

Preface

Purpose of the operating instructions

These operating instructions contain information based on the requirements for mechanical engineering documentation. This information relates to the place of use, transport, storage, mounting, use and maintenance.

These operating instructions are intended for:

- Users
- Commissioning engineers
- Maintenance personnel

Read especially the information in the chapter "Safety instructions" (Page 27).

You can find more information such as operating instructions, examples and reference information in the TIA Portal information system.

Basic knowledge required

General knowledge of automation technology and process communication is needed to understand the operating instructions. Knowledge of personal computers and the Microsoft operating systems is required to understand this manual.

Scope of the operating instructions

The operating instructions apply to the following HMI devices in conjunction with the WinCC software package:

Name	Type	Article number
SIMATIC HMI KP400 Comfort	4" Key Panel	6AV2124-1DC01-0AX0
SIMATIC HMI KTP400 Comfort	4" Touch/Key Panel	6AV2124-2DC01-0AX0
SIMATIC HMI KP700 Comfort	7" Key device	6AV2124-1GC01-0AX0
SIMATIC HMI TP700 Comfort	7" Touch Panel	6AV2124-0GC01-0AX0
SIMATIC HMI KP900 Comfort	9" Key Panel	6AV2124-1JC01-0AX0
SIMATIC HMI TP900 Comfort	9" Touch Panel	6AV2124-0JC01-0AX0
SIMATIC HMI KP1200 Comfort	12" Key Panel	6AV2124-1MC01-0AX0
SIMATIC HMI TP1200 Comfort	12" Touch Panel	6AV2124-0MC01-0AX0
SIMATIC HMI KP1500 Comfort	15" Key Panel	6AV2124-1QC02-0AX0, 6AV2124-1QC02-0AX1
SIMATIC HMI TP1500 Comfort	15" Touch Panel	6AV2124-0QC02-0AX0, 6AV2124-0QC02-0AX1
SIMATIC HMI TP1900 Comfort	19" Touch Panel	6AV2124-0UC02-0AX0, 6AV2124-0UC02-0AX1
SIMATIC HMI TP2200 Comfort	22" Touch Panel	6AV2124-0XC02-0AX0, 6AV2124-0XC02-0AX1

Naming conventions

Term	Applies to	
System	- System - Machining center - One or more machines	
Comfort HMI device HMI device Device	- KP400 Comfort - KTP400 Comfort - KP700 Comfort - TP700 Comfort - KP900 Comfort - TP900 Comfort - KP1200 Comfort - TP1200 Comfort	- KP1500 Comfort - TP1500 Comfort - TP1900 Comfort - TP2200 Comfort
Key model Key HMI device	- KP400 Comfort - KP700 Comfort - KP900 Comfort - KP1200 Comfort	KP1500 Comfort
Touch model Touch HMI device	- KTP400 Comfort - TP700 Comfort - TP900 Comfort - TP1200 Comfort	- TP1500 Comfort - TP1900 Comfort - TP2200 Comfort
Comfort V1 devices	- KP400 Comfort - KTP400 Comfort - KP700 Comfort, F-State <19 ² - TP700 Comfort, F-State <22 ² - KP900 Comfort, F-State <18 ² - TP900 Comfort, F-State <19 ² - KP1200 Comfort, F-State <20 ² - TP1200 Comfort, F-State <20 ²	- KP1500 Comfort, MLFB 6AV2124-1QC02-0AX0 - TP1500 Comfort, MLFB 6AV2124-0QC02-0AX0 - TP1900 Comfort, MLFB 6AV2124-0UC02-0AX0 - TP2200 Comfort, MLFB 6AV2124-0XC02-0AX0
Comfort V1.1 devices	- KP700 Comfort, F-State ≥19 ² - TP700 Comfort, F-State ≥22 ² - KP900 Comfort, F-State ≥18 ² - TP900 Comfort, F-State ≥19 ² - KP1200 Comfort, F-State ≥20 ² - TP1200 Comfort, F-State ≥20 ²	

8.5.2 Transport and short-term storage

The following information applies to a device that is transported in the original packaging and weather-proof packaging, and stored from some time.

