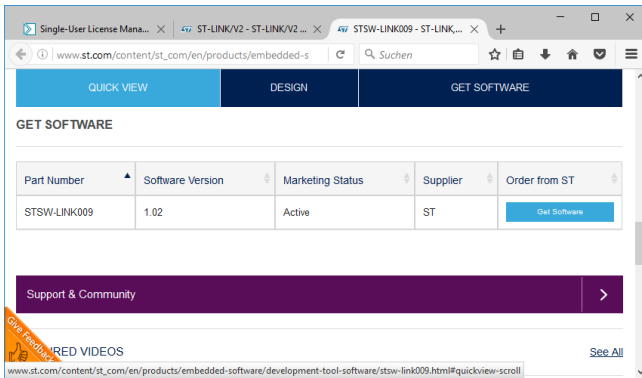
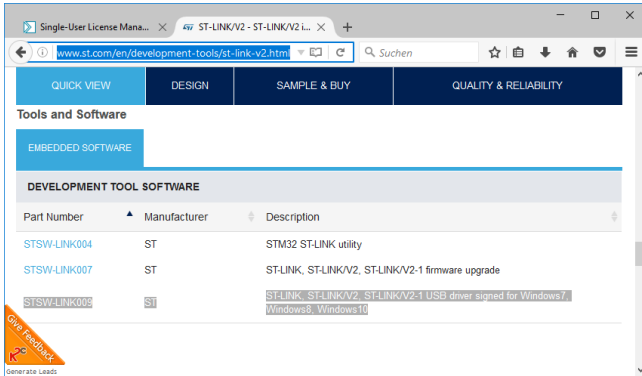
Please search for the 'STM32F091CC' device.



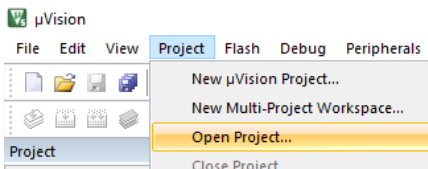
Select the device-specific packages to be installed.



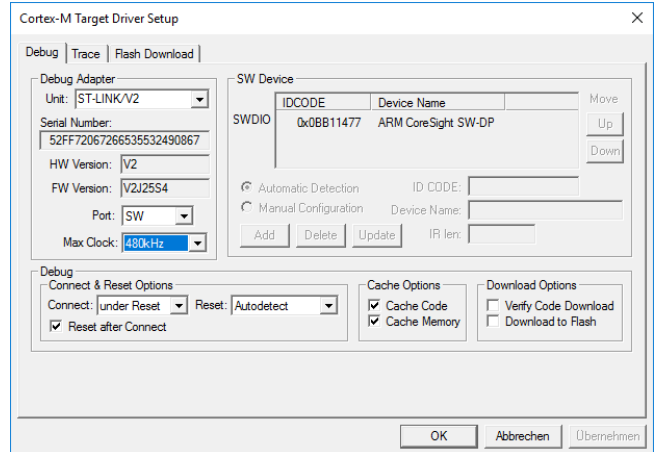
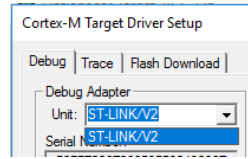
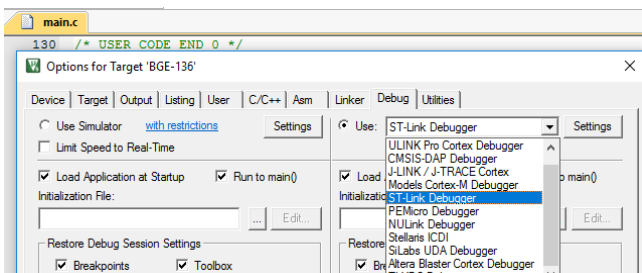
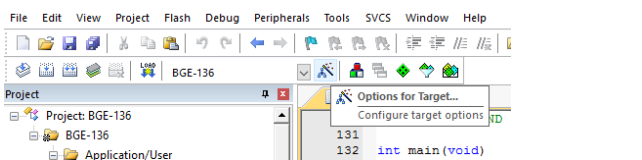
To program and debug the Mini-PLC, the ST-Link/V2-Isol Programmer is required (BARTH® Art. No. 0017-0066 and Connection Cable VK-35 Art. No. 0091-0035). Please download the 'ST-LINK/V2' driver from: <http://www.st.com>



