



# ITB-DC – Throttle with Integrated Stepper Motor Driver

## Assembly Instructions



Original assembly instructions

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# 1 General Information

Prior to use, read these assembly instructions carefully and familiarize yourself with the product. Installation and start-up should not be carried out before reading and understanding this document. Keep these assembly instructions readily available so that you can reference them as needed.

## 1.1 What Is the Purpose of this Assembly Instructions?

These assembly instructions serve as an aid for the installation and operation of the product and support the technical staff with all operating and maintenance tasks to be performed. Furthermore, these instructions are aimed at preventing dangers to life and health of the user and third parties.

## 1.2 Who Are these Assembly Instructions Targeted To?

These assembly instructions provide a code of conduct for personnel tasked with the setup, 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 the electronic components used 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 What Symbols Are Used in the Assembly Instructions?

The following symbols are used in these instructions 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 Assembly Instructions?**

The following abbreviations/acronyms are used in the assembly instructions.

| Abb.    | Term   | Description  | Explanation  |
|---------|--|--|--|
| AC      | Alternating Current                            | Alternating current  |  |
| CAN bus | Controller Area Network bus                    | Bus for control devices/networks                                     | Asynchronous serial connection system for linking control units                      |
| CE      | Conformité Européenne                          | Conformity with EU directives  | Mark based on EU legislation for certain products in conjunction with product safety |
| DC      | Direct Current                                 | Direct current   |  |
| EMC     | Electromagnetic Compatibility                  |  | Compatibility of electrical or electronic equipment items with their surroundings    |
| ISO     | International Organization for Standardization | International Organization for Standardization                       |  |
| ITB-DC  | Integrated Throttle Body Direct Control        | Throttle body with integrated stepper motor and stepper motor driver |  |
| MICT    | MOTORTECH Integrated Configuration Tool        |  | Software for configuring MOTORTECH controllers                                       |
| PE      | Protective Earth                               | Protective conductor   |  |
| USB     | Universal Serial Bus                           |  | Serial connection system to link a computer to external devices                      |

## 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 damage can occur if the following instructions are not complied with:

- The gas engine must only be operated by trained and authorized personnel.
- Observe all safety instructions of the system and all safety instructions of the system operator.
- 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 mains and secured against unintentional reactivation.
- Perform only such maintenance and repair work as is described in the assembly instructions, and follow the instructions given while working.
- Only use spare parts supplied by MOTORTECH for the maintenance of the device.
- Further work must only be performed by personnel authorized by MOTORTECH. Non-compliance with the instructions will void any guarantee for the proper function of the equipment as well as the responsibility for the validity of the certifications.
- Safety devices must not be dismounted 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 that occur during operation of the gas engine or electronic engine control.
- 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 result in explosion hazard. The inhalation of gas can also lead to death or severe health damages. Therefore, upon completion of all assembly works, always check the system's tightness.
- Always ensure adequate ventilation of the engine compartment.
- Ensure a safe position at the gas engine.
- There is a risk of burning on hot surfaces. Allow the gas engine to cool down before starting any work.
- Personal protective equipment (PPE), e.g. safety shoes and gloves, must be worn during all work on the gas engine.
- Noise from the system can cause permanent or temporary damage to your hearing. Wear suitable hearing protection at the system.
- Your behavior can reduce possible residual risks to a minimum. Observe responsible handling of the gas engine and the gas-carrying system.



### 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 equipment and the work environment as possible.
- Do not remove the circuit boards from the housing of the device.

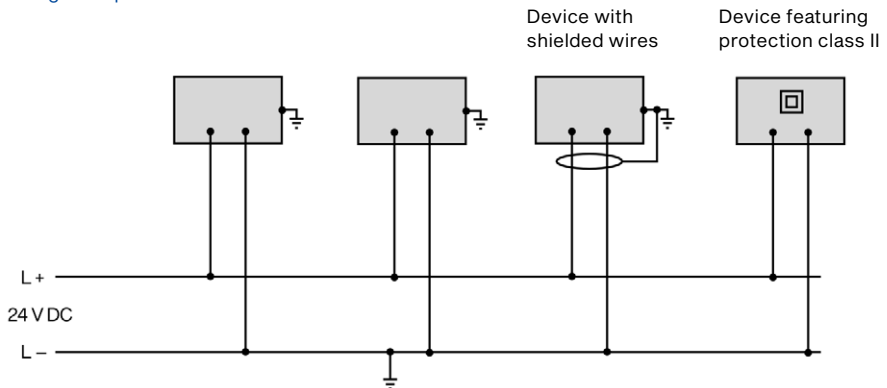
### 2.3 Information on Electric Isolation

If ground and earth potential are not properly isolated, the following problems as well as others can occur:

- Electromagnetic interferences (e.g. ground loops)
- Signal corruption (e.g. of the analog voltage signal)
- Unwanted leakage currents

Therefore, earth potential and the negative pole of the power supply of all devices in the electric assembly that provide the option, should be connected separately. If possible, the negative pole of the power supply should only be connected to earth potential at one point in the entire system.

#### Wiring Example



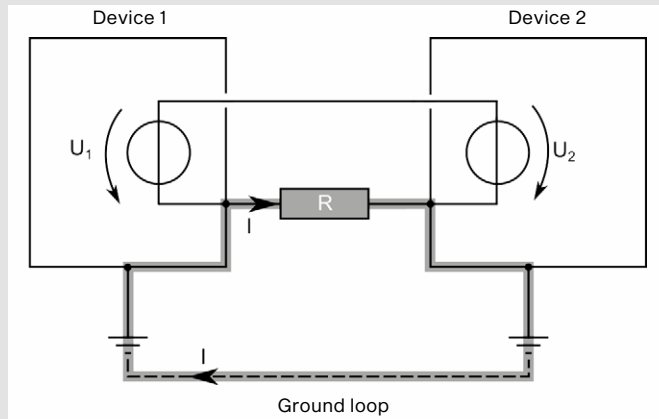
## 2 Safety Instructions



### Occurrence of ground loops

The devices shown in the following image do not feature the possibility to connect the earth potential and the negative pole of the power supply separated from each other. This results in a ground loop.

A ground loop is a ground connection of an electric wiring assembly that is closed as a loop. Due to impedance (resistance  $R > 0$ ) of the loop, low-frequency interference currents can lead to an unwanted voltage drop in the signal path.



## 2.4 Special Safety Instructions for the Device



### Explosion hazard!

If the system is not entirely tight and sealed, gas may escape and result in explosion hazard. Upon completion of all assembly works, always check the system's tightness. The formation of explosive gases in the area of the device must be prevented, e.g. by adequate ventilation or the use of gas sensors which switch off the gas supply. Also comply with all locally applicable explosion protection regulations.

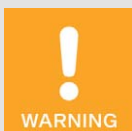
All works involving gas-carrying parts must be executed by trained personnel only.

**Explosion hazard!**

Do not disconnect any connectors while the system is live. There is a risk of explosion.

**Risk of burning!**

High temperatures may occur on the surface of the system especially on the stepper motor.

**Risk of injury!**

The ITB-DC throttle body is designed for operation in circuits with **protected extra-low voltage (PELV)**. The voltages in these circuits must not exceed 50 V AC or 75 V DC.

The ITB-DC throttle must not be electrically connected to circuits which carry dangerously high voltages or which could do so if a single fault occurs.

Therefore, the following conditions, among others, must be fulfilled:

- The power supply may only be provided from power supply units with safe electrical isolation or from batteries.
- The power supply line must be protected with a suitable fuse to protect the circuit from overload and short circuits.
- Relays with safe isolation must be used for coupling to circuits that carry or in the event of a failure could carry dangerous voltage.
- All currently applicable standards and regulations must be taken into account.

**Operational safety!**

All screws of the connectors must be adequately tightened.

## 2 Safety Instructions



### **Operational safety!**

The proper functioning of the device is only guaranteed if the device is operated within the permissible supply voltage range. Therefore, use a power supply according to the specifications in the assembly instructions.



### **Operational safety!**

The throttle body can overheat and mechanical components including the ball bearing can block if the throttle body is coated with paint. To ensure proper operation, the throttle body must not be coated with paint.



### **Danger of interference with radio reception!**

The device is not intended for use in residential areas and cannot ensure adequate protection of radio reception in such environments.

## 2.5 Safety Concept

To ensure safe operation, the gas engine must be equipped with an independent shut-off device that can be used to switch off the engine if the throttle fails. The throttle on its own is not a safety function. Depending on the interface used, there are also different ways of detecting an error so that an appropriate response can be made.

### **Use of the Analog Current Input**

If the analog current input is used for control, the binary error output (Error) should be used to immediately detect an error, react and switch off the motor if necessary.

The analog current input should also be monitored via the optional *Cable Break Detection*. Refer to the section *Monitoring the Control System* on page 43.

### **Use of a Fieldbus (CAN)**

If a fieldbus is used for control, either the binary error output (Error) should be used or the error bits of the fieldbus protocol should be evaluated.

In order to detect a fieldbus failure, *Fieldbus Monitoring* should be activated in the MICT. In addition, monitoring of the fieldbus communication by the master control system should be ensured. Refer to the section *Monitoring the Control System* on page 43.

### 2.6 Proper Disposal

For the proper disposal of MOTORTECH equipment, observe the information provided at [www.motortech.de](http://www.motortech.de).

## 3 Intended Use

### 3.1 Functional Description

The ITB-DC throttle body controls the supply of the gas-/air mixture to the gas engine. The change in the opening angle of the throttle body is specified via the integrated stepper motor driver and implemented by the stepper motor. In this way, the speed and power of the motor are controlled in conjunction with the connected speed control.

The control of the throttle can be manual or automatic. Manual settings are made via a connected computer. In automatic mode, binary or analog input signals, such as those provided by a master control, are analyzed. In addition, a connection via CAN bus is possible.

The throttle is configured using a connected computer. The software (MICT) used for this purpose is also used to display current system data and error messages.

### 3.2 Applications



#### **Danger of interference with radio reception!**

The device is not intended for use in residential areas and cannot ensure adequate protection of radio reception in such environments.

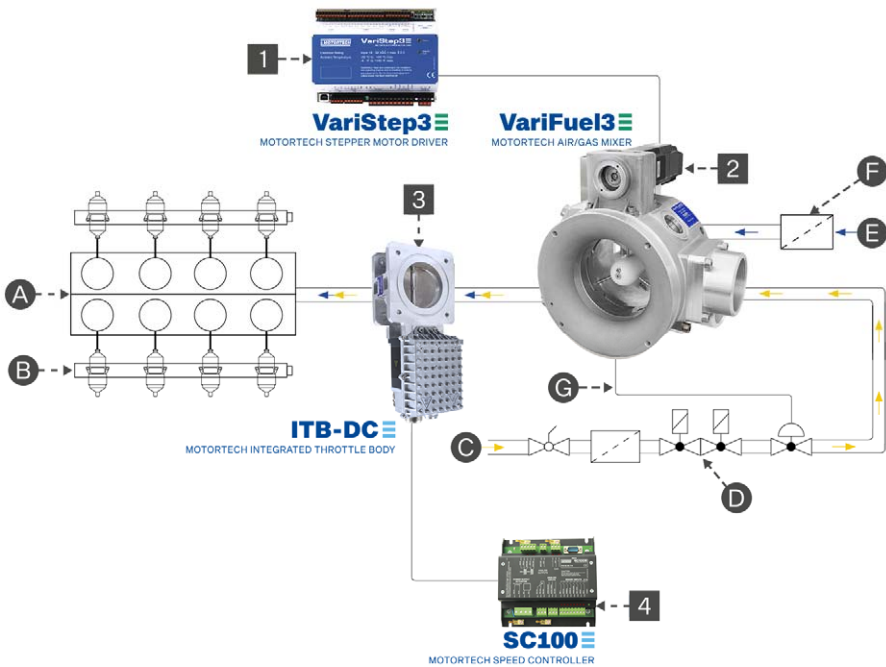
The ITB-DC throttle is suitable for use on stationary gas engines in continuous operation with a maximum ambient temperature of +85 °C (+185 °F). The temperature of the media flowing through must not exceed +80 °C (+176 °F).

As per EN 55011, the ITB-DC throttle is equipment of Group 1 and Class A.

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

### 3 Intended Use

#### System Overview (Example)



- 1** VariStep3 stepper motor driver
- 2** VariFuel3 gas mixer
- 3** ITB-DC throttle body
- 4** SC100 speed control

- A** Engine
- B** Wiring rail (ignition)
- C** Gas supply
- D** Gas train
- E** Air supply
- F** Air filter
- G** Impulse line

# 4 Product Description

## 4.1 Technical Data

### 4.1.1 Certifications

#### Machinery Directive

- The ITB-DC throttle body is partly completed machinery according to article 2g of the EC Machinery Directive.
- The partly completed machinery must not be put into service until the final machinery into which the product is to be incorporated has been declared in conformity with the provisions of the Machinery Directive.

The ITB-DC throttle is certified as follows: CE

The certificates are enclosed with your product.

