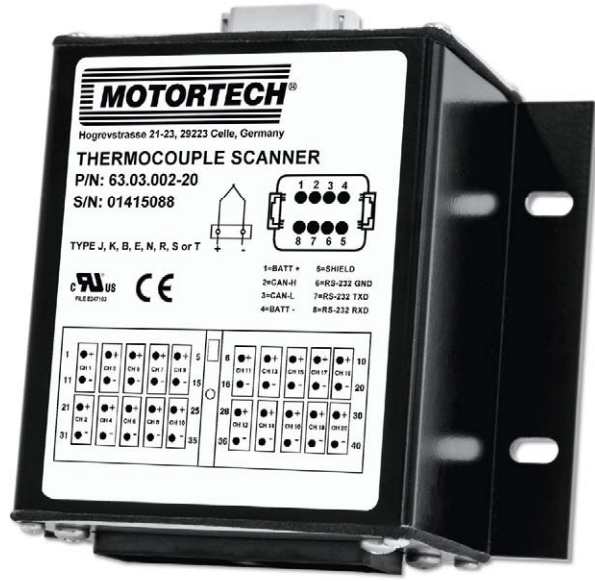


TempScan20 – Temperature Module

Operating Manual



P/N 01.40.001-EN | Rev. 08/2019

Original instructions

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1 General Information



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

1.1 What Is the Purpose of this Operating Manual?

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

1.2 Who Is this Operating Manual Targeted to?

The operating manual provides a code of conduct for personnel tasked with the 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 electronic ignition systems are necessary. Persons who are only authorized to operate the gas engine shall be trained by the operating company and shall be expressly instructed concerning potential hazards.

1.3 Which Symbols Are Used in the Operating Manual?

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



Example

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



Notice

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



Warning

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

1 General Information



Danger

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

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

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

Abb.	Term	Description	Explanation
ADC	Analog-to-Digital Converter		Component that converts analog input signals into digital signals.
ATEX	Atmosphères Explosibles	Potentially explosive atmospheres	
CAN bus	Controller Area Network bus	Bus for control devices / networks	Asynchronous serial connection system for linking control units
CE	Conformité Européenne		Mark based on EU legislation for certain products in conjunction with product safety
CSA	Canadian Standards Association		Organization that defines standards, inspects products for safety compliance, and issues pertinent certifications.
DC	Direct Current		
EMC	Electromagnetic Compatibility		Compatibility of electrical or electronic equipment items with their surroundings
EPL	Equipment Protection Level		Protection level of equipment as per IEC 60070-0
HMI	Human-Machine Interface		Interface between human and machine or computer
LSS	Layer Setting Services		Service for configuration of node ID and bit rate in a CAN-open® network
RoHS	Restriction of Hazardous Substances		

1 General Information



Abb.	Term	Description	Explanation
RS232	Recommended Standard 232		Industrial standard for a physical interface for asynchronous serial data transfer
SD card	Secure Digital card	Secure digital storage card	Digital storage medium
USB	Universal Serial Bus		Serial connection system to link a computer to external devices
XML	Extensible Markup Language		Markup language for displaying hierarchically structured data

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.
- 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 this operating manual, 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 warranties 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 detected while operating the gas engine.
- 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 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 engine.
- Your behavior can reduce possible residual risks to a minimum. Ensure responsible handling of the device.

2.2 Electrostatic Discharge Hazards

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

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

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

2.3 Special Safety Instructions for the Device



Explosion hazard!

Do not under any circumstances carry out work on electrical connections while the circuit is active. If the system is located in a hazardous area, there is a risk of explosion.



Explosion hazard!

Flammable gases or vapors can penetrate into the device. For installation in a potentially explosive atmosphere, it is imperative that you observe the information in section *Use in Potentially Explosive Atmospheres* on page 12.



Risk of destruction!

Strong electromagnetic fields can affect the TempScan20 or destroy it. Therefore, do not install the device in the vicinity of high voltage or high current devices.

2 Safety Instructions



Operational safety!

The TempScan20 and HMI module PowerView3 are not designed for safety-critical applications. The CANopen® protocol and the binary inputs and outputs of the PowerView3 must not be used for safety-critical purposes.



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 in accordance with the specifications in the operating manual.

2.4 Proper Disposal

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

3 Intended Use



3.1 Functional Description

The temperature module TempScanzo is designed for temperature measurement of up to 20 thermocouples of the types B, E, J, K, N, R, S, and T. Warnings and error messages can be transmitted via the CAN bus if temperatures exceed or fall below the set limits. The configuration of the device and the processing of measured values is carried out via the HMI display PowerView3 from MOTORTECH, which must be connected to the TempScanzo via the CAN bus.

3.2 Applications

The temperature module TempScanzo is designed for use in the industrial sector on power generators and stationary gas engines and supports thermocouples of the types B, E, J, K, N, R, S, and T. The TempScanzo is operated jointly with the HMI module PowerView3. The TempScanzo does not support safety-critical applications.


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


3 Intended Use

3.3 Use in Potentially Explosive Atmospheres

3.3.1 European Union

The TempScan20 is certified in accordance with ATEX Directive 2014/34/EU for use in a potentially explosive atmosphere of zone 2 in the European Union.

 II 3G Ex nA IIC T4 Gc

Labeling	Meaning
	Marking of explosion protection (the product complies with ATEX Directive 2014/34/EU)
II	Equipment group II = Ex areas with the exception of mines susceptible to firedamp
3G	Equipment category 3 = Ex hazard infrequent and for a short period G = Gases
Ex	Ex protection in accordance with EN 60079-xx (-0, -15)
nA	Type of protection nA = non-sparking equipment
IIC	Subdivision into explosion groups : II = Gases C = Gases such as hydrogen
T4	Temperature class T4 = maximum surface temperature $\leq +135\text{ °C}$ ($\leq +275\text{ °F}$)
Gc	Equipment protection level (EPL) Gc = normal

Ex ambient temperature range: $-40\text{ °C} \leq T_{amb} \leq +70\text{ °C}$ ($-40\text{ °F} \leq T_{amb} \leq +158\text{ °F}$)

It is essential that you observe the following special conditions of use:

- Power supply shall provide the transient protection at a level not exceeding 140 % of the peak rated voltage.

