

VARISTEP – STEPPER MOTOR CARD

OPERATING MANUAL



VariStep 
MOTORTECH STEPPER MOTOR CARD

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1 GENERAL INFORMATION

Read through this operating manual carefully before use and become familiar with the machine. Installation and start-up should not be carried out before reading and understanding this document. Keep this manual readily available so that you can reference it as needed.

1.1 What Is the Purpose of this Operating Manual?

This manual serves as an aid for the installation and operation of the product and supports the technical staff with all operating and maintenance tasks to be performed. Furthermore, this manual is aimed at preventing dangers to life and health of the user and third parties.

1.2 Who Is this Operating Manual Targeted to?

The operating manual provides a code of conduct for personnel tasked with the set-up, operation, maintenance, and repair of gas engines. A certain level of technical knowledge with respect to the operation of gas engines and basic knowledge of electronic ignition systems are necessary. Persons who are only authorized to operate the gas engine shall be trained by the operating company and shall be expressly instructed concerning potential hazards.

1.3 Which Symbols Are Used in the Operating Manual?

The following symbols are used in this manual and must be observed:



Example

This symbol indicates examples, which point out necessary handling steps and techniques. In addition, you receive additional information from the examples, which will increase your knowledge.



Notice

This symbol indicates important notices for the user. Follow these. In addition, this symbol is used for overviews that give you a summary of the necessary work steps.



Warning

This symbol indicates warnings for possible risks of property damage or risks to health. Read these warning notices carefully and take the mentioned precautionary measures.



Danger

This symbol indicates warnings for danger to life, especially due to high voltage. Read these warning notices carefully and take the mentioned precautionary measures.

1.4 Which Abbreviations/Acronyms Are Used in the Operating Manual?

In the manual or the user interface, the following abbreviations / acronyms are used.

Abb.	Term	Description	Explanation
CAN bus	Controller Area Network Bus	Bus for control devices / networks	Asynchronous serial connection system for networking control devices
CE	Conformité Européenne	Conformity with EU directives	Mark based on EU legislation for certain products in conjunction with product safety
CPU	Central Processing Unit		
DC	Direct Current		
EMC	Electromagnetic Compatibility		Compatibility of electrical or electronic equipment items with their surroundings
ESD	Electrostatic Discharge		
LED	Light Emitting Diode		Light emitting electronic semiconductor
MICT	MOTORTECH Integrated Configuration Tool		Configuration software for MOTORTECH control units
USB	Universal Serial Bus		Serial wiring system to connect a computer to external equipment

2 SAFETY INSTRUCTIONS

2.1 General Safety Instructions

MOTORTECH equipment is manufactured as state of the art and therefore safe and reliable to operate. Nevertheless the equipment can cause risks or damages can occur, if the following instructions are not complied with:

- The gas engine must only be operated by trained and authorized personnel.
- Operate the equipment only within the parameters specified in the technical data.
- Use the equipment correctly and for its intended use only.
- Never apply force.
- For all work, such as installation, conversion, adaptation, maintenance, and repair, all equipment must be disconnected from the power supply and secured against unintentional restarting.
- Perform only such maintenance and repair work as is described in this operating manual, and follow the instructions given while working. For maintenance of the equipment, only use spare parts supplied by MOTORTECH. Further work must only be performed by personnel authorized by MOTORTECH. Non-compliance with the instructions will void any warranties for the proper function of the equipment as well as the responsibility for the validity of the certifications.
- Safety devices must not be dismantled or disabled.
- Avoid all activities that can impair the function of the equipment.
- Operate the equipment only while it is in proper condition.
- Investigate all changes detected while operating the gas engine or ignition system.
- Ensure compliance with all laws, directives and regulations applicable to the operation of your system, including such not expressly stated herein.
- If the system is not entirely tight and sealed, gas may escape and lead to an explosion hazard. Upon completion of all assembly works, please always check the system's tightness.
- Always ensure adequate ventilation of the engine compartment.
- Ensure a safe position at the gas engine.

2.2 Electrostatic Discharge Hazards

Electronic equipment is sensitive to static electricity. To protect these components from damage caused by static electricity, special precautions must be taken to minimize or prevent electrostatic discharge.

Observe these safety precautions while you work with the equipment or in its vicinity.

- Before performing maintenance or repair work, ensure that the static electricity inherent to your body is discharged.
- Do not wear clothing made from synthetic materials to prevent static electricity from building up. Your clothing should therefore be made of cotton or cotton mix materials.
- Keep plastics such as vinyl and Styrofoam materials as far away from the control system, the modules, and the work environment as possible.
- Do not remove the circuit boards from the housing of the device.

2.3 Special Safety Instructions for the Device



Explosion hazard!

When the system is powered up, do not remove any connectors unless the system is not located in a potentially explosive atmosphere.



Explosion hazard!

If the system is not entirely tight and sealed, gas may escape and lead to an explosion hazard. Upon completion of all assembly works, always check the system's tightness. Also ensure that the gauge port on the VariFuel2 is closed.

All works involving gas-carrying parts must be executed by trained personnel only.



Operational safety!

All screws of the connectors must be adequately tightened.

2 SAFETY INSTRUCTIONS



Risk of destruction due to electrostatic discharge!

The VariStep stepper motor card may only be installed by specialized personnel who has been trained in handling ESD sensitive components and with due regard to relevant ESD standards. It must be installed into a control cabinet, and it is necessary to comply with the ESD standard DIN EN 61340-5-1; VDE 0300-5-1:2008-07.

Damages caused by electrostatic discharge are not covered by the guarantee.



Risk of burning!

The surfaces of the system may heat up to high temperatures.



Risk of damage!

The stepper motor of the VariFuel2 is not suitable for carrying or lifting a gas mixer. There is a danger that the stepper motor could break, and if the gas mixer were to fall, it could result in injury or property damage.

Always carry or lift the gas mixer by its exterior housing.

2.4 Proper Disposal

After the expiration of its service life, MOTORTECH equipment can be disposed of with other commercial waste, or it may be returned to MOTORTECH. We will ensure its environmentally friendly disposal.

3 INTENDED USE

3.1 Functional Description

The VariStep stepper motor card controls the stepper motor of a VariFuel2 gas mixer. This stepper motor changes the openings of the fuel ring, thus adapting the composition of the air/gas mixture.

Control can be manual or automatic. Manual adjustments can be made using buttons on the stepper motor card or via a connected PC. In automatic mode, digital or analog input signals, such as those provided by a master control, are analyzed.

The stepper motor card is configured using a connected PC. The software used for this purpose is also used to display current system data and error messages.

3.2 Applications

The VariStep stepper motor card can be used for all VariFuel2 gas mixers with stepper motors. If two VariFuel2 gas mixers are being used, two VariStep stepper motor cards are required. An additional splitter is not necessary.

Any use other than the one described in the operating manual shall be considered improper use and will result in the voiding of all warranties.

4 PRODUCT DESCRIPTION

4.1 Technical Data

4.1.1 Certifications

The stepper motor card is certified in accordance with the following standards:

CE

- EMC Directive 2004/108/EC
 - Emission standard for industrial environments as per DIN EN 61000-6-4:2007
 - Immunity for industrial environments as per DIN EN 61000-6-2:2006

CE DECLARATION OF CONFORMITY

The company: **MOTORTECH GmbH**
Hogrevestrasse 21-23
29223 Celle

declares that the products: **VariStep Stepper Motor Card**

Intended purpose: **to be used on gas-Otto-engines**

complies with the provisions of the following EC-Directives:
EMC Directive 2004/108/EC

under consideration of following standards:
DIN EN 61000-6-4:2007
DIN EN 61000-6-2:2006
DIN EN 61000-4-2, DIN EN 61000-4-3
DIN EN 61000-4-4, DIN EN 61000-4-5
DIN EN 61000-4-6, DIN EN 61000-4-8

The marking of the product is: **P/N 31.01.955**

This declaration is submitted by:
Name: **Florian Virchow** Professional status: **Managing Director**

Celle, 16.02.2011
City, Date 
legally binding signature

4 PRODUCT DESCRIPTION

4.1.2 Mechanical Data

The stepper motor card has the following mechanical characteristics:

Feature	Value
Dimensions	217 x 128 x 50 mm (8.54 x 5.04 x 1.97 ") (length x width x height)
Weight	655 g (1.44 lbs)
Shape of device	Refer to chapter <i>Overview Drawings</i> on page 18
Mechanical environmental conditions	Protection: IP20
Climatic environmental conditions	-15 °C to 65 °C max. (5 °F to 149 °F) Max. 85% humidity without condensation up to 2000 m (6561.68 ') above sea level

4.1.3 Warning Notices on the Device

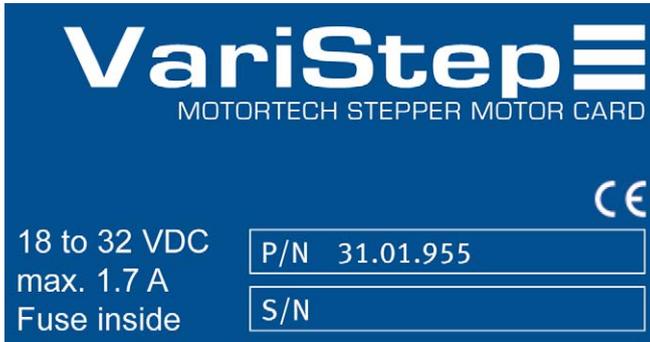
Top of Device

Warning	Meaning
	Component subject to electrostatic hazards
<p>WARNING: Read and understand the operation manual prior to installing or making any adjustments. Do not disconnect equipment unless power has been switched off.</p>	

4.1.4 Product Identification – Labeling on the Device

The numbers required for unique product identification are on the device:

Top of Device



Bottom of Device



Abb.	Meaning
P/N	Control unit product number
S/N	Control unit serial number

4 PRODUCT DESCRIPTION

4.1.5 Electrical Data

The stepper motor card has the following electrical characteristics:

Feature	Value
Power consumption	Max. 31 W
Power supply	18 to 32 V DC
Required current	Max. 1.7 A
Internal fuse	3.15 A, delay, 5x20 mm, exchangeable

Electrical Data for Inputs and Outputs

The inputs and outputs of the stepper motor card have the following electrical data:

Inputs and outputs	Values/characteristics
Digital inputs	<ul style="list-style-type: none">– Galvanically isolated– Input voltage up to 32 V DC– Input current at least 5 mA for high level– Save low level: voltages below 1.0 V DC for at least 30 μs– Save high level: voltages above 4.5 V DC for at least 5 μs

Diagram of the signal

When the reset signal is given, the high-level must be present at the relevant input for at least 50 ms before it is possible to initiate the reset.

Inputs and outputs	Values/characteristics
Digital outputs	<ul style="list-style-type: none"> - Galvanically isolated - Low level: output is high-impedance - High level: output is low-impedance - Switching voltage: maximum 32 V - Current: maximum 500 mA
Analog voltage input (U_{in})	Permissible voltage: 0 to 10 V Input resistance: 12.4 k Ω
Analog current input (I_{in})	Permissible current: 0 to 20 mA Max. difference in potential relative to device ground: +/-15 V Input resistance: 10 Ω
Analog voltage output (U_{out})	Output voltage: 0 to 10 V Working resistance: min. 300 Ω
Analog current output (I_{out})	Output current: 0 to 20 mA Working resistance: max. 300 Ω

4.1.6 Interfaces

USB

- Compatible with USB 1.1 and USB 2.0
- The connector B version is only suitable for temporary data exchange and not for a permanent connection.