The device was tested according to IEC 60721-3-2:2018 Class 2K11 with the following amendments and limitations:

Type of condition	Permitted range
Temperature	-20 ... 60 °C
Atmospheric pressure	1140 ... 660 hPa, corresponds to an elevation of -1000 to 3500 m
Relative humidity	10 ... 90 %
Pollutant concentration	In accordance with ANSI/ISA-71.04-2013 severity level G3

Note

If dewing has developed, wait until the HMI device has dried completely before switching it on.
Do not expose the HMI device to direct radiation from a heater.

8.5.3 Operating conditions

The following information applies to a device installed according to the specifications in these operating instructions.

The HMI device is designed for weatherproof and stationary operation according to IEC 60721-3-3.

The device was tested according to IEC 60721-3-3:2019 Class 3K22 with the following amendments and limitations:

Type of condition	Mounting position	Permitted range
Temperature, Mounting in landscape format	Vertical	0 ... 50 °C ¹
	Inclined, maximum inclination 35°	0 ... 40 °C
Temperature, Mounting in portrait format	Vertical	0 ... 40 °C
	Inclined, maximum inclination 35°	0 ... 35 °C
Atmospheric pressure ² , operation elevation	1140 ... 795 hPa, corresponds to an elevation of -1000 to 2000 m	
Relative humidity	From 10 ... 90%, no condensation at the rear of the device	
Pollutant concentration	According to ANSI/ISA-71.04-2013 severity level G3	

¹ TP1900 Comfort and TP2200 Comfort: 0 ... 45 °C

² No pressure difference is allowed inside and outside the enclosure / control cabinet

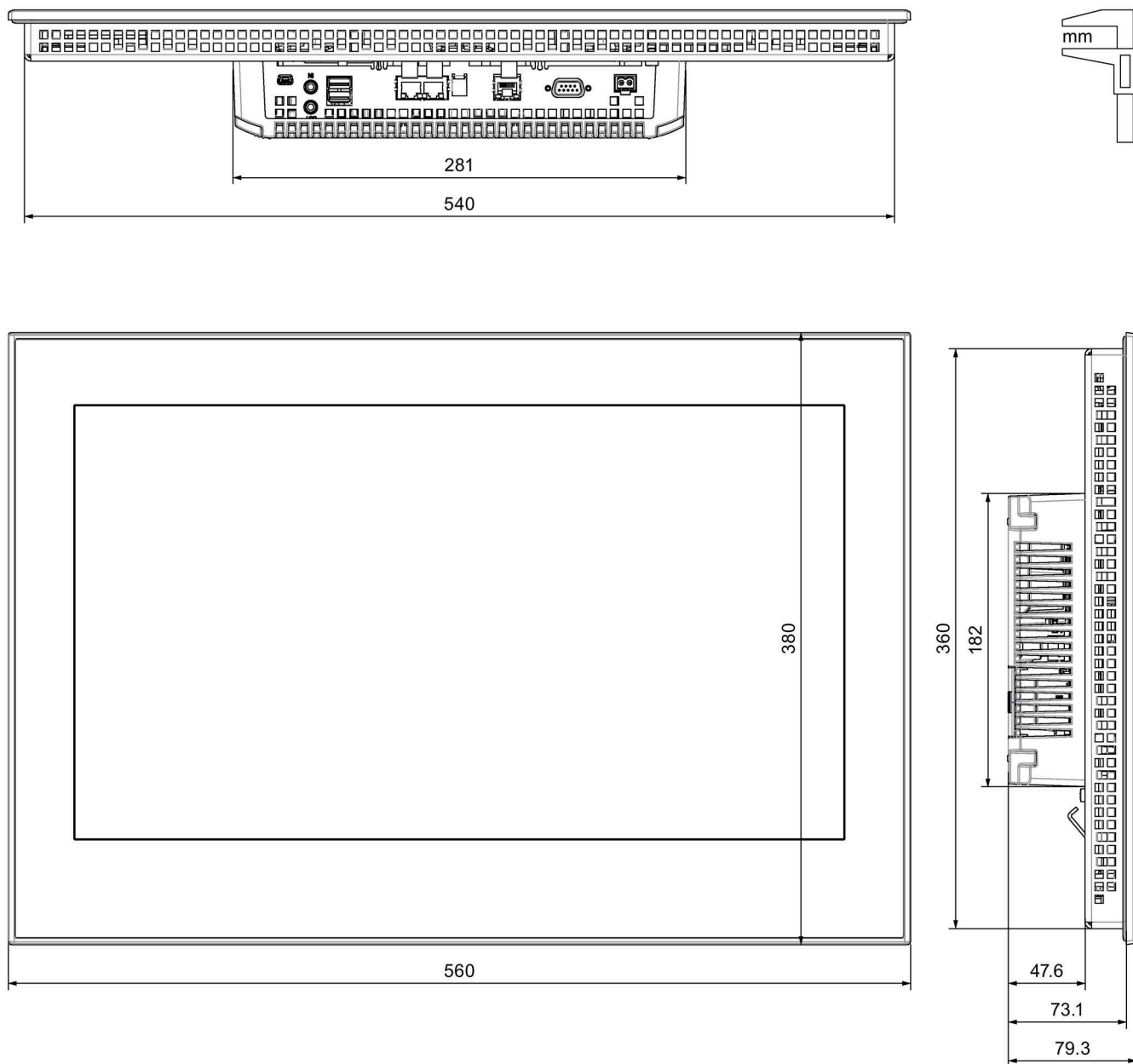
Read the Notes on use (Page 29).