3 Intended Use



- End user shall use DEUTSCH® mating plugs for connection with the receptacles of the models as shown below:

Supply receptacle	Mating plug
DT13-08PA	DT06-8S

Thermocouple receptacle	Mating receptacle
DRC13-40PA	DRC16-40S, DRC18-40S, DRC16-40SA, DRC18-40SA

- The equipment shall be protected from ultraviolet light sources within the final installation.

3.3.2 USA, Canada

The TempScanzo is certified by the CSA for use in a Class I, Division 2, Groups A, B, C and D, T4 hazardous location in the USA and Canada. For this, you must adhere to the information of the CSA certificate 70017536, which is enclosed with the product.

4 Product Description

4.1 Technical Data

4.1.1 Certifications

The TempScan20 is certified as follows:

UL

- UL 508 (April 2010) (FTPM2) – Controls for Stationary Engine Driven Assemblies
- cUL C22.2 No. 14-18 (2018)

CSA



Use in potentially explosive atmospheres!

For use in a potentially explosive atmosphere in the USA and Canada pursuant to CSA, it is imperative that you observe the information of the CSA certificate 70017536, which is enclosed with the product.

- Class I, Division 2, Groups A, B, C, D; T₄
- Class 1, Zone 2, AEx/Ex nA IIC T₄ Gc IP₅₄
- CAN/CSA-C22.2 No. 0-M91 (R2001)
- CAN/CSA-C22.2 No. 60079-0:11
- CAN/CSA-C22.2 No. 61010-1-12
- CAN/CSA-C22.2 No. 60079-15:12
- CSA Std. C22.2 No. 213-M1987
- ANSI/ISA-61010-1 (82.02.01)
- ANSI/ISA-12.12.01-2013
- ANSI/UL 60079-0:13
- ANSI/UL 60079-15:12

4 Product Description

CE

- ATEX Directive 2014/34/EU



Use in potentially explosive atmospheres!

For use in a potentially explosive atmosphere in accordance with ATEX Directive 2014/34/EU in the European Union, it is essential that you observe the information in section *European Union* on page 12.

- EN 60079-0:2012 + A11:2013 – Explosive atmospheres - Part 0: Equipment - General requirements
- EN 60079-15:2010 – Explosive atmospheres - Part 15: Equipment protection by type of protection "n"
- EMC Directive 2014/30/EU
 - EN 55011:2009 + A1:2010 – Industrial, scientific and medical equipment Radio-frequency disturbance characteristics - Limits and methods of measurement
 - EN 61000-6-2:2005 + AC:2005 – Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
 - EN 61000-6-4:2007 + A1:2011 – Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
 - EN 61326-1:2013 – Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements
- RoHS Directive 2011/65/EU

4 Product Description

4.1.2 Mechanical Data

The temperature module TempScan20 has the following mechanical characteristics:

Feature	Value
Dimensions	145.3 mm x 149 mm x 73 mm (5.72" x 5.86" x 2.87") (length x width x height)
Weight	1 kg (2.2 lbs)
Shape of device	See section <i>Overview Drawings</i> on page 21
Mechanical environmental conditions	Protection class: IP67 Protection class in potentially explosive atmospheres: IP54 Pollution degree as per UL 508 (April 2010): 3
Climatic environmental conditions	Operation and storage: -40 °C to +85 °C (-40 °F to +185 °F) Operation in potentially explosive atmospheres: -40 °C to +70 °C (-40 °F to +158 °F) Max. 95 % without condensation at +30 °C to +60 °C (+86 °F to +140 °F)
Vibration resistance	4 g as per IEC 60068-2-6:2007

4 Product Description



4.1.3 Warning Notices on the Device



Validity of warning notices on device

The warning notices on the device are valid for the TempScan20 and all components connected to it.



CSA 15.70017536
Class 1, Division 2, Groups A,B,C,D T4
Class 1, Zone 2, AEx/Ex nA IIC T4 Gc

248638 Installed per Control Drawing 041715



Sira 15ATEX4138X
II 3 G Ex nA IIC T4 Gc
MADE BY: AXIOMATIC, 5915 Wallace St, Mississauga, Canada

Power: 24Vdc, 100 mA

Inputs: TC

Output: SAE J1939

-40°C ≤ Tamb ≤ 70°C

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS 1, DIVISION 2.
AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE 1, DIVISION 2.

WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS.
AVERTISSEMENT - RISQUE D'EXPLOSION - NE PAS DEBRANCHER TANT QUE LE CIRCUIT EST SOUS TENSION, A MOINS QU'IL NE S'AGISSE D'UN EMPLACEMENT NON DANGEREUX.

English warning notice on the device

Warning – Explosion Hazard – Substitution of components may impair suitability for Class 1, Division 2.

Warning – Explosion Hazard – Do not disconnect while circuit is live unless area is known to be non-hazardous.

French warning notice on the device

Avertissement – Risque d'explosion – La substitution de composants peut rendre ce matériel inacceptable pour les emplacements de Classe 1, Division 2.

Avertissement – Risque d'explosion – Ne pas débrancher tant que le circuit es sous tension, à moins qu'il ne s'agisse d'un emplacement non dangereux.