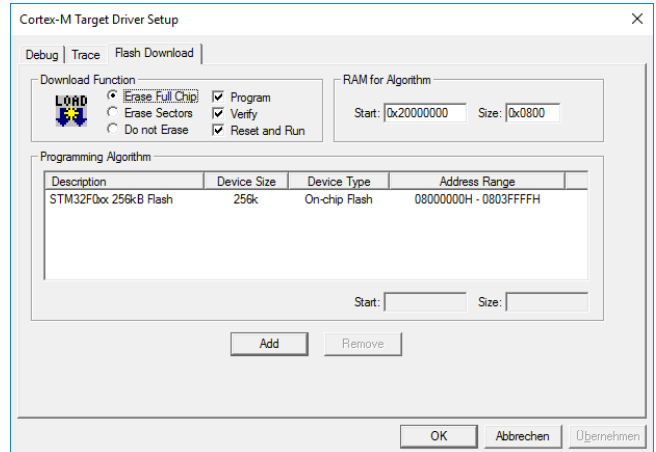
Now open a sample project in the KEIL® µVision® Software Suite.



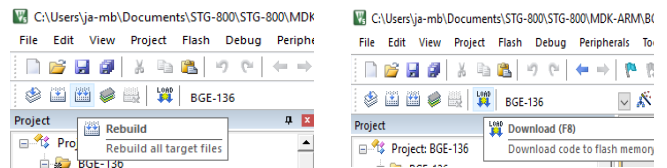
Open the 'options' menu and select 'ST-Link Debugger' as your favourite programmer/debugger tool.



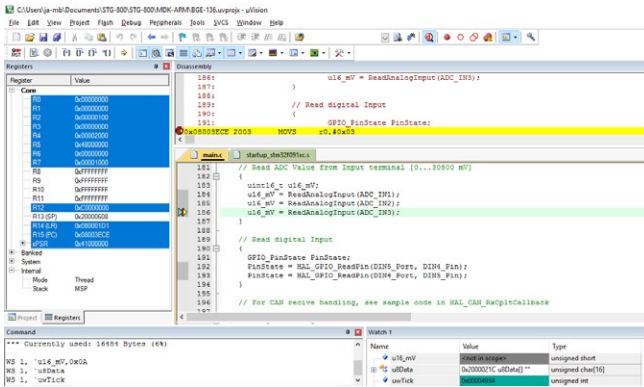
Please ensure the following programmer settings.



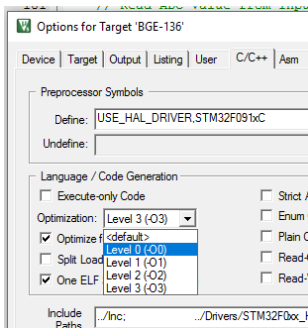
Now build and download a sample project.



After successful download you will be able to debug the project.

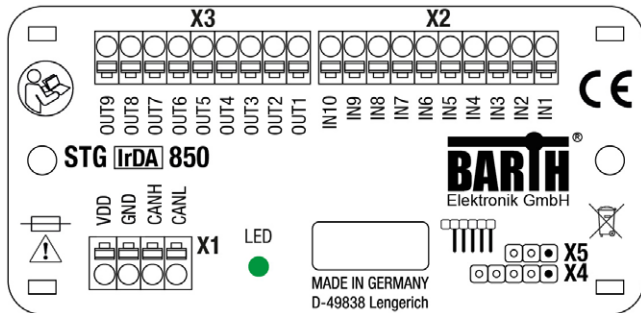


To read online values you have to set the optimization level down to ,0' in the ,C/C++ options menu'.