### 4.1.2 Mechanical Data

The ITB-DC throttle body has the following mechanical characteristics:

| Feature                                      | Value   |
|--|---|
| Dimensions                                   | See section <i>Overview Drawings</i> on page 21   |
| Weight                                       | See following table   |
| Shape of device                              | See section <i>Overview Drawings</i> on page 21   |
| Diameter of the throttle body                | See following table   |
| Maximum rotation angle of the throttle body  | 80°   |
| Chemical resistance                          | Water, oil, gaseous fuels   |
| Maximum absolute pressure                    | 4.5 bar   |
| Maximum temperature of media flowing through | +80 °C (+176 °F)  |
| Connection stepper motor                     | 24-pole military style connector  |
| Permissible vibrations                       | 5 Hz to 25 Hz: constant vibration displacement of 1.6 mm<br>25 Hz to 100 Hz: constant acceleration of 4 g<br>100 Hz to 1,000 Hz: constant acceleration of 2.8 g |
| Climatic environmental conditions            | –40 °C to +85 °C (–40 °F to +185 °F)<br>Max. 95 % humidity without condensation<br>up to max. 4,000 m above sea level   |



Weight

The weight depends on the type, series and diameter of the throttle.

| Series     | Diameter of the throttle body | Weight             |
|------------|-------------------------------|--------------------|
| 50 series  | 42 mm (1.65")                 | 2.4 kg (5.29 lbs)  |
| 100 series | 55 mm (2.17")                 | 3.0 kg (6.61 lbs)  |
|            | 60 mm (2.36")                 | 2.9 kg (6.40 lbs)  |
|            | 68 mm (2.68")                 | 2.9 kg (6.40 lbs)  |
| 140 series | 75 mm (2.95")                 | 4.0 kg (8.82 lbs)  |
|            | 80 mm (3.15")                 | 3.9 kg (8.60 lbs)  |
|            | 85 mm (3.35")                 | 3.8 kg (8.38 lbs)  |
| 150 series | 90 mm (3.54")                 | 4.8 kg (10.58 lbs) |
|            | 100 mm (3.94")                | 4.5 kg (9.92 lbs)  |
| 152 series | 100 mm (3.94")                | 4.0 kg (8.82 lbs)  |
| 200 series | 100 mm (3.94")                | 6.4 kg (14.11 lbs) |
|            | 105 mm (4.13")                | 6.2 kg (13.67 lbs) |
|            | 110 mm (4.33")                | 6.1 kg (13.45 lbs) |
|            | 115 mm (4.53")                | 5.7 kg (12.57 lbs) |
|            | 120 mm (4.72")                | 5.6 kg (12.35 lbs) |
|            | 125 mm (4.92")                | 5.4 kg (11.91 lbs) |

4.1.3 Warning Notices on the Device



Validity of warning notices on device

The warning notices on the device are valid for the ITB-DC and all components connected to it.

Warning Notice on the Device

WARNING  
EXPLOSION HAZARD!  
Do not connect or disconnect when energized.

# 4 Product Description

## Warning Symbols on Device



Warning of a hazardous point



Warning of hot surface

### 4.1.4 Product Identification – Labeling on the Device

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

- Part number of the throttle body (P/N)
- Arrangement number of the throttle (A/N)
- Revision number of the throttle indicating its precise construction status (R/N)
- Serial number of the throttle body (S/N)

#### On the Throttle Body

|            |                      |
|------------|----------------------|
| ITB-DC 150 |                      |
| P/N        | 30.51.150-090        |
| A/N        | TB2.15.0JB-D00-AA-0  |
| R/N        | R0306000015-01.00.00 |
| S/N        | 1234567              |

(Illustration example)

On the Connector


**MOTORTECH®**

**Electrical Rating:**  
Input 24 V= • max. 4.0 A

**Ambient Temperature:**  
-40 °C to +85 °C max.  
-40 °F to +185 °F max.

**WARNING**  
EXPLOSION HAZARD!  
Do not connect or  
disconnect when  
energized.

Made by  
MOTORTECH GmbH  
Hunaeusstrasse 5  
29227 Celle | Germany  
www.motortech.de



4.1.5 Electrical Data

The ITB-DC throttle body has the following electrical characteristics:

| Feature           | Value   |
|-------------------|---|
| Power consumption | Max. 72 W   |
| Power supply      | Nominal voltage: 24 V DC<br>Operating voltage: 16.8 V DC to 32 V DC |
| Required current  | Max. 4 A  |

Electrical Data for Inputs and Outputs

The inputs and outputs of the ITB-DC throttle have the following electrical data:

| Inputs and outputs   | Values/characteristics   |
|----------------------|--|
| Binary input (Reset) | <ul style="list-style-type: none"><li>Galvanically separated</li><li>Input voltage up to 32 V DC</li><li>Input current at least 5 mA for high level</li><li>Save low level:<br/>Voltages below 1.0 V DC</li><li>Save high level:<br/>Voltages above 4.5 V DC</li></ul> <p>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.</p> |

## 4 Product Description

| Inputs and outputs    | Values/characteristics   |
|-----------------------|--|
| Binary output (Error) | <ul style="list-style-type: none"><li>– Galvanically separated</li><li>– Switching voltage: max. 32 V</li><li>– Current: max. 50 mA</li><li>– Max. voltage drop at 50 mA: 1.9 V</li><li>– NC or NO contact depending on the configuration in the MICT (see <i>Inputs/Outputs – Control Setup</i> on page 59)</li></ul> |
| Analog current input  | Permissible current: 0 mA to 20 mA<br>Max. difference in potential relative to ground: +3.5 V<br>Input resistance: max. 25 $\Omega$  |
| Analog current output | Output current: 0 mA to 20 mA<br>Working resistance: max. 500 $\Omega$   |

### 4.1.6 Interfaces

#### USB Interface

- Compatible with USB 2.0
- Connector type B
- Galvanically isolated

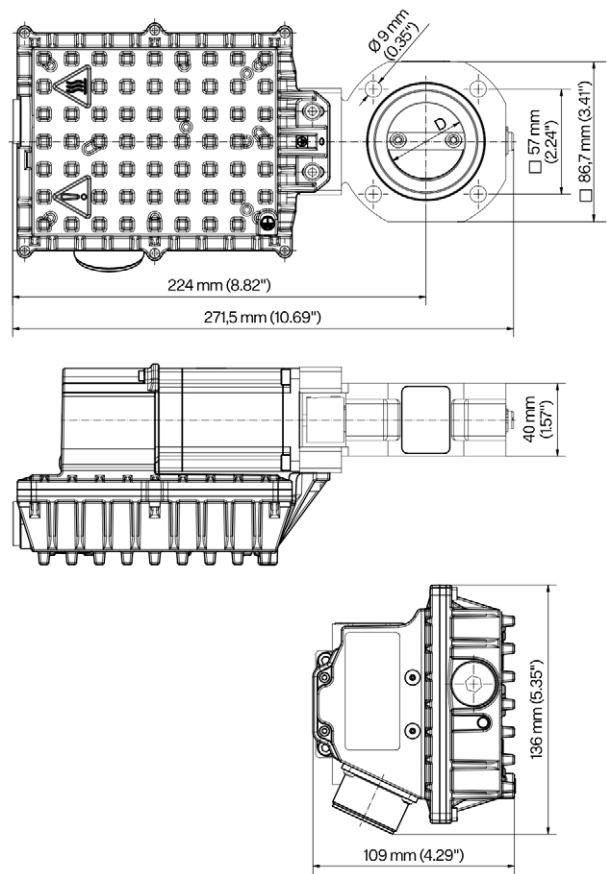
#### CAN Bus Interface

- Classic Extended Frame Format (CAN 2.0B)
- As per ISO 11898, up to 1 Mbit/s
- Transient-proof (automotive classification)
- Max. 110 participants
- Galvanically isolated

4.1.7 Overview Drawings

50 series (P/N 30.51.050-D)

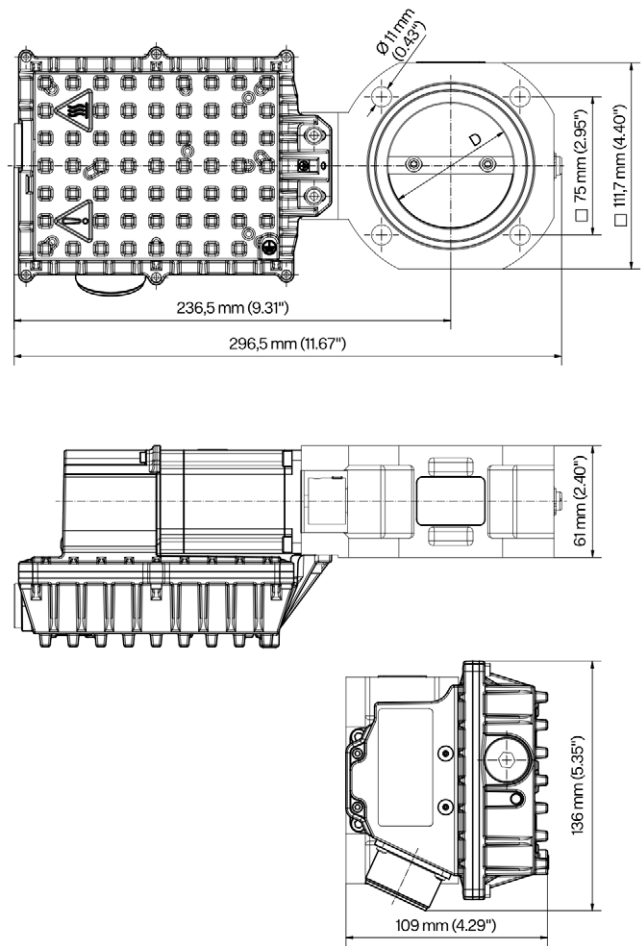
P/N 30.51.055-D also corresponds to the following drawing, but without the gasket (O-ring 56.75 mm x 3.53 mm [2.23" x 0.14"] ) and the groove required for it.



# 4 Product Description

## 100 series (P/N 30.51.100-D)

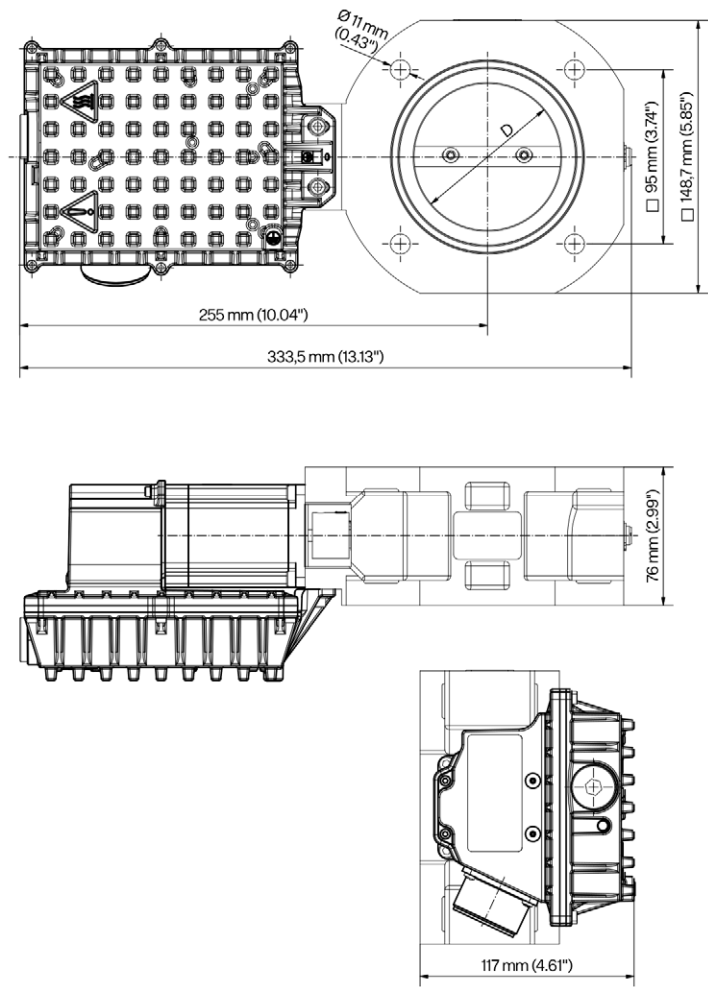
P/N 30.51.105-D also corresponds to the following drawing, but without the gasket (O-ring 82.14 mm x .,53 mm [3.23" x 0.14"]) and the groove required for it.



# 4 Product Description

140 series (P/N 30.51.140-D)

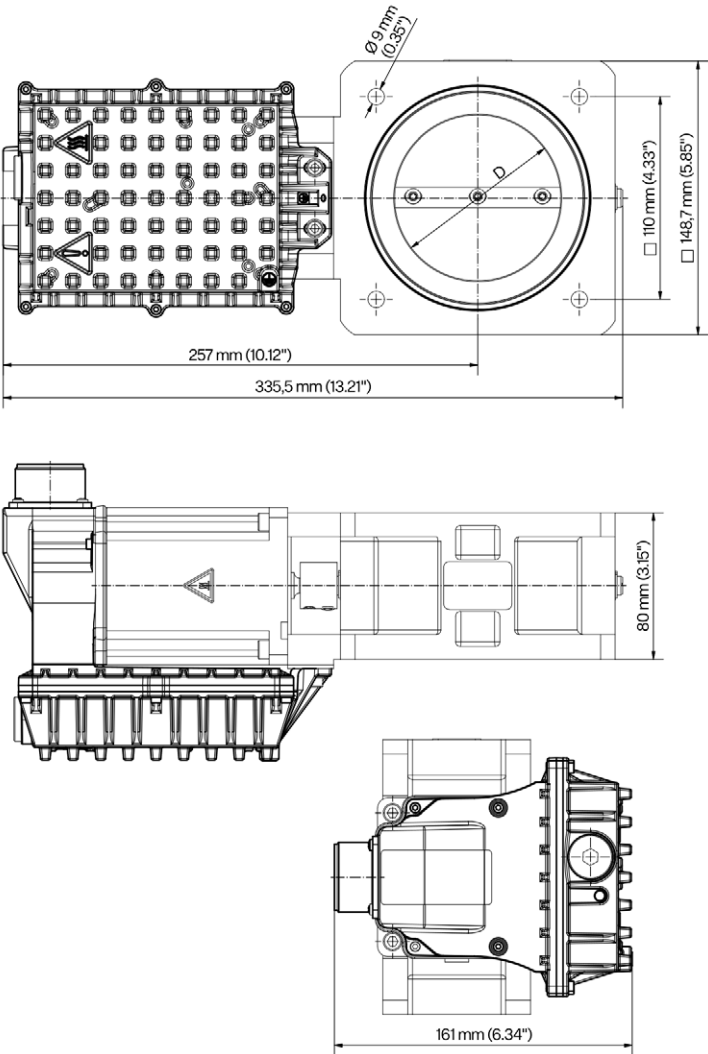
P/N 30.51.145-D also corresponds to the following drawing, but without the gasket (O-ring 98.02 mm x 3.53 mm [3.86" x 0.14"]) and the groove required for it.