4 Product Description

4.1.4 Product Identification – Labeling on the Device

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

Top of Device

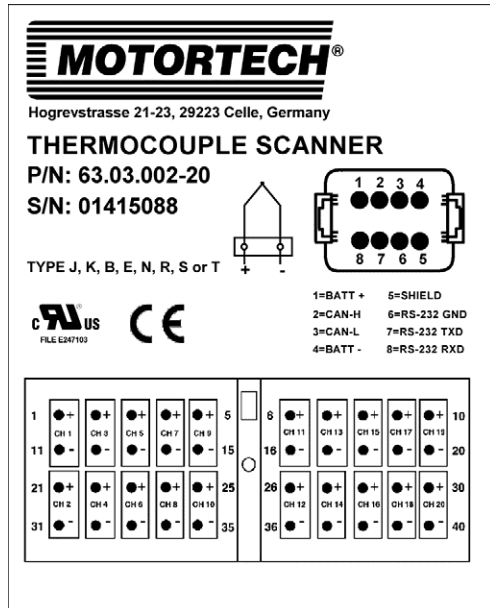


Abb.	Meaning
------	---------

P/N	Part number of the temperature module
S/N	Serial number of the temperature module
	The serial number is composed as follows: BBBYYDDD
	– BBB: unique number in batch
	– YY: year of construction
	– DDD: day of construction

4 Product Description



4.1.5 Electrical Data

The temperature module TempScanzo has the following electrical characteristics:

Feature	Value
Power consumption	2.5 W
Power supply	Nominal voltage: 24 V DC Operating voltage: 9 V DC to 32 V DC
Required current	200 mA at 12 V typical 100 mA at 24 V typical
Protection	The power supply input is protected against: <ul style="list-style-type: none">– Reverse polarity– Transient surges as per EN 61326-1:2013, industrial environment, criterion B– Internal short circuits The power supply input is galvanically isolated from the thermocouple inputs and the CAN interface.

Electrical Data for the Thermocouple Inputs

The thermocouple inputs of the temperature module have the following electrical data:

Feature	Value
Thermocouple types	B, E, J, K, N, R, S, and T
Measuring Range	-273 °C to +1,735 °C (-459.4 °F to +3,155 °F)
Measurement resolution	0.001 °C
Measuring accuracy	±1 °C
Measuring speed	100 ms per channel max. 2.4 s for a complete cycle of all 20 channels
Thermal drift	Max. 150 ppm/°C of the range
Galvanic isolation	– Isolation test voltage 500 V DC – The thermocouple inputs are galvanically isolated from the power supply input and the CAN interface.
Error Detection	– Line interruptions – No updating of data in the analog-to-digital converter

■ 4 Product Description

4.1.6 Interfaces

CAN

- Classical Extended Frame Format (CAN 2.0B)
- Galvanically isolated
- CANopen® protocol

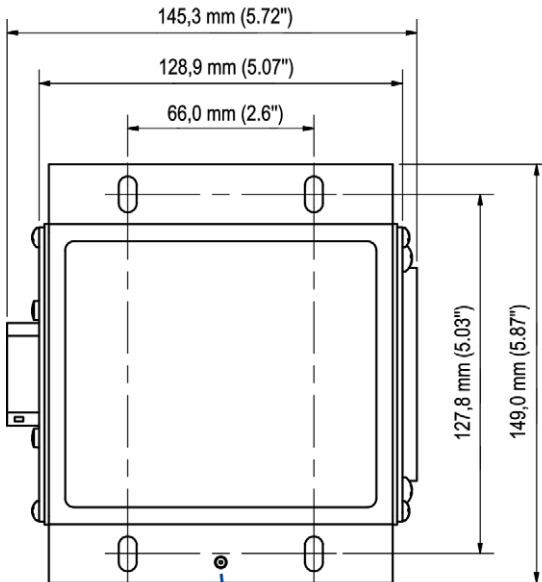
RS232

- Service interface (for internal use only)

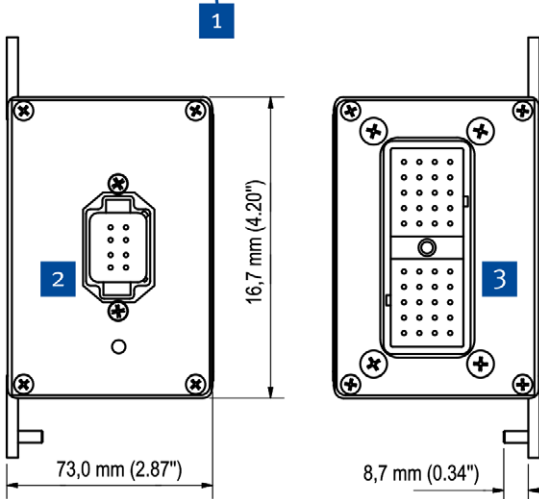
4 Product Description

4.1.7 Overview Drawings

Dimensions and Device Components



Pos.	Description
1	Ground stud for grounding the Temp-Scan20
2	Connection to power supply and CAN bus (DEUTSCH® DT13-08PA)
3	Thermocouple connection (DEUTSCH® DRC13-40PA)



5 Installation Instructions







5.1 Unpacking

Unpack the equipment, taking care not to damage it, and ensure that the operating manual is always stored with the equipment and is easily accessible. Check the contents for completeness and verify that the equipment meets your application requirements.

Scope of Supply




The scope of supply of the TempScan20 includes:

- TempScan20 temperature module
- Operating manual
- Accessory kit TempScan20

Designation	Amount	Figure
Contact (for mating plugs)	48	
Sealing plugs (for unused connections in the mating plugs)	24	
120 Ω CAN terminating resistor	1	
Removal tool for contacts	1	
Mating receptacle for thermocouples (DEUTSCH® DRC16-40S)	1	
Mating plug for power supply/CAN bus (DEUTSCH® DTo6-o8SA)	1	

5 Installation Instructions



Designation	Amount	Figure
Wedge lock for power supply/CAN bus mating plug	1	
Protective cap for power supply/CAN bus harness	1	
Protective cap for thermocouple wiring harness	1	

5 Installation Instructions

5.2 Installation

The temperature module TempScan20 is suitable for mounting on the engine. Install the device as follows:



Use in potentially explosive atmospheres!

For use in a potentially explosive atmosphere, it is essential that you observe the information in section *Use in Potentially Explosive Atmospheres* on page 12.



Risk of destruction!

Strong electromagnetic fields can affect the TempScan20 or destroy it. Therefore, do not install the device in the vicinity of high voltage or high current devices.

