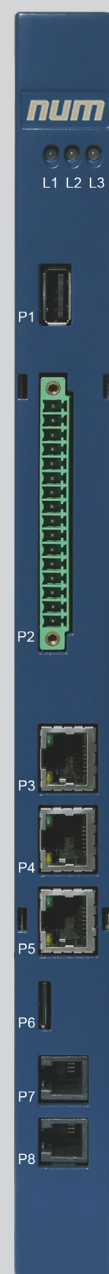


FlexiumPro

Installation manual

M00070EN-03

Edition 01.2026



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The programming examples described in this manual are intended for guidance only. They must be specially adapted before they can be used in programs with an industrial application, according to the automated system used and the safety levels required.

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1 Foreword

1.1 Use of the manual

This manual is for use by qualified personnel only.

To reduce the risk due to an improper use of the product, do not perform any servicing other than that contained in this manual unless you are qualified to do so.

To ensure proper use of these products, please always read this User's manual carefully and retain for future reference. Should the unit require maintenance, please contact a NUM authorized service center only.

This description is only intended for the use of trained specialists in control and automation technology who are familiar with the applicable national standards. It is essential that the following notes and explanations are followed when installing and commissioning these components.

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

1.1.1 Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development. For that reason the documentation is not in every case checked for consistency with performance data, standards or other characteristics.

In the event that it contains technical or editorial errors, we retain the right to make alterations at any time and without warning.

No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

1.2 Hazard and safety use instructions - Symbology use in the manual

Symbol	Meaning of the symbol
	The information " i " icon indicates notes on product use.
	The STOP icon indicates a wrong operation which may damage the product or indicates important notes on product use .
	The TRIANGLE icon indicates hazard for human beings and this information is referring to personal damage! Whenever one of these icons appear, please beware, use and apply adequate precautions to avoid hazards or damage situations during the drive installation and commissioning operations! Please beware! Prevent and safety instruction against accidental contact with electrical components.

1.3 Document revisions

Date	Index	Reason for revision	See chapter
01 - 2025	00	Document creation: FlexiumPro - Installation manual	-
03.2025	01	MP07 code description correction	5.2.1
07.2025	02	Add ordering code for Windows IoT Enterprise LTSC 2021	4.1.1 4.2.1 4.3.1 6.2.1
01.2026	03	Correction of digital and analog input/output connections	8.4

1.4 How to read the manual

This manual is structured and divided into 11 main sections as indicated here below. We suggest to follow these indicated manual sections.

1	Foreword This section introduces the use of the manual.
2	FlexiumPro CNC System This section introduces the FlexiumPro CNC System components with a short descriptions and general layout of the CNC System.
3	FlexiumPro RTK (Real Time Kernel) This section introduces the RTK description and characteristics, the general connectors layout and the led status signalling and the mounting instructions.
4	FlexiumPro Panels FS - Operators panels This section introduces the FS154i, FS184i, FS244i, FS122, FS153, FS184, FS194L, FS244 panels and USB QWERTY keyboard (Horizontal and Vertical external keyboard) description, characteristics, the general connectors layout, the mounting instructions.
5	FlexiumPro MP Panels - Machine panel This section introduces the MP06, MP07 and MP08 panel description, characteristics, the general connectors layout, the installing button labels procedure and the mounting instruction.
6	NUM Industrial Box PC This section introduces the NUM Industrial Box PC P1 G4A / Box PC P2 G4 description, characteristics, the general connectors layout and the mounting instructions.
7	Portable Handwheel HBA-X This section introduces the HBA-X description, characteristics.
8	FlexiumPro connections This section introduces all system connections of the Flexium components.
9	NUMSafe devices Due to certification requirements, the Safety components instructions are given in dedicated manuals. Please refer the manuals list in the chapter.
10	Available accessories This section introduces all the available accessories around Flexium (Cable, plugs, connector kit....)

1.5 NUM Agency

The list of NUM agencies is given on <http://www.num.com>

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2 FlexiumPro CNC System

2.1 FlexiumPro System

Available in three configurations: 6, 8 and 68, FlexiumPro is key element of NUM's high-end applications systems. The compact dimensions are the result of a design aimed at limiting energy requirements. The PLC, programmed according to IEC 61131-3, as well as the powerful and user friendly development environment provides efficient tools for development, commissioning and servicing of your machines.

FlexiumPro uses standardized interfaces such as Ethernet - real-time when required EtherCAT and / or CANopen for I/Os, as well as a dedicated and efficient digital bus DISC ET for connection to the servo drives.

The CNC units (RTK for Real Time Kernel) can be linked together in a global configuration, Integrating machine control panels, inputs and outputs, handwheels, positioning axes and more is easy, thanks to the versatility of the field bus interfaces.

For very specific requirements like particular coordinate conversion, FlexiumPro offers the machine manufacturer secure and real time access to the system interpolator's data; integration of CAD/CAM systems is also facilitated.

