Heatable Sample Gas Lines

CGWB 13, TBL 01-S, TBL 01-C, TBL 01-E

Operator's Manual

42/23-24 EN Rev. 5

Contents

Preamble

Contents of this Operator's Manual

This Operator's Manual contains all information required to be able to install, put into operation and operate the heatable sample gas lines CGWB 13, TBL 01-S, TBL 01-C and TBL 01-E safely and as specified.

The Operator's Manual also contain information about the operation of the temperature controller type 703041. The complete Operator's Manual of the temperature controller is a constituent of the scope of supply and delivery.

Symbols and Typefaces in the Operator's Manual

WARNING denotes safety instructions which must be followed when handling the device, in order to prevent danger to user.

NOTE denotes information about particular features with regard to the handling of the device and the use of this Operator's Manual.

1, 2, 3, ... denotes the reference numbers in the figures.

Spare Parts

You can order spare parts via our service "Parts OnLine". You will find Parts OnLine on the Internet at "http://www.abb.com/partsonline".

Further Details on the Internet

You will find further details about the products and services of ABB Analyzer Technology on the Internet at "http://www.abb.com/analytical".

Further Information

If the information in this Operator's Manual does not cover a particular situation, ABB after sales service will be pleased to provide further information.

Please contact your local service representative. For emergencies, please contact

ABB Service,
Telephone: +49-(0)180-5-222580, Telefax: +49-(0)621-38193129031,
E-mail: automation.service@de.abb.com

Specified Use

Specified Use

The heatable sample gas lines of the types CGWB 13, TBL 01-S, TBL 01-C and TBL 01-E are used to prevent the formation of condensate when the sample gas is being fed from the gas sampling point to the gas analyzer.

Any other application is not compliant with the specified use.

Observation of this Operator’s Manual is also part of the specified use.

Safety Information

Requirements for Safe Operation

In order to operate in a safe and efficient manner the device should be properly handled and stored, correctly installed and set-up, properly operated and correctly maintained.

Personnel Qualifications

Only persons familiar with the installation, set-up, operation and maintenance of comparable devices and certified as being capable of such work should work on the device.

Special Information and Precautions

These include

- The content of this operator's manual,
- The safety information affixed to the device,
- The applicable safety precautions for installing and operating electrical devices,
- Safety precautions for working with gases, acids, condensates, etc.

National Regulations

The regulations, standards and guidelines cited in this operator's manual are applicable in the Federal Republic of Germany. The applicable national regulations should be followed when the device is used in other countries.

Device Safety and Safe Operation

The device is designed and tested in accordance with EN 61010 Part 1, "Safety Provisions for Electrical Measuring, Control, Regulation and Laboratory Instruments" and has been shipped ready for safe operation. To maintain this condition and to assure safe operation, read and follow the safety information in this manual. Failure to do so can put persons at risk and can lead to device damage as well as damage to other systems and devices.

Protective Lead Connection

The protective lead (ground) should be attached to the protective lead connector before any other connection is made.

Risks of a Disconnected Protective Lead

The device can be hazardous if the protective lead is interrupted inside or outside the device or if the protective lead is disconnected.

Risks Involved in Opening the Covers

Current-bearing components can be exposed when the covers or parts are removed, even if this can be done without tools. Current can be present at some connection points.

Risks Involved in Working with an Open Device

All work on a device that is open and connected to power should only be performed by trained personnel who are familiar with the risks involved.

When Safe Operation can no Longer be Assured

If it is apparent that safe operation is no longer possible, the device should be taken out of operation and secured against unauthorized use.

The possibility of safe operation is excluded:

- If the device is visibly damaged,
- If the device no longer operates,
- After prolonged storage under adverse conditions,
- After severe transport stresses.

Guide for the Installation

Basic Steps

NOTE
Please refer to the planning documents for the installation. Please also refer to the technical data (see chapter "Technical Data" on page 27).

Step	Action
1	Unpack the supplied parts (see section "Unpacking" on page 7).
2	If required, assemble or shorten the sample gas line (only types CGWB 13 and TBL 01-C, see section "Assembling or Shortening the Heatable Sample Gas Line" on page 8).
3	Install the heatable sample gas line (see section "Laying the Heatable Sample Gas Line Correctly" on page 13).
4	Carry out the electrical connection (see section "Requirements and Procedures for Electrical Connection" on page 17).

After you have carried out these steps, the sample gas line is operative.