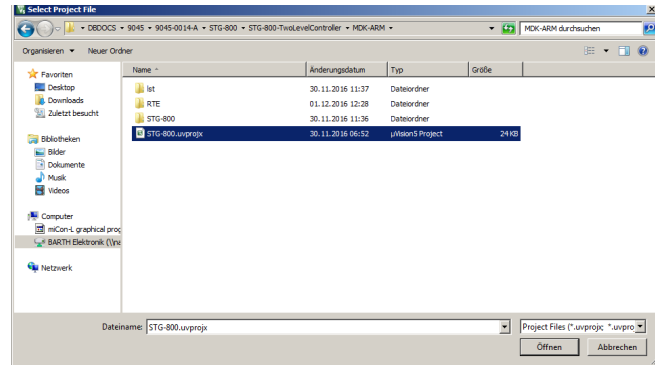
4.2 Connecting the Mini-PLC

To program and debug the Mini-PLC, the ST-Link/V2-Isol Programmer (BARTH® Art. No. 0017-0066 and the Connection Cable VK-35 Art. No. 0091-0035) are required. To connect the programmer to the STG-850 please use the X4 connector. The X5 connector can be used as TTL232 UART interface within your application. For USB communication please use the VK-16 Connection Cable (BARTH® Art. No. 0091-0016).

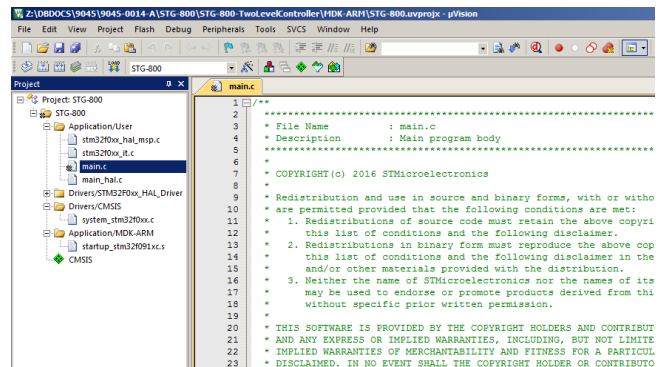


4.3 First steps in KEIL® uVision®

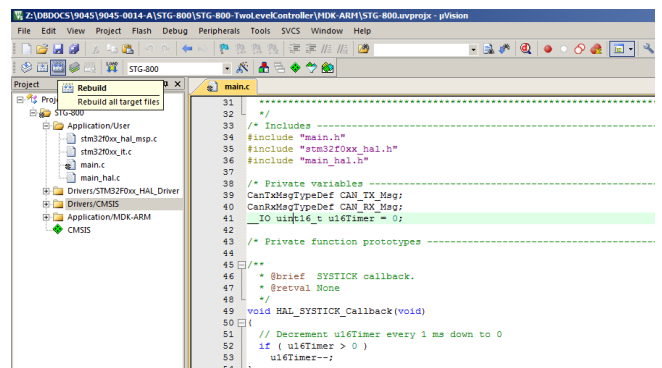
The BARTH® software package for STG-850 includes numerous free and ready-to-use sample programming templates. Each template refers to the Mini-PLC's hardware design and contains all required port connections. To create your own project simply modify or extend one of the following programming templates. Choose and open your favourite sample programming template project in the KEIL® uVision® Software.



