



# **Operating Instructions**

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# 1 About this manual

# 1.1 Validity

This operating manual is for customers of Pfeiffer Vacuum. It describes the functioning of the designated product and provides the most important information for safe use of the unit. The description follows applicable EU guidelines. All information provided in this operating manual refers to the current state of the product's development. The documentation remains valid as long as the customer does not make any changes to the product.

Up-to-date operating instructions can also be downloaded from www.pfeiffer-vacuum.com.

Backing pump relay boxes	Order number
Relay box, shielded, for backing pumps, 1-phase 7A for TC 110 and TCP 350, M8	PM 071 282 -X
Relay box, shielded, for backing pumps, 1-phase 20 A for TC 110 and TCP 350, M8	PM 071 283 -X
Relay box, shielded, for backing pumps, 1-phase 7 A for TC 400/ 1200, TM 700 and TCP 350, M12	PM 071 284 -X
Relay box, shielded, for backing pumps, 1-phase 20 A for TC 400/ 1200, TM 700 and TCP 350, M12	PM 071 285 -X

# 1.2 Conventions

## Safety instructions

The safety instructions in Pfeiffer Vacuum operating instructions are the result of risk evaluations and hazard analyses and are oriented on international certification standards as specified by UL, CSA, ANSI Z-535, SEMI S1, ISO 3864 and DIN 4844. In this document, the following hazard levels and information are considered:

# DANGER

## Imminent danger

Indicates an imminent hazardous situation that will result in death or serious injury.

## WARNING

Possibly imminent danger

Indicates an imminent hazardous situation that can result in death or serious injury.

## CAUTION

#### Possibly imminent danger

Indicates an imminent hazardous situation that can result in minor or moderate injury.

## NOTICE

#### Command or note

Command to perform an action or information about properties, the disregarding of which may result in damage to the product.

Pictographs		Prohibition of an action or activity in connection with a source of danger, the disregarding of which may result in serious accidents
	$\overline{\mathbf{A}}$	Warning of a displayed source of danger in connection with operation of the unit or equipment
		Command to perform an action or task associated with a source of dan- ger, the disregarding of which may result in serious accidents
		Important information about the product or this document
Instructions in the text	→ Work instru	uction: here you have to do something.
Symbols used	<ul> <li>Fore-vac</li> <li>Vacuum f</li> <li>Exhaust f</li> <li>Electric c</li> </ul>	uum flange flange flange onnection
Abbreviations used	TC: TM: TCP:	Electronic drive unit for turbopump Electronic drive unit and magnetic bearing controller for turbopump Electronic drive unit for turbopump, external with power supply

# 2 Safety

# 2.1 Safety precautions



## Duty to inform

Each person involved in the installation or operation of the unit must read and observe the safety-related parts of these operating instuctions.

The operator is obligated to make operating personnel aware of dangers originating from the unit or the entire system.

- Observe all safety and accident prevention regulations.
- Regularly check the proper observance off all safety measures.
- Do not loosen any plug connection during operations.
- Keep leads and cables well away from hot surfaces (> 70 °C).
- The unit has been accredited with protection class IP 65. Take necessary measures when installing into ambient conditions, which afford other protection classes.
- Always ensure a safe connection to the protective earthing conductor (PE, protection class I).
- Before carrying out any work disconnect the unit and all associated installations safely from the mains.

# 2.2 Proper use



## NOTICE

## **EC** conformity

The manufacturer's declaration of conformity becomes invalid if the operator modifies the original product or installs additional components.

- Following installation into a plant and before commissioning, the operator must check the entire system for compliance with the valid EU directives and reassess it accordingly.
- The relay box may only be used to control vacuum backing pumps on Pfeiffer Vacuum turbopumps with related electronic drive units.
- The relay box may only be used up to the specified maximum contact load.
- Permissible electronic drive units for the connection of the relay boxes:
  - integrated electronic drive unit TC 110 with connection cable
  - integrated electronic drive unit TC 110 with TCS 12
  - integrated electronic drive unit TC 400
  - integrated electronic drive unit TC 400 with Y-Connector
  - integrated electronic drive unit TM 700
  - integrated electronic drive unit TM 700 with Y-Connector
  - integrated electronic drive unit TC 1200
  - integrated electronic drive unit TC 1200 with Y-Connector
  - external electronic drive unit TCP 350 with adapter cable
- The shielded version supports the electromagnetic compatibility and reduces interaction with other electric devices.