CHAPTER 1

Assembly

Unpacking

Unpacking

Step	Action
1	Unpack the heatable sample gas line and the temperature controller.
2	Make sure that any accompanying accessories do not get lost.
3	Check the contents of the delivery to ensure that it is complete by comparing the actual goods with the dispatch note.

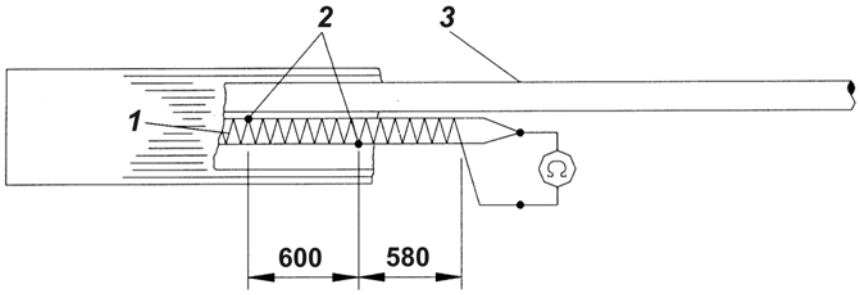
NOTE
Keep the packing material for possible future transport.
If damage has occurred during transport due to improper handling, please submit a damage report to the transport institution (railway company, post office, forwarding agency) within seven days.

Assembling or Shortening the Heatable Sample Gas Line

The heatable sample gas lines of the types CGWB 13 and TBL 01-C can be shortened.

Important Components of the Sample Gas Line

(Dimensions in mm)



1	Heating cable
2	Contact points with depressions
3	Process line

The contact points of the heating cable are approx. 580-600 mm apart.

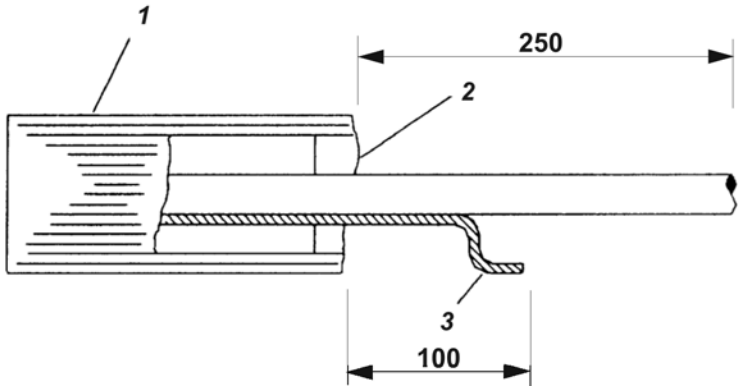
WARNING
Danger of failure of the heatable sample gas line!
Ensure that you carry out all the requisite assembly and shortening work as described in these instructions. The heating of the heatable sample gas line must work perfectly over the entire length. Otherwise there is a danger of all the downstream modules and devices being damaged by the formation of condensate.

General Rules for Assembly or Shortening

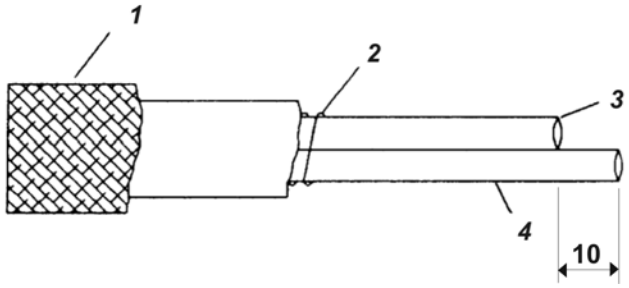
- Take note of the type of heatable sample gas line you are installing. Refer to the order for the type. In addition, please refer to the information in the specification sheet.
- The shortening set supplied with sample gas lines which can be shortened contains all the individual parts for quick and simple assembly or shortening.
- Both ends of the heatable sample gas line must be assembled for operation.
- The inner gas hose line must be longer than the surrounding sheathing after shortening.
- Small depressions in the heating cable mark the contact points of the hottest points in the cable. They are 600 mm apart in each case.
- You must separate and insulate the heating cable, so that the last contact point is not more than 100 mm from the end of the cable.
- If the last contact point is 600 mm away from the end of the cable in the worst case, the maximum heating power is no longer available over a cable length of approx. 500 mm.
- Reduce the sample gas line to the requisite length between the gas sampling point and gas analyzer or sample gas cooler by shortening and not by coiling on account of the danger of condensate being formed.
- Insulate the ends of the heating cables separately and do not connect them to each other.