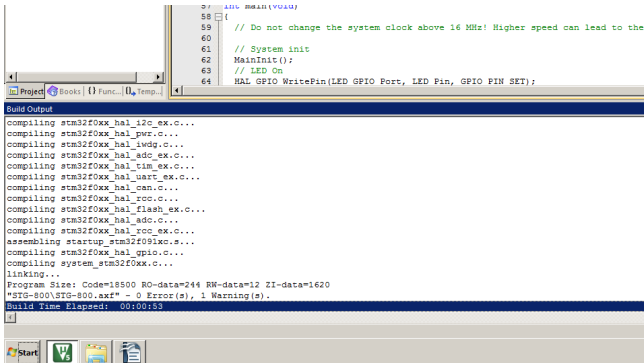
Open the ,main.c' from the sample project.



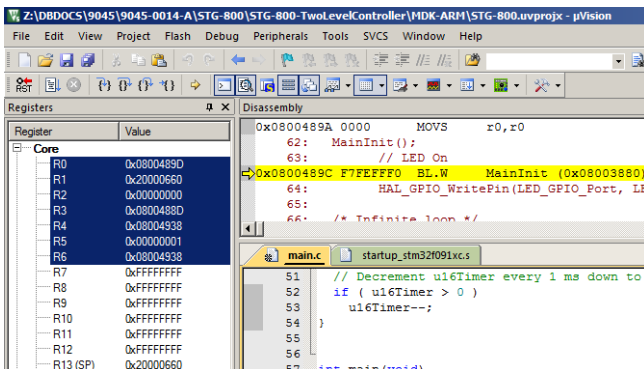
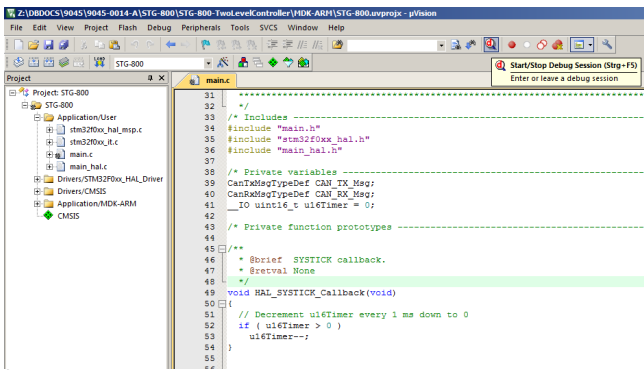
Rebuild the project.



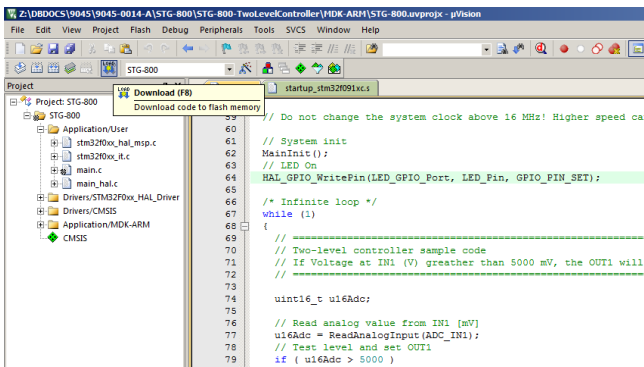
Wait... and have a look at the Output Window during the Rebuild.



Now start your Debug Session...



...or download (F8) your application instead of debugging.



Now you are at the point to create your own programs.
Have fun with your BARTH® Mini-PLC !

4.3.1 Using the IrDA interface

The STG-850 features an IrDA (SIR) interface which bases on infrared light technology to transfer serial data. This interface can be used in combination with the BARTH® PG-65 Parameter programmer (BARTH® Art. No. 0017-0065) to communicate user-defined parameters.



The IrDA Interface will not be supported using the graphical programming with miCon-L.

Learn more about the IrDA feature in the PG-65 user manual and related product documentation.