# 4 Product Description

## 150 series (P/N 30.51.150-D)

P/N 30.51.155-D also corresponds to the following drawing, but without the gasket (O-ring 116 mm x 3 mm [4.57" x 0.12"]) and the groove required for it.

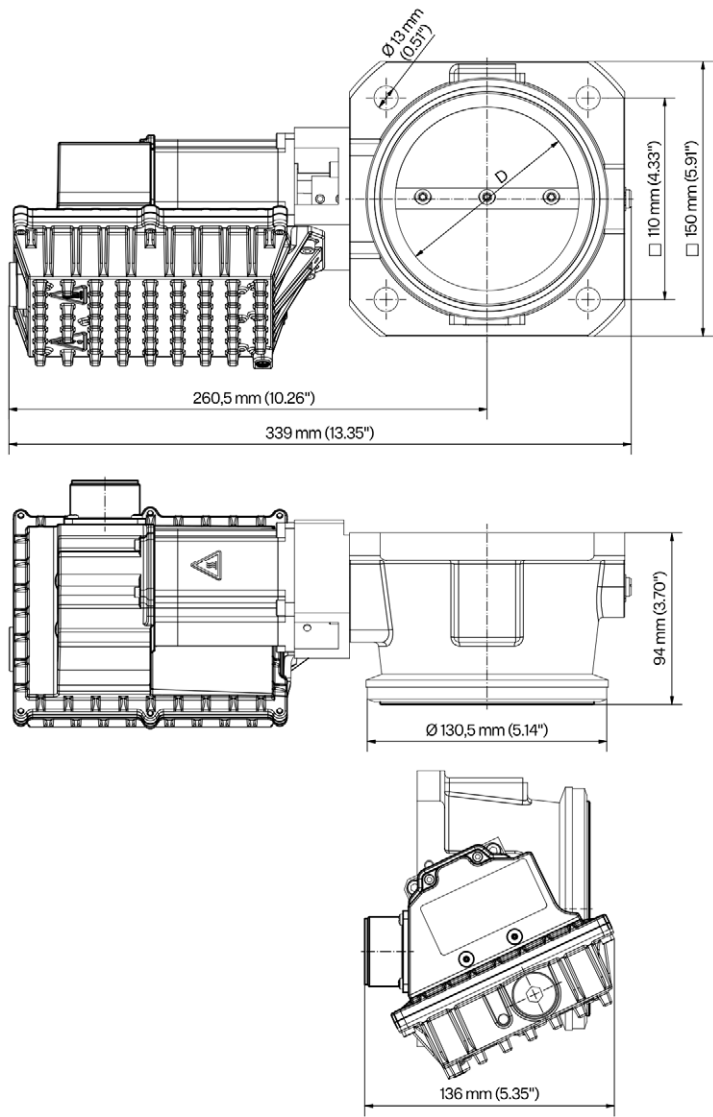




# 4 Product Description

## 152 series (P/N 30.51.152-D)

The 152 series is only available with gasket (O-ring 116 mm x 3 mm [4.57" x 0.12"]).

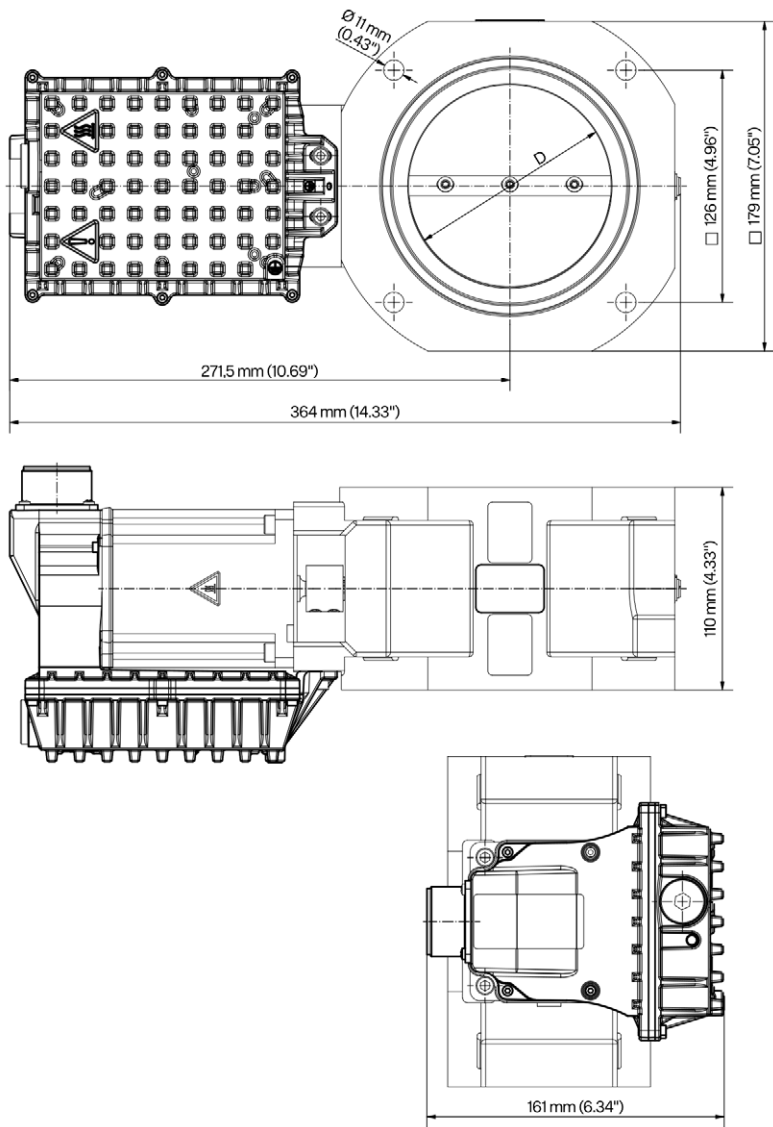


# 4 Product Description

## 200 series (P/N 30.51.200-D)

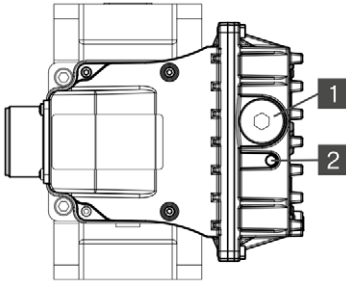
P/N 30.51.205-D also corresponds to the following drawing, but without the gasket (O-ring 148.82 mm x 3.53 mm [5.86" x 0.14"])

P/N 30.51.205-D also corresponds to the following drawing, but without the gasket (O-ring 148.82 mm x 3.53 mm [5.86" x 0.14"])



### 4.1.8 USB Port and LED

The USB port and the LED are located on the side of the housing of the controller. The USB port is locked with a screw.



| Pos. | Description                   |
|------|-------------------------------|
| 1    | Locking screw of the USB port |
| 2    | LED for status signaling      |

(Illustration example)

#### Status Signaling

The status of the ITB-DC throttle is signaled via the LED on the device.

- Flashing **green**: Error-free operation
- Flashing **orange**: Warning  
Warnings can be confirmed via MICT, fieldbus or the external reset signal. In addition, the LED flashes orange for the following reasons.
  - Invalid configuration data was detected.
  - Overtemperature or over current error confirmed by MICT.
  - A reference run is required.
- Flashing **red**: Error  
Errors can be confirmed via MICT, fieldbus or the external reset signal. Errors can for example be caused by:
  - Step loss of the stepper motor e.g. due to overload
  - Overtemperature
  - Low voltage
  - Over current
  - Position target timeout (fieldbus)
  - Cable break (analog input)
  - Critical error/assertion
- Alternate flashing of **red** and **green**:  
The supply voltage for the device was too low during start up.

## 4 Product Description

### 4.1.9 Technical Data of the Stepper Motor

The control results in the following technical data for the stepper motor:

| Feature                             | 50, 100, 140, 152 series | 150, 200 series     |
|-------------------------------------|--------------------------|---------------------|
| Step width                          | < 0.06°                  | < 0.06°             |
| Speed (when open from 10 % to 90 %) | 35 ms                    | 35 ms               |
| Holding torque                      | 1.7 Nm (1.25 lb-ft)      | 5.4 Nm (3.98 lb-ft) |

### 5.1 Unpacking

Unpack the equipment, taking care not to damage it. Always place the device safely and protected from falling over or falling down. Ensure that the assembly instructions are always stored with the device and is easily accessible. Check the contents for completeness and verify that the device type meets your application requirements.

#### Scope of Supply

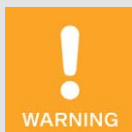
The scope of supply of the ITB-DC throttle body consists of the following components:

- ITB-DC throttle body
- Two O-rings, if necessary
- Storage device with software for configuration of the throttle
- Assembly instructions
- USB interface cable for connecting the throttle to a computer
- Declaration of Incorporation
- EU Declaration of Conformity

#### Required Accessories

- Harness for connection between the throttle and master control resp. speed control.

### 5.2 Mounting the Device



#### Explosion hazard!

If the system is not entirely tight and sealed, gas may escape and result in explosion hazard. Upon completion of all assembly works, always check the system's tightness. The formation of explosive gases in the area of the device must be prevented, e.g. by adequate ventilation or the use of gas sensors which switch off the gas supply. Also comply with all locally applicable explosion protection regulations.

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



#### Risk of destruction!

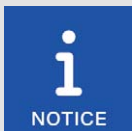
Make sure that the device is not covered and ensure sufficient circulation of air.

## 5 Installation Instruction



### **Operational safety!**

To ensure sufficient cooling by the cooling body, do not paint and/or cover the ITB-DC throttle body. Also protect the cooling body from pollution.



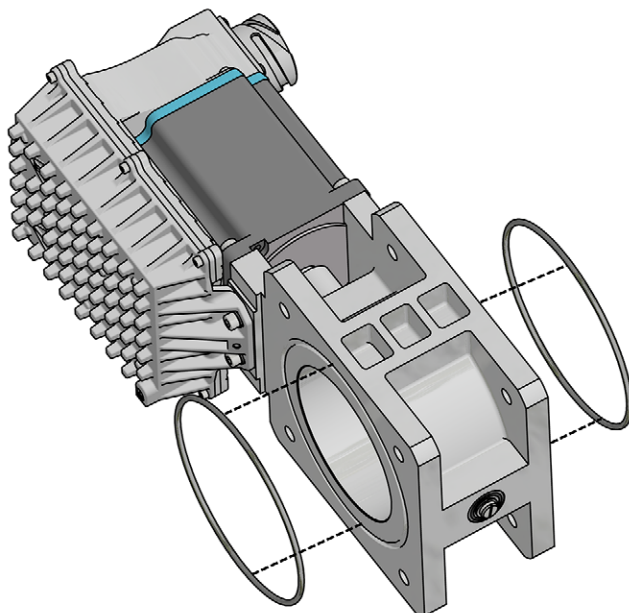
### **Consider the connector**

During planning of the installation, consider the dimensions of the connector on the harness (about 100 mm (3.94") on the 90° connector).

When installing the throttle in the intake section, also observe the engine manufacturer's specifications and ensure safe handling. The installation location of the throttle body can be freely selected.

1. For throttles with groove, insert the supplied O-rings on both sides of the throttle (see illustration).

Example: 150 series



For throttles without a groove, use gaskets that match your mounting flanges.

2. For the installation of the throttle body between the two flanges, use four continuous screws or threaded rods (strength class 8.8 or higher).  
Use the following torques:
  - M8: 25 Nm  $\pm$  10 % (18.4 lb-ft  $\pm$  10 %)
  - M10: 49 Nm  $\pm$  10 % (36.1 lb-ft  $\pm$  10 %)
3. Check the system's tightness.
4. Connect the harness with the connector to the stepper motor of the throttle, taking the following points into account:
  - Tighten the union nut to approx. 13 Nm (9.6 lb-ft).
  - Use medium strength thread lock fluid.
5. To reduce vibrations at the connector, mechanically support the harness after a maximum of 20 cm (7,87") if possible.
6. When disconnected from the power supply, connect the open end of the harness to a master control or speed control. For this, read the operating manual on your respective control.

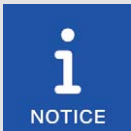
## 6 Wiring of the Device



### **Risk of damage to the device!**

Incorrectly installed wiring can cause damage to the device. Please adhere to the following points:

- Do not disconnect connectors under load. This can cause an arc.
- Use the prescribed wire cross sections and suitable wire end ferrules.