Assembling or Shortening the Sample Gas Line CGWB 13

(Dimensions in mm)

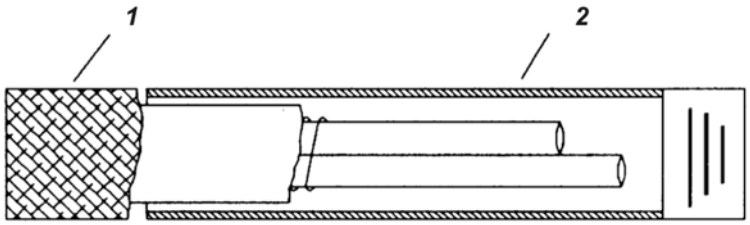
Step	Action
1	Cut back the sheathing of the sample gas line by approx. 250 mm Cut the heating cable, so that it projects approx. 100 mm and the last contact point is not more than 100 mm away from the end of the cable.
	NOTE Take note of the contact points in the heating cable and do not cut at a contact point. If necessary, cut the sample gas line to length by a further 250 mm.
	
	1 Sample gas line *2* Sealing compound *3* Heating cable
2	Push back the heat insulation and encapsulate the end of the sheathing with the silicone sealing compound "End sealant" from the shortening set.

3 Splice the heating cable and strip the end insulation of one of the two wires of the heating cable by 10 mm.



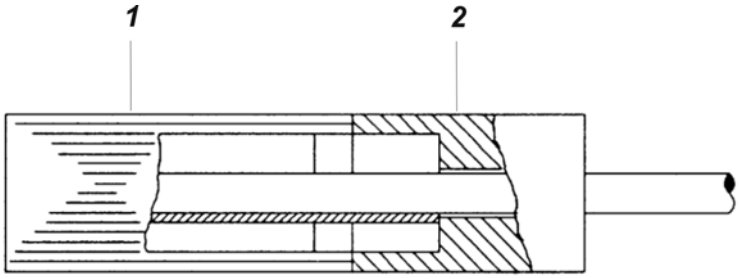
1	Heating cable with protective braiding
2	Resistance wire
3	Insulated copper conductor, strip 10 mm!
4	Insulated copper conductor

4 Insulate the cable ends with the enclosed shrink sleeve.



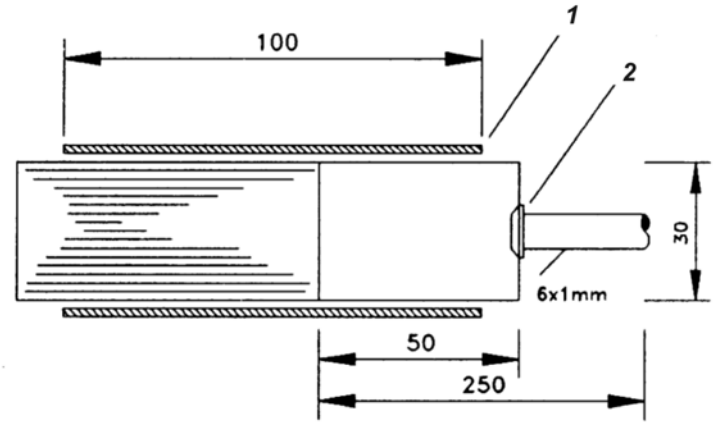
1	Heating cable with protective braiding
2	Shrink sleeve

5 Pass the end piece over the process line.



1	Sample gas line
2	End piece

6	Use a heat gun (maximum temperature 120 °C!) to fuse the end of the sample gas line and the end piece with the shrink sleeve.



1	Shrink sleeve
2	Sealing compound

NOTE
The maximum temperature of the heat gun may not exceed 120 °C, otherwise the shrink sleeve will be damaged!

7	Encapsulate the process line inlet with "End sealant".

Assemble or Shorten the Sample Gas Line TBL 01-C

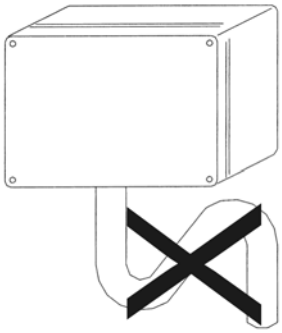
A shortening set is enclosed with the sample gas line TBL 01-C. Instructions for assembling and shortening the sample gas line are a constituent of the shortening set.

Laying the Heatable Sample Gas Line Correctly

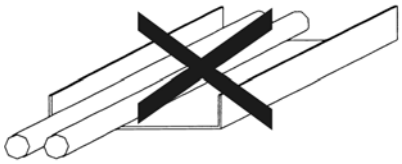
WARNING
Danger of overheating!
Follow all the instructions in this section. The heatable sample gas line may be damaged through overheating or it may malfunction if it is laid incorrectly.