CAN Bus 2.0B Interface (currently not yet available)

- As per ISO 11898, up to 1 MBit/s
- Transient-proof (automotive classification)
- Max. 110 participants

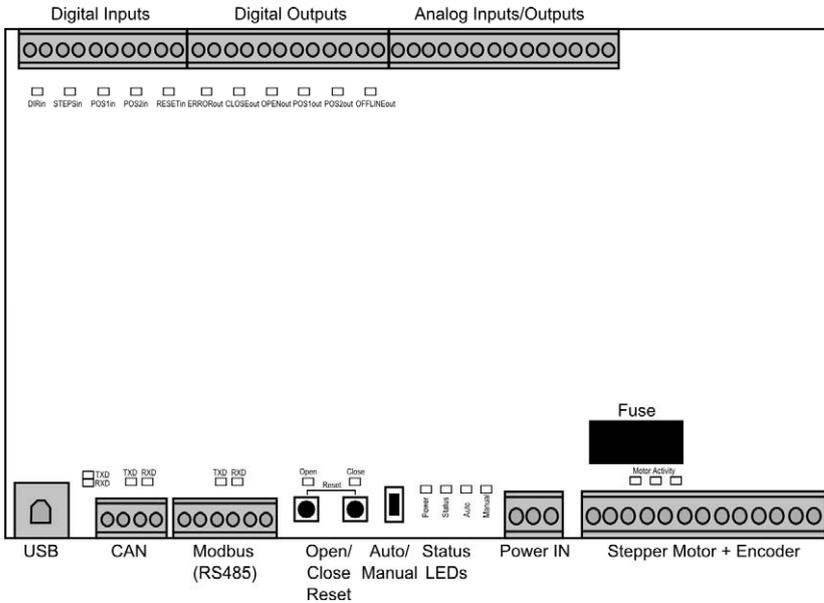
Modbus Interface (currently not yet available)

- RS485 standard
- Max. 32 participants
- Full duplex (4-pole) or half duplex (2-pole)

4 PRODUCT DESCRIPTION

4.1.7 Overview Drawings

Ports/Connections and LEDs



Designation	Function
Digital Inputs	Digital inputs via which the fuel ring opening can be modified. There is also a digital input available for a reset signal (refer to <i>Wiring Digital Inputs</i> on page 24).
Digital Outputs	Digital outputs that signal the position of the stepper motor and the status of the stepper motor card (refer to <i>Wiring Digital Outputs</i> on page 25).
Analog Inputs/Outputs	Analog inputs and outputs that are used to modify and return the position of the stepper motor (refer to <i>Wiring Analog Inputs and Outputs</i> on page 26).
USB	Port for the data transmission to the PC. The data transfer is signaled by means of the LEDs <i>TXD</i> and <i>RXD</i> (<i>TXD</i> =data being sent, <i>RXD</i> =data being received).
CAN (not yet available)	Port for communication via CAN bus with master control devices (such as ALL-IN-ONE). The data transfer is signaled by means of the LEDs <i>TXD</i> and <i>RXD</i> (<i>TXD</i> =data being sent, <i>RXD</i> =data being received).

Designation	Function
Modbus (RS485) (not yet available)	Port for communication via Modbus with master control devices. The data transfer is signaled by means of the LEDs <i>TXD</i> and <i>RXD</i> (<i>TXD</i> =data being sent, <i>RXD</i> =data being received).
Open/Close; Reset	The <i>Open</i> and <i>Close</i> buttons can be used to control the stepper motor in manual mode (refer to <i>Manual and Automatic Operation</i> on page 31). In the case of an error, the error can be reset followed by a reference run if you press the two buttons simultaneously.
Auto/Manual	Switch used to change between manual and automatic mode (see <i>Manual and Automatic Operation</i> on page 31)
Status LEDs	<ul style="list-style-type: none"> – <i>Power</i> This LED lights up if there is a sufficient supply voltage present. – <i>Status</i> This LED flashes green if the stepper motor card is working without any problems. If an error has occurred, this LED will flash orange (refer to <i>Runtime Data – Errors</i> on page 59). – <i>Auto</i> This LED lights up if the stepper motor card is in automatic mode and is controlled by the signals of the master control. – <i>Manual</i> This LED lights up if the stepper motor card is in manual mode.
Power IN	Connection for the supply voltage (refer to <i>Wiring Power Supply</i> on page 21)
Stepper Motor + Encoder	Port for the stepper motor and the encoder. The <i>Motor Activity</i> LEDs flash whenever the stepper motor moves (refer to <i>Wiring Stepper Motor and Encoder</i> on page 22).
Fuse	Replaceable fuse (3.15 A)

5 INSTALLATION INSTRUCTIONS

5.1 Installation Instructions

Unpack the stepper motor without damaging it and ensure that the operating manual is always within reach of the device and easily accessible. Installation locations where strong vibrations or ambient temperatures of below $-15\text{ }^{\circ}\text{C}$ ($5\text{ }^{\circ}\text{F}$) or above $65\text{ }^{\circ}\text{C}$ ($149\text{ }^{\circ}\text{F}$) are present are not permissible and result in the warranty being voided.



Risk of damage!

The device must not be installed directly on or at the engine, as vibration and heat may cause damage to electronic components.



Risk of damage!

Please make sure that the device is not covered and ensure sufficient circulation of air.



Risk of destruction due to electrostatic discharge!

The VariStep stepper motor card may only be installed by specialized personnel who has been trained in handling ESD sensitive components and with due regard to relevant ESD standards. It must be installed into a control cabinet, and it is necessary to comply with the ESD standard DIN EN 61340-5-1; VDE 0300-5-1:2008-07.

Damages caused by electrostatic discharge are not covered by the guarantee.

Scope of Supply

The VariStep stepper motor card as supplied consists of the following components:

- VariStep stepper motor card
- CD-ROM
- USB cable
- Operating manual

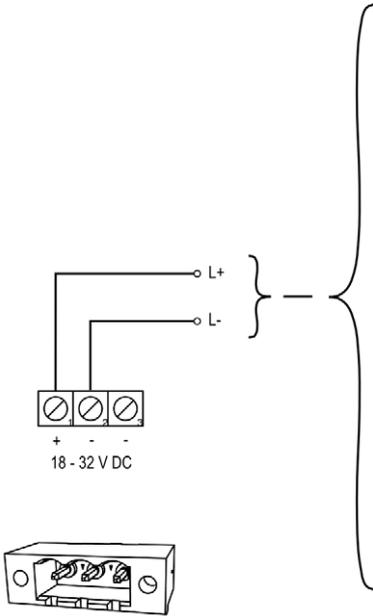
Assembly of Control Unit

1. Please install the control unit on the DIN-rail in the control cabinet.
2. Please fix the card using the attachment screws on the sides.

6 WIRING OF THE CONTROL UNIT

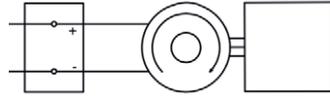
6.1 Wiring Power Supply

The power supply is wired using the 3-pole plug.

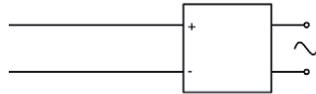


Variations

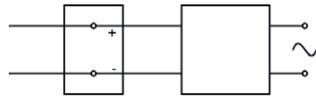
1 Battery Generator Control unit



2 Supply voltage



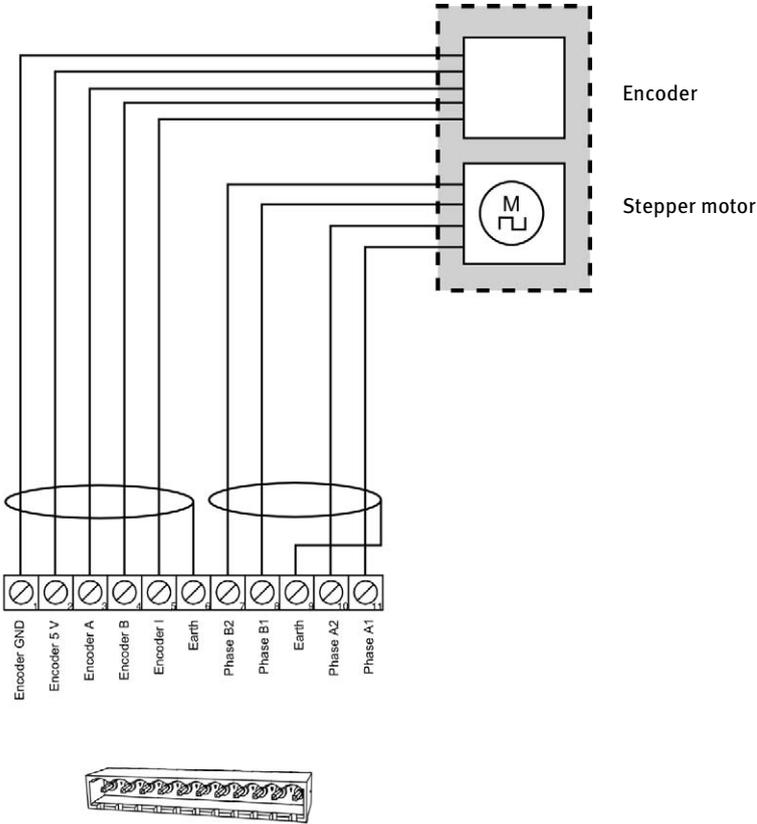
3 Battery Charger



6 WIRING OF THE CONTROL UNIT

6.2 Wiring Stepper Motor and Encoder

Wiring via the 11-pole plug on the stepper motor card. The length of the connecting cable must not exceed 10 m (32.8 ft).



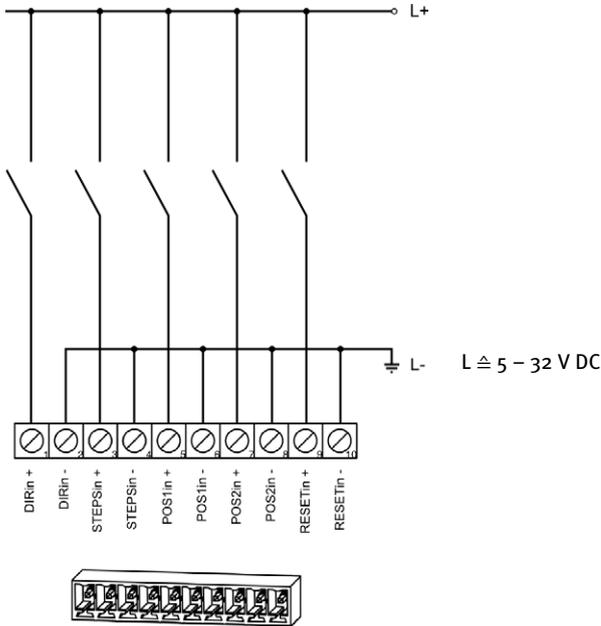
Pin assignment when using the original MOTORTECH wiring harness:

Pin stepper motor card	Description	Pin stepper motor and encoder	Wire color/designation
1	Encoder ground	J	Brown
2	Encoder 5V supply voltage	I	Yellow
3	Encoder A	E	White
4	Encoder B	F	Green
5	Encoder I (index)	G	Grey
6	Encoder earth	H	Shield
7	Stepper motor phase B2	D	4
8	Stepper motor phase B1	C	3
9	Stepper motor earth	H	Shield
10	Stepper motor phase A2	B	2
11	Stepper motor phase A1	A	1

6 WIRING OF THE CONTROL UNIT

6.3 Wiring Digital Inputs

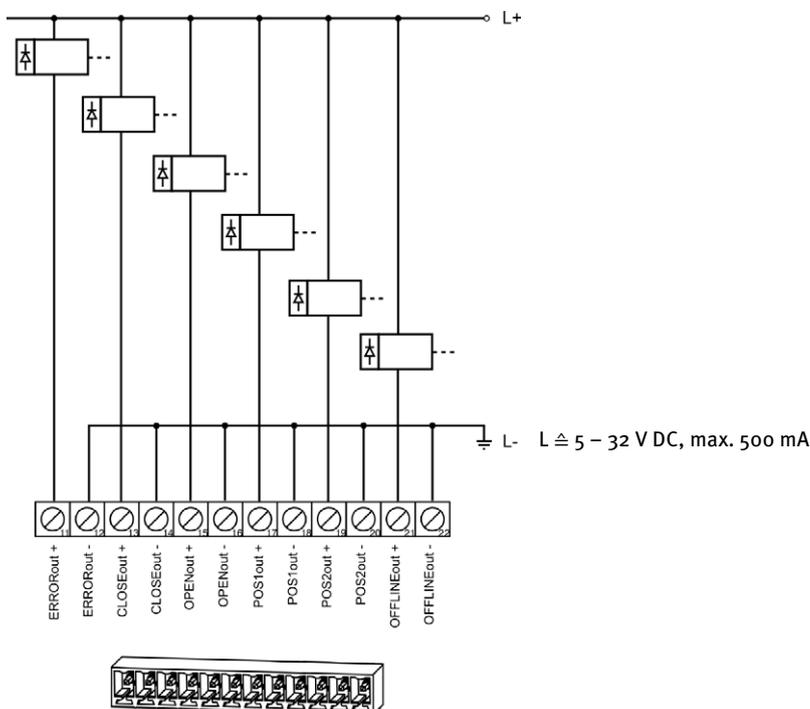
The digital inputs are wired using the 10-pole plug. The inputs can be switched both on the side of the operating voltage and on the ground side.