Also observe the climate diagram in the following section and the specifications for the extended inclination and ambient temperature range; see section "Permitted mounting positions (Page 34)".

Note

The system components connected to the HMI device, the power supply for example, must also be suited to the respective operating conditions.

8.7.15 Dimension drawings of the TP2200 Comfort V1



Miscellaneous

Comfort HMI devices	KP400 Comfort	KTP400 Comfort	KP700 Comfort	TP700 Comfort	KP900 Comfort	TP900 Comfort	KP1200 Comfort	TP1200 Comfort
Buffered real-time clock ¹	Yes							
Audio reproduction	Onboard beeper		Integrated or external via Line OUT					

¹ Battery backup typically 6 weeks

8.8.2 KP1500 Comfort, TP1500 Comfort to TP2200 Comfort

Weight

Comfort V1 devices	KP1500 Comfort V1	TP1500 Comfort V1	TP1900 Comfort V1	TP2200 Comfort V1
Weight without packaging	5.4 kg	5.2 kg	6.5 kg	7.1 kg

Comfort V2 devices	KP1500 Comfort V2	TP1500 Comfort V2	TP1900 Comfort V2	TP2200 Comfort V2
Weight without packaging	4.7 kg	4.4 kg	5.6 kg	6.7 kg

Display

Comfort HMI devices	KP1500 Comfort	TP1500 Comfort	TP1900 Comfort	TP2200 Comfort
Type	LCD TFT with extended viewing angle		LCD TFT	LCD TFT with extended viewing angle
Active display area	15.4" 331.2 x 207.0 mm		18.5" 409.8 x 230.4 mm	21.5" 475.2 x 267.3 mm
Resolution	1280 x 800 pixels		1366 x 768 pixels	1920 x 1080 pixels
Possible colors	Up to 16 million			
Brightness control	Yes, from 0 to 100 ¹ , 0 = backlighting off			
Backlighting	LED		LED	LED
Half Brightness Life Time (MTBF ²)	80000 h		50000 h	30000 h
Pixel error class in accordance with ISO 9241-307	I			

¹ Via WinCC: Complete range, via Control Panel: Minimum to 100

² MTBF: Operating hours after which the maximum brightness is reduced by half compared to the original value. MTBF is increased by using the integrated dimming function, for example time-controlled via screen saver or centrally via PROFInergy.