Fundamentals for Laying the Sample Gas Line

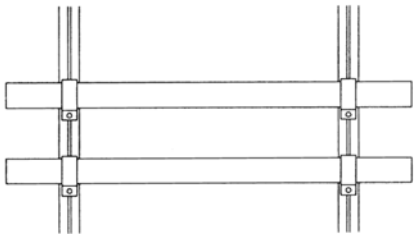
Do not lay the heated sample gas line in a thermowell.



When laying the sample gas line, avoid the formation of water locks, particularly at the sampling points.

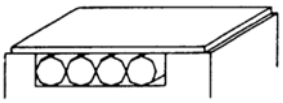
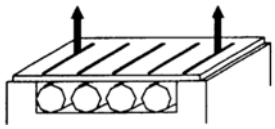
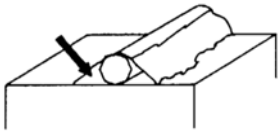
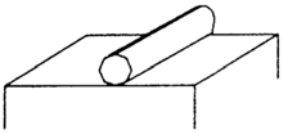
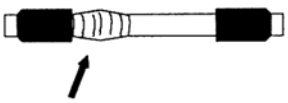
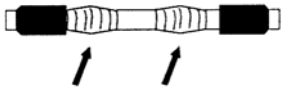
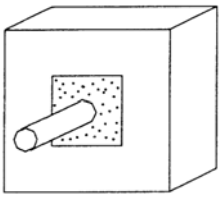
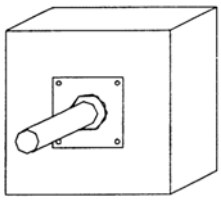


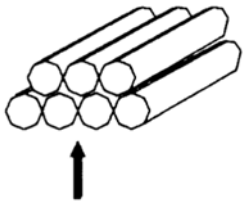
Do not lay the heated sample gas line in a cable tray together with other electrical or pneumatic lines, especially not in an enclosed cable tray.



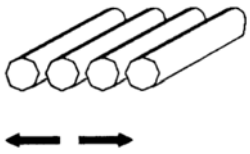
When laying the heated sample gas lines on exposed C-profiles with BBS cable clips:
Do not overtighten the cable clips, in order to prevent damage to the sample gas line through crushing.

Procedure for Laying the Sample Gas Line

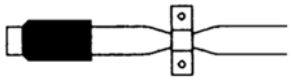
incorrect	correct
	
Do not lay the heatable sample gas lines directly side-by-side in an enclosed duct or shaft. This results in heat accumulation.	Ensure that the hoses do not touch. Maintain a distance of 25 mm. Provide adequate ventilation. Heat can be conducted away as a result.
	
Prevent powdery substances, adhesives or other thermally insulating materials from soiling the heated sample gas line. Otherwise, overheating will occur at these points.	If soiling occurs, clean the materials and remedy the cause. Heat can be conducted away again as a result.
	
Avoid heat accumulation through wrapping the heatable sample gas line with other materials, otherwise the sample gas line will overheat at these points. Do not cover the area near the temperature sensor, otherwise the rest of the sample gas line will cool down.	Do not wrap the sample gas line. Ensure that the area near the temperature sensor is exposed. This results in error-free temperature measurement.
	
Do not lay the heatable sample gas line in wall break-throughs which are subsequently sealed with a sealing compound under any circumstances. The sample gas line will be destroyed by overheating in this case!	When laying the heatable sample gas line through a wall break-through, use bulkhead plates with conduit thread cable glands, in order to provide adequate cooling of the sample gas line.



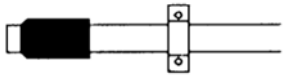
Avoid bundling or laying several heatable sample gas lines, so that they touch each other. This results in overheating at the contact points.



Lay several heatable sample gas lines separately with a distance of at least 2.5 cm and provide adequate ventilation. Heat can be conducted away as a result.



Do not squeeze the heat insulation in mounting brackets tightly together, so that the outer braiding is pressed on to the heat conductor. If you disregard this, damage to the protective braiding and the heatable sample gas line may occur.



Tighten the BBS cable clips sufficiently but not excessively, in order to prevent damage to the protective braiding and the heatable sample gas line.