Pin	Designation	Function
1	DIRin +	The level on the digital input indicates towards which direction the fuel ring is moved if there are pulse signals on the <i>STEPSin</i> input (refer to <i>Inputs / Outputs - Control Setup</i> on page 48).
2	DIRin -	
3	STEPSin +	The pulse signals on the input move the fuel ring gradually (refer to <i>Inputs / Outputs - Control Setup</i> on page 48).
4	STEPSin -	
5	POS1in +	If a high level is applied, position 1 as defined in the configuration is approached.
6	POS1in -	
7	POS2in +	If a high level is applied, position 2 as defined in the configuration is approached.
8	POS2in -	
9	RESETin +	If a high level is applied for at least 50 ms, the device exits the error mode and the stepper motor card is reset. Subsequently, it initiates a reference run.
10	RESETin -	

6.4 Wiring Digital Outputs

The digital outputs are wired using the 12-pole plug. The outputs can switch both the operating voltage and the ground.



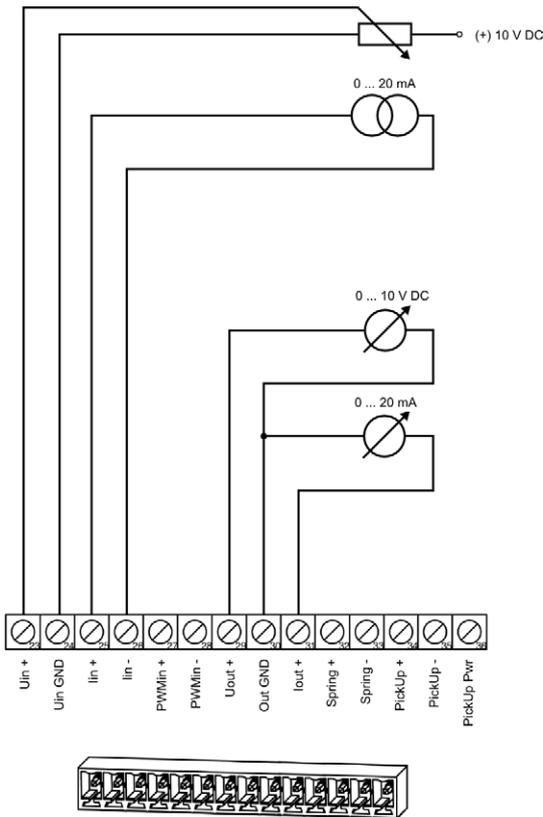
Pin	Designation	Function
11	ERRORout +	The output is low-resistance if an error has occurred and the stepper motor card is in automatic mode. To exit the error state, the error needs to be acknowledged (refer to <i>Acknowledging Faults</i> on page 71).
12	ERRORout -	
13	CLOSEout +	The output is low-resistance if the stepper motor has reached the closed position.
14	CLOSEout -	
15	OPENout +	The output is low-resistance if the stepper motor has reached the open position.
16	OPENout -	
17	POS1out +	The output is low-resistance if the stepper motor has reached the configured position 1.
18	POS1out -	

6 WIRING OF THE CONTROL UNIT

Pin	Designation	Function
19	POS2out +	The output is low-resistance if the stepper motor has reached the configured position 2.
20	POS2out -	
21	OFFLINEout +	The output is low-resistance if the stepper motor card is in a state in which it does not react to external control signals (e. g. manual mode or reference run).
22	OFFLINEout -	

6.5 Wiring Analog Inputs and Outputs

The analog inputs and outputs are wired using the 14-pole plug.



Pin	Designation	Function
23	Uin +	Voltage input, via which the fuel ring can be adjusted (refer to <i>Inputs / Outputs - Control Setup</i> on page 48).
24	Uin GND	
25	lin +	Current input, via which the fuel ring can be adjusted (refer to <i>Inputs / Outputs - Control Setup</i> on page 48).
26	lin -	
27	PWMin +	Not used for VariFuelz.
28	PWMin -	
29	Uout +	Voltage and current output with shared ground. The outputs export the current position of the fuel ring as appropriate signal.
30	Uout/lout GND	
31	lout +	
32	Spring +	Not used for VariFuelz.
33	Spring -	
34	PickUp +	Not used for VariFuelz.
35	PickUp -	
36	PickUp Pwr	



Unused inputs and outputs

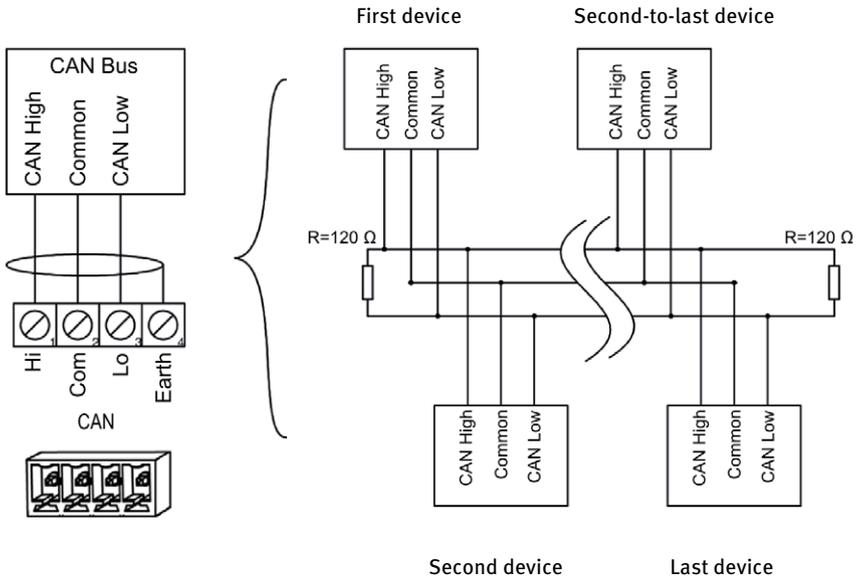
Please note that the terminals for the analog inputs and outputs not selected in the MICT must remain unoccupied.

6 WIRING OF THE CONTROL UNIT

6.6 Wiring CAN Bus

The CAN bus 2.0B interface is currently not yet available.

The CAN bus interface is wired using the 4-pole plug.



CAN bus wiring

Note the following when connecting the CAN bus:

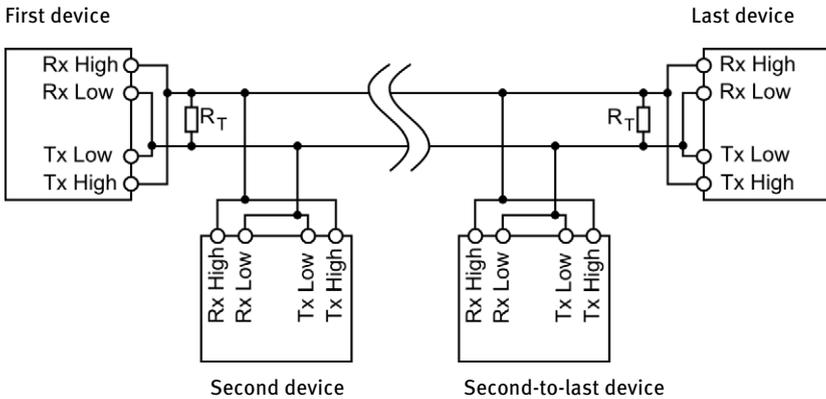
- There can be a maximum of 110 devices connected to one CAN bus.
- The maximum wire length is 250 m (820 ft) depending on the transfer rate.
- Each bus end must be fitted with a terminating resistor with 120 Ω (as indicated in the drawing).

6.7 Wiring Modbus

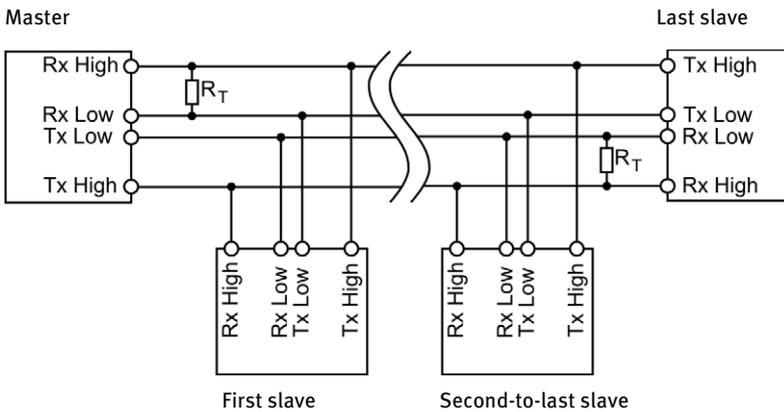
The Modbus interface is currently not yet available.

The Modbus can be wired as half duplex or full duplex, and twisted cables must be used. In both models, the load resistance R_T matches the wave impedance of the cable.

Wiring Half Duplex



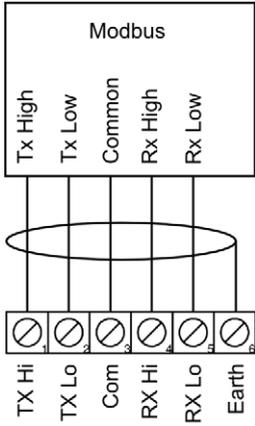
Wiring Full Duplex



6 WIRING OF THE CONTROL UNIT

Port on Stepper Motor Card

The Modbus is wired using the 6-pole plug.



RS485



7 FUNCTIONS

7.1 Manual and Automatic Operation

The opening in the fuel ring can be adjusted via the stepper motor card in two operation modes:

- manual operation
- automatic operation

You can switch from manual to automatic mode using the *Auto/Manual* switch or via the MICT. In this case the MICT overwrites the switch position on the device. You can block the switching of the *Auto/Manual* switch by configuring the MICT accordingly. If the status LEDs *Manual* or *Auto* light up, this indicates the operation mode the stepper motor card is currently in.

Manual Operation

In manual operation, the external input signals of the master control are ignored. The openings of the fuel ring can be opened or closed using the *Open* and *Close* buttons or via the MICT. The stepper motor card must be in manual operation to configure the MICT and to transfer these settings to the device.



Risk of damage!

In manual operation, the signals of the master control are not analyzed. If you make any adjustments in the manual mode with the gas engine running, please make sure that these settings do not endanger the correct operation of the gas engine.

Automatic Operation

In automatic operation, the stepper motor card evaluates the external input signals of the control unit connected. The *Open* and *Close* buttons are disabled when adjusting the openings. The device cannot be configured via the MICT. In automatic operation, the MICT can only be used to display the data and to create log files.