### **Wiring of components**

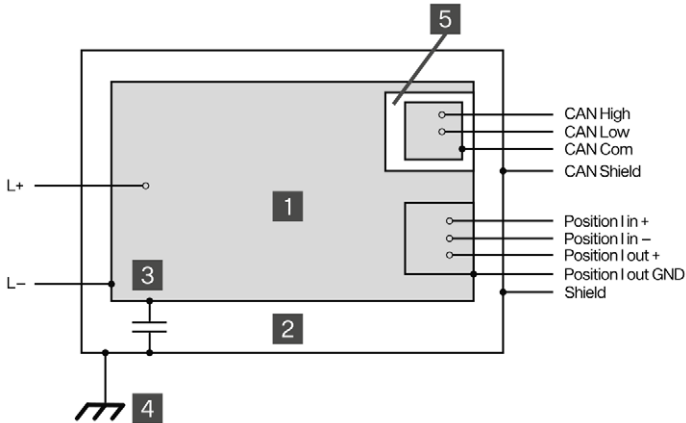
If you are not using harnesses manufactured by MOTORTECH, carry out the wiring according to the following specifications:

- Power supply:  
2-wire cable, min. conductor cross-section 0.75 mm<sup>2</sup>, max. cable length 10 m (32')  
If the cable length is longer, a respective larger cross-section must be selected (10 m to 30 m min. conductor cross-section 1.5 mm<sup>2</sup>)
- Binary inputs and outputs:  
multicore cable, min. conductor cross-section 0.2 mm<sup>2</sup>, max. cable length 30 m (98')
- Analog inputs and outputs:  
multicore, shielded cable, min. conductor cross-section 0.2 mm<sup>2</sup>, max. cable length 30 m (98')
- CAN bus:  
shielded bus cable in compliance with ISO 11898-2 and CiA® 303-1, e.g. 2-pair, shielded bus cable, min. conductor cross-section 0.34 mm<sup>2</sup>, max. cable length 250 m (820') at 250 kbit/s



### Grounding

The device must be connected to the earth potential of the system via the provided earth connection (e.g. on the motor block).



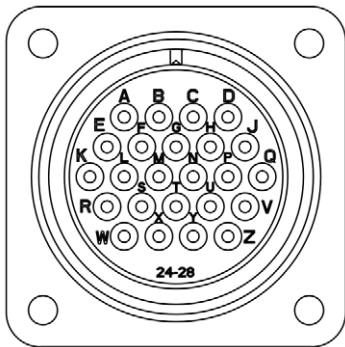
| Pos. | Designation                            |
|------|--|
| 1    | Circuit board                          |
| 2    | Housing                                |
| 3    | Negative pole L- of the voltage supply |
| 4    | Earth                                  |
| 5    | Insulation                             |

- **Earth**  
Conductive connection with the earth (potential equalization, PE). The enclosure of the device has to be connected to earth.
- **Shield**  
All shield connections are labeled *Shield* and are conductively connected to the enclosure of the device.
- **Negative pole L- of the power supply**  
Reference potential of the electrical circuit on the circuit board inside the device. The negative pole L- of the power supply and the signal connection labeled *GND* are connected to the ground. The enclosure of the device is not or only capacitively connected to ground.

# 6 Wiring of the Device

## 6.1 Connector on the Device

The device is connected via the 24-pole military style connector.



| Pin | Description        | Pin | Description     |
|-----|--------------------|-----|-----------------|
| A   | Reset –            | N   | Position I in + |
| B   | Reset +            | P   | Position I in – |
| C   | CAN Shield         | Q   | Power In L –    |
| D   | Position I out GND | R   | Not assigned    |
| E   | CAN ID 2           | S   | Not assigned    |
| F   | CAN Com            | T   | Not assigned    |
| G   | CAN Low            | U   | Error –         |
| H   | Position I out +   | V   | Not assigned    |
| J   | Analog Shield      | W   | Not assigned    |
| K   | Error +            | X   | Not assigned    |
| L   | CAN ID 1           | Y   | Not assigned    |
| M   | CAN High           | Z   | Power In L +    |

### 6.2 Wiring of Power Supply

**Risk of injury!**

The stepper motor may be started unintentionally when the supply voltage is applied. There is a risk of fingers or other body parts being trapped or squashed. Therefore, work on the connected devices (throttle body) must always be carried out with disconnected supply voltage.

**Throttle body grounding**

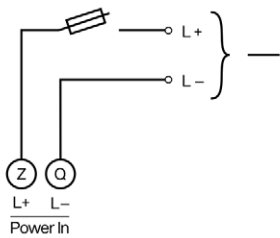
In order to comply with the EMC requirements and to dissipate electrostatic charges, it is absolutely necessary that the throttle body has a good conductive connection to the engine block and to earth.

The use of the original MOTORTECH harness is recommended for wiring the power supply and connection to a master control. If you are using a different harness, please refer to the information box in the section *Wiring of the Device* on page 32.

The power supply must be protected with an external fuse. When selecting the fuse, the maximum current for the cross-section of the selected wiring must be observed.

# 6 Wiring of the Device

L  $\triangleq$  24 V DC (nominal voltage)

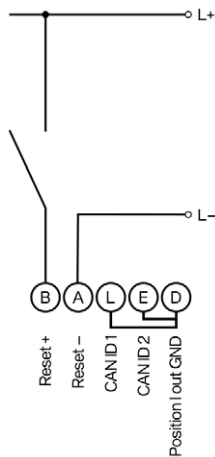


| Variations |              |           |              |
|------------|--------------|-----------|--------------|
| 1          | Battery      | Generator | Control unit |
|            |              |           |              |
| 2          | Power supply |           |              |
|            |              |           |              |
| 3          | Battery      | Charger   |              |
|            |              |           |              |

6.3 Wiring Binary Inputs

L  $\triangleq$  5 V DC to 32 V DC

Wiring example (CAN ID 1 and CAN ID 2 in the connector bridged to the analog ground connection)



| Pin | Designation | Function  |
|-----|-------------|---|
| B   | Reset +     | If a high level is applied for at least 50 ms, the throttle body is reset and the error mode is exited should an error exist. Subsequently, it initiates a reference run. The input can be switched both on the side of the operating voltage and on the ground side.   |
| A   | Reset -     |   |
| L   | CAN ID 1    | These inputs can be used to define one of four CAN addresses for the device (Harness Coding), so that a master control can differential, between up to four throttles that are installed on different engine sides for example. The pins must be bridged directly in the connector to the analog ground connection (Pin D) and are not galvanically isolated. If a pin is bridged, this corresponds to a logical 1. The pins are only queried after switching on the throttle or after downloading a new configuration. |
| E   | CAN ID 2    |   |

The following table shows which coding corresponds to which instance. The assignment of the respective instance to the communication parameters in the fieldbus is carried out in the MICT (see *Miscellaneous – Communication* on page 62).

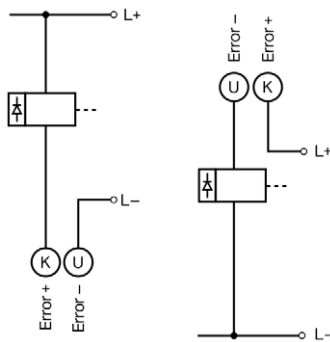
# 6 Wiring of the Device

| Instance (in MICT) | CAN ID 1   | CAN ID 2   |
|--------------------|------------|------------|
| 0                  | 0 (open)   | 0 (open)   |
| 1                  | 1 (bridge) | 0 (open)   |
| 2                  | 0 (open)   | 1 (bridge) |
| 3                  | 1 (bridge) | 1 (bridge) |

## 6.4 Wiring Binary Output

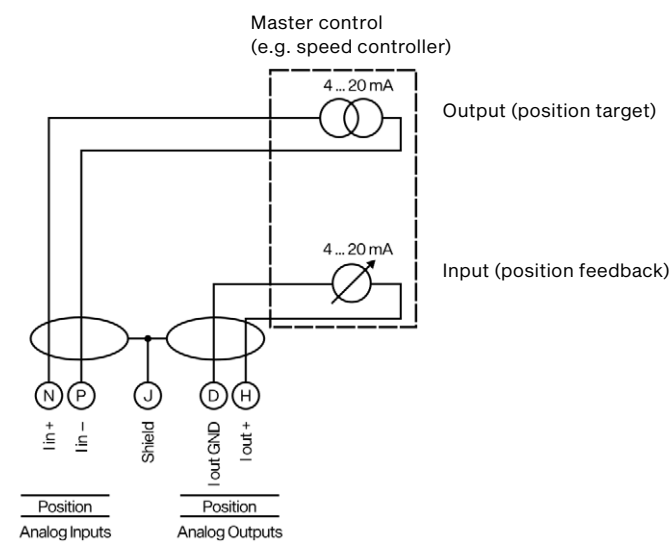
$L \triangleq 5\text{ V DC to }32\text{ V DC; max. }50\text{ mA}$

The output can switch both ground and the operating voltage.



| Pin | Designation | Function  |
|-----|-------------|---|
| K   | Error +     | The output can be configured as a normally closed or normally open contact via the MICT and switches if an error has occurred and the throttle is in automatic mode. To leave the error condition you need to acknowledge the error. This can be done via the binary input <i>Reset</i> , the MICT or via the fieldbus. |
| U   | Error -     |   |

6.5 Wiring Analog Inputs and Outputs



| Pin | Designation    | Function   |
|-----|----------------|--|
| N   | Analog Inputs  | Position I in +<br>Current input used to adjust the throttle body. The input has a value range from 0 mA to 20 mA and can be configured via the MICT, for example to 4 mA to 20 mA.  |
| P   |                |  |
| J   | Analog Shield  | Shield   |
| D   | Analog Outputs | Position I out GND<br>Current output that exports the current position of the stepper motor as appropriate signal. The output has a value range from 0 mA to 20 mA and can be configured via the MICT, for example to 4 mA to 20 mA. |
| H   |                |  |

# 6 Wiring of the Device



## Example: Use of a voltage input

The SC100 speed control has a voltage input. The following steps are required to connect the position feedback signal of the ITB-DC (current output) to the feedback input of the SC100 (voltage input):

1. Connect the 270  $\Omega$  resistor supplied with the harness in parallel to the signal lines between the *ACT fbd* and *Fdb GND* clamps on the SC100.
2. Define the values under *Analog sensors* in WinScope; e.g:  
*Fdb 0 pos*: 0.70 V  
*Fdb 100 pos*: 4.48 V.
3. Adjust the values of the analog current output on the configuration page *Inputs/Outputs – Control Setup* in the MICT: e.g.  
*Close*: 2.6 mA ( $0.70\text{ V}/270\ \Omega = 2.6\text{ mA}$ )  
*Open*: 16.6 mA ( $4.48\text{ V}/270\ \Omega = 16.6\text{ mA}$ )

## 6.6 Wiring CAN Bus



### CAN bus wiring

Note the following when connecting the CAN bus:

- Each bus end must be fitted with a terminating resistor of 120  $\Omega$  (see drawing).
- Only use cables that are specified by the manufacturer for use in the CAN bus.
- The shield must be connected across the entire bus cable.
- The cable shielding must be connected to earth at one point.
- The reference potential (Com) of the CAN bus must be connected to earth at exactly one point.
- The maximum cable length depends on the bit rate:

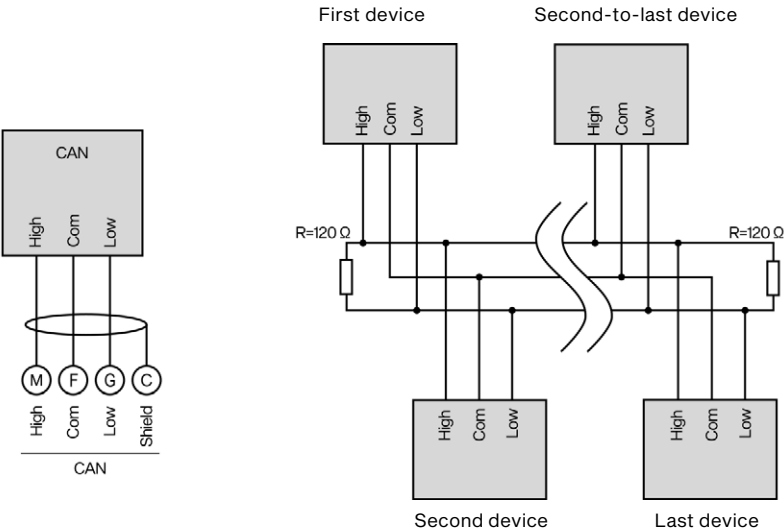
| Bit rate   | Maximum cable length | Maximum length of a stub | Maximum length of all stubs |
|------------|----------------------|--------------------------|-----------------------------|
| 1 Mbit/s   | 25 m (82')           | 1.5 m (5')               | 7.5 m (25')                 |
| 800 kbit/s | 50 m (164')          | 2.5 m (8')               | 12.5 m (41')                |
| 500 kbit/s | 100 m (328')         | 5.5 m (18')              | 27.5 m (90')                |
| 250 kbit/s | 250 m (820')         | 11 m (36')               | 55 m (180')                 |
| 125 kbit/s | 500 m (1,640')       | 22 m (72')               | 110 m (360')                |
| 50 kbit/s  | 1,000 m (3,280')     | 55 m (180')              | 275 m (902')                |

- Comply with the standards ISO 11898-1 and CiA® 303-1.



# 6 Wiring of the Device

The terminating resistor may already be included in the harness. For this, please refer to the harness wiring diagram. The throttle should preferably be installed at one end of the bus. If this is not possible, the maximum permissible length of the stub must be taken into account. Please refer to the information in the box above.



# 7 Functions

## 7.1 Manual and Automatic Operation

The throttle opening can be adjusted in two operation modes:

- Manual operation
- Automatic operation

You can switch between manual and automatic operation via the MICT. The selected operation mode is signaled in the window *Runtime Data – Overview* via status displays. Refer to the section *Runtime Data – Overview* on page 66.