1. Select a suitable place for the TempScan20. When selecting a location, bear in mind the following points:
 - The maximum wire length of the CAN bus, that depends on the bit rate, must be observed (see section *CAN Bus Wiring* on page 28).
 - The maximum length of each thermocouple lead is 30 m (98').
 - The maximum length of the supply voltage cable is 10 m (32').
 - Install the device horizontally so that the connections exit laterally. This protects the device better against penetrating moisture.
 - The TempScan20 and the wiring must be suitable for the ambient temperature (see section *Mechanical Data* on page 16).
 - Make sure there is sufficient space to carry out maintenance work on the TempScan20, the wiring harness and for strain relief.
2. To protect the circuit against overload and short circuits, secure the supply voltage cable with a type 3 A, 32 V DC, slow blow fuse.
3. Attach the TempScan20 using four M6 screws. Use screws with strength class 8.8 and tighten them to a torque of 10 Nm (7.4 lb-ft). Secure the screw connection with lock nuts as per to ISO 10511:2012 or suitable serrated lock washers, depending on the type of fastening.
 - ▶ The TempScan20 is now installed and ready for grounding and wiring.

5 Installation Instructions



5.3 Grounding

There are two options for grounding the TempScan20.

Grounding via Protective Conductors

Connect the ground stud of the TempScan20 with a protective conductor. The protective conductor must have an eyelet and a minimum cross-section of 4 mm^2 (12 AWG). The eyelet must be positioned between a nut and a toothed washer.

The engine, the TempScan20 and all associated equipment should be grounded via a common point.

Grounding Using a Ground Strap

Instead of a protective conductor, a ground strap can be used, which at the same time helps to dissipate interference currents. The ground strap must possess the following characteristics:

- Design: Flat, no-core braid with suitable eyelet for the ground stud
- Width: 1.3 cm (0.5")
- Maximum length: 30 cm (12") and a suitable eyelet for the ground stud

6 Wiring of the Device

6.1 Connecting Thermocouples

You can connect up to 20 thermocouples to your TempScan20 using the supplied mating receptacle for thermocouples DEUTSCH® DRC16-40S. The TempScan20 supports the thermocouple types B, E, J, K, N, R, S, and T. Different types can be connected at the same time.



Use in potentially explosive atmospheres!

For use in a potentially explosive atmosphere, it is essential that you observe the information in section *Use in Potentially Explosive Atmospheres* on page 12.



Use suitable thermocouples

Make sure that the thermocouples are suitable for the proposed use. Using unsuitable thermocouples may return false data. Read the documentation supplied with your thermocouples.



Mounting the thermocouples

Make sure the thermocouples are properly installed. Extend the thermocouple leads only with special extensions for thermocouples. Read the documentation supplied with your thermocouples.

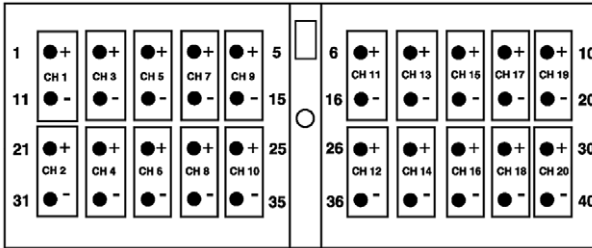
Use shielded thermocouple leads to connect the thermocouples to the TempScan20. In doing so, observe the following:

- Connect the shields of the thermocouple leads to the ground stud. When the TempScan20 is installed into a control cabinet, the shields can alternatively be connected to the earthing point of the control cabinet or to an earthing point at the cable bushing of the control cabinet.
- Cut off the shielding of each thermocouple lead at the thermocouple.
- The maximum length of each thermocouple lead is 30 m (98').
- Without shielding, a thermocouple lead should not be exposed for more than 5 cm (2").

6 Wiring of the Device



Then connect the thermocouples to the TempScan20 via the supplied mating receptacle DEUTSCH® DRC16-40S as follows:



1. First slide the supplied protective cap for the thermocouple wiring harness loosely onto the thermocouple wiring harness.
2. Connect the thermocouples to the mating receptacle for thermocouples using the supplied contacts. If needed, a special crimping tool from MOTORTECH is available for this. Observe the assignment of the thermocouple connector at the TempScan20 (see illustration above) and be aware of the polarity. If necessary, you can remove accidentally inserted contacts with the supplied removal tool for contacts.
3. Close the unused openings of the mating plug with one of the supplied sealing plugs by inserting the sealing plug up to the head into the respective opening.
4. Slide the protective cap onto the mating receptacle.
5. Ensure that the power supply to the TempScan20 is disconnected.
6. Insert the mating receptacle into the thermocouple connector on the TempScan20 and screw it tight.
 - ▶ The thermocouples are connected to the TempScan20.

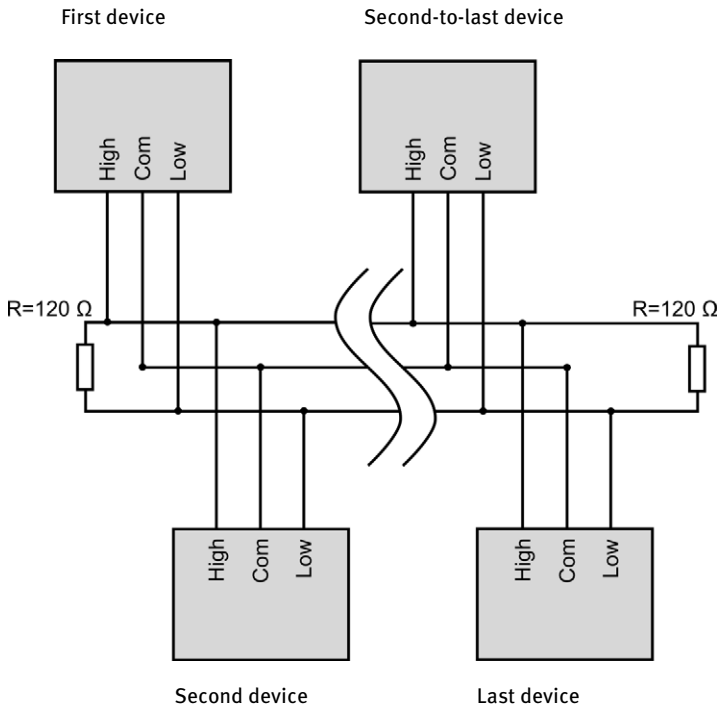
6 Wiring of the Device

6.2 CAN Bus Wiring

General Information on CAN Bus Wiring

The wiring of the CAN bus requires three conductors (CAN Hi, CAN Lo and CAN Com). The conductors for CAN Hi and CAN Lo must be twisted wires. At a bit rate of 250 kbit/s, the bus may only have a maximum wire length of 250 m (820') and must be terminated at both ends by a terminating resistor of 120 Ω between the CAN Hi and CAN Lo conductors to prevent reflections.