Permissible Values for Laying the Sample Gas Line

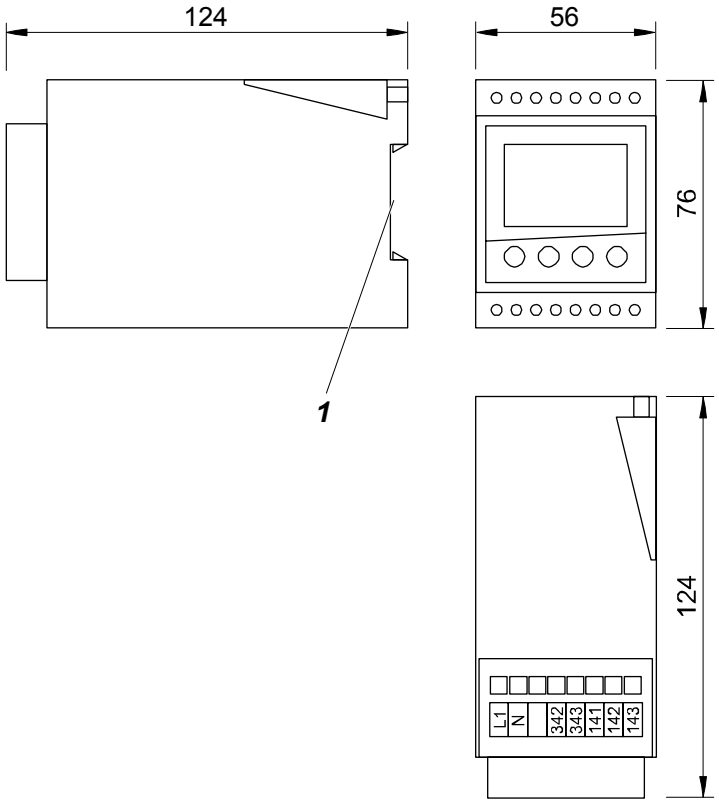
Comply with the following values when laying the heatable sample gas line:

Characteristic	Permissible value	
Maximum line length	Basic version	50 m
	Version with anti-frost heater	65 m
Minimum bending radius	Basic version	300 mm
	Version with anti-frost heater	300 mm
Maximum clip distance	With horizontal laying	1.2 m
	With vertical laying	3.5 m
Lowest laying temperature	-10 °C	
Temperature of the sheathing	max. 60 °C	

Assembly of the Temperature Controller

Design of the Temperature Controller Type 703041

(dimensions in mm)



1	Attachment for top-hat rail TS35

Installation of the Temperature Controller Type 703041

Step	Action
1	Install the temperature controller on the top-hat rail in the rail-mount housing.

CHAPTER 2

Electrical Installation

Requirements and Procedures for Electrical Connection

WARNING!
Please observe the relevant national safety regulations for the construction and operation of electrical installations as well as the following safety instructions.
Before connecting the power supply, check that the operating voltage on the rating plate is the same as the mains voltage.
The protective-conductor terminal must be connected to a protective conductor before any other connections are set up.
The device can be dangerous if the protective conductor is interrupted inside or outside the device or the protective-conductor terminal is disconnected.

WARNING!
You must be able to disconnect the device from the power supply! For this purpose, install a 2-pin mains isolator in the power supply line, since the device does not have its own power switch.

NOTE
Lay the signal lines separate from the power supply lines. Carefully plan the combination of signal lines in cables.

What material is required?

Select the required line material as per the planning documents.

Connect the Signal Lines

Step	Action
1	Unscrew the casing cover of the temperature controller.
2	Push the cable through the conduits into the casing.
3	Connect the signal lines to the terminals according to the connecting diagrams (see section "Electrical Connections for the Temperature Controller" on page 20).

Connect the Power Supply

Before connecting the device:

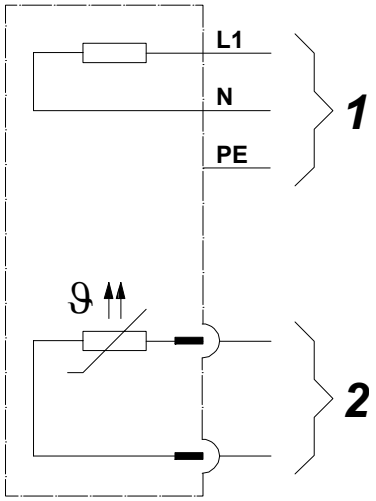
- Check that the operating voltage on the rating plate is the same as the mains voltage.
- Ensure that the power supply leads are adequately fuse-protected (miniature circuit-breakers).
- Install either a mains isolator in the power supply leads or a switchable socket near the device, thus making it possible to disconnect all poles of the device and the switching units from the power supply if necessary.