### Manual Operation

In manual operation, the external input signals of the master control are ignored. The position of the throttle can then be changed via the MICT (*Device -> Manual Adjustment*). The throttle must also be in manual operation to transfer a changed configuration to the device.



#### **Risk of destruction!**

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, make sure that these settings do not endanger the correct operation of the gas engine.

### Automatic Operation

In automatic operation, the throttle body evaluates the external input signals of the controller connected. 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 ITB-DC throttle body initiates a reference run. This means that the closed position of the throttle is determined. In automatic mode, the stepper motor subsequently approaches the position defined by the master control. In manual operation, the throttle initially remains in the closed position.

No signals are evaluated at the inputs during the reference run. A reference run can also be triggered via the MICT. In addition, the reference run is signaled in the window *Runtime Data - Overview* via a status display. Refer to the section *Runtime Data – Overview* on page 66.

## 7.3 Open/Closed Positions

The Open and the Close position are specified as follows:

- *Open*: Throttle is completely open (100 % open)
- *Closed*: Throttle is completely closed (0 % open)

The throttle cannot be moved beyond these two positions and all corresponding signals are limited.

### 7.4 Configurable Opening Angles (Position 1 and 2)

Two opening angles can be configured via the MICT, which can be controlled in manual mode via the MICT and in automatic mode via fieldbus. 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, refer to the section *Positions – Values* on page 61.

### 7.5 Changing the Opening Angle

In automatic mode the opening angle can be controlled directly via the following inputs.

- Analog current input 0-20 mA
- Fieldbus CAN

Depending on which master control you are using, you can select the required input using the MICT. If one of both end positions (*open* or *closed*) has been reached, the signals are limited at the inputs in the corresponding direction.

You can configure the inputs with the MICT. Refer to the section *Inputs/Outputs – Control Setup* on page 59.

### 7.6 Analysis of Positions via Analog Outputs or Fieldbus

The current position of the throttle body can be sent to the master control via an analog voltage output or a fieldbus. The MICT can be used to configure which current value corresponds to the open or closed position. The current applied on the output is then set accordingly proportional to the current opening angle.

You can configure the output with the MICT. Refer to the section *Inputs/Outputs – Control Setup* on page 59.

### 7.7 Monitoring the Control System

Depending on the control of the throttle, additional monitoring functions can be activated in the MICT:

- **Cable Break Detection**  
If the throttle is controlled via the analog current input, *Cable Break Detection* can be activated in MICT (see *Inputs/Outputs – Control Setup* on page 59). A *Failure Threshold* can be defined for cable break detection. If the input current undercuts this failure threshold, the throttle enters the error state.
- **Fieldbus Monitoring**  
If the throttle is controlled via fieldbus, *Fieldbus Monitoring* can be activated in MICT (see *Inputs/Outputs – Control Setup* on page 59). For the fieldbus monitoring a *Position Target Timeout* can be defined. If no position target is preset via the fieldbus for longer than this specified time, the throttle goes into the error state.

In the error state, the binary error output (Error) is switched in both cases. If an error position is defined in the MICT, the throttle attempts to assume this position if this is still possible. For example, in the event of a step loss or overcurrent error, the stepper motor can generally no longer fulfill this request. For further information, refer to the section *Positions – Values* on page 61.

# 7 Functions

## 7.8 Access Control

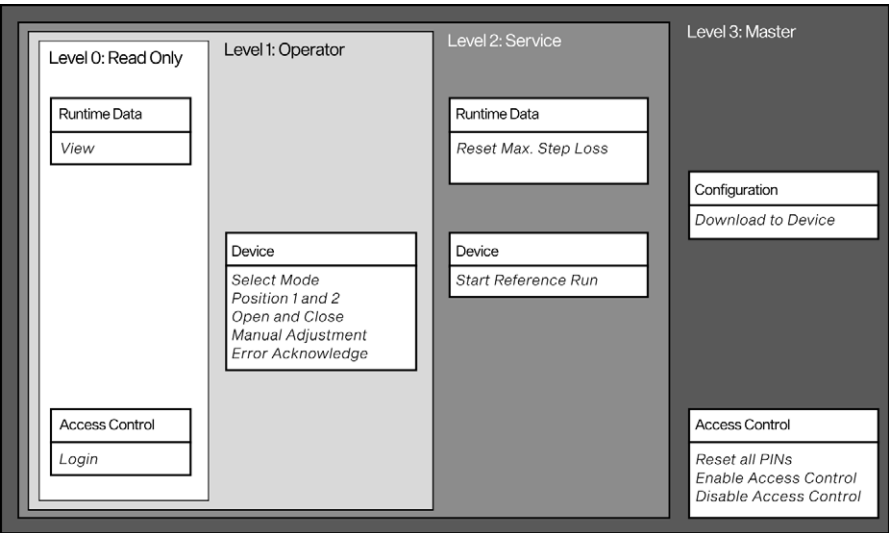
You can protect the ITB-DC throttle against unauthorized access by establishing the access control in the MICT. The access control has four operating levels, three of which can be secured with different PINs. As a default setting, the access control is not activated. If the access control for the throttle is activated, it is independent from the access levels that control authorizations 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 change to the throttle. Although he has the full authorization set in the MICT, he is prompted to log in with the PIN for the *Level 3 (Master)*. This ensures that it is not possible for any user with an MICT and the generally valid password to change the configuration of your throttle.

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



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 make position changes (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 \(Service\)](#)

The service personnel can also initiate a reference run and reset the counter in the runtime data for the maximum number of step losses that occurred.

- [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 throttle.

For information on the access levels in the MICT, refer to the section *Access Levels in the MICT* on page 47.

## 8 Settings via the MICT

MICT is an abbreviation for *MOTORTECH Integrated Configuration Tool*. You configure your ITB-DC throttle via the MICT and can adapt it to the master control.

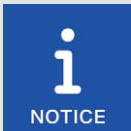
If you are using a different version of the MICT than shown in the following sections, the scope of functions may differ.

### 8.1 MICT System Requirements

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

- x86-compatible computer
- Display with a resolution of at least 1440 x 900 pixels (WXGA+)
- USB interface 1.1 or higher
- Microsoft® Windows 10, Windows 11

### 8.2 MICT Installation



#### **Note the compatibility of the MICT versions**

Older firmware versions of certain MOTORTECH devices are not supported by the MICT version provided on the data carrier, or are only supported with restrictions.

When selecting the MICT version to be installed, please refer to the compatibility overview on the data carrier supplied with the product.

The software for installing the MICT is on the storage device enclosed with the ITB-DCthrottle.

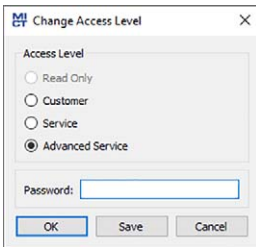
To install the MICT, proceed as follows:

1. Start the installation:
  - Via the menu:  
Start the file *Start.exe* on the storage device. Start the installation routine of the MICT via *Software -> Install MICT*.
  - Directly from the storage device:  
Start the installation routine of the MICT directly. It is on the storage device in the subdirectory *Installation* and for example named as follows: *MICT-2.48.0-setup.exe*.
2. Run the installation.  
Follow the instructions of the installation routine. Note that the license agreement terms must be accepted before using the MICT.
3. Install the USB driver via the menu as well or directly from the storage device.
  - Via the menu:  
*Software -> USB Drivers -> Install USB Drivers*
  - Directly from the storage device:  
Start the exe file in subdirectory *Drivers*(e.g. *CDM21226\_Setup.exe*).
    - ▶ The MICT is set up. You can connect your computer to the throttle via the USB interface.

### 8.3 Access Levels in the MICT

You can open the MICT on your computer via *Start -> Programs -> MOTORTECH -> MICT 2.x.x -> MICT 2.x.x*.

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 can be obtained from your MOTORTECH contact person (refer to *Customer Service Information* on page 78). You can save the password for your access level using the button *Save*. It then does not have to be entered again the next time the MICT is started.



The following access levels are available:

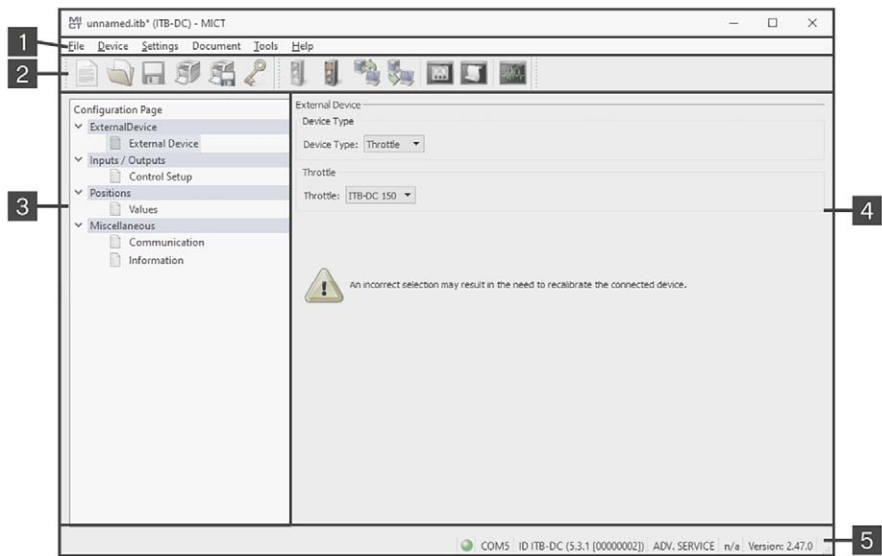
- **Read Only**  
On this level, the user can open a configuration and transfer it to the device. However, he cannot make changes to the configuration. The user has read-only access to all other settings.
- **Customer**  
This level enables the configuration of the basic functions required for operation in addition to the read-only function.
- **Service**  
This level contains all functions for a standard installation.
- **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 Settings via the MICT

## 8.4 Configuration Pages (Overview)

The configuration pages are divided into the following sections:



| Pos. | Area                  |
|------|-----------------------|
| 1    | Menu bar              |
| 2    | Toolbar               |
| 3    | Navigation bar        |
| 4    | Configuration section |
| 5    | Status bar            |

The functions in the menu bar, 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 device:
  - 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 ITB-DC if access control has been activated and the user has logged on with a PIN.
- Indication of the MICT program version

### 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:

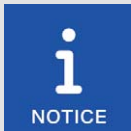
| Symbol  | Menu  | Function   |
|---|---|--|
|    | <i>File -&gt; New</i>                           | Creates a new configuration.   |
|    | <i>File -&gt; Open</i>                          | Opens an existing configuration.   |
|    | <i>File -&gt; Save /<br/>File -&gt; Save As</i> | Saves the current configuration.   |
|   | <i>File -&gt; Recent Documents</i>              | The last five configuration files used are offered for selection.  |
|   | <i>File -&gt; Close</i>                         | Closes the current configuration.  |
|   | <i>File -&gt; Open trace</i>                    | Opens a runtime data record (trace file). Refer to the section <i>Runtime Data</i> on page 65.   |
|   | <i>File -&gt; 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 by the ITB-DC. |
|   | <i>File -&gt; Change Access Level</i>           | Changes the MICT access level for accessing the configuration data and functions.  |
|  | <i>File -&gt; Print</i>                         | Prints the current configuration.  |
|  | <i>File -&gt; Print To PDF File</i>             | Prints the configuration to a PDF file.  |
|   | <i>File -&gt; Print Preview</i>                 | Opens a print preview of the configuration.  |
|   | <i>File -&gt; Quit</i>                          | Exits the MICT.  |
|  | <i>Device -&gt; Connect</i>                     | Connects to the device.  |
|  | <i>Device -&gt; Disconnect</i>                  | Cuts the connection to the device.   |

## 8 Settings via the MICT

| Symbol  | Menu   | Function  |
|---|--|---|
|  | <i>Device -&gt; Download to device</i>       | Downloads configuration data from the computer to the device. This function can only be executed in manual mode.  |
|  | <i>Device-&gt; Upload from device</i>        | Uploads configuration data from the device to the computer.   |
|  | <i>Device -&gt; Runtime data</i>             | Opens the window <i>Runtime Data</i> . Refer to the section <i>Runtime Data</i> on page 65.   |
|  | <i>Device -&gt; Log</i>                      | Opens the window <i>Log (Advanced Service only)</i> . Refer to the section <i>Log</i> on page 72.   |
|   | <i>Device -&gt; Select Mode</i>              | Opens the window <i>Select operation mode</i> in which you can select the operation mode. The following modes are possible: <i>Manual Operation Mode</i> or <i>Automatic Operation Mode</i> . |
|   | <i>Device -&gt; Manual Adjustment</i>        | Opens a window in which you can manually adjust the opening angle.  |
|   | <i>Device -&gt; Open Position</i>            | Completely opens the throttle in manual mode.   |
|   | <i>Device -&gt; Close Position</i>           | Completely closes the throttle in manual mode.  |
|   | <i>Device -&gt; Position 1</i>               | In manual mode, drives to the position 1 defined in the configuration by a percentage.  |
|   | <i>Device -&gt; Position 2</i>               | In manual operation, drives to the position 2 defined in the configuration by a percentage.   |
|   | <i>Device -&gt; Reference Run</i>            | Initiates a reference run in manual mode ( <i>Service</i> and <i>Advanced Service</i> only).  |
|   | <i>Device -&gt; 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 board of the ITB-DC.                                |
|   | <i>Device -&gt; Error Acknowledge</i>        | All operational errors are acknowledged.  |
|   | <i>Device -&gt; Trigger Error</i>            | The process carried out by the stepper motor driver (e.g. a reference run), is canceled and the stepper motor driver switches into error mode.  |
|   | <i>Device -&gt; Access Control</i>           | The setup for the access control to the device is described in a separate section. Please read the section <i>Access Control of Throttle</i> on page 52.                                      |
|   | <i>Settings -&gt; Language</i>               | Opens the window <i>Select Language</i> in which you can change the interface language of the MICT.   |
|   | <i>Settings -&gt; Online update settings</i> | Opens the window <i>Online Update Settings</i> . Refer to the section <i>Online Update Settings</i> on page 51.   |

| Symbol | Menu                                       | Function  |
|--------|--|---|
|        | <i>Settings-&gt; Database settings</i>     | Opens a dialogue window in various databases can be assigned as source for the MICT.  |
|        | <i>Settings -&gt; 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 -&gt; Display by cylinders</i> | This function is available for certain MOTORTECH ignition controllers and has no effect in conjunction with the ITB-DC.     |
|        | <i>Document</i>                            | Has no function with the ITB-DC.  |
|        | <i>Tools -&gt; Coils</i>                   | Opens a database with information on MOTORTECH ignition coils.  |
|        | <i>Tools -&gt; Knock Sensor Recording</i>  | Opens a tool for analyzing knock sensor recordings recorded with MOTORTECH Knock Controller.                                |
|        | <i>Help -&gt; Help</i>                     | Opens the online help function.   |
|        | <i>Help -&gt; About MICT</i>               | Opens detailed information on the MICT.   |

### 8.6 Online Update Settings

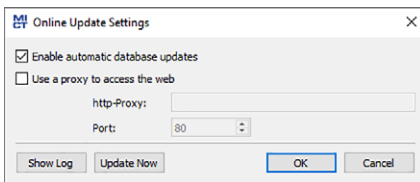


#### Perform regular online updates

MOTORTECH is constantly expanding its databases. Perform regular online updates to make optimal use of the opportunities that the ITB-DC provides.