The diagram shows an example of the wiring for four devices:





CAN bus wiring

Note the following when connecting the CAN bus:

- Each bus end must be fitted with a terminating resistor of 120 Ω (see drawing).
- The maximum wire length depends on the bit rate:

Bit rate	Maximum wire 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')

- Only use cables that are specified by the manufacturer for use in the CAN bus.

The TempScanzo is delivered with a bit rate set to 250 kbit/s.

Shielding and Grounding

Use a shielded CAN bus cable. The CAN bus shield is usually grounded via the PowerView3. Further information on this can be found in the PowerView3 operating manual.

Settings on the Devices

All connected devices are designated as nodes on the CAN bus. Each node is identified by a CANopen[®]-node ID. These node numbers must be indicated both in the connected devices as well as in the configuration of the PowerView3. Refer to the operating manuals of the respective devices for instructions on how to set the node ID for each device and to determine if further settings must be made to communicate via the CAN bus.

A node ID can only be assigned once within a CAN bus and must be a number between 1 and 127. Note that some devices use several node numbers. The node numbers must be assigned in the configuration after start-up of the PowerView3.

6 Wiring of the Device



Overview of the CAN bus

Setting up the CAN field bus requires the following settings:

- Activate CAN interface on the devices if applicable.
- Assign unique CANopen®-node IDs to the devices.
- Set bit rate of all devices to 250 kbit/s.



CANopen® protocol

If you require information on the CANopen® protocol, contact your MOTOR-TECH contact person.

6.3 Connection to Power Supply and CAN Bus



Use in potentially explosive atmospheres!

For use in a potentially explosive atmosphere, it is essential that you observe the information in section *Use in Potentially Explosive Atmospheres* on page 12.



Operational safety!

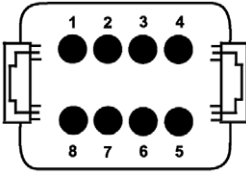
The proper functioning of the device is only guaranteed if the device is operated within the permissible supply voltage range. Therefore, use a power supply in accordance with the specifications in the operating manual.



Grounding of the CAN bus shield

The CAN bus shield is usually grounded via the PowerView3. For further information, refer to the PowerView3 operating manual.

6 Wiring of the Device



Pin	Assignment	Pin	Assignment
1	L+ (BATT +)	5	CAN/RS232 Shield (SHIELD)
2	CAN Hi (CAN-H)	6	RS232 GND (RS-232 GND)
3	CAN Lo (CAN-L)	7	RS232 TX (RS-232 TXD)
4	L- (BATT -)	8	RS232 RX (RS-232 RXD)

The TempScan20 is connected to the power supply and the CAN bus via the supplied mating plug for power supply/CAN bus DEUTSCH® DTo6-o8SA. For the connection to the power supply, use a cable with a conductor cross-section of at least 0.5 mm² and a maximum length of 10 m (32').

Make the connection as follows:

1. First slide the supplied protective cap for the power supply/CAN bus harness loosely onto the shared power supply/CAN bus harness.
2. Connect the power supply and the CAN bus to the mating plug using the supplied contacts. If needed, also connect the CAN bus shield (e.g. when the CAN bus shield is not to be grounded via the PowerView3). A special crimping tool is available from MOTORTECH for connecting the wires. Observe the assignment of the power supply and CAN bus connector at the TempScan20 (see illustration above). Connect CAN Com to *CAN/RS232 Shield*.
3. Secure the contacts in the mating plug with the supplied wedge lock.
4. Close the unused openings of the mating plug with one of the supplied sealing plugs by inserting the sealing plug up to the head into the respective opening.
5. Slide the protective cap onto the mating receptacle.
6. Make sure that the thermocouples are connected (see section *Connecting Thermocouples* on page 26).
7. Plug the mating plug into the power supply and CAN bus connector of the TempScan20.
 - ▶ The TempScan20 is connected to the CAN bus and the power supply.
 - ▶ The TempScan20 starts automatically after establishing the power supply.

7 Settings in the PowerView3



Enabled access control in PowerView3

If the access control is enabled in the PowerView3, certain functions are only available to you from a certain access level and you will be prompted to enter the corresponding PIN when you select these functions. For more information on the access control, refer to the PowerView3 operating manual.

In order to use the TempScan20, you have to configure it with the PowerView3 from MOTORTECH. For this purpose, the PowerView3 must be connected to the TempScan20 via the CAN bus. To configure the TempScan20, perform the following steps:

1. Make sure that the device type *TempScan20* is activated in the PowerView3. Further information on this can be found in the PowerView3 operating manual.
2. In the *Device Setup* view of the PowerView3, add the TempScan20 to the list of connected devices (see section *Adding a Device* on page 32).
3. If necessary, change the node ID and the bit rate at the TempScan20 via the PowerView3 (see section *Changing Node ID and Bit Rate* on page 33).
4. For each thermocouple, configure the corresponding channel in the PowerView3. If necessary, save the configuration in the TempScan20 permanently (see section *Configuring Channels* on page 35) or back up it on a storage device (see section *Working with Configurations* on page 40).
5. If necessary, make further settings for temperature monitoring of the connected thermocouples (see section *Measuring Temperatures* on page 38).
6. The TempScan20 is operated jointly with the HMI module PowerView3. Make sure that both devices can be operated with one another without interruption. Ensure an uninterrupted connection between the PowerView3 and the TempScan20 via the CAN bus.