Input device

Comfort HMI devices	KP1500 Comfort	TP1500 Comfort	TP1900 Comfort	TP2200 Comfort
Keyboard (numeric/alpha entry)	Yes		No	
Touch screen (analog resistive)	No		Yes	
Function keys	36		No	
Labeling strips	Yes		No	

Memory

Comfort HMI devices	KP1500 Comfort	TP1500 Comfort	TP1900 Comfort	TP2200 Comfort
Usable memory for application data		24 MB		
Usable memory for recipe data ¹		4 MB		
Additional memory for options		24 MB		
Data memory card ²		1 x MMC/SD combination slot		
System memory card ²		1 x SD slot		

¹ Can be extended via memory card

² Memory cards are available as SIMATIC HMI accessories

Interfaces

Comfort HMI devices	KP1500 Comfort	TP1500 Comfort	TP1900 Comfort	TP2200 Comfort
1 x RS 422/485 (PROFIBUS)		Max. 12 Mbps, applies to DP operations		
Ethernet (PROFINET)		2 x RJ45 10/100 Mbps ¹		
Ethernet (PROFINET basic functionality)		1 x RJ45 10/100/1000 Mbps		
Audio		Line Out		
USB 2.0		2 x Host ² 1 x Device ³		

¹ With integrated switch (one IP address only)

² USB type A, maximum load 500 mA, equivalent to USB standard 2.0

³ USB type Mini-B (5-pin); not with Comfort V2 devices; equivalent to USB standard 2.0

Power supply

Comfort V1 devices	KP1500 Comfort V1	TP1500 Comfort V1	TP1900 Comfort V1	TP2200 Comfort V1
Rated voltage	24 V DC			
Permitted voltage range	+19.2 V ... +28.8 V			
Mains and voltage buffering time	20 ms, corresponds to PS2 according to IEC 61131-2			
Rated current	1.5 A		1.3 A	2.2 A
Rated current (min. ... max.), load-dependent	1.5 ... 3.5 A		1.3 ... 3.7 A	2.2 ... 4 A
Inrush current I^2t	0.5 A ² s			
Power consumption ¹	36 W		32 W	53 W
Maximum permitted transients	35 V (500 ms)			
Minimum time between two transients	50 s			
Internal protection	Yes			

¹ The power loss generally corresponds to the specified value for power consumption.

Comfort V2 devices	KP1500 Comfort V2	TP1500 Comfort V2	TP1900 Comfort V2	TP2200 Comfort V2
Rated voltage	24 V DC			
Permitted voltage range	+19.2 V to +28.8 V			
Rated current	1.7 A		1.7 A	1.7 A
Rated current, load-dependent	1.45 ... 2.1 A		1.4 ... 2.1 A	1.5 ... 2.1 A
Inrush current I^2t	0.5 A ² s			
Power consumption ¹	41 W		41 W	41 W
Maximum permitted transients	35 V (500 ms)			
Minimum time between two transients	50 s			
Internal protection	Yes			

¹ The power loss generally corresponds to the specified value for power consumption.

Miscellaneous

Comfort HMI devices	KP1500 Comfort	TP1500 Comfort	TP1900 Comfort	TP2200 Comfort
Buffered real-time clock ¹	Yes			
Audio reproduction	Integrated or external via Line OUT			

¹ Battery backup typically 6 weeks

Inputs	Outputs
5 bytes	5 bytes

	7	6	5	4	3	2	1	0	Byte
Keys	F8	F7	F6	F5	F4	F3	F2	F1	n+0
	F16	F15	F14	F13	F12	F11	F10	F9	n+1
	F24	F23	F22	F21	F20	F19	F18	F17	n+2
	F32	F31	F30	F29	F28	F27	F26	F25	n+3
					F36	F35	F34	F33	n+4