5 Appendix

5.1 Specifications

5.1.1 General

Hardware design	BARTH® IrDA Mini-PLC fully enclosed in proprietary PU resin, tiny and rugged housing with plugable spring terminal connectors, ultra-lightweight
Programming options	Open Source, C-Programming using the powerful KEIL® µVision® Software, free license
Interfaces	UART TTL232 (3.3V TTL level) USB (VK-16 required) reserved for miCon-L software communication or USB/COM
	CAN 2.0A/B/open®/SAE J1939 NMEA2000
	IrDA/SIR (for PG-65 communication)

5.1.2 Power supply

Operating voltage	7 to 32 VDC
Current consumption	nominal 10 mA at 32 VDC (depending on configuration)
Fusing	6 A max. (external) mandatory for voltage reversal protection
Voltage reversal protection	yes (combined with external fuse)
ESD/TVS protection	yes, integrated
Heat dissipation air (at full load)	normally < 2 W

5.1.3 Inputs

Number digital	6+4
Number analog	6
Analog / digital input IN1 - IN6	$U_{IN} = 0$ to 30 VDC $R_{IN} > 11$ kOhm $f_{IN} \leq 1$ kHz $t_{IN} \geq 1$ ms
Digital / counter input IN7 - IN10	$U_{IN} = 0..30$ VDC $R_{IN} > 20$ kOhm $U_{LOW} < 3$ VDC $U_{HIGH} \geq 5$ VDC $f_{IN} \leq 25$ kHz $t_{IN} \geq 40$ µs
Accuracy ADC IN1 - IN6	<0.15 VDC
ADC resolution (internal)	12 Bit
Potential isolation	no (common GND)
ESD/TVS protection	yes
Permissible cable length (per input)	normally 40 m

5.1.4 Outputs

Number digital	8+1
Number PWM	1
Output OUT1 - OUT8	Output type: solid state (highside) $I_{OUT} \leq 1.5$ A (resistive load) @ $f_{OUT} = 0$ to 100 Hz $U_{OUT} \geq U_{IN} - 0,45$ V $I_{TOT} \leq 6$ A (paralleling permissible) Maximal allowable load inductance for a single switch off (one output): $V_{DD} = 12$ VDC, $I_L = 1.5$ A, $Z_L \leq 70$ mH $V_{DD} = 12$ VDC, $I_L = 1$ A, $Z_L \leq 200$ mH On-state resistance V_{DD} to OUT: $R_{ON} \leq 180$ mOhm Turn-on time: $t_{ON} \leq 250$ µs Turn-off time: $t_{OFF} \leq 270$ µs
PWM Output OUT9	Output type: solid state (lowside) $I_{OUT} \leq 2$ A (resistive load) @ $f_{OUT} = 1$ kHz to 10 kHz $I_{OUT} \leq 1$ A (resistive load)
Potential isolation	no

5.1.5 Interfaces

CAN	CAN 2.0A/B: 11/29 bit ID, base frame format Baud rates: 50, 100, 125, 250, 500 kbit, 1Mbit CANopen® multi line, single line, master, slave SAE J1939 NMEA 2000 Meets or exceeds the requirements of applications ISO 11898-2, loss of ground protection from -32 V to +32 V, thermal shutdown protection
TTL232	3.3V TTL level, config: 8N1 Baud rates: 2400 to 115.2 kbit/s
IrDA (infrared)	SIR (9.6 kbit/s to 115.2 kbit/s) IrPHY (for PG-65 communication)

5.1.6 Security features

Security Features	System and independent watchdog Fail safe oscillator Power on/down reset Supply voltage supervisor
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5.1.7 Program and data memory

Memory	256 kB Flash program memory 32 kB SRAM 64 kB EEPROM
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5.1.8 Timebase (oscillator)

Primary Oscillator	Crystal quartz MEMS unit (precise „micro-electro-mechanical system“)
Nominal Frequency	16.000 MHz
Frequency tolerance	$\pm 50 \times 10^{-6}$
Frequency aging	$\pm 5 \times 10^{-6}$ / year max.