7.2 Reference Run

After the device is switched on or was reset, the stepper motor card initiates a reference run. This means that the stepper motor determines its current position. In automatic mode, the stepper motor subsequently approaches the position defined by the master control. In manual mode, the fuel ring remains completely open (at first).

During the reference run, the resistance of output *OFFLINEout* is low and the corresponding LED lights up. The signals of the inputs are not analyzed.

7 FUNCTIONS

7.3 Open/Closed Positions

The open and the closed position are specified as follows:

- *Open*: Openings of the fuel ring are completely open (100% open)
- *Closed*: Openings of the fuel ring are completely closed (0% open)

When one of the two positions is reached, the relevant digital output *OPENout* or *CLOSEout* is switched and the appropriate LED lights up. It is not possible to move the fuel ring beyond these two positions and all relevant signals will be ignored.

7.4 Configurable Opening Angles (Position 1 and 2)

The MICT can be used to configure two opening angles in the fuel ring, and these openings can be controlled directly via digital inputs (*POS1in*, *POS2in*). If the signals *POS1in* and *POS2in* are simultaneously present, position 1 will be approached. When the stepper motor reaches one of the two positions, the relevant digital output (*POS1out*, *POS2out*) is switched and the appropriate LED lights up. In this way you can define the opening angles for certain operating states such as starting or purging the gas engine.

You can configure positions 1 and 2 with the MICT. For further information, please refer to the section *Positions – Values* on page 51.

7.5 Change of Openings via Digital and Analog Inputs

In automatic mode, the openings of the fuel ring can directly be controlled using the following inputs:

- Digital inputs *DIRin* and *STEPSin*
- Analog voltage input *Uin*
- Analog current input *Iin*

Depending on which master control you are using, you can select the required input using the MICT. If one of the two end positions (*Open* or *Closed*) has been reached, all signals to the inputs in the appropriate direction are ignored.

You can configure the inputs with the MICT. For further information, please refer to the section *Inputs / Outputs - Control Setup* on page 48.

7.6 Analysis of Positions via Analog Outputs

The current position of the fuel ring can be sent to the master control via an analog voltage output or an analog current output. Using the MICT, it is possible to configure which of the two outputs is to be used and which voltage or current value corresponds to the open or closed position. The current and/or voltage applied on the output is then determined proportional to the opening of the fuel ring.

You can configure the outputs with the MICT. For further information, please refer to the section *Inputs / Outputs - Control Setup* on page 48.

7.7 Access Control

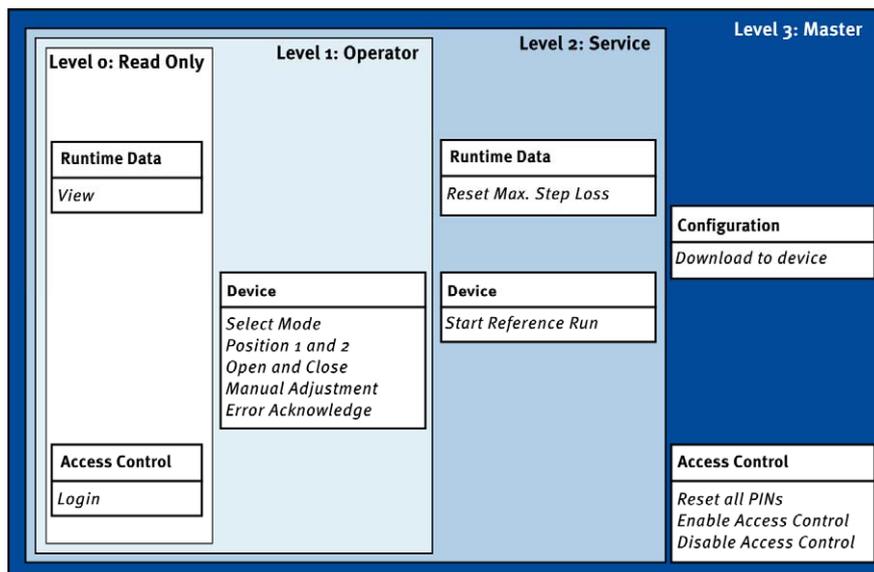
You can protect the control unit of your VariFuel2 against unauthorized access by establishing the access control in the MICT. The access control has four operating levels, three of which can be secured with different PINs. As a default setting, the access control is not activated. If the access control for the control unit is activated, it is independent from the access levels that control the views within the MICT.



Access Control

A user is logged in to the *Advanced Service* access level on the MICT. He changes a configuration and would like to download the latter to the control unit. Although the user has the full authorization set in the MICT, he is prompted to log on using the PIN for *Level 3 (Master)*. This ensures that it is not possible for any user with an MICT and a general password to change the configuration of your control unit.

Various functions are at your disposal on the four operating levels. The figure below illustrates this:



7 FUNCTIONS

The following functions are available on the different levels:

- **Level 0 (Read Only)**
Enables read-only access for all users.
- **Level 1 (Operator)**
At this level, the user can change the positions of the fuel ring (approach closed and open position, position 1 and position 2, and make manual changes to the opening). Beyond that, he can change the operation mode and can confirm errors.
- **Level 2 (Service)**
Service personnel can also initiate a reference run and reset the maximum step losses within the runtime data.
- **Level 3 (Master)**
At this level, the master can also reset all PINs and enable or disable the access control. Moreover, only the master is authorized to download a changed configuration to the control device.

For information on the access levels in the MICT, please refer to the section *Access Levels in the MICT* on page 36.

8 SETTINGS VIA THE MICT

8.1 MICT System Requirements

For the installation of the MICT, the following minimum requirements must be fulfilled:

- x86-compatible PC, minimum performance category Intel Pentium 4 with 2 GHz
- 128 MB free RAM
- 100 MB free disk space
- USB 1.1 compatible interface
- Display with minimum XGA resolution (1024 x 786 pixels)
- Microsoft Windows XP, Windows 7

8.2 MICT Installation

The software for the installation of the MICT is on the CD-ROM enclosed with the control unit.

To install the MICT, proceed as follows:

1. Start the installation.
 - CD-ROM as installation medium
Insert the CD-ROM in the CD/DVD drive of your PC. If the Autorun function is activated for the drive, the installation will start automatically. If the function is disabled for the drive, the installation routine can be started with the file *setup.exe* from the CD-ROM directory.
 - Alternative
Copy the installation routine *setup.exe* to your PC. The installation is started by executing the file.
2. Run the installation.
Follow the instructions of the installation routine. Please note that the license agreement terms must be accepted before using the MICT. If the terms are not accepted, the installation cannot continue.
3. Install the USB driver by running the file *CDMxxxxx_Setup.exe* (e.g. *CDM20824_Setup.exe*).
 - ▶ You have set up the MICT and can now connect your PC to the control unit via the USB interface.

8 SETTINGS VIA THE MICT

8.3 Access Levels in the MICT

Open the MICT on your PC using *Start -> Programs -> MOTORTECH -> MICT -> MICT*.

After opening the MICT, select the access level for which you have clearance. The access level controls the options you have at your disposal in the MICT. The password required for access is sent to you together with the device.



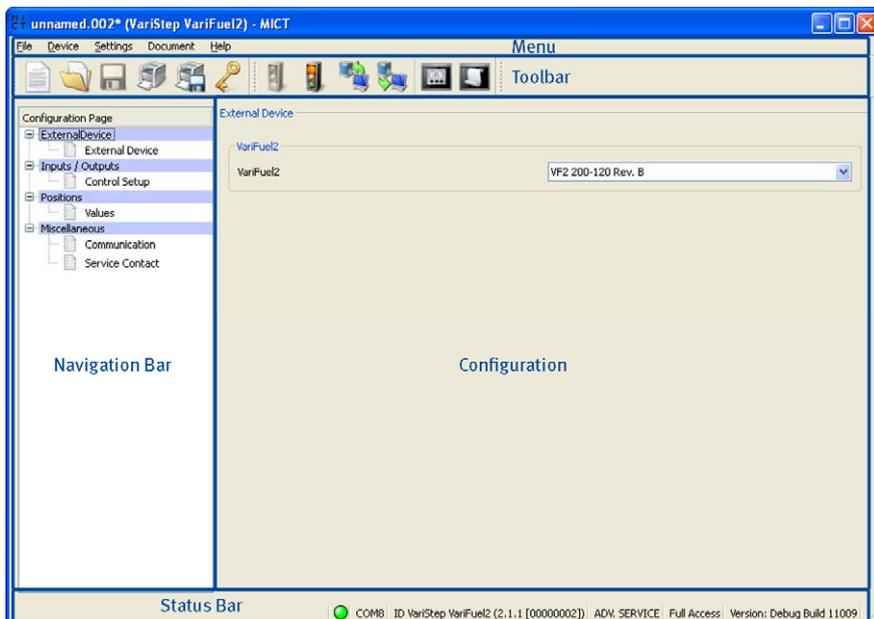
The following access levels are available:

- **Read Only**
At this level, the user can open a configuration and transfer it to the device. However, he cannot make changes to the configuration. The user has read-only access to all other settings.
- **Customer**
This level enables the configuration of the basic functions required for operation in addition to the read-only function.
- **Service**
This level contains all of the functions required for maintenance.
- **Advanced Service**
This level offers full access to all functions of the MICT and is enabled and accessible for specially trained personnel only.

The following sections describe the options at your disposal with the *Advanced Service* access level. If you have registered for a different level, you cannot execute all functions shown.

8.4 Configuration Pages (Overview)

The configuration pages are divided into the following sections:



The functions in the menu, navigation bar, and the toolbar as well as the configuration section will be described in the following.

The status bar provides you with the following information (from left to right):

- Status display
 - Indicates whether a connection is established with the controller:
 - Green: connection established
 - Red: the connection was interrupted and is being restored
 - Gray: the connection is not established and is not being restored
- Indication of the interface being used for the connection to the device
- Indication of the device ID
- Indication of the access level of the user in the MICT
- Indication of the operating level for the VariStep if access control has been activated and the user has logged on with a PIN
- Indication of the MICT program version

8 SETTINGS VIA THE MICT

8.5 Menu Bar and Toolbar

The following functions are available to you via the symbols on the toolbar and the entries in the menu bar:

Symbol	Menu	Function
	<i>File -> New</i>	Creates a new configuration.
	<i>File -> Open</i>	Opens an existing configuration.
	<i>File -> Save / File -> Save As</i>	Saves the current configuration.
	<i>File -> Close</i>	Closes the current configuration.
	<i>File -> Open trace</i>	Opens a runtime data record (trace file). Please refer to the section <i>Runtime Data</i> on page 55.
	<i>File -> Open pickup trace</i>	Opens a saved recording of pickup signals (putrace file), for example from a MOTORTECH ignition controller. Pickup signals cannot be recorded with the VariStep.
	<i>File -> Change Access Level</i>	Changes the access level for accessing the configuration data and functions.
	<i>File -> Print</i>	Prints the current configuration.
	<i>File -> Print To PDF File</i>	Prints the configuration to a PDF file.
	<i>File -> Print Preview</i>	Opens a print preview of the configuration.
	<i>File -> Quit</i>	Exits the MICT.
	<i>Device -> Connect</i>	Connects to the device.
	<i>Device -> Disconnect</i>	Cuts the connection to the device.