7.1 Adding a Device

In the HMI module PowerView3 from MOTORTECH, add the TempScan20 to the connected devices as follows:

1. In the *Start Menu* of the PowerView3, open the *Device Setup* view via the *Devices* button. With activated access control in the PowerView3, you need at least the rights for the access level *Service* for this.
2. If you have not already done so, activate the device type *TempScan20* using the corresponding activation code. Further information on this can be found in the PowerView3 operating manual.
3. Use the *Add* button to add a TempScan20 with the respective node ID. The factory setting for the node ID on the TempScan20 is 80. Assign each node ID only once within the CAN bus. Up to three TempScan20 can be added to the PowerView3 device configuration.

7 Settings in the PowerView3



- ▶ The TempScan20 is added in the PowerView3.



Further information can be found in the PowerView3 operating manual.

7.2 Changing Node ID and Bit Rate



LSS commands: Disconnect all other devices from the CAN bus!

When sending LSS commands, all devices connected to the CAN bus are addressed. In order to change the bit rate or the node ID of the desired device only, no other devices may be connected to the PowerView3 via the CAN bus.



LSS commands: Use identical bit rates!

LSS commands can only be received from another device in the CAN bus if the LSS master (here: PowerView3) is set to the bit rate of the other device. If necessary, set the corresponding bit rate in the PowerView3 before sending the LSS command.

7 Settings in the PowerView3



MOTORTECH devices preset to 250 kbit/s

For communication via the CAN bus, it is mandatory that all connected devices use the same bit rate. MOTORTECH devices are usually delivered with a bit rate set to 250 kbit/s. Use this bit rate in the TempScan20 as well.

You can change the node ID and bit rate of the TempScan20 in the PowerView3 in the view *Communication Setup*. This view can be accessed from the PowerView3 *Start Menu* via the *Connection* button. In order to change the node ID and the bit rate with enabled access control in the PowerView3, you need the rights for the access level *Master*.

MOTORTECH® PowerView3 Communication Setup

PowerView3
Node ID: 66
Bit Rate:
 500 kbit/s 125 kbit/s
 250 kbit/s 100 kbit/s
Save Reset

LSS Commands
Node ID: 80
Bit Rate:
 500 kbit/s 125 kbit/s
 250 kbit/s 100 kbit/s
Send Command

Start
Back
Tooltip
Alert
Service
13:57

Changing Node ID

Change the node ID of the TempScan20 as follows:

1. Make sure that the current bit rate of the TempScan20 is set in the PowerView3. The factory setting for the bit rate in the TempScan20 is 250 kbit/s.
2. Make sure that there is only the TempScan20 connected to the PowerView3 via the CAN bus.
3. In the *LSS Commands* area, set the node ID that the TempScan20 is to be given.
4. Tap *Send Command*.
 - ▶ The node ID of the TempScan20 is changed.

7 Settings in the PowerView3



Changing Bit Rate

Change the bit rate of the TempScan20 as follows:

1. Make sure that the current bit rate of the TempScan20 is set in the PowerView3. The factory setting for the bit rate in the TempScan20 is 250 kbit/s.
2. Make sure that there is only the TempScan20 connected to the PowerView3 via the CAN bus.
3. Make sure that the current node ID of the TempScan20 is set in the *LSS Commands* area. Otherwise, the node ID is changed accordingly when the LSS command is sent. The factory setting for the node ID on the TempScan20 is 80.
4. Select the bit rate that the TempScan20 is to be given.
5. Tap *Send Command*.
 - ▶ The bit rate and the node ID of the TempScan20 are changed. Note that for further communication with the TempScan20 the same bit rate must be set in the PowerView3.

Further information can be found in the PowerView3 operating manual.

7.3 Configuring Channels



Operational safety!

The TempScan20 and HMI module PowerView3 are not designed for safety-critical applications. The CANopen® protocol and the binary inputs and outputs of the PowerView3 must not be used for safety-critical purposes.



Further configuration options



There are further configuration options for the TempScan20. These are described in the PowerView3 operating manual.

With the PowerView3, you configure the channels of the TempScan20. The views for individual configuration of each channel can be accessed as follows:

Start Menu -> TempScan20 -> Preferences -> Channels

7 Settings in the PowerView3

With enabled access control in the PowerView3, you need at least the rights for the access level *Service* to configure the channels and store the configuration in the TempScan20.



The  and  buttons allow you to switch between the channels.

Configuring Channels

Carry out the following steps for all channels which have a thermocouple connected to them:

1. Under *Status*, enable the channel for displaying measured values in the PowerView3.
2. Assign a *Tag* (max. five characters) and a *Name* (max. 20 characters) for each channel.
3. Under *Thermocouple*, set the thermocouple type connected to the TempScan20 channel.
4. For detecting over- and undertemperatures of the thermocouple connected to the channel, configure the upper shutdown threshold (*Shutdown High*), the upper warning threshold (*Warning High*) and the lower warning threshold (*Warning Low*):

With  and  in steps of 1 °C or 1 °F

With  and  in steps of 20 °C or 20 °F



Minimum separation of threshold values

The threshold values *Shutdown High*, *Warning High* and *Warning Low* must each be separated by at least 10 °C (18 °F).

The TempScan20 signals the exceedance of these thresholds via the CAN bus.

5. Under *Status*, activate the checkbox *Warning Output* if binary output 1 (Warning) is to be activated additionally for the displayed channel in case the temperature warning thresholds are not met.
6. Under *Status*, activate the checkbox *Error Output* if the binary output 2 (Error) is to be activated additionally for the displayed channel in case the temperature shutdown threshold is not met.
7. If needed, assign the channel to one or several groups under *Group*. For more information on configuring groups, refer to the PowerView3 operating manual.
 - ▶ The TempScan20 measures the temperature for all activated channels.
 - ▶ If the binary outputs are activated in the PowerView3, they will be switched when thresholds are exceeded or undershot.