The MICT uses data from various databases 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*



## 8 Settings via the MICT

You have the following options:

- [Enable automatic database updates](#)  
Using the check box, you can enable and disable automatic online updates. 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](#)  
Use the checkbox to activate settings for internet access via a proxy server, which you can then set up by entering *http-Proxy* and *Port*.
- [Show Log](#)  
With this button, you can open a window in which the online updates performed are logged.
- [Update Now](#)  
With this button, you manually start an online update.

### 8.7 Access Control of Throttle

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

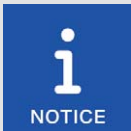
- [Troubleshooting](#)
- [Position changes](#) (open, closed, position 1 and 2, manual adjustment, reference run)
- [Configuration](#) (transfer of a configuration to the throttle)

The access control regulates the accesses to the throttle via the MICT. For explanations concerning access control of the throttle and the delimitation of the access levels in the MICT, refer to section *Access Levels in the MICT* on page 47.

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

*Device -> Access Control*

#### 8.7.1 Enable/Disable Access Control



##### **Enable/Disable access control**

As a default setting, the access control is not enabled, and all PINs are set to 0000. Once the access control has been enabled, and the PINs were changed, these PINs will continue to be used. To re-enabled the access control, 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 53.

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. Confirm the input with OK.

### 8.7.2 Login/logout

If the access control is enabled, 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.

### 8.7.4 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 yet logged into the *Master (level 3)* level, 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. In the menu bar, select the entry *Device* -> *Access Control* -> *Get reset all PINs request key* to open a window with the same name.

## 8 Settings via the MICT

2. Send the request key with the serial number to your service contact person at MOTORTECH (refer to *Customer Service Information* on page 78). 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 person.
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 Working with Configurations

To ensure that the ITB-DC throttle interprets incoming data correctly and converts them to the desired control signals, it requires information on connected the master control. This information is stored in a configuration file on the stepper motor driver.

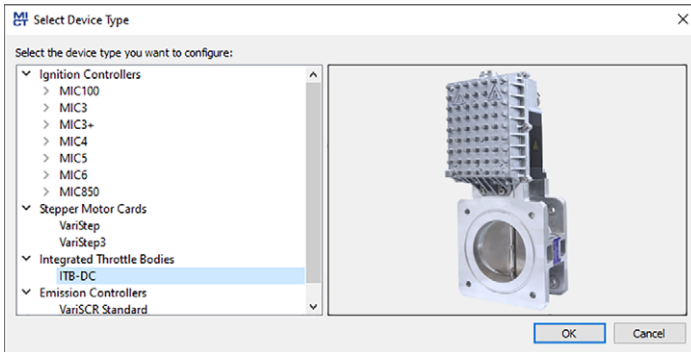
You need the MICT for the following tasks:

- Creating configuration files
- Opening configuration files from a storage device
- Processing configuration files
- Saving configuration files on a storage device
- Downloading configuration files to a ITB-DC throttle
- Uploading configuration files from a ITB-DC throttle
- Displaying current and saved runtime data

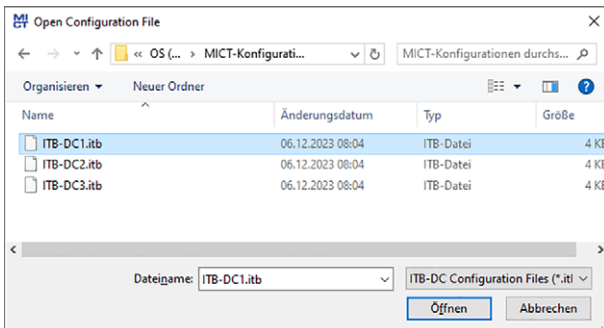
### 8.8.1 Create, Open, Save



Click on the symbol to create a new configuration and select the entry *Integrated Throttle Bodies* -> *ITB-DC*.



Click on the symbol to open a saved configuration.



Click on the symbol to save the configuration currently displayed in the MICT to a storage device.

### 8.8.2 Upload, Download



Click the symbol to upload the current configuration from the ITB-DC throttle to the MICT. If applicable, the MICT first establishes a connection to the throttle connected.



Click the symbol to download the configuration in the MICT to the ITB-DC throttle. This function can only be executed when the throttle is in manual mode. This action overwrites the existing configuration on the device. If applicable, the MICT first establishes a connection to the throttle connected.

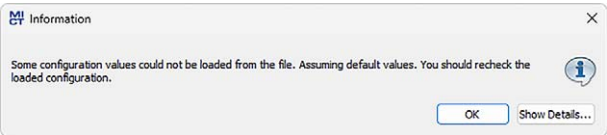
# 8 Settings via the MICT



**Existing configuration is cleared!**

If you download a configuration to a ITB-DC throttle the previously used configuration is deleted and the new settings are immediately implemented.

## 8.8.3 Compatibility Information



If you upload a configuration from the ITB-DC throttle to the MICT that does not correspond to the status of your MICT, or if you open this type of configuration in the MICT, the following situations may occur:

- No values are present in the configuration for certain MICT functions. The MICT assumes the standard values for these functions.
- The configuration contains function values that are not support by the MICT.

The following situations can occur if you download a configuration from the MICT to a ITB-DC throttle whose firmware does not correspond to the status of your MICT:

- No values are present in the configuration for certain firmware functions. The firmware continues to use the preset values for these functions.
- The configuration contains function values that are not support by the firmware.

If you download a configuration to the throttle and are notified of functions that are not supported by the MICT, you should check the throttle settings. Re-upload the configuration from the throttle to the MICT. You can then see which settings are not transmitted to the MICT.

Perform a firmware update, if necessary and/or update your MICT so that you can use all the functions of the ITB-DC throttle without restriction.



8.9 Configuration

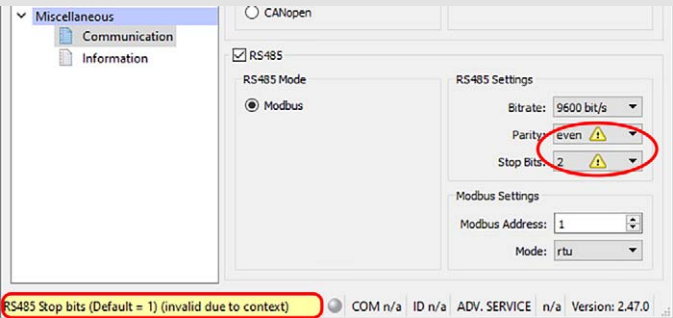
The window opens after you select the device type for a new configuration or an existing configuration or have uploaded one from the device. You can make changes to the configuration by selecting an entry from the navigation bar. The corresponding configuration data are then displayed in the configuration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



Indication of invalid entries

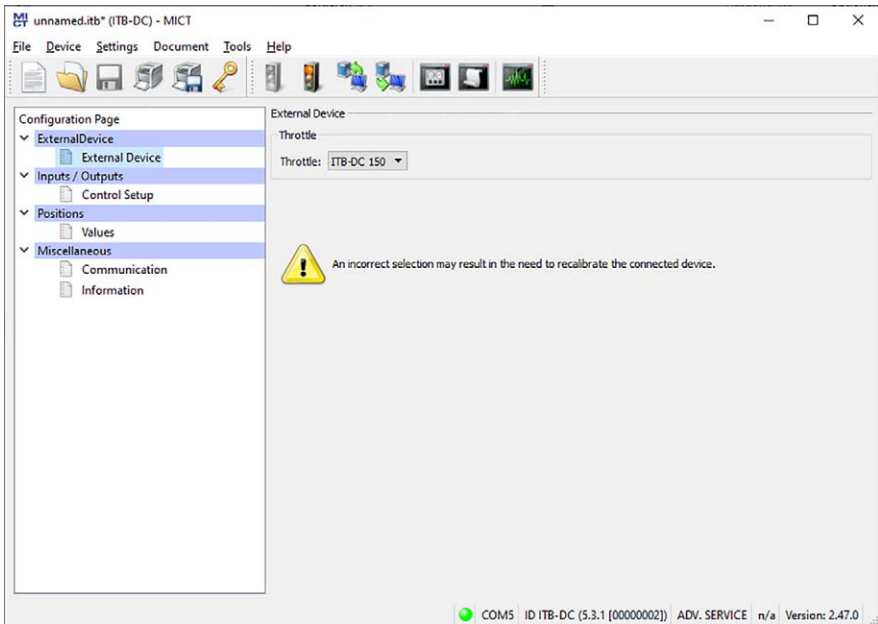
An invalid selection or invalid input values are highlighted by pulsating warning signs on the configuration pages of the MICT. Additional information is provided in the status bar.

Example:



## 8 Settings via the MICT

### 8.9.1 External Device



To change the device type, approval for the access level *Advanced Service* is required.

#### External Device

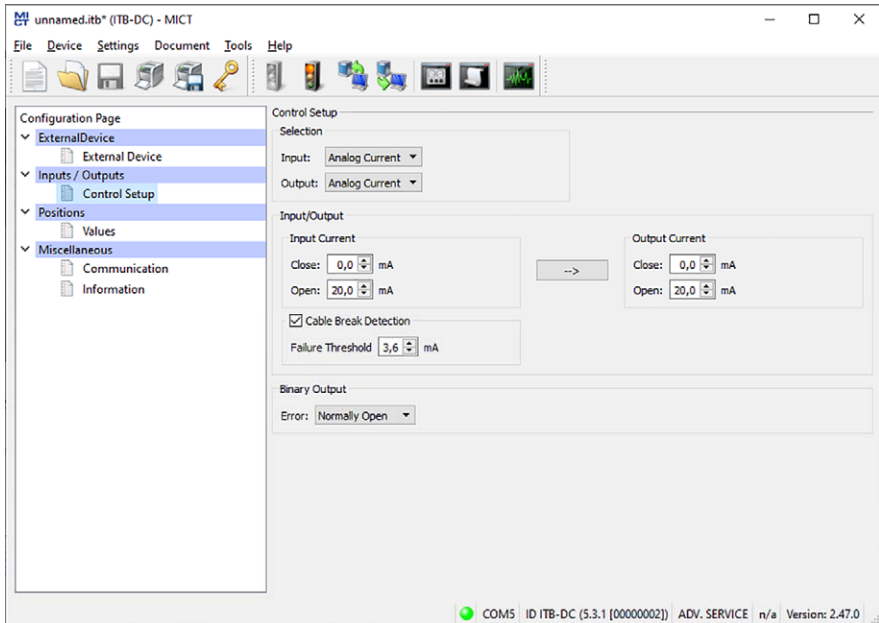
Select the device type you wish to configure and control from the drop-down list.

When the device type has been changed and the modified configuration has been downloaded to the device, the LED on the device flashes orange. This indicates that a reference run is required.

#### – Throttle

Select this option to select from the following drop-down list the throttle body with integrated stepper motor (ITB-DC) that corresponds to your application.

### 8.9.2 Inputs/Outputs – Control Setup



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

#### Selection

##### – Input

Select the input that is to be used for position setting by the master control connected. The following options are possible:

##### – Analog Current

Position setting is achieved via the analog current signal.

##### – Fieldbus


Position setting is achieved via a fieldbus. This requires corresponding configuration of the communication with the desired fieldbus (see *Miscellaneous – Communication* on page 62).

##### – Output

Shows the analog output used by the master control connected. For the ITB-DC, only an analog current output is available. If the connected controller only has a voltage input, refer to the example at the end of this section.