LED							
7	6	5	4	3	2	1	0
F8	F7	F6	F5	F4	F3	F2	F1
F16	F15	F14	F13	F12	F11	F10	F9
F24	F23	F22	F21	F20	F19	F18	F17
F32	F31	F30	F29	F28	F27	F26	F25
				F36	F35	F34	F33

Inputs	Outputs
5 bytes	--

Direct key assignment									
	7	6	5	4	3	2	1	0	Byte
Touch buttons	7	6	5	4	3	2	1	0	n+0
	15	14	13	12	11	10	9	8	n+1
	23	22	21	20	19	18	17	16	n+2
	31	30	29	28	27	26	25	24	n+3
	39	38	37	36	35	34	33	32	n+4

LED

No output area

8.11 Communication with controllers

Number of connections

Connection	KP400 Comfort KTP400 Comfort	KP700 Comfort to KP1500 Comfort TP700 Comfort to TP2200 Comfort
Number using a bus connection	4	8
Number of connections based on "SIMATIC HMI HTTP Protocol"	4	8

Note

Communication faults with PROFINET IO

If you enable PROFINET services in the Control Panel of the HMI device, communication problems can occur if you use controllers from other manufacturers.

Controllers that are not compatible with PROFINET services are noted in the following table in the footnote. Do not enable PROFINET services for these controllers.

Controllers

The table below shows the controllers and the communication drivers which can be used with the HMI devices.

Controller	HMI devices
SIMATIC S7-1500	Yes
SIMATIC S7-1200	Yes
SIMATIC S7-300/400	Yes
SIMATIC S7-200	Yes
SIMATIC HTTP protocol	Yes
LOGO!	Yes
Allen-Bradley EtherNet/IP	Yes
Allen-Bradley DF1	Yes ^{1,2}
Mitsubishi MC TCP/IP	Yes
Mitsubishi FX	Yes ²
Modicon Modbus TCP/IP	Yes
Modicon Modbus RTU	Yes ²
Omron Hostlink	Yes ²

¹ Direct communication with PLC 5 with the KF2 module, otherwise only released via the optional RS422-RS232 converter, article number 6AV6 671-8XE00-0AX0.

² PROFINET IO must be disabled.

8.12 Scope of functions with WinCC

The tables below show the objects which can be integrated in a project for an HMI device.

Note

The specified values are maximum values of the individual objects. Simultaneous use of multiple objects with their maximum value can lead to problems in the active project.

Alarms

Object	Specification	HMI devices		
		KP400 Comfort KTP400 Comfort	KP700 Comfort to KP1200 Comfort, TP700 Comfort to TP1200 Comfort	KP1500 Comfort, TP1500 Comfort to TP2200 Comfort
Alarms	Number of discrete alarms	2000	4000	6000
	Number of analog alarms	50	200	
	Alarm length	80 characters		
	Number of tags / process values in an alarm	Max. 8		
	Number of alarm classes	32		
	Display	Alarm window, alarm view		
	Acknowledge error alarm individually	Yes		
	Edit alarm	Yes		
	Alarm indicator	Yes		
ALARM_S	Display S7 alarms	Yes		
Message buffer with retentivity ¹	Alarm buffer capacity	256	1024	
	Simultaneously queued alarm events	64	500	
	View alarm	Yes		
	Delete alarm buffer	Yes		
	Print alarms line by line	Yes		

¹ As of WinCC V15.1 retentivity can be deactivated.

Note

Read the notes on using the internal memory

If too many alarms are written to the alarm buffer in short time intervals, the life of the internal memory and thus the service life of the HMI device will be reduced.

When configuring alarms, read the notes on the internal memory in the section "Memory concept (Page 63)".