Further information can be found in the PowerView3 operating manual.

Saving Configuration

In the *Preferences* view (accessible via *Start Menu* → *TempScan20* → *Preferences*), tap the *Store Setup* button to permanently save the following information in the TempScan20:

- Warning and shutdown thresholds
- Thermocouple types
- The information whether a channel is activated or deactivated.

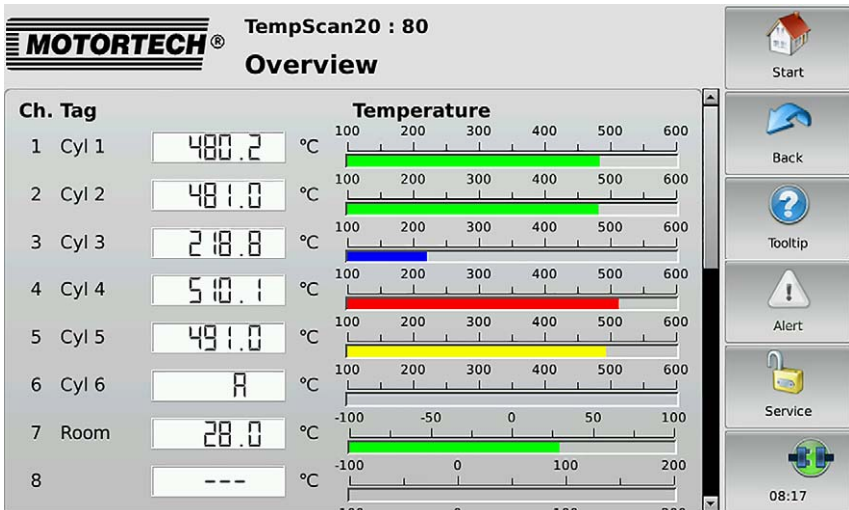
Otherwise, this information will be lost in the TempScan20 if the TempScan20 is switched off temporarily and is not connected to the PowerView3 when switching on.

7 Settings in the PowerView3

7.4 Measuring Temperatures

Measured temperatures are transmitted by the TempScan20 via the CAN bus. The PowerView3 from MOTORTECH additionally offers the following options:

- Visualization of measured temperatures (e. g. in the view *Overview*, accessible via *Start Menu* -> *TempScan20* -> *Overview*).



This view lists all the channels of the TempScan20:

- *Ch.*: channel number
- *Tag*: user-specified abbreviation
- Currently measured *Temperature* (A = thermocouple failed; --- = channel not activated)

The colors of the temperature displays have the following meaning:

- Green: The temperature is within the permitted range.
- Blue: The temperature has dropped below the lower warning threshold.
- Yellow: The upper warning threshold has been exceeded.
- Red: The upper shutdown threshold has been exceeded.
- Recording of measured temperatures
- Switching the binary outputs

Further information can be found in the PowerView3 operating manual.

■ 7 Settings in the PowerView3



Further Processing of Recorded Data on the PC

With the MOTORTECH Trend Viewer software, you can process data on your PC that has been recorded with the PowerView3. The software provides the following options:

- Visualization of data
- Export of data as CSV file
- Export of data as graphic file

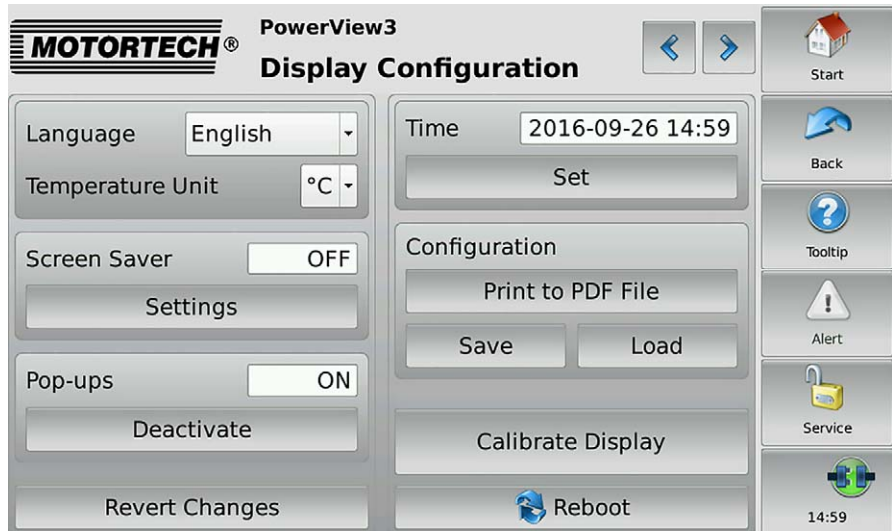
Further information can be found in the MOTORTECH Trend Viewer operating manual. The MOTORTECH Trend Viewer is included in the scope of supply of the PowerView3.

7 Settings in the PowerView3

7.5 Working with Configurations

You can back up the TempScan20 configuration of the PowerView3 on a storage device to restore it if required or to transfer it to another PowerView3.

To do this, call up the *Display Configuration* view from the PowerView3 *Start Menu* via the *Display* button:



With enabled access control in the PowerView3, you need at least rights for the access level *Operator* to save and load configurations. You have the following options in the *Configuration* area:

- **Save**
Save the configuration data of your PowerView3 as well as each connected TempScan20 to a USB flash drive or an SD card in XML files.
- **Load**
Load a configuration that is stored on a USB flash drive or on an SD card.

Further information can be found in the PowerView3 operating manual.

8.1 Start-up



Use in potentially explosive atmospheres!

For use in a potentially explosive atmosphere, it is essential that you observe the information in section *Use in Potentially Explosive Atmospheres* on page 12.