Symbol	Menu	Function
	<i>Device -> Download to device</i>	Downloads configuration data from the PC to the device. This function can only be executed in manual mode.
	<i>Device -> Upload from device</i>	Uploads configuration data from the device to the PC.
	<i>Device -> Runtime data</i>	Opens the window <i>Runtime Data</i> . Please refer to the section <i>Runtime Data</i> on page 55.
	<i>Device -> Log</i>	Opens the window <i>Log (Advanced Service only)</i> . Please refer to the section <i>Log</i> on page 64.
	<i>Device -> Select Mode</i>	Opens the window <i>Select Mode</i> , in which you can select the operation mode. The following modes are possible: <i>Manual Operation Mode</i> , <i>Automatic Operation Mode</i> or <i>Hardware Controlled Operation Mode</i> .
	<i>Device -> Manual Adjustment</i>	Opens a window in which you can manually adjust the opening angle of the fuel ring.
	<i>Device -> Open Position</i>	Completely opens the fuel ring in manual mode.
	<i>Device -> Close Position</i>	Closes the openings of the fuel ring in manual mode.
	<i>Device -> Position 1</i>	Opens the fuel ring in manual mode as per the percentage specified in the configuration for position 1.
	<i>Device -> Position 2</i>	Opens the fuel ring in manual mode as per the percentage specified in the configuration for position 2.
	<i>Device -> Reference Run</i>	Performs a reference run in manual mode (only <i>Service</i> and <i>Advanced Service</i>).
	<i>Device -> Temperature Extremes</i>	Opens a window in which the maximum and minimum temperature are displayed. These values are measured throughout the operating time on the control unit's board.
	<i>Device -> Error Acknowledge</i>	All operating errors are acknowledged.

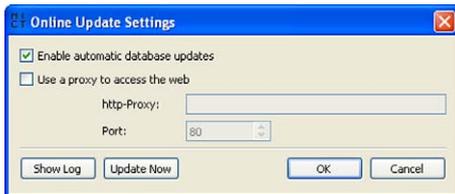
8 SETTINGS VIA THE MICT

Symbol	Menu	Function
	<i>Device -> Access Control</i>	The setup for the access control to the device is described in a separate section. Please read the chapter <i>Access Control of Control Unit</i> on page 42.
	<i>Device -> Trigger Software Reset</i>	Restarts the device's operating software (only <i>Advanced Service</i>).
	<i>Settings -> Language</i>	Opens the window <i>Select Language</i> in which you can change the interface language of the MICT.
	<i>Settings -> Online update settings</i>	Opens the window <i>Online Update Settings</i> . Please refer to the section <i>Online Update Settings</i> on page 41.
	<i>Settings -> Temperature scale</i>	Opens the window <i>Select Temperature Scale</i> , in which you can change the unit for the temperatures shown in the MICT.
	<i>Settings -> Display by cylinders</i>	This function is available for certain MOTORTECH ignition controllers and has no effect in conjunction with the VariStep.
	<i>Document</i>	Has no function with the VariStep.
	<i>Help -> Help</i>	Opens the online help function.
	<i>Help -> About MICT</i>	Opens detailed information on the MICT.

8.6 Online Update Settings

The MICT uses data from a VariFuel database for the configuration. Such data can be updated with automatic online updates. The settings for the update can be entered with the following entry in the menu bar:

Settings -> Online update settings



You have the following options:

- **Enable automatic database updates**
 Enable and disable the automatic online update using the checkbox. As the default setting, the online update is activated and is executed daily (if an internet connection is established) at first start-up of the MICT.
- **Use a proxy to access the web**
 Using the checkbox, you can activate settings for internet access via a proxy server, which you can then set up by entering *http-Proxy* and *Port*.
- **Show Log**
 This button opens a window in which the online updates performed are logged.
- **Update Now**
 This button is used to start a manual online update.



Online update

After the online update, the updated data will only be used if these have been downloaded onto the device. However, this requires the relevant authorization.

Whenever the configuration is uploaded from the device, the version of the configuration saved in the device will be compared with the version in the database. If the two versions are not the same, a window with additional instructions will open up.

8 SETTINGS VIA THE MICT

8.7 Access Control of Control Unit

If the access control to the control unit is activated, access to the following areas is possible with a PIN only:

- **Troubleshooting**
- **Position changes** (Open, Close, Position 1 and 2, Manual Adjustment, Reference Run)
- **Configuration** (transfer of a configuration to the control unit)

The access control regulates the accesses to the control unit via the MICT. Explanations on the access control functionality of the control unit and on the delimitation of the access levels in the MICT can be found in the chapter *Access Control* on page 33.

The access control functions can be accessed in the menu bar via:

Device -> Access Control

8.7.1 Enabling/Disabling Access Control



Enabling and disabling access control

As a default setting, the access control is not activated, and all PINs are set to 0000. Once the access control has been activated, and the PINs were changed, these PINs will continue to be used. To activate the access control again, you will need the PIN for level 3 (*Master*). It is therefore recommended to reset all PINs before disabling.

If that was not done, or a system must be unlocked for another reason, a request key can be issued in the MICT. Refer to the section *Resetting all PINs* on page 44.

To enable or disable the access control, proceed as follows:

1. Open the input dialog via *Device -> Access Control -> Enable* or *Disable access control*.
2. Enter the PIN for the level *Master (Level 3)*.
3. Accept the input with OK.

8.7.2 Login/Logout

If the access control is activated, you are prompted to log in if you want to execute functions that are allocated to a specific operating level. In addition, you can log in specifically to an operating level via the menu bar.

To log into a specific operating level, proceed as follows:

1. Open the input dialog via *Device -> Access Control -> Login*.
2. First select the level you wish to log on to.
3. Enter the PIN for the desired level.
4. Confirm the input with OK.
 - ▶ You are now logged into the corresponding level and can execute all functions that are allocated to this operating level without having to log in again.

After completing the log-in, you can log out again as follows:

Device -> Access Control -> Logout

8.7.3 Changing the PIN

To change the PIN for a specific operating level, proceed as follows:

1. Open the input dialog via *Device -> Access Control -> Change PIN*.
2. First select the level for which you wish to change the PIN.
3. Enter the current PIN for the desired level.
4. Enter the new PIN in the two subsequent fields.
5. Confirm the input with OK.
 - ▶ The PIN for this operating level has now been changed.

8 SETTINGS VIA THE MICT

8.7.4 Resetting all PINs

To reset all PINs, proceed as follows:

1. Open the input dialog via *Device -> Access Control -> Reset all PINs*.
2. If you are not logged in to the level *Master (level 3)* yet, you will be prompted to log in with the relevant PIN.
3. Confirm the input with *OK*.
4. To reset all PINs, you will be prompted again to enter the PIN for the level *Master (level 3)*.
5. Confirm the input with *OK*.
 - ▶ All PINs are now reset to the value *0000*.

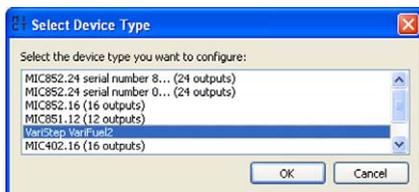
To reset all PINs, you need the PIN for the level *Master (level 3)*. To be able to unlock a system in case of emergency that was locked in this way, you have the following option:

1. From the menu bar, select the entry *Device -> Access Control -> Get reset all PINs request key* to open a window with this name.
2. Send the request key with the serial number to your service contact partner at MOTORTECH (refer to *Customer Service Information* on page 71). This key is valid only for the respective controller and only for a certain amount of time.
 - ▶ Your information will be verified, and you will receive an authorization key from your contact partner.
3. From the menu bar, select the entry *Device -> Access Control -> Set reset all PINs authorization key* to open a window with this name.
4. Enter the authorization key received in the input field.
5. Confirm the input with *OK*.
 - ▶ If the input was correct, all PINs are reset to the default value *0000*.

8.8 Selecting the Device Type



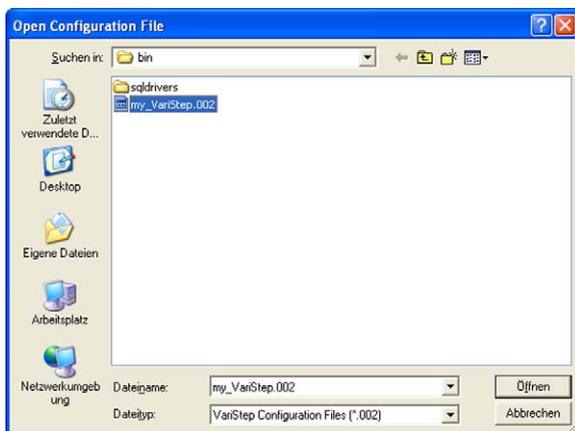
Click on the symbol to start a new configuration and select *VariStep VariFuel2* as the device type.



8.9 Opening an Existing Configuration File



Click on the symbol to open an existing configuration file.

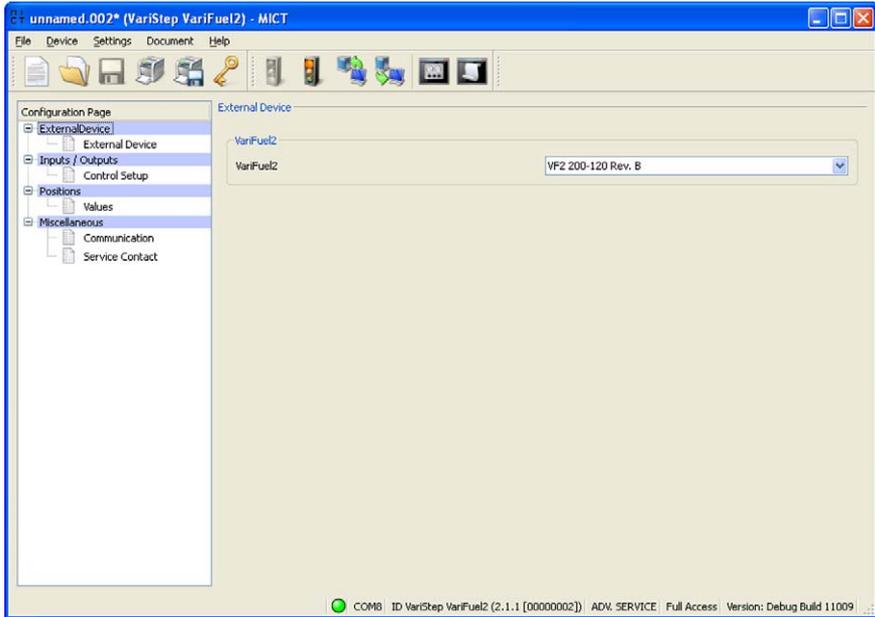


8.10 Configuration

The window opens after you select the device type for a new configuration or an existing configuration or have uploaded one from the device. You can make changes to the configuration by selecting an entry from the navigation bar. The corresponding configuration data are then displayed in the configuration and adjustments section and can be processed. The following sections will describe the settings and adjustments you can implement in the different areas.

8 SETTINGS VIA THE MICT

8.10.1 External Device



To change the VariFuel2 type, access to the level *Advanced Service* is required.

VariFuel2

Use the drop-down list to select the VariFuel2 type that matches the device that you wish to configure. Note the stepper motor revision when making your selection.



Note the stepper motor revision

The revision of the stepper motor can be identified from the nameplate on the stepper motor of your VariFuel2.

VariFuel2 stepper motors whose revisions are not stated on the nameplate or which are supplied without a nameplate are revision A stepper motors. For revision A, select the entry for your VariFuel2 type without a revision specification under *External Device* (e. g. *VF2 200-120* for a VariFuel2 type 200-120 with revision A stepper motor).

If you do not have any VariFuel2 types with a matching stepper motor revision displayed under *External Device*, your MICT's VariFuel database is not up-to-date. In this case, perform an online update. For further information, please refer to the section *Online Update Settings* on page 41.



Changing the VariFuel2 type

Scenario:

You have replaced one VariFuel2 gas mixer with another VariFuel2 type.

Problem:

Upon connection of the new VariFuel2, the control unit will perform a reference run. However, since this configuration still contains data from the first VariFuel, it is possible that the VariFuel2 may leave the traversing range and be mechanically damaged as a result, or it may be necessary to readjust the VariFuel2.