## 8 Settings via the MICT

### Input/Output

- **Input Current**  
For the analog input, enter the values for the open and closed position. Note the value range for the current input from 0 mA to 20 mA.
-   
Click this button to apply the settings of the analog current input to the analog current output.
- **Output Current**  
Enter the current values that should correspond to the open and closed position. Here, the same value ranges are applicable as with the analog inputs.
- **Cable Break Detection**  
If the throttle is controlled via the analog current input, cable break detection can be activated.
  - **Failure Threshold**  
Enter a value for the failure threshold. If the input current falls below this failure threshold, the throttle enters the error mode and the binary error output is switched. The throttle then moves to the error position defined in the MICT if it is activated.
- **Fieldbus Monitoring**  
If the throttle is controlled via fieldbus, the fieldbus monitoring can be activated.
  - **Target Position Timeout**  
Enter the time that the controller tolerates without information on the target position via the fieldbus before it enters the error mode. If this value is exceeded, the binary error output is switched. The throttle then moves to the error position defined in the MICT if it is activated.

### Binary Output

The binary output is active if an error has occurred and the throttle is in automatic mode.

- **Error**  
Set the error output as a normally closed or normally open.



#### Setting the analog current input

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

#### Example:

Your master control works with a current input of 4 mA 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 opening is 75 %.

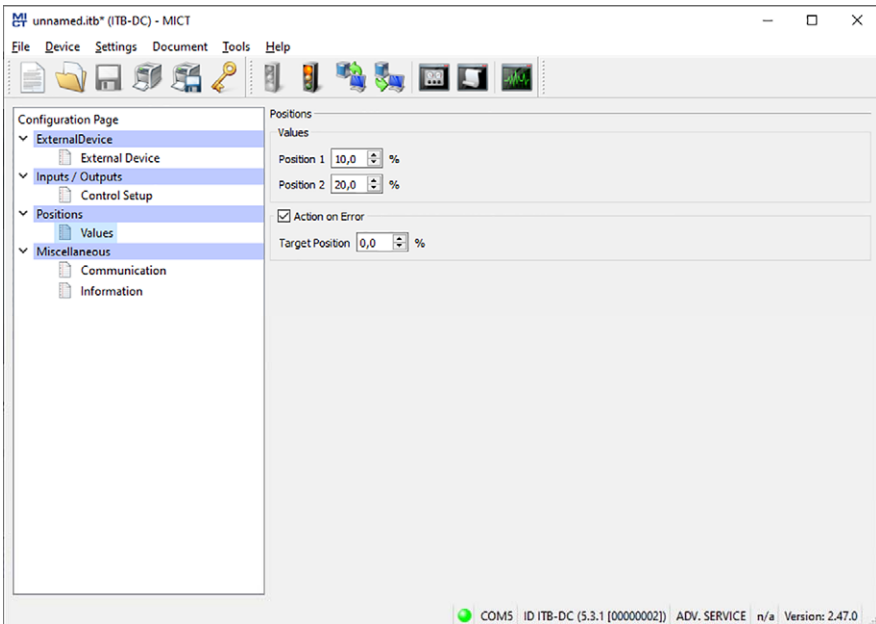


### Example: Use of a voltage input

The SC100 speed control has a voltage input. The following steps are required to connect the position feedback signal of the ITB-DC (current output) to the feedback input of the SC100 (voltage input):

1. Connect the 270  $\Omega$  resistor supplied with the harness in parallel to the signal lines between the *ACT fbd* and *Fdb GND* clamps on the SC100.
2. Define the values under *Analog sensors* in WinScope; e.g:  
*Fdb 0 pos*: 0.70 V  
*Fdb 100 pos*: 4.48 V.
3. Adjust the values of the analog current output on the configuration page *Inputs/Outputs – Control Setup* in the MICT: e.g.  
*Close*: 2.6 mA ( $0.70 \text{ V} / 270 \Omega = 2.6 \text{ mA}$ )  
*Open*: 16.6 mA ( $4.48 \text{ V} / 270 \Omega = 16.6 \text{ mA}$ )

### 8.9.3 Positions – Values



# 8 Settings via the MICT

## Position 1/Position 2

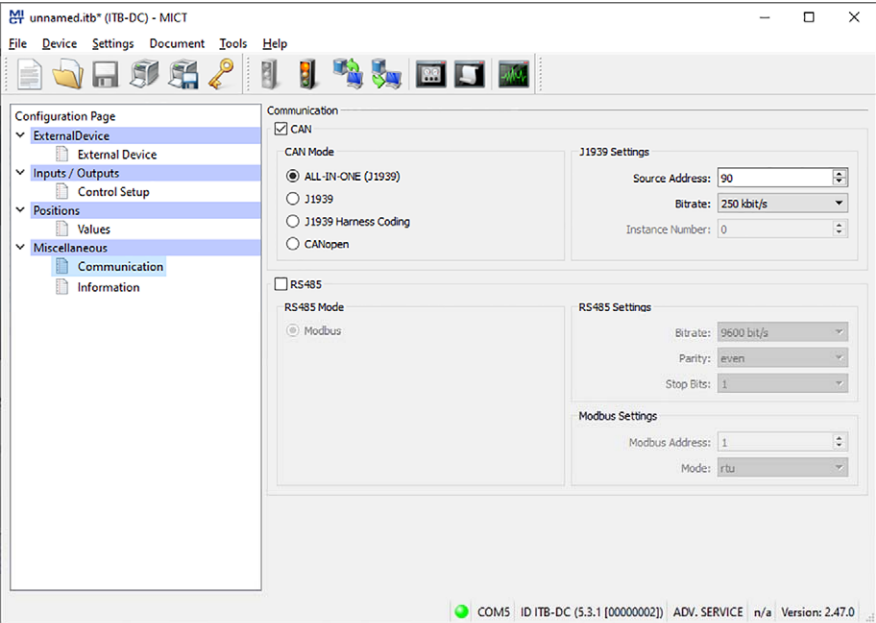
You can define two configurable positions using these two input fields. This requires approval for the access level *Service* or *Advanced Service*. Enter the desired opening angle of the gas supply for the throttle as a percentage value (100 % corresponds to open, 0 % corresponds to closed). The openings specified here can be set in manual mode via the MICT and in automatic mode via fieldbus .

For further information, refer to the section Configurable Opening Angles (Position 1 and 2).

## Action on Error

For the *Target Position*, enter the desired degree of opening that the throttle should move to in the event of an error, if this is still possible. For example, in the event of a step loss or overcurrent error, the stepper motor can generally no longer fulfill this request. The target position is also approached if the failure threshold for cable break detection is undercut or the position target timeout is exceeded when operating with fieldbus. Refer to the section *Monitoring the Control System* on page 43.

## 8.9.4 Miscellaneous – Communication



## CAN

Via the field CAN, deactivate or activate the CAN interface of the device.

- [ALL-IN-ONE \(J1939\)/J1939/J1939 Harness Coding/CANopen](#)  
Select the desired protocol, depending on whether you want to set the communication for the ALL-IN-ONE or for another master control.

- **Source Address/CANopen Node ID**

In the protocol *ALL-IN-ONE (J1939)* the source address can be assigned between 0 and 253. In the CANopen protocol, a CANopen node ID from 1 to 127 can be assigned. Note that IDs cannot be assigned more than once.

- **Bitrate**

Select the desired data transfer rate from the list. In the protocol *ALL-IN-ONE (J1939)*, 250 kbit/s and 500 kbit/s are available for selection. In the CANopen protocol, a bit rate from 50 kbit/s to 1 Mbit/s can be set. For both protocols, we suggest the use of a baud rate of 250 kbit/s.

- **Instance Number**

If you are using several throttles in the field bus, you can assign an instance number here to make it easier to distinguish between the configurations and the communication parameters defined in them.

### RS485

Not available for the ITB-DC.

### Additional CAN Parameters

- **Transmission Repetition Rate**

Set the repetition rate for the transmission of the TXPGN in the fieldbus.

- **J1939 PGN**

- **Receive/Transmit**

Set the parameters for communication in the fieldbus.

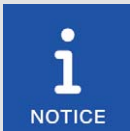
- **Harness Coding**

If you use coded harnesses, you can use one configuration for up to four devices. Depending on the instance, the specified communication parameters are then used. The instance is defined via harness coding. Refer to the section *Wiring Binary Inputs* on page 37.



#### Setting the transfer rate

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



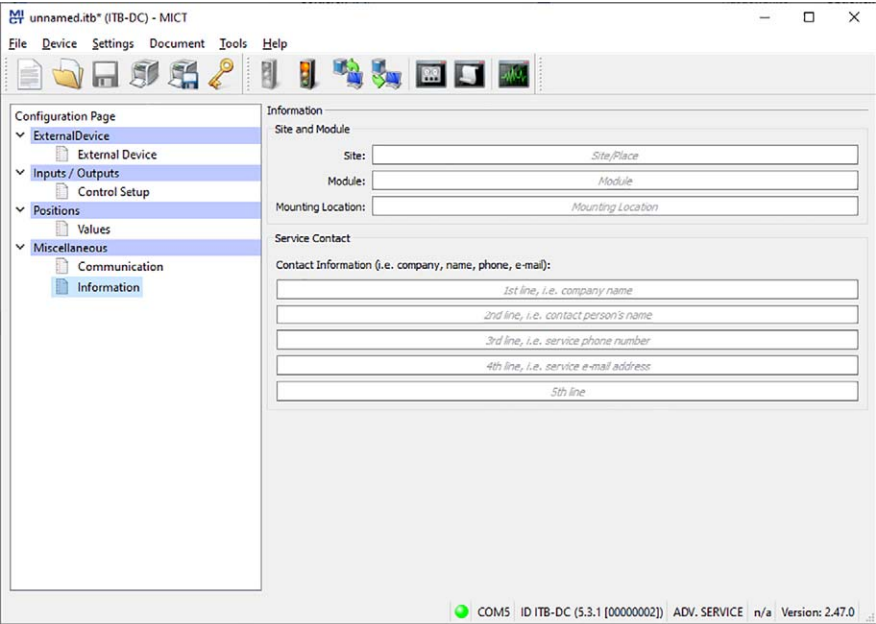
#### Information on protocols

Please contact your MOTORTECH contact person if you require more information on the CANopen®, J1939 and Modbus protocols.

# 8 Settings via the MICT

## 8.9.5 Miscellaneous – Information

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



### Site and Module

In this section, enter information on the system and the module for which the configuration will be used.

### Service Contact

In this section, individual contact data can be saved that can be called up and displayed via MICT.








8.10 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 the runtime data trace.         |
|  | Stops the runtime data trace.          |

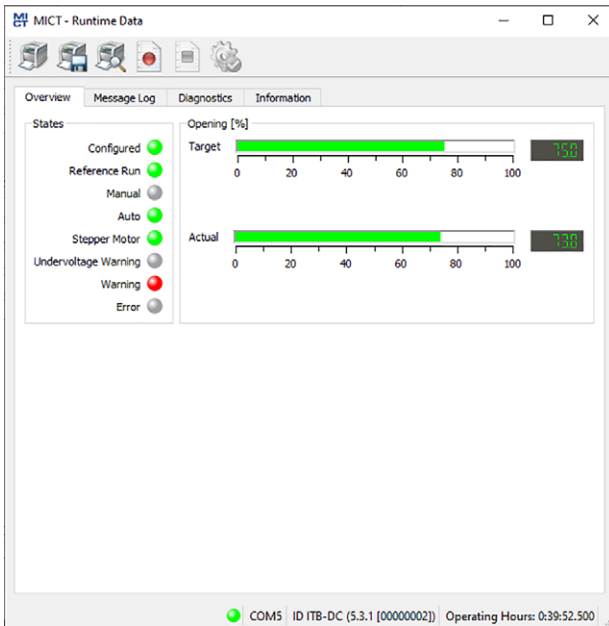


**Save runtime data locally**

You should always save runtime data on the local computer and not on a network drive or external storage device. Trace files can only be moved freely once the recording is stopped.

## 8 Settings via the MICT

### 8.10.1 Runtime Data – Overview



You can find the following information in the window:

#### Configured

The status display shows whether there is a valid configuration on the throttle:

- green: The throttle has a valid configuration.
- red: The throttle has no or an invalid configuration. An existing configuration can for example become invalid during a firmware update. The throttle is not ready for operation again until a valid configuration is downloaded to the device.

#### 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.

### Undervoltage Warning

The status display signals a drop in the supply voltage below 15 V. Please also observe the voltage drop on the harness.

- green: The supply voltage is above 15 V.
- red: The supply voltage is below 15 V.

### Warning/Error

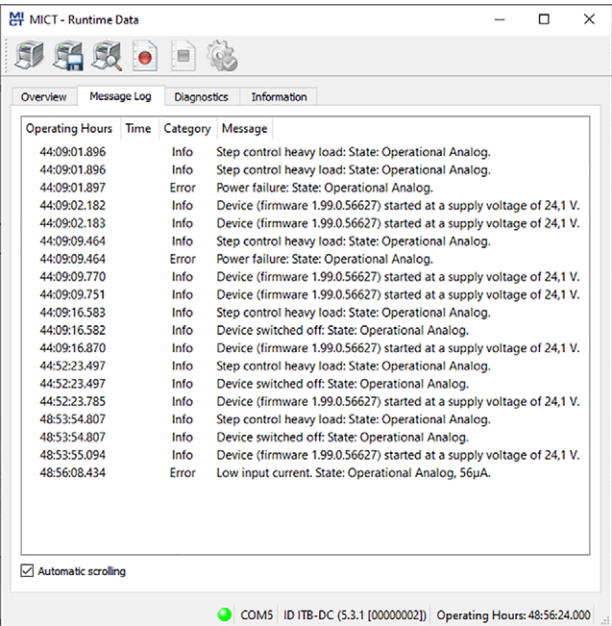
A red status display indicates that a warning or an error has occurred. The display will go out if the warning or the error is acknowledged via the MICT (*Device -> Error Acknowledge*). Refer to the section *Runtime Data – Message Log* on page 68.