Before you start up the TempScan20, take note of the following:

1. Make sure that the device is installed correctly (see section *Installation* on page 24).
2. Make sure that the device is grounded (see section *Grounding* on page 25).
3. Make sure that the thermocouples are properly connected to the TempScan20 (see section *Connecting Thermocouples* on page 26).
4. Make sure that the TempScan20 is correctly wired and connected to the other devices and the PowerView3 via the CAN bus (see section *CAN Bus Wiring* on page 28). If necessary, make sure that the master control can receive and correctly interpret the CAN messages of the TempScan20.
5. Make sure that the TempScan20 is correctly configured via the PowerView3 (see section *Settings in the PowerView3* on page 32). When doing so, ensure that the correct thermocouple type is set for each channel.
6. The TempScan20 is operated jointly with the HMI module PowerView3. Make sure that both devices can be operated with one another without interruption. Especially ensure an uninterrupted connection between the PowerView3 and the TempScan20 via the CAN bus.


8.2 Shutdown

Shut down the device as follows:

1. Interrupt the power supply (see section *Connection to Power Supply and CAN Bus* on page 30).
 - ▶ The TempScan20 switches off automatically after interruption of the power supply.
2. Separate the device from CAN bus (see section *CAN Bus Wiring* on page 28).
 - ▶ The device is out of service.

8 Operation

8.3 Possible Faults

Fault	Possible cause	Possible solution
In the context menu <i>Add Device</i> of the PowerView3, the following symbol appears next to <i>TempScan20</i> :	The device type <i>Temp-Scan20</i> is not activated in the PowerView3.	Activate the device type <i>Temp-Scan20</i> in the PowerView3 (see PowerView3 operating manual).
		
The <i>TempScan20</i> button in the start menu of the PowerView3 has a purple frame and when you tap the button, the following message appears: "Device type not activated."	The device type <i>Temp-Scan20</i> is not activated in the PowerView3.	Activate the device type <i>Temp-Scan20</i> in the PowerView3 (see PowerView3 operating manual).
When you tap <i>TempScan20</i> in the PowerView3 <i>Start Menu</i> , you get the error message "Vendor ID or product code not valid."	The wiring of the CAN bus is defective.	Check the CAN bus wiring.
	The bit rate of the <i>Temp-Scan20</i> does not correspond to the bit rate of the PowerView3.	Change the bit rate of the <i>Temp-Scan20</i> (see section <i>Changing Node ID and Bit Rate</i> on page 33).
Measured values are incorrect.	The <i>TempScan20</i> has been assigned with the wrong node ID in the PowerView3 device configuration.	Set the correct node ID for your <i>TempScan20</i> in the PowerView3 (see PowerView3 operating manual).
	Wrong thermocouple type settings	Set the correct thermocouple type via the PowerView3 (see section <i>Configuring Channels</i> on page 35).
	The thermocouple is faulty.	Replace the thermocouple (see section <i>Connecting Thermocouples</i> on page 26).
A thermocouple does not display any measured values.	The thermocouple is not connected properly.	Connect the thermocouple correctly (see section <i>Connecting Thermocouples</i> on page 26).
	The relevant channel is not activated.	Activate the corresponding channels via the PowerView3 (see section <i>Configuring Channels</i> on page 35).
	The thermocouple is faulty.	Replace the thermocouple (see section <i>Connecting Thermocouples</i> on page 26).



Fault	Possible cause	Possible solution
	The thermocouple is not connected properly.	Connect the thermocouple correctly (see section <i>Connecting Thermocouples</i> on page 26).
A threshold value cannot be set to the desired temperature.	Threshold values are too close to each other.	Threshold values must differ by a minimum of 10 °C (18 °F).

8.4 Troubleshooting

In order to support the service personnel in troubleshooting, the views *Status* and *Reference Junction* are available for the TempScan20 in the PowerView3. These views can be accessed as follows in the PowerView3:

Start Menu -> TempScan20 -> Preferences -> Internal Status

With enabled access control in the PowerView3, you need at least the rights for the access level *Service* for this.

The  and  buttons allow you to switch between the views.

The views are described as follows.

8 Operation

Status

MOTORTECH® TempScan20 : 127
Status

Error React Delay [ms]	5000
Power Supply Measured [V]	800
ADC Filter Frequency [Hz]	50
Start in Operational Mode	0

Start
Back
Tooltip
Alert
Service
15:10

The following information is provided:

- [Error React Delay \[ms\]](#)
Time span after which the TempScan temperature module sends an error message if a warning or shutdown threshold is not met.
- [Power Supply Measured \[V\]](#)
The internal supply voltage varies depending on the external supply voltage of the PowerView3.
- [ADC Filter Frequency \[Hz\]](#)
Information on the filter frequency of the inputs of the TempScan temperature module.
- [Start in Operational Mode](#)
This entry must show the value 0 so that the TempScan temperature module does not start in operational mode and can be configured at any time via the PowerView3. If any other value occurs, contact MOTORTECH service.

Reference Junction

	Channels 1-10	Channels 11-20
Input Field Value [°C]	3163	32.20
Auto Correct on [bits]	3FF	3FF

The following information is provided:

- **Input Field Value [°C]**
In order to determine a temperature with thermocouples, you need a reference junction temperature. This entry provides information on the current temperature measured by the reference junction.
- **Auto Correct on [bits]**
The hexadecimal number *3FF* indicates that the reference junction temperature is used to determine the temperature with the thermocouples. If any other value occurs, contact MOTORTECH service.

8 Operation

8.5 Customer Service Information

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

Phone: +49 5141 93 99 0
Fax: +49 5141 93 99 99
Email: service@motortech.de

8.6 Returning Equipment for Repair/Inspection

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

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

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

MOTORTECH GmbH

Hogrevestr. 21–23
29223 Celle

Germany

Phone: +49 5141 93 99 0
Fax: +49 5141 93 99 98

www.motortech.de
motortech@motortech.de

MOTORTECH Americas, LLC

1400 Dealers Avenue, Suite A
New Orleans, LA 70123

USA

Phone: +1 504 355 4212
Fax: +1 504 355 4217

www.motortechamericas.com
info@motortechamericas.com

8.7 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.

■ 9 Maintenance



Please follow the following maintenance instructions:

- Do not use caustic liquids or steam cleaners for cleaning the device.
- Check the wiring at regular intervals.
- Check all plug-in connections for proper condition.

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