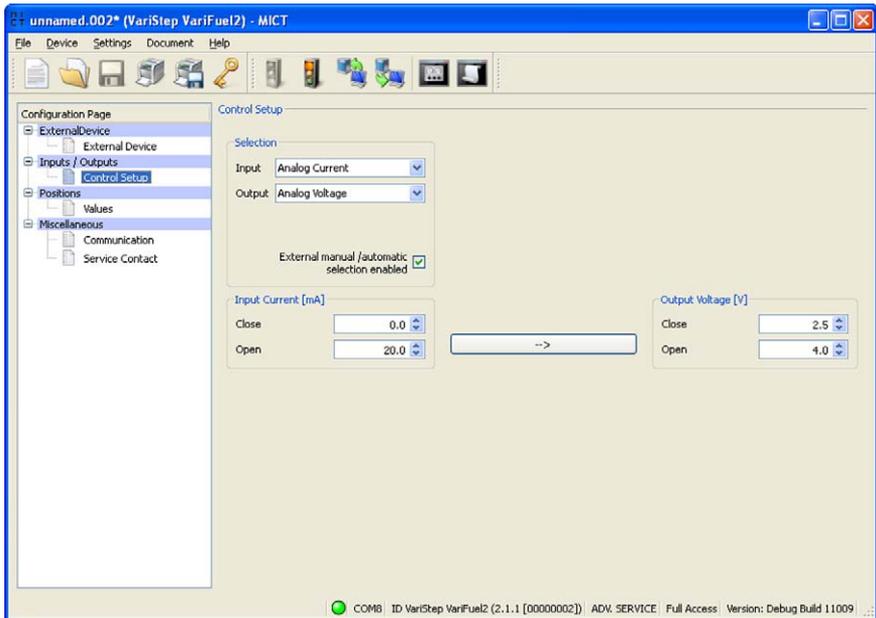
Solution:

The following procedure will help to solve the problem:

1. Disconnect the first VariFuel2 from the control unit.
2. Connect the MICT with the control unit.
 - ▶ The defective connection with the stepper motor causes an operating error.
3. Switch to manual mode.
4. Acknowledge the error via the MICT (*Device -> Error Acknowledge*).
5. Change the configuration to the new VariFuel2 type.
6. Download the altered configuration to the device.
7. Disconnect the control unit from the voltage supply.
8. Connect the new VariFuel2 with the control unit.
9. Reconnect the control unit with the supply voltage.
 - ▶ A reference run will be performed. The new VariFuel2 is then ready for operation.

8 SETTINGS VIA THE MICT

8.10.2 Inputs / Outputs - Control Setup



The settings on the configuration page depend on the inputs and outputs used by your master control. In this case please refer to all information given in the relevant documentations of the control units. To make changes, access to the level *Advanced Service* is required.

Selection

- **Input**
Select the input that is to be used by the connected master control to adjust the fuel opening.
- **Output**
Select the analog output that is to be used by the connected master control.
- **External manual/automatic selection enabled**
Deactivate this checkbox to deactivate the *Auto/Manual* switch on the control unit. The control unit may then only be used in manual mode via the MICT and with the relevant authorization.

Input Voltage/Input Current

Depending on which input is selected, you have different adjustment options available. For the analog inputs, please enter the values for the open and closed position of the fuel ring. Here, please adhere to the following values:

- Input voltage: 0 to 10 V
- Input current: 0 to 20 mA

Input Step Count/Step Count Configuration

Set the *Direction* and *Init Position* of the steps. The initial position (= *Init Position*) will be approached after the reference run of the stepper motor.

To make these settings, please refer to all additional information as provided in the following note.



Click this button to apply the settings of the analog input (current or voltage) to the output selected. If you have selected another input as an output (e. g. input: current; output: voltage), the adjusted values are converted in accordance with the output's value range.

Output Voltage/Output Current

Depending on the relevant selection, enter the relevant current or voltage values, which correspond to the open and closed position of the fuel ring. Here, the same value ranges are applicable as with the analog inputs.

8 SETTINGS VIA THE MICT



Settings of the input selected

Analog Inputs (Current or Voltage)

Based on the values used by your master control, you can define the values of the open and the closed position for the analog inputs in the MICT. The value applied on the input will then be converted to the relevant opening angle of the fuel ring proportional to the values entered.

Example:

Your master control works with a power input of 4 to 20 mA. In the MICT, you configure 4 mA to refer to the closed position and 20 mA to the open position. If the current on the input is now 16 mA, the fuel ring will be 75% open.

Digital Inputs

In the MICT, you can define the behavior for the digital inputs *DIRin* and *STEPSin*. The level at *DIRin* determines the direction in which the fuel ring will move if there are pulse signals at *STEPSin*.

Example:

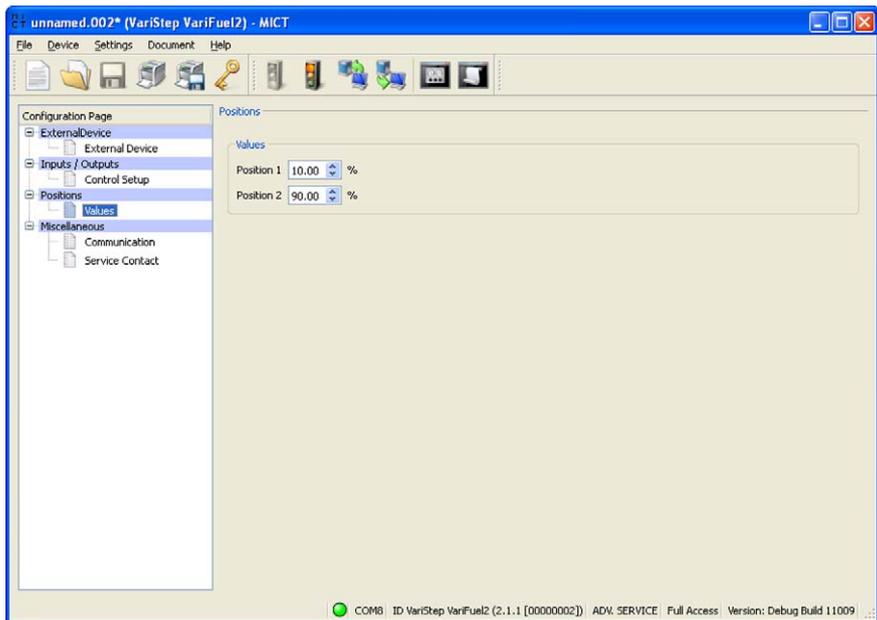
You have selected the option *High -> Open* in the MICT under *Direction*. If a high level is now present on *DIRin*, one step will be added to the current position with each pulse signal received at *STEPSin*. The fuel ring will then move gradually from the closed to the open direction.



Unused inputs and outputs

Please note that the terminals for the analog inputs and outputs not selected in the MICT must remain unoccupied.

8.10.3 Positions – Values



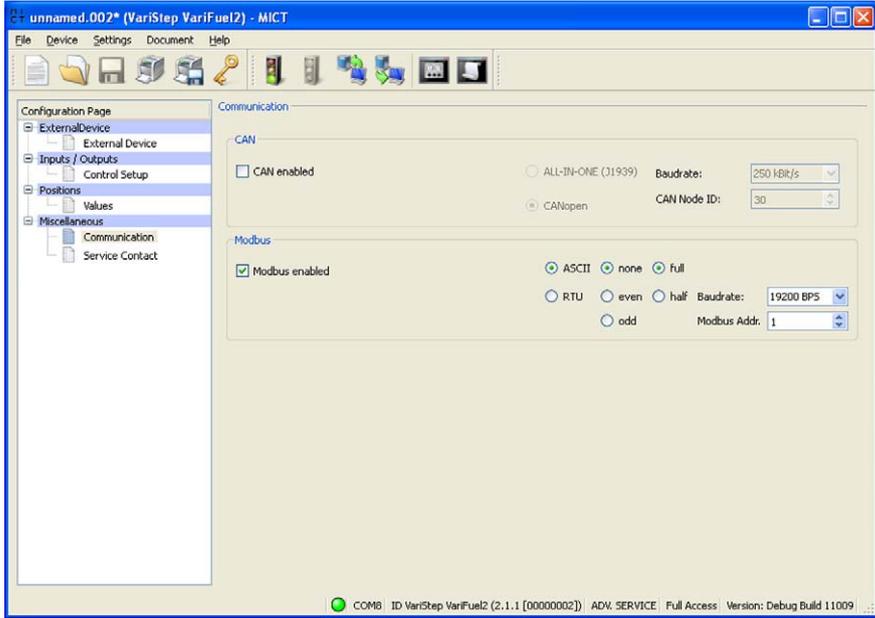
Position 1/Position 2

You can define two configurable positions using these two input fields. This requires access to the access level *Service* or *Advanced Service*. Please enter the desired opening angle of the fuel ring as percentage (100% refers to open, 0% refers to closed). The openings named here can be set using the MICT or the digital inputs of the control unit.

For further information, please refer to the section *Configurable Opening Angles (Position 1 and 2)* on page 32.

8 SETTINGS VIA THE MICT

8.10.4 Miscellaneous – Communication



The two interfaces are currently not yet available.

The CAN and the Modbus interface cannot be activated simultaneously.

CAN

Clicking on the field *CAN enabled* enables or disables the CAN interface on the device.

– ALL-IN-ONE (11939)/CANopen

Please select the desired protocol, depending on whether you want to set the communication for the ALL-IN-ONE or another master control.

– Baudrate

Select the desired data transfer rate from the list. Using the *ALL-IN-ONE (11939)* protocol, you can select between 250 kBit/s and 500 kBit/s. Using the *CANopen* protocol, the baud rate can be set between 10 kBit/s and 1 MBit/s. For both protocols, the recommended value is 250 kBit/s.

– Source Addr/CAN Node ID

Using the *ALL-IN-ONE (11939)* protocol, the source address can be assigned between 0 and 253. Using the *CANopen* protocol, the CANopen node ID can be assigned between 1 and 127. Please note that IDs cannot be assigned more than once.

Modbus

Clicking on the field *Modbus enabled* enables or disables the Modbus interface on the device.

- **ASCII/RTU**
Define whether data is transferred in ASCII or RTU mode.
- **none/even/odd**
Define whether a parity bit is used and if the parity is to be even or odd.
- **full/half**
Define whether communication is full-duplex or half-duplex.
- **Baudrate**
Select the desired data transfer rate from the list. The Modbus baud rate can be set between 1200 and 500000 BPS, the recommended value being 19200 BPS.
- **Modbus Addr**
The Modbus address can be assigned between 1 and 247. Please note that IDs cannot be assigned more than once.



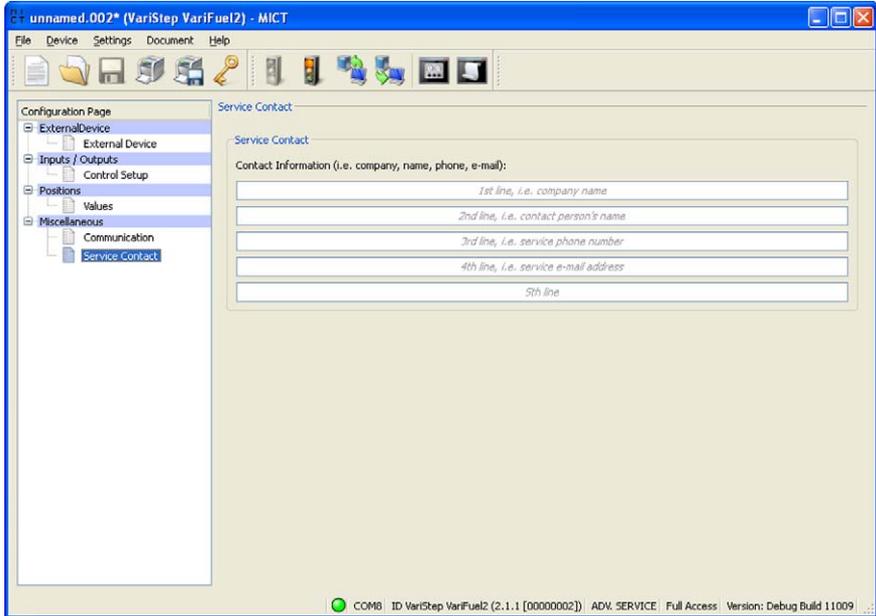
Setting the transfer rate

Please note that all devices connected with a bus must be set to the same transfer rate.