Connect the power supply as follows:

Step	Action
1	Connect the power supply leads to the terminals according to the connecting diagrams.
2	Put on the casing cover and screw it tight.
3	Connect the power supply leads to the power supply (see sections Electrical Connections of Sample Gas Lines on page 19 Electrical Connections for the Temperature Controller on page 20).

The heatable sample gas line can be put into operation after it has been connected to the power supply.

Electrical Connections of Sample Gas Lines

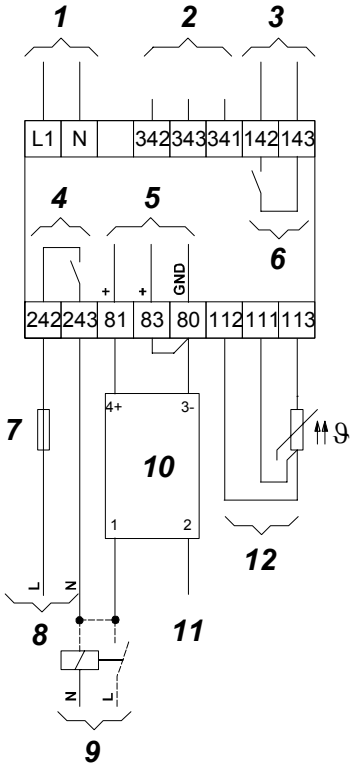


1	Connections for heating
2	Connections for temperature measurement

Electrical Connections for the Temperature Controller

NOTE
With loads > 2 A, use a coupling relay.

Connect the temperature controller type 703041 as shown in the following connection diagram:



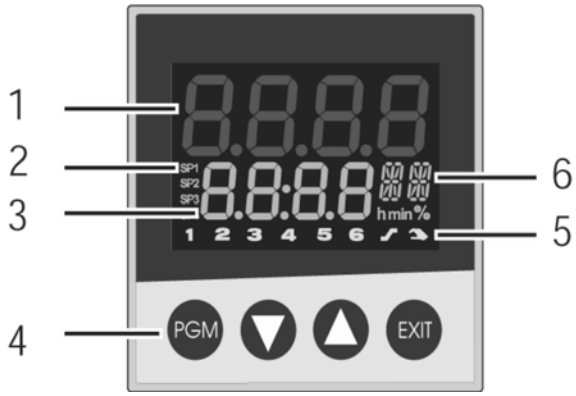
1	110...240 VAC, -15 / + 10%, 48...63 Hz
2	Unassigned connections 342, 343 and 341
3	Binary output 1
4	Alarm 2 limiter, max. 230 V / 3 A
5	0 / 12 V
6	Alarm 1 temperature, max. 230 V / 3 A
7	Fuse M2A
8	Binary output 2
9	Coupling relay, use for load current > 2 A
10	Solid state relay TYA 432-100/30
11	Load output
12	Resistance thermometer Pt100 DIN

CHAPTER 3

Operation of the Temperature Controller

Operator Panel of the Temperature Controller

Operator Panel of the Temperature Controller Type 703041



1	7-segment display, red, four-digit Decimal place configurable (automatic adjustment on exceeding the display capacity) Basic setting: actual value
2	Display of active set point, green Basic setting: SP1 Possible display values: SP1, SP2, SP3, SP4 (SP = set point)
3	7-segment display, green, four-digit Decimal place configurable, is also used for the user guidance display of parameter and level symbols Basic setting: set point
4	Function keys
5	Signaling, yellow Display of: ▪ Switch positions of binary outputs 1...6 ▪ Ramp/program function active ▪ Manual operation active
6	16-segment display + units, green, two-digit Display of: ▪ Unit °C/°F ▪ Characters for h, min and %

Operation of the Temperature Controller

WARNING
Danger of damage to the regulated device!
You may not make any changes to set points and limits which do not comply with the specified use of the regulated device.
Alterations to the preset set points may therefore only be carried out by trained technical personnel.

Existing Settings

The temperature controller type 703041 is configured in the factory for the temperature control application.

Changing Settings

WARNING
Electric shock!
You must disconnect the voltage for the current circuit, in which the electrical equipment is integrated, when putting the device out of service. Otherwise there is a danger of electric shock.

If the pre-set limits have to be changed for structural reasons, you must proceed as described in the following. We recommend that you also refer to the separately enclosed Operator's Manual of the controller.