FlexiumPro is a complete, user-friendly and versatile range of CNC systems consisting of:

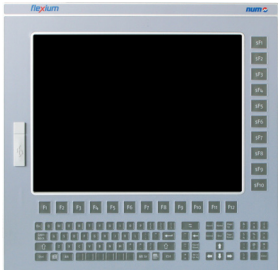
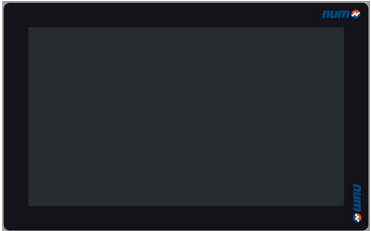
- CNC Kernel: FlexiumPro RTK
- Operator panels with integrated PC
- Human Machine Interface: FlexiumPro HMI
- PLC software
- Machine panel
- Remote inputs/outputs: NUM EtherCAT modules CTMxxx
- Servo drives: NUM DrivePro
- NUM Motors: various ranges.

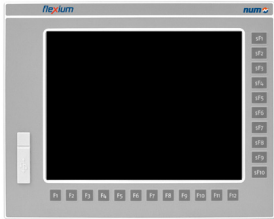
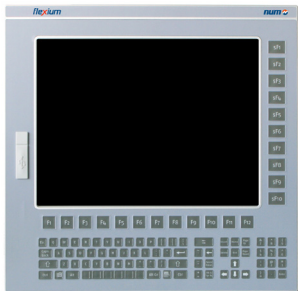
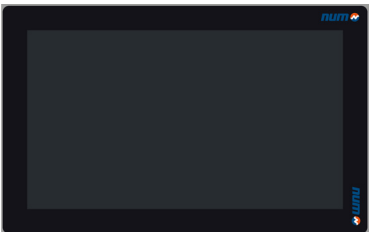


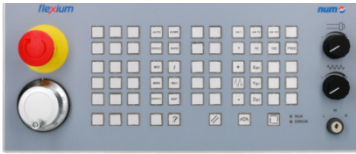
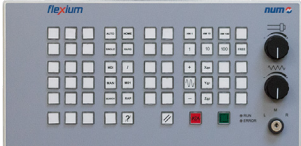
Please refer to NUM FlexiumPro Catalog for more detailed information upon the NUM CNC System configurations.

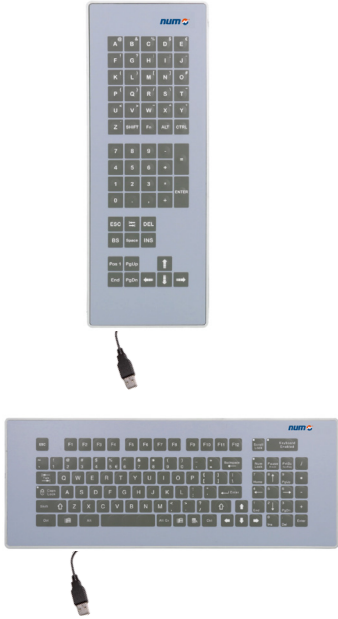
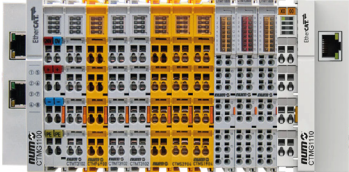
2.2 System components

FlexiumPro	
RTK 	FlexiumPro RTK is the heart of a system, with a Multicore ARM architecture and hard Real Time Operating System it Integrates a powerful PLC, IEC 61131-3 compliance, and the NUM NCK. By means of two EtherCAT ports, I/O terminals, Safe PLC and Safe I/Os and drives are connected. PLC application, part programs, machine configuration, calibrations, etc., are all safely saved on a removable µSD card and to secure shutdown processes, the NUM FlexiumPro RTK (Real Time Kernel) integrates a super-capacitor, which keeps the system alive for the time needed to save all data in the case of hard power off Interfaces: • 1 x PLC EtherCAT • 1 x NUM DrivePro bus connection • 1 x Company Network • 2 x analogue output • 2 x analogue input • 4 x fast input for probing • 4 x fast opt-isolated output • 1 x CANopen

Active panels (with integrated PC)	
FS154i P2 15" 	FS154i P2 15" panels provide the Human Machine interface and can provide the PLC function. FS153i and FS154i are similar in design. They all provide 22 function keys and are proposed with or without keyboard, with or without touch screen.
FS184i 18.5" 	FS184i 18.5" is a landscape oriented panel equipped with a multi touch capacitive feature. Therefore, it does not provide keyboard nor function keys. As the other PC panels it provides the HMI and can handle the PLC function. It is available with performance level P2.
FS244i 24" 	FS244i 24" is a portrait or landscape oriented panel equipped with a multi touch capacitive feature. Therefore, it does not provide keyboard nor function keys. As the other PC panels it provides the HMI and can handle the PLC function. It is available with performance level P2.

Passive panels (without integrated PC)	
FS122 12" 	FS122 12" panels designed for use with an external PC or NUM Industrial Box PC P1/P2 or for multi HMI systems. FS122 panels are available with and without touch screen. Both versions provide 22 function keys.
FS153 15" 	FS153 15" panels designed for use with an external PC or NUM Industrial