5.1.9 Electrical connection

Electrical Connection	pluggable spring terminal connectors 0.25 to 1.5 mm ² Manufacturer: Phoenix Contact Series: COMBICON Type: FMC1,5/x-ST-3,5-BK
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5.1.10 Electromagnetic compatibility (EMC)

Electrostatic discharge (ESD) on IN1 to IN10	20 kV air discharge 30 kV contact discharge (IEC/EN 61 000-4-2, level 3)
Electrostatic discharge (ESD) on OUT1 to OUT9	8 kV (human body model) (MIL-STD883D)
Electromagnetic fields	Field strength 10 V/m (IEC/EN 61000-4-3)
CAN bus terminals (CANH, CANL to GND)	IEC 61000-4-2: Unpowered Contact Discharge ± 15000 V IEC 61000-4-2: Powered Contact Discharge ± 8000 V

5.1.11 Environmental conditions

Operation temperature	-40 to +70 °C (IEC 60068-2-1/2)
Storage temperature	-40 to +70 °C (IEC 60068-2-1/2)
Relative humidity	5 to 95% non-condensing (IEC 60068-2-30)
Air pressure (in operation)	500 to 1500 hPa
Shock resistance	min. 100 m/s ² (IEC 60068-2-27)
Vibration resistance	min. 50 m/s ² @ 10..100 Hz (IEC 60068-2-6)
Degree of protection	IP 20, limited by connectors (EN 50178, IEC 60529)
Drop	Drop height: 1000 mm (IEC 60068-2-31)
Free fall (packaged)	1500 mm (IEC 60068-2-32)

5.1.12 Weight and dimensions

Weight	80 g (without connectors)
Dimensions	93 x 45 x 15 mm (LxWxH) Height housing: 11 mm
Mounting	via two M4 screws or 3.6mm cable ties

5.1.13 MTTF and MTTFd

Calculation basis	DIN EN ISO 13849-1:2008 (@T=25°C)
Calculation formula	DIN EN ISO 13849-1:2008 Annex C.5: MTTF, MTTFd data of electrical components (typical and worst case) D.1: Parts count method (worst case with safety factor 10) $MTTF = \frac{1}{\sum_1^n \frac{1}{MTTF_n}}$ $MTTFd = MTTF \cdot 2$ $MTTFd = \frac{MTTF \cdot 2}{10}$ (worst case)
MTTF [years]	195
MTTFd [years]	390
MTTFd worst case [years]	39
Explanation	This information is given without any guarantee. The indicated product is no safety component according to the machine directive 2006/42/EC (subject to modifications).

5.1.14 Ordering information

Ordering information Mini-PLC	Mini-PLC STG-850 Art. No. 0850-0850 GTIN 4251329401443
Ordering information accessory	Connection Cable VK-16 (TTL232 <-> USB) Art. No. 0091-0016 GTIN 4251329400187 Connection Cable VK-35 (OS) Art. No. 0091-0035 GTIN 4251329401276 Programmer ST-Link/V2 ISOL Art. No. 0017-0066 GTIN 4251329401269

5.2 Documents, videos and software

Detailed information, additional documents, application notes and videos relating to this product are downloadable from www.barth-elektronik.de and www.micon-l.de

5.3 Disposal



If you wish to finally dispose of the product, ask your local recycling centre or dealer for details about how to do this in accordance with the applicable disposal regulations.

5.4 Conformity declaration

For the following designated product it is hereby confirmed, that the construction in that technical design brought by us in traffic corresponds to the standards specified below. In the event of any alternation which has not been approved by us being made to any device as designated below, this statement shall thereby be made invalid.

Description	Mini-PLC
Type	STG-850
Art. No.	0850-0850
Directive 2004/108/EG relating to electromagnetic compatibility (EMC) CE	Applied norms: 2004/108/EG 2004/108/EC 2014/30/EU
RoHS Directive 2011/65EU	We hereby declare that our product is compliant to the RoHS Directive on restriction of the use of certain hazardous substances in electrical and electronic appliances.

BARTH® Elektronik GmbH, Lengerich, 23.10.2017

D. Barth

Dipl.-Ing. (FH) D. Barth
CEO