Step	Action
1	Remove the controller from the rail-mount housing .
2	Remove the hardware bridge between terminals 80 and 83.
3	Remove the level locking, as described in the section "Level locking".
4	Make any requisite changes to set points as described in the section "Selection of a function": ▪ Operator level OPr ▪ Process data Proc ▪ Configuration level Conf ▪ Limit comparator LC ▪ Alter alarm thresholds AL AL1 = temperature alarm AL2 = thermal cut-out SP1 = set point 1 - service temperature
5	Complete the input as described in the section "Input values".
6	Reinsert the wire jumper between terminals 80 and 83.
7	Reinstall the controller in the rail-mount housing.

Level Concept for Operation

The operator functions and displays are divided into 3 levels.

Level	Description		
1	Standard display  The display is in the display mode.		
2	Selection level Here you can choose between: ▪ Operator level (Display: OPr) ▪ Parameter level (Display: PArA) ▪ Configuration level (Display: ConF)		
3	Operator level (Display: OPr) Choice between ▪ Process data (Display: Proc) ▪ User data: (Display: USEr) ▪ Program data: (Display: Pro)	Parameter level (Display: PArA) Choice between ▪ Set of parameters 1: (Display: PAr 1) ▪ Set of parameters 2: (Display: PAr 2)	Configuration level (Display: ConF) Choice between ▪ Analog inputs: (Display: InP) ▪ Controller: (Display: Cntr) ▪ Sensor: (Display: Pro) ▪ Limit comparators Display: LC) ▪ Outputs (Display: OutP) ▪ Binary functions (Display: bi nF) ▪ Display (Display: di SP) ▪ Timer (Display: tFct) ▪ Interfaces (Display: IntF)

Note: if you do not press a key in the operator panel within 30 seconds, the device automatically switches back to the standard display mode.

Selection of a Function

Step	Action	
1	You are	
	in the standard display:	in another display:
	Go to Step 2.	Press key EXIT for more than 2 seconds to go to the standard display:
2	Press key PGM to go to the selection level.	
3	Select the desired level with key ▲ or key ▼: OPr for the operator level PArA for the parameter level ConF for the configuration level	
4	Press key PGM to select one of these levels.	
5	Select the desired function in the following level with ▲ or key ▼.	

Level Locking

Access to the individual levels can be locked by inputting a code number. The following values can be selected via the function keys:

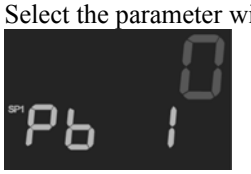
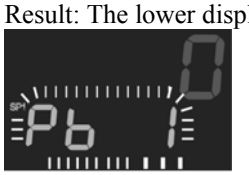
Code	Operator level	Parameter level	Configuration level
0	free	free	free
1	free	free	locked
2	free	locked	locked
3	locked	locked	locked

The preset default value for the code is "0".
You can select one of the other codes as follows:

Step	Action
1	To input the code, simultaneously press PGM and ▼ > 5 s.
2	Start the code change with PGM. Result: The display blinks.
3	Select the code with ▲ and ▼.
4	Return to the standard display with EXIT.

Input Values

The symbol for the parameter is shown in the bottom display during input.
Proceed as follows for the value input:

Step	Action
1	Select the parameter with ▲ or ▼. 
2	Change to the input mode with PGM. Result: The lower display blinks. 
3	Change the value with ▲ or ▼. The change is made dynamically through the length of the key press.
4	If you wish to apply the set value permanently: ▪ Press PGM or ▪ wait 2 s. If you do not wish to apply the value: ▪ Press EXIT.

CHAPTER 4

Technical Data

Heatable Sample Gas Line CGWB 13

	Line with frost protection	Self-regulating strip heater	Parallel strip heater, regulated
Outer covering	PVC	PVC	PVC
Sample gas hose	PTFE	PTFE	PTFE
Line end assembly	various options (see specification sheet)	various options (see specification sheet)	various options (see specification sheet)
Heating	self-regulating strip heater	self-regulating strip heater	CPD heating element, regulated
Power supply	230 V or 115 V, 50…60 Hz	230 V or 115 V, 50…60 Hz	230 V or 115 V, 50…60 Hz
Heating power	16 W/m	30 W/m	60 W/m
Current consumption	Making/hold current = 65/25 mA	0.15 A/m	0.3 A/m
Holding temperature	+20…+50 °C	+90…+110 °C	200 °C
Ambient temperature	–30…+60 °C	–30…+60 °C	–30…+60 °C
Outer diameter	30 mm	43 mm	40 mm
Sample gas hose	6 x 4 x 1 mm or 8 x 6 x 1 mm	6 x 4 x 1 mm or 8 x 6 x 1 mm	6 x 4 x 1 mm or 8 x 6 x 1 mm
Maximum line length	130 m	90 m	60 m
Line bushing	M42	M42	M42
Minimum bending radius	300 mm	300 mm	300 mm
Weight	approx. 1 kg/m	approx. 1 kg/m	approx. 1 kg/m
Connecting cable for heating (permanently connected)	3 x 2.5 mm^2; length 5 m	3 x 2.5 mm^2; length 5 m	3 x 2.5 mm^2; length 5 m
Connecting cable for Pt100 (permanently connected)	–	–	LIYCI 2 x 0.14 mm^2; length 5 m