### Opening

- **Target**  
The value is assigned to the throttle in automatic mode by the master control or, in manual mode, by the MICT.
- **Actual**  
The displayed value represents the opening of the throttle as a percentage.

# 8 Settings via the MICT

## 8.10.2 Runtime Data – Message Log



In the view *Message Log*, information, warnings and errors are listed.

The following information is provided:

- **Operating Hours**  
Operating hours counter reading at the time of message
- **Time**  
Time and date cannot be shown for ITB-DC throttle.
- **Category**  
Message type (information, warning, error)
- **Message**  
Message text; you can find more information on the message text in the following sections.

You have the following options:

- **Automatic scrolling**  
If this box is checked, the system automatically displays the last list entry until a new event occurs.

### 8.10.2.1 Information

#### Information

Configuration changed.

Device (firmware *version*) started at a supply voltage of *value*.

Device switched off.

Message log cleared.

NVRAM formatted.

One or more messages are lost due to exhausted memory pool or message queue overrun.

Shutdown timestamps cleared.

Step control heavy load.

Step loss error self acknowledged.

For all information, the status of the ITB-DC when the information occurred is indicated. Additional parameters are provided if necessary.

### 8.10.2.2 Warnings

#### Warning

Cpu usage.

General warning.

Reset life time.

Use backup life time.

For all warnings, the status of the ITB-DC when the warning occurred is indicated. Additional parameters are provided if necessary.

### 8.10.2.3 Errors

#### Errors

CAN handler message queue full.

Error triggered by command.

Coprocessor handler message queue full.

General error.

Input handler message queue full.

Interframe step loss.

Low Power

Output handler message queue full.

Over current.

Over temperature.

## 8 Settings via the MICT

### Errors

Stop step loss.

Timeout.

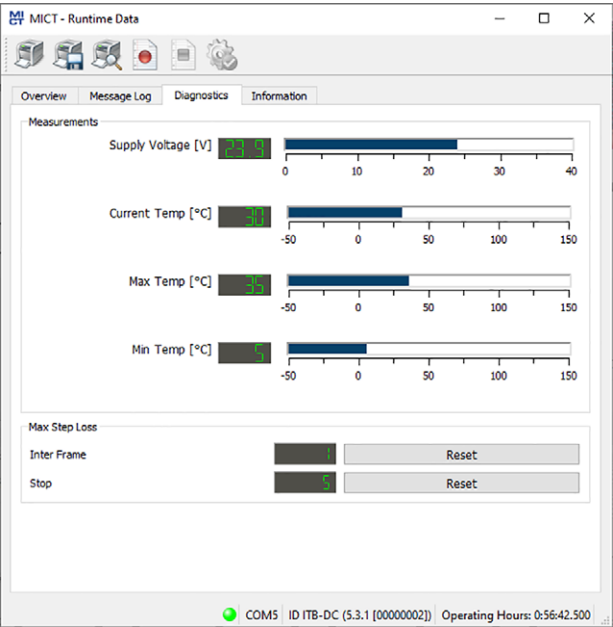
Background task message queue full.

Cable break detected on analog current input.

Target position timeout detected on fieldbus.

For each error message, the status of the ITB-DC at the time the error occurred is provided. Additional parameters are provided if necessary.

### 8.10.3 Runtime Data – Diagnostics



In this screen, you can find the following information:

#### Supply Voltage

Current supply voltage of the device.

#### Current Temp

Current temperature of board.

#### Max Temp

Maximum board temperature reached since the last time the device was switched on.

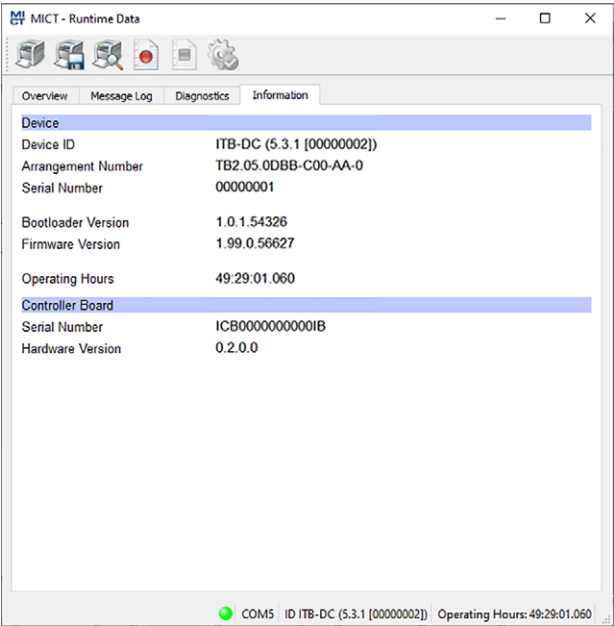
Min Temp

Minimum board temperature reached since the last time the device was switched on.

Max. Step Loss

Internal diagnosis parameters associated with the control of the stepper motor. The maximum step losses that have occurred since the last switch-on are displayed. If the step losses are too high, this will cause an error message.

8.10.4 Runtime Data – Information



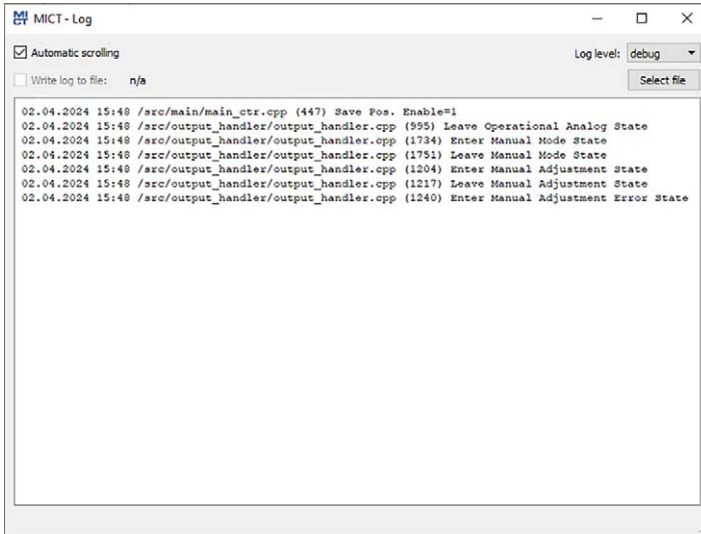
In this view, you can find an overview of the device and version data. You also have the option of printing this data in the same way as all current runtime data or sending it as a PDF to MOTORTECH Service Department by e-mail in the event of problems. For fast support, we will then immediately have all required information.

## 8 Settings via the MICT

### 8.11 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 selection of the log level is specified by MOTORTECH if needed.
- [Write log to file](#)  
This checkbox activates or deactivates, 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 *Select file* 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 list *Log level*.
5. Leave the window open.
  - ▶ The log messages are logged both in the window and in the selected file.



### 9.1 Start-up

Before you start up the throttle body, take note of the following:

- The throttle body has to be properly installed.
- The tightness of the system must have been checked.
- The throttle body and the seals have to be without any damage.
- Make sure that there are no foreign bodies in the piping.
- Ensure that the wiring of the harness is implemented correctly.
- Ensure that no gas is present in the inlet and exhaust systems before you start the engine.
- Ensure that the gas valve is closed.
- The screws or threaded rods have to be tightened firmly.

### 9.2 Shutdown

When shut down the device, first switch off the power supply before disconnecting the plugs. Before dismounting the device, the gas supply must be switched off and the pipe must be free of gas.

### 9.3 Firmware Update

Using the MOTORTECH Flash Tool, you can perform a firmware update for the throttle. The provided storage device comprises this program.

#### Install MOTORTECH Flash Tool





Install the MOTORTECH Flash Tool as follows:

1. Start the installation:
  - Via the menu:  
Start the file *Start.exe* on the storage device. Start the installation routine for the MOTORTECH Flash Tool via *Software -> MOTORTECH Flash Tool -> Install MOTORTECH Flash Tool*.
  - Directly from the storage device:  
Start the installation routine of the MOTORTECH Flash Tool directly. It is on the storage device in the subdirectory *Installation* and for example named as follows: *MOTORTECH-Flash-Tool-0.23.00000-setup.exe*.
2. Install the program.  
Follow the instructions of the installation routine. Note that the license agreement terms must be accepted before using the MOTORTECH Flash Tool.
3. If the USB driver is not yet installed, also install it via the menu or directly from the storage device.
  - Via the menu:  
*Software -> USB Drivers -> Install USB Drivers*
  - Directly from the storage device:  
Start the exe file in subdirectory *Drivers* (e.g. *CDM21226\_Setup.exe*).
    - ▶ The MOTORTECH Flash Tool is set up. You can now connect your PC to the throttle via the USB interface.

# 9 Operation

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

## Start Firmware Update



### 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 Throttle* on page 52.

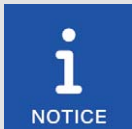


### Backup the existing configuration

Your device's configuration may be lost if the firmware update is not performed properly. Always backup the existing configuration via the MICT prior to performing an update. For more information read the section *Working with Configurations* on page 54.

To start a firmware update, proceed as follows:

1. If an MICT is connected with the throttle, disconnect this connection.
2. Start the MOTORTECH Flash Tool via *Start -> Programs -> MOTORTECH -> MOTORTECH Flash Tool -> x.x.x (e.g. 0.23.00000) -> MOTORTECH Flash Tool*.
  - ▶ The MOTORTECH Flash Tool will now start.
  - ▶ The software automatically checks all ports for connected devices.
3. In the *Status* section under *Device*, check if your device has been recognized properly.
  - ▶ If the MOTORTECH Flash Tool does not recognize a device that is connected to your computer 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 via the folder icon in the field *Path*.
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 throttle will be restarted automatically.
  - ▶ Now, a window opens informing you about the firmware version currently used on your throttle and also about the relevant update version.
7. 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 throttle will initiate a reference run.
8. After a successful firmware update, check all configuration data.



### 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: 1,000 ms to 10,000 ms, standard value: 3,000 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: 1,000 ms to 10,000 ms, standard value: 3,000 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.

## 10.1 Possible Faults

| Fault  | Possible cause   | Solution  |
|--|--|---|
| The supply voltage has dropped below 8 V.                      | The power supply is dimensioned too small.   | Provide a power supply in accordance with the technical specifications. |
|  | The starter battery is worn out.   | Do not operate the throttle body from the starter battery.              |
|  | The wiring for the power supply is routed defective or incorrectly. Please also observe the voltage drop on the harness. | Check the wiring and make sure that the supply voltage is available.    |
| The predefined steps are not carried out by the stepper motor. | The throttle body is stuck (e.g. due to pollution).  | Clean the throttle body.  |
|  | The stepper motor or the integrated stepper motor driver is defective.   | Please contact your MOTORTECH contact person for repair.                |
| The temperature of the board has been exceeded.                | The ambient temperature is too high.   | Ensure sufficient ventilation.  |
|  | Air circulation around the device is insufficient.   | Ensure sufficient air circulation.                                      |
|  | The cooling body is dirty.   | Clean the cooling body.   |
| The reference run failed.                                      | The throttle body is stuck (e.g. due to pollution).  | Clean the throttle body.  |
|  | The stepper motor or the integrated stepper motor driver is defective.   | Please contact your MOTORTECH contact person for repair.                |
| The current to the stepper motor is too high.                  | The stepper motor is defective.  | Please contact your MOTORTECH contact person for repair.                |
|  | The stepper motor driver is defective.   | Please contact your MOTORTECH contact person for repair.                |
| The throttle body does not move.                               | The connection between the throttle body and the master control is faulty.   | Check the wiring.   |
|  | The stepper motor or the integrated stepper motor driver is defective.   | Please contact your MOTORTECH contact person for repair.                |

# 10 Errors

## 10.2 Acknowledging Faults

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

- Via *Error acknowledge* in the MICT

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

- The master control sends a signal to the binary reset input
- the higher-level control system sends a corresponding signal via the fieldbus
- Via *Error acknowledge* in the MICT

Critical errors can only be acknowledged by switching the device off and on.



### Error confirmation in automatic operation

If the ITB-DC is in automatic mode and an error immediately reoccurs 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.

## 10.3 Customer Service Information

You can reach us during our business hours by:

- Phone: +49 5141 93 99 0
- Email: [service@motortech.de](mailto:service@motortech.de) (technical support)  
[sales@motortech.de](mailto:sales@motortech.de) (all other matters)

## 10.4 Returning Equipment for Repair/Inspection

To return the device for repair and inspection, first consult your MOTORTECH contact person (see *Customer Service Information* on page 78). From him you will receive all the information you need to process your order quickly and smoothly. For return shipment, also observe the instructions in the section *Instructions for Packaging the Equipment* on page 78.

## 10.5 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.

### 11.1 Maintenance Instructions

**Explosion hazard!**

If the system is not entirely tight and sealed, the combustible gas mixture may escape and result in an explosion hazard.

If the device is demounted by the customer for installation or maintenance purposes, the customer is responsible for restoring the system's leak tightness.

Observe the following maintenance instructions:

- Do not use caustic liquids for cleaning the device.
- A visual inspection must be carried out every time the engine is serviced within the normal service intervals of your system.
- Dirty seals can lead to leakage of the throttle body. When replacing seals, only use clean seals from MOTORTECH.
- For repair, the device must be returned to MOTORTECH (see *Returning Equipment for Repair/Inspection* on page 78). If needed, a replacement or exchange device can be provided. For this purpose, contact your MOTORTECH contact person (see *Customer Service Information* on page 78).

### 11.2 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](http://www.motortech.de).

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## GAS ENGINE TECHNOLOGY