8 SETTINGS VIA THE MICT

8.10.5 Miscellaneous – Service Contact

This configuration page can be viewed by all users, but changes can only be made with authorization for the *Service* access level.



Service Contact

In this area, you can store individual contact data.

8.11 Runtime Data



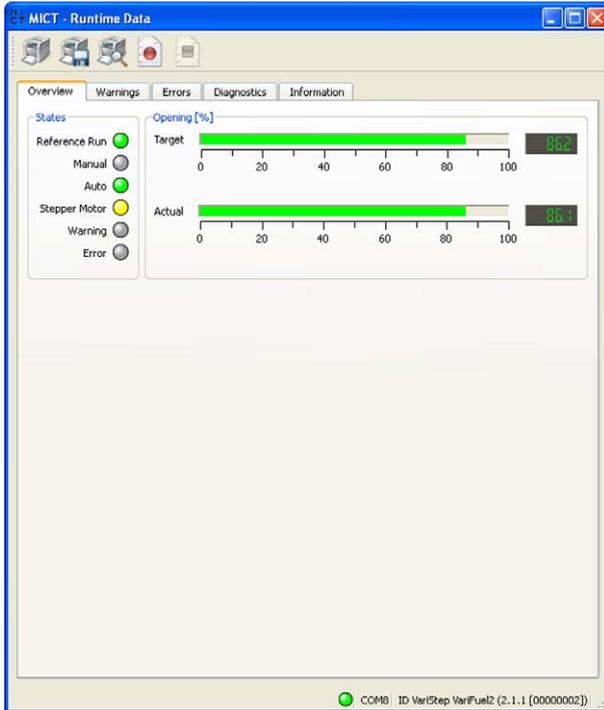
Click on the symbol to open the window *Runtime Data*. The following sections will give you an overview of the data you can view on the individual tabs.

You can print and record the runtime data. For this purpose, the following functions are at your disposal in the toolbar in the window:

Symbol	Function
	Prints the runtime data.
	Prints the runtime data to a PDF file.
	Opens the print preview.
	Starts recording the runtime data.
	Stops recording the runtime data.

8 SETTINGS VIA THE MICT

8.11.1 Runtime Data – Overview



In this screen, you can find the following information:

Reference Run

The status display provides information on the reference run:

- Green: The reference run was completed successfully.
- Yellow: The reference run is being carried out.
- Red: Errors occurred during the reference run. The reference point was not found.

Manual/Auto

The status display indicates the operation mode selected:

- Green: The operation mode is set.
- Yellow: A command is carried out in the operation mode selected. In automatic operation mode, the status display will only turn yellow if position 1 or 2 is approached.
- Red: An error occurred in the operation mode selected.

Stepper Motor

The status display indicates the condition of the stepper motor:

- Green: The stepper motor is ready.
- Yellow: The stepper motor is active.
- Red: An error occurred.

Warning/Error

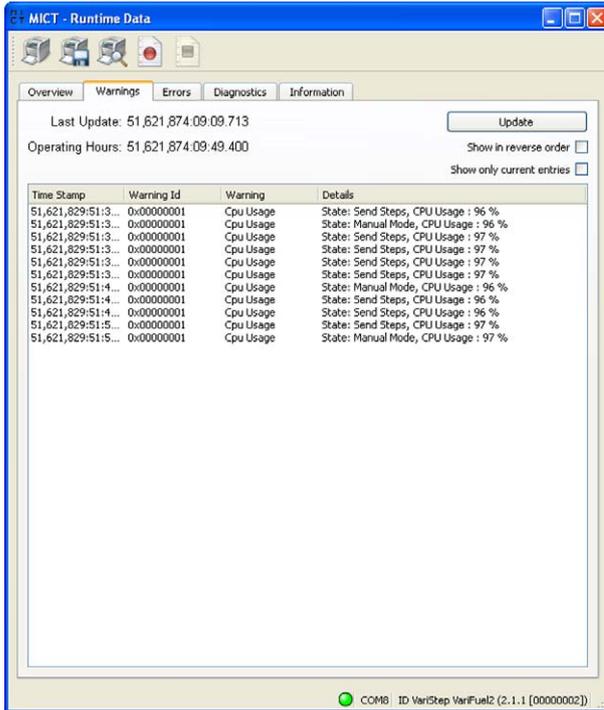
A red status display indicates that an error or a warning message occurred. The display will go out if the error is acknowledged via the MICT (*Device -> Error Acknowledge*). For further information, please refer to the sections *Runtime Data – Errors* on page 59 and *Runtime Data – Warnings* on page 58.

Opening

- **Target**
Value that is assigned to the stepper motor card in automatic mode by the master control or, in manual mode, by the MICT or the *Open/ Close* buttons on the device.
- **Actual**
The displayed value represents the opening of the fuel ring as a percentage.

8 SETTINGS VIA THE MICT

8.11.2 Runtime Data – Warnings



The following information is provided:

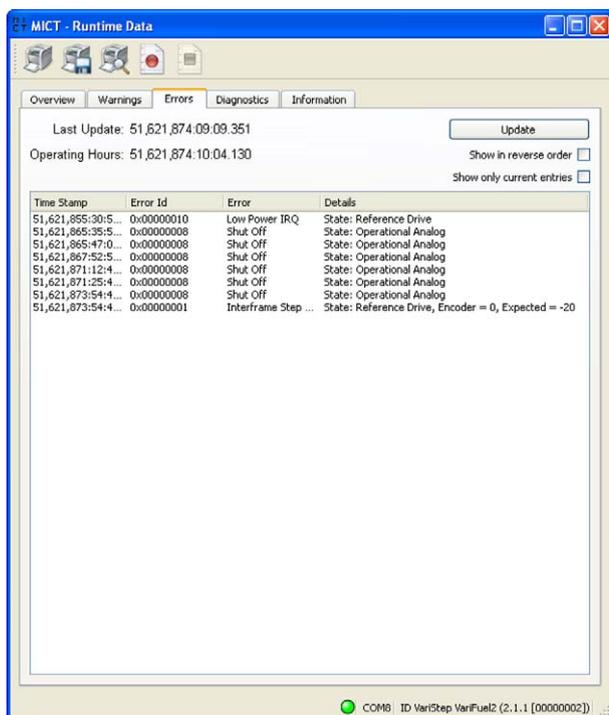
- **Time Stamp**
Status of the operating hours counter at which the warning occurred.
- **Warning Id**
The warning ID is used to identify the warning.
- **Warning**
Brief description of the warning. The following warnings are possible:

Warning	Description
Cpu Usage	The CPU load has exceeded the value of 80%.

You have the following options:

- **Update**
 With the *Update* button, you can manually update the warning list displayed. If a warning occurs, the list is updated automatically.
- **Show in reverse order**
 Activate the checkbox to reverse the order of the listed entries.
- **Show only current entries**
 Activate the checkbox to only show the entries which are still up-to-date.

8.11.3 Runtime Data – Errors



The following information is provided:

- **Time Stamp**
 Status of the operating hours counter at which the error occurred.
- **Error Id**
 The error ID is used to identify the error.

8 SETTINGS VIA THE MICT

– Error

Short description of the error. The following errors are possible:

Errors	Description
Interframe Step Loss	Step losses due to rough-running gas mixer Solution: Check if gas mixer moves stiffly or if belt tension is too high.
Stop Step Loss	Step losses due to rough-running gas mixer Solution: Check if gas mixer moves stiffly or if belt tension is too high.
Timeout	The relevant action could not be finished within the predefined time. Please inform the technical service incl. the entire error message.
Shut Off	Device was switched off.
Low Power IRQ	Short-time drops of the supply voltage. Solution: Improve supply voltage.
Etpu Handler Msg Queue Full	Software is overloaded. Please inform the technical service.
Input Handler Msg Queue Full	Software is overloaded. Please inform the technical service.
Output Handler Msg Queue Full	Software is overloaded. Please inform the technical service.
Over Temperature IRQ	Excess temperature Solution: Improve cooling.
Over Current IRQ	The current to the stepper motor is too high. Solution: Check wiring to the stepper motor.

You have the following options:

– Update

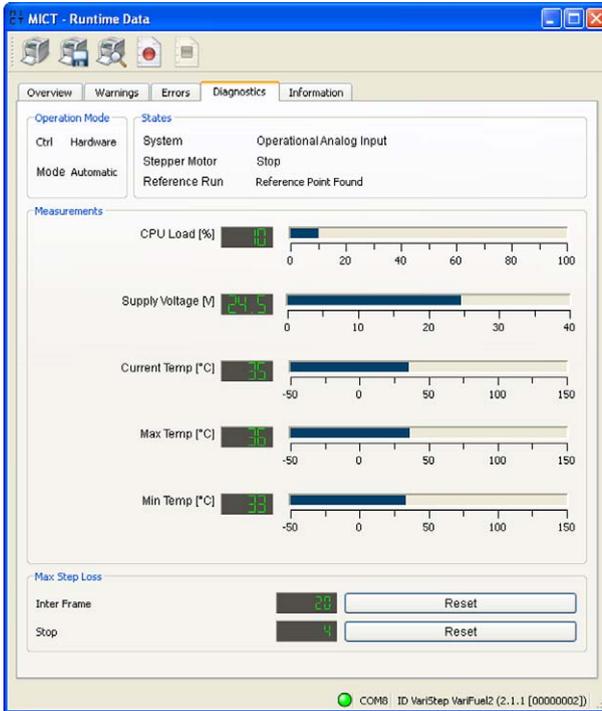
With the *Update* button, you can manually update the error list displayed. If an error occurs, the list is updated automatically.

– Show in reverse order

Activate the checkbox to reverse the order of the listed entries.

- Show only current entries
 Activate the checkbox to only show the entries which are still up-to-date.

8.11.4 Runtime Data – Diagnostics



In this screen, you can find the following information:

Operation Mode

The operation mode section shows which operation mode (*Manual or Automatic Operation Mode*) is currently active and how the operation mode was adjusted. Here, there are the following two options:

- **Ctrl**
 Shows if the operation mode has been adjusted using the MICT or the *Auto/Manual* switch on the device (*Hardware*).
- **Mode**
 The current operation mode is displayed.

8 SETTINGS VIA THE MICT

States

This area shows the current conditions of the control unit, the stepper motor and all individual phases of the reference run.

CPU Load

Current capacity utilization of the processor.

Supply Voltage

Current supply voltage of control unit.

Current Temp

Current temperature of board.

Max Temp

Maximum reached temperature of the board since the control unit was switched on the last time.

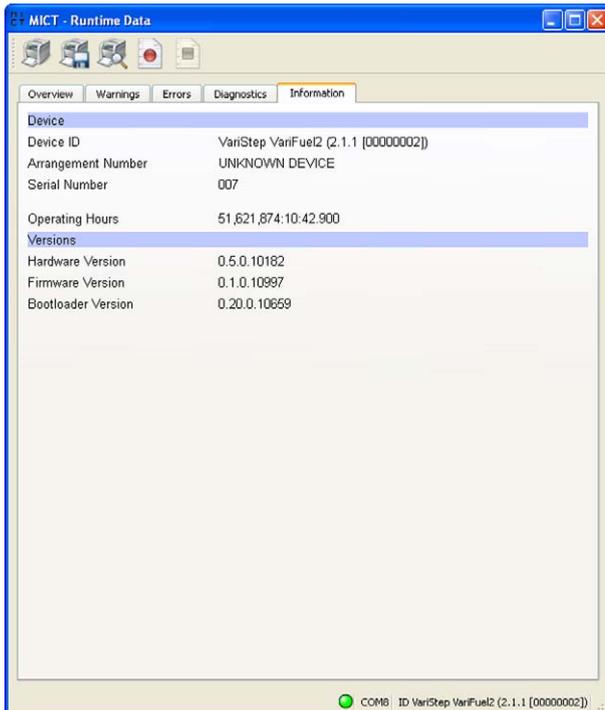
Min Temp

Minimum reached temperature of the board since the control unit was switched on the last time.