Heatable Sample Gas Lines TBL 01-S, TBL 01-C, TBL 01-E

	TBL 01-S **Self-regulating strip heater**	**TBL 01-S** **Fixed resistor heating conductor**
Outer covering	Polyamide corrugated tubing	Polyamide corrugated tubing
Sample gas hose	PTFE tube 6 x 4 x 1 mm or 8 x 6 x 1 mm	PTFE tube 6 x 4 x 1 mm or 8 x 6 x 1mm
Line end assembly	Probe: metal cap, analyzer: flange or hard caps on each side (pipe projecting 300 mm) or silicone caps on each side (probe: 6/4 VA connection, analysis: pipe projecting 300 mm	
Power supply	230 V or 115 V, 50…60 Hz	230 V or 115 V, 50…60 Hz
Heating power	30 W/m	90 W/m
Holding temperature	+90…+110 °C	200 °C
Ambient temperature	–30…+60 °C	–30…+60 °C
Outer diameter	43 mm	43 mm
Maximum line length	100 m	40 m
Line bushing	M48	M48
Minimum bending radius	200 mm	200 mm
Weight	approx. 1 kg/m	approx. 1 kg/m
Electrical connection for heater and Pt100	permanently connected, 3 x 2.5 mm^2, length 5 m	permanently connected, 3 x 2.5 mm^2 or 2 x 0.14 mm^2, length 5 m

	TBL 01-C **Self-regulating heating conductor**	**TBL 01-E** **Fixed resistor heating conductor**
Outer covering	Metal corrugated tubing (for ACK) or Outer sheath of PVC (for ACMP)	Polyamide corrugated tubing
Sample gas hose	PTFE tube 6 x 4 x 1 mm	PTFE tube 6 x 4 x 1 mm or 8 x 6 x 1 mm
End assembly of tubing	Probe: metal cap - analyzer: silicone cap (mandatory for ACK) or with POM plastic caps on each side (mandatory for ACMP) or probe: PTFE cap - analyzer: POM cap (mandatory for ACMP 120 °C)	PA hard caps
Power supply	230 V or 115 V, 50…60 Hz	230 V or 115 V, 50…60 Hz
Heating power	30 W/m or 47 W/m	90 W/m
Holding temperature	100 °C or 120 °C	200 °C
Ambient temperature	–30 … +60 °C	–30 … +60 °C
Outer diameter	43 mm	43 mm
Maximum line length	70 m	40 m
Line bushing	M48	M48
Minimum bending radius	200 mm	200 mm
Weight	approx. 1 kg/m	approx. 1 kg/m
Electrical connection for heater and Pt100 100	permanently connected, 3 x 2.5 mm^2 or 2 x 0.14 mm^2, length 5 m	permanently connected, 3 x 2.5 mm^2 or 2 x 0.14 mm^2, length 5 m

CHAPTER 5

Putting out of Service and Packing

Putting out of Service

WARNING
Electric shock!
You must disconnect the voltage for the current circuit, in which the electrical equipment is integrated, when putting the device out of service. Otherwise there is a danger of electric shock.

Putting the Heatable Sample Gas Line out of Service

Step	Action
1	Disconnect the power supply to the sample gas pump.
2	Disconnect the power supply to the heated sample gas line.
3	For toxic or highly corrosive gases: Purge the sample gas line with instrument air (dry, oil and grease-free) or dry nitrogen.

Packing for Return

Packing the Sample Gas Line

1. If the original packing material is no longer available, wrap the device in bubble foil or corrugated cardboard. When shipping overseas, also heat-seal the device air-tight in 0.2 mm thick polyethylene, including a desiccant (e.g. silica gel). The amount of desiccant used should be adequate for the package volume and the probable shipping time (at least 3 months).
2. Pack the device in an adequately large box lined with shock absorbent material (e.g. foam material). The thickness of the cushioning material should be adequate for the weight of the device and the mode of shipping. The box should also be lined with a double layer of bitumen paper for overseas shipping.
3. Mark the box "Fragile! Handle with care!".

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