# 2.3 Improper use

Improper use will cause all claims for liability and warranties to be forfeited. Improper use is defined as usage for purposes deviating from those mentioned above, especially:

- The connection of a mains power voltage not corresponding to the rating plate
- Operation with contact loads higher than the information on the rating plate

#### 3 **Product description**

To correctly identify the product when communicating with Pfeiffer Vacuum, always have the information from the rating plate available.

#### 3.1 Relay box, single phase, 7 A



Fig. 1: View of backing pump relay box, shielded, 7 A

1	Casing / relay box	6	Cable fitting M16
1a	Control cable	7	Cable fitting M12

The relay box PM 071 282 -X / PM 071 284 -X with semiconductor relay is provided especially for the intermittent operation on Pfeiffer Vacuum diaphragm vacuum pumps. The maximum relay contact load is 7 A.

#### 3.2 Relay box, single phase, 20 A





1	Casing / relay box	11	Cable fitting M16
1a	Control cable	12	Cable fitting M12

The relay box PM 071 283 -X / PM 071 285 -X with mechanical relay is provided for the operation of larger Pfeiffer Vacuum backing pumps. The maximum relay contact load is 20 A.

#### **Electrical connection** 4



## DANGER

## Voltage-bearing elements

Danger to life from electric shock as a result of improper installation.

- → Electrical connection may be carried out only by trained and authorised electricians.
- → Ensure the system is adequately earthed.
- → Establish an adequate fuse protection on customer side (depending on the model).
- → Unscrew and remove the cover of the relay box.
- → Pay attention to grounding cables!





1a

1h

- Cable fitting M12 7
- 9 Fuse
- Mains connection output, backing pump

Control lead for electronic drive unit

- Mains connection input 1c
- 3 Connection terminal
- Semiconductor relay 4

- Earthing cable 11 L/L1 Conductor (black)
- Ν Neutral (blue)
- ΡE Protective earth (yellow/green)
- → Install the power supply and the backing pump connection, according to their technical data to the terminals of the relay box.
  - L/L1: Conductor
  - N: Neutral
  - PE: Protective earth
- → Secure cables with cable fittings.
- → Close the relay box.



- PE: Protective earth
- → Secure cables with cable fittings.
- → Close the relay box.

# 5 Connection to the electronic drive unit

Relay box model and connection to a Pfeiffer Vacuum turbopump depends on the respective electronic drive unit and the applied backing pump.

#### Caption for the connection of the relay box to turbopump and backing pump

- 1 Backing pump relay box
- 1b Connection backing pump

1a Control lead

1c Mains input connection

5.1 TC 110



- → Connect the control lead of the relay box to the electronic drive unit via a connection cable (e.g. PM 061 351 -T) or via TCS 12.
- → Make the settings and control via the interfaces of the electronic drive unit.

# 5.2 TC 400 / TM 700



- → Connect the control lead of the relay box directly to a vacant accessory port of the electronic drive unit or using an Y-Connector.
- → Make the settings and control via the interfaces of the electronic drive unit.

# 5.3 TC 1200



- → Connect the control lead of the relay box directly to a vacant accessory port of the electronic drive unit or using an Y-Connector.
- → Make the settings and control via the interfaces of the electronic drive unit.

# 5.4 TCP 350



- → Connect the control lead of the relay box to the "remote" connection of the electronic drive unit using an adapter cable.
- $\rightarrow$  Make the settings and control via the interfaces of the electronic drive unit.

# 6 Operation

→ Establish the mains supply for the relay box.

- Make sure the supply voltage for the backing pump is valid.
- Observe the rating plates!

# 6.1 Operation mode backing pump

Operation of a connected backing pump via the electronic drive unit depends on the backing pump type.