Max Step Loss

Internal diagnosis parameters associated with the control of the stepper motor. If the step losses are too high, this will cause an error message.

8.11.5 Runtime Data – Information



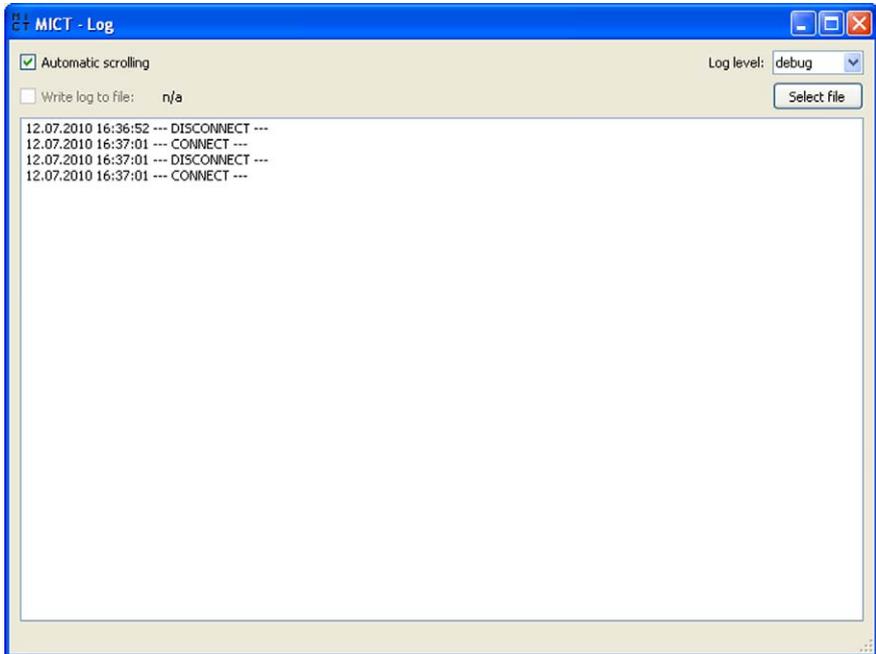
In this view, you can find an overview of the device and version data. You can also print the current runtime data or, in case of problems, send them to the MOTORTECH Service Department via fax or as a PDF file via e-mail. For fast support, we will then immediately have all required information.

8 SETTINGS VIA THE MICT

8.12 Log



Click on the symbol to open the window *Log*. This window is only available to users with authorizations starting at the access level *Advanced Service*.



The window *Log* serves to support error diagnostics by MOTORTECH.

- **Automatic scrolling**
If the function is active, the view panel focuses on the latest message.
- **Log level**
The log level to be selected will be specified as required by MOTORTECH.
- **Write log to file**
This checkbox activates or disables, respectively, the saving of the logged data in a selected file. If the function is disabled, the logged data are merely shown on the display.
- **Select file**
With this button, you can select a file to which you want to save the logged data.

If you are prompted to create a log file in the case of a service request, proceed as follows:

1. Open the window *Log* via the toolbar or the menu bar.
2. Select a path with the file selection button and enter the file name for the log file.
 - ▶ If the file does not yet exist, it is automatically created with the extension *.log*.
3. Activate the checkbox *Write log to file*.
4. Select the level specified by MOTORTECH from the *Log level*/list.
5. Leave the window open.
 - ▶ The log messages are logged both in the window and in the selected file.

9 OPERATION

9.1 Firmware Update

Using the MOTORTECH Flash Tool, you can perform a firmware update for the control unit. The provided CD-ROM comprises this program.

Install MOTORTECH Flash Tool

This is how to install the MOTORTECH Flash Tool:

1. Start the installation.
 - Insert the CD-ROM into the CD/DVD drive of your PC. If the Autorun feature is enabled for the drive, cancel the installation program for the *MOTORTECH Integrated Configuration Tool*.
 - Copy the file *MOTORTECHFlashTool-x.x.x.zip* (e. g. *MOTORTECHFlashTool-o.8.3.zip*) onto your PC.
 - Unzip the file.
 - Start the installation process by running the *setup.exe* file.
2. Install the program.

Follow the instructions of the installation routine. Please note that the license agreement terms must be accepted before using the MOTORTECH Flash Tool. If the terms are not accepted, the installation cannot continue.
3. If not already done, install the USB driver by running the file *CDMxxxxx_Setup.exe* (e. g. *CDM20824_Setup.exe*) from the CD-ROM.
 - ▶ The MOTORTECH Flash Tool is now set up. You can connect your PC to the control unit via the USB interface.

Menu Bar and Toolbar

After launching the MOTORTECH Flash Tool, the following functions are available to you via the icons on the toolbar and the entries in the menu bar:

Symbol	Menu	Function
	<i>File -> Open</i>	Opens a firmware file.
	<i>File -> Quit</i>	Exits the program.
	<i>View -> Extended file information view</i>	Fades in / out additional information of the firmware file.
	<i>View -> Extended connection settings</i>	Fades in / out additional information and settings of the connection to the device.
	<i>View -> Reload file</i>	Reloads the file information of the selected firmware file.
	<i>Device -> Search devices</i>	Restarts the search for connected devices.
	<i>Device -> Flash device</i>	Starts the update process or downgrade process.
	<i>Settings-> Language</i>	Opens the window <i>Select Language</i> in which you can change the interface language of the program.
	<i>Help -> Help</i>	Opens the online help function.
	<i>Help -> About MOTORTECH Flash Tool</i>	Opens detailed information on the program.

9 OPERATION

Start Firmware Update

To start the firmware update, proceed as follows:

1. If an MICT is connected with the control unit, please disconnect this connection.
2. Launch the MOTORTECH Flash Tool via *Start -> Programs -> MOTORTECH -> MOTORTECH Flash Tool -> x.x.x (e. g. 0.8.3) -> MOTORTECH Flash Tool*.
 - ▶ The MOTORTECH Flash Tool will now start.
 - ▶ The software automatically checks all ports for connected devices.
3. In the area *Status* under *Device*, check that the device has been recognized correctly.
 - ▶ If the MOTORTECH Flash Tool does not recognize a device that is connected to your PC via the USB interface, you can usually still carry out a firmware update. To do so, observe the instructions in the information windows of the MOTORTECH Flash Tool for the following steps.
4. In the area *File*, select the desired update file using the *Select* button.
5. By reading the displayed file information, ensure that the update file is correct for your device.
6. Start the update process using the *Flash* button or using the menu or toolbar.
 - ▶ The control unit is restarted automatically.
 - ▶ Now, a window opens informing you about the firmware version currently used on your control unit and also about the relevant update version.
7. Please confirm with *Yes* to proceed with the update process.
 - ▶ Now the update will start.
 - ▶ If the firmware update was successful, you will see a relevant message.
 - ▶ Now, the control unit will initiate a reference run.
8. After a successful firmware update, check all configuration data.



Access control for firmware update

If you have activated the access control for the device, you need the PIN for the level *Master* for the firmware update. For more information read the section *Access Control of Control Unit* on page 42.



Downgrade process

The process for a downgrade is largely the same as the update process. You will only be informed that a new firmware has been installed on the device.



Help with connection problems

If a correctly connected device is not found during the automatic search, this can, for example, be because too many communication interfaces are assigned and must be checked. In this case, an interface from the drop-down list *Port* in the area *Connection* can be selected and thus specified.

If the desired port is not yet displayed in the list or if the problem should continue, an adjustment of the time-outs for the connection helps. The time-out settings are displayed in the main view by the following entry in the menu bar: *View -> Extended connection settings*.

Enter the following settings:

- **Update Request Timeout**
Adjustment range: 1000 ms to 10000 ms, default value: 3000 ms. An extension of the time-out can be an advantage, especially with connection problems that occur because the computer has many assigned ports.
- **Start Timeout**
Adjustment range: 1000 ms to 10000 ms, default value: 3000 ms. A time-out change can be an advantage, especially with connection problems that occur because the communication between the computer and the device has been interrupted.

10 DISTURBANCES

10.1 Troubleshooting

If the stepper motor card detects an error, the LED *status* will flash red. In automatic mode, the digital output *ERRORout* is also activated and the corresponding LED lights up. Using the MICT you can see the type of error occurred. For further information, please refer to the section *Runtime Data – Errors* on page 59.

10.2 Possible Faults

Low power

The supply voltage has fallen short of 11 V.

Potential causes:

- The power supply is dimensioned too small.
- The battery is worn out.
- The wiring for the power supply is defective.
- The wiring for the power supply is routed incorrectly.

Step loss

The steps prescribed by the control unit have not been carried out by the stepper motor.

Potential causes:

- The belt tension is too high.
- The fuel ring is stuck (e.g. due to deposits).
- The wiring to the stepper motor is defective or incorrect.
- The stepper motor is defective.

Over temperature

The temperature of the control unit's board has been exceeded.

Potential causes:

- The ambient temperature is too high.
- Air circulation around the device is insufficient.

Reference run failed

It was not possible to determine the reference point of the stepper motor.

Potential causes:

- The belt tension is too high.
- The fuel ring is stuck (e.g. due to deposits).
- The wiring to the stepper motor is defective or incorrect.
- The stepper motor is defective.

Over current

The current to the stepper motor is too high.

Potential causes:

- The wiring to the stepper motor is defective or incorrect.
- The stepper motor is defective.
- The stepper motor card is defective.

10.3 Acknowledging Faults

In manual mode, you have the following options for acknowledging operating errors:

- By means of the function *Error Acknowledge* in the MICT
- By pressing the *Open* and *Close* buttons simultaneously

In automatic mode, you have the following options for acknowledging operating errors:

- The master control sends a signal to the digital reset input
- By pressing the *Open* and *Close* buttons simultaneously
- By means of the function *Error Acknowledge* in the MICT



Error confirmation in automatic operation

If the control unit is in automatic mode and an error should immediately reoccur after the acknowledgment of this error via the MICT, switch over into the manual mode before re-acknowledging the error again. After you have acknowledged the error, you can correct a defective configuration and transfer it to the device via download.

10.4 Customer Service Information

You can reach our customer service during business hours at the following phone and fax number, or by e-mail:

Tel. +49 5141 9399 0
 Fax +49 5141 9399 99
 E-mail service@motortech.de

10 DISTURBANCES

10.5 Returning Equipment for Repair / Inspection

To return the device for repair and inspection, obtain a return form and return number from MOTORTECH.

Fill out the return form completely. The completely filled out return form guarantees fast, uncomplicated processing of your repair order.

Send the device and the return form to one of the two addresses below or to the nearest MOTORTECH representative:

MOTORTECH GmbH

Hogrevestrasse 21-23
29223 Celle

Germany

Tel. +49 51 41 - 93 99 0

Fax +49 51 41 - 93 99 98

www.motortech.de

motortech@motortech.de

MOTORTECH Americas, LLC

1400 Dealers Avenue, Suite A
New Orleans, LA 70123

USA

Tel. +1 504 355 4212

Fax +1 504 355 4217

www.motortechamericas.com

info@motortechamericas.com

10.6 Instructions for Packaging the Equipment

For return shipment, equipment should be packaged as follows:

- Use packaging material that does not damage the equipment surfaces.
- Wrap the equipment with sturdy materials and stabilize it inside the packaging.
- Use sturdy adhesive film to seal the packaging.
- The stepper motor card must be packed within an ESD protective foil.

11 MAINTENANCE

11.1 Spare Parts and Accessories

For spare parts and accessories, please refer to our current Product Guide, which is available for you to download on the Internet at www.motortech.de.

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