Tags, values and lists

Object	Specification	HMI devices		
		KP400 Comfort KTP400 Comfort	KP700 Comfort to KP1200 Comfort, TP700 Comfort to TP1200 Comfort	KP1500 Comfort, TP1500 Comfort to TP2200 Comfort
Tags	Quantity	1024	2048	4096
Limit value monitoring	Input/output	Yes		
Linear scaling	Input/output	Yes		
Text lists	Quantity	300	500 ¹	
Graphics lists	Quantity	100	500 ¹	

¹ The maximum total of text and graphics lists is 500.

Screens

Object	Specification	HMI devices		
		KP400 Comfort KTP400 Comfort	KP700 Comfort to KP1200 Comfort, TP700 Comfort to TP1200 Comfort	KP1500 Comfort, TP1500 Comfort to TP2200 Comfort
Screens	Quantity	500		750
	Objects per screen	50	400	600
	Tags per screen	50	400	400
	Complex objects per screen (for example, bars)	5	20	40
	Template	Yes		

Recipes

Object	Specification	HMI devices		
		KP400 Comfort KTP400 Comfort	KP700 Comfort to KP1200 Comfort, TP700 Comfort to TP1200 Comfort	KP1500 Comfort, TP1500 Comfort to TP2200 Comfort
Recipes	Quantity	100	300	500
	Data records per recipe	200	500	1000
	Entries per data record	200	1000	2000
	Recipe memory	512 KB	2 MB	4 MB
	Storage location ¹	- Memory card (MMC/SD) - USB storage medium - Network drive		

¹ The number of recipe data records may be restricted by the capacity of the storage medium.

Logs

Note

The HMI devices are suitable for the logging of relatively small volumes of data.

Manage the data in several adjacent logs in a segmented circular log. The use of a large circular log has a negative effect on performance.

Object	Specification	HMI devices		
		KP400 Comfort KTP400 Comfort	KP700 Comfort to KP1200 Comfort, TP700 Comfort to TP1200 Comfort	KP1500 Comfort, TP1500 Comfort to TP2200 Comfort
Logs	Number of logs	10	50	
	Number of partial logs in a segmented circular log	400		
	Entries per log ¹	10000	20000	50000
	Filing format	CSV with ANSI character set, RDB, TXT		
	Storage location	• Memory card • USB storage medium • Network drive		

¹ The number of entries in the log may be restricted by the capacity of the storage medium.

Read the notes on using logs in the section "Memory concept (Page 63)".

Safety

Object	Specification	HMI devices		
		KP400 Comfort KTP400 Comfort	KP700 Comfort to KP1200 Comfort, TP700 Comfort to TP1200 Comfort	KP1500 Comfort, TP1500 Comfort to TP2200 Comfort
User view	Number of user groups	50		
	Number of users	50		
	Number of authorizations/ user permissions	32		

Infotexts

Object	Specification	HMI devices		
		KP400 Comfort KTP400 Comfort	KP700 Comfort to KP1200 Comfort, TP700 Comfort to TP1200 Comfort	KP1500 Comfort, TP1500 Comfort to TP2200 Comfort
Infotexts	Length (no. of characters)	500 (depending on font)		
	For alarms	Yes		
	For screens	Yes		
	For screen objects (e.g. I/O field, switch, button, invisible button)	Yes		

Additional functions

Object	Specification	HMI devices		
		KP400 Comfort KTP400 Comfort	KP700 Comfort to KP1200 Comfort, TP700 Comfort to TP1200 Comfort	KP1500 Comfort, TP1500 Comfort to TP2200 Comfort
Screen settings	Touch screen calibration ¹ Brightness setting	Yes Yes		
Language change	Number of languages per project	32		
VBScript	User-specific extension of the functionality	Yes		
	Number of scripts	50	100	200
Graphic objects	Vector and pixel graphics	Yes		
Trends	Quantity	50	300	400
Task planner	Number of tasks	10	48	
Text objects	Quantity	2500	40000	
Direct keys	PROFIBUS DP direct keys	Yes		
	PROFINET IO direct keys	Yes		

¹ For HMI devices with touch screen only