Operation mode [P:025]	recommended backing pump
"0" continous operation	all kinds of backing pumps
"1" Intermittend operation	diaphragm pumps only
"2" Delayed switching on	all kinds of backing pumps

→ Adjust the parameter [P:025] to the desired value.

Continous operation	With "pumping station on", the electronic drive unit sends a signal to the configured ac- cessory connection to switch on the backing pump. This signal can also be used for con- trolling a fore-vacuum safety valve.
Intermittend opera- tion (diaphragm pumps only)	Intermittend operation can extend the life expectancy of the membrane of a connected diaphragm pump. Either a diaphragm pump with built-in semiconductor relay or an inter- connected relay box with semiconductor relay is required for intermittend operation. The backing pump is switched on and off in dependence of the turbopump's power consump- tion. A relation to the supplied fore-vacuum pressure is derived from the power consump- tion. The switching off and switching on thresholds for the backing pump are adjustable. Fluctuations in the power consumption of idling turbopumps and type-dependent varying fore-vacuum pressures of the backing pumps require the switching thresholds to be set separately for the intermittend mode.
	Pfeiffer Vacuum recommends the intermittend mode between 5 and 10 hPa. A pressure gauge and a dosing valve are required to set the switching thresholds.
	<ul> <li>→ Switch on the vacuum system via the function "pumping station" and await the run-up.</li> <li>→ Generate a fore-vacuum pressure of 10 hPa by gas inlet via dosing valve.</li> <li>&gt; Dead and note the perspector [P:240]</li> </ul>
	<ul> <li>Adjust the switch on threshold backing pump via parameter [P:711] to the determined drive power for a fore-vacuum pressure of 10 hPa.</li> </ul>
	→ Reduce the fore-vacuum pressure to 5 hPa.
	→ Read and note the parameter [P:316].
	→ Adjust the switch off threshold backing pump via parameter [P:710] to the determined drive power for a fore-vacuum pressure of 5 hPa.
Delayed switching on	Switching on the turbopump and the backing pump at the same time can result in un- wanted gas flows. Depending on process or application requirements, the backing pump can be switched on with a delay. The switch-on delay depends on the rotation speed of the turbopump and is fixed in the electronic drive unit at 6 Hz.

The switch-on delay signal can also be used for switching a fore-vacuum safety valve.

# 7 Accessories

An overview about original Pfeiffer Vacuum accessories for the designated device can be found in the operating instructions of the respective vacuum pump.

# 8 Technical data

Parameter	Relay box, shielded, for backing pumps	Relay box, shielded, for backing pumps
Mains requirement: frequency (range)	50/60 Hz	50/60 Hz
Mains requirement: voltage (range)	100-240 (± 10 %) V AC	100-240 (± 10 %) V AC
Contact rating	7 A	20 A
Control voltage	24 V DC	24 V DC

# 8.1 Dimensions



Fig. 5: Dimensions of the relay boxes (7 A) and pattern of fixing holes



Fig. 6: Dimensions of the relay boxes (20 A) and pattern of fixing holes

# CE Declaration of conformity

We hereby declare that the product cited below satisfies all relevant provisions according to the following **EC directives**:

- Low Voltage 2006/95/EEC
- Electromagnetic Compatibility 2004/108/EC

PM 071 282 -X / PM 071 283 -X / PM 071 284 -X / PM 071 285 -X/ HiPace®

Harmonised standards and national standards and specifications which have been applied:

DIN EN 61000-3-2 : 2008 DIN EN 61000-3-3 : 2006 DIN EN 61010-1 : 2010 DIN EN 61326-1 : 2006 DIN EN 62061 : 2005

Signatures:

& Micone

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## A PASSION FOR PERFECTION



Vacuum solutions from a single source	Pfeiffer Vacuum stands for innovative and custom vacuum solutions worldwide, technological perfection, competent advice and reliable service.
Complete range of products	From a single component to complex systems: We are the only supplier of vacuum technology that provides a complete product portfolio.
Competence in theory and practice	Benefit from our know-how and our portfolio of training opportunities! We can support you with your plant layout and provide first-class on-site-service worldwide.

Are you looking for a perfect vacuum solution? Please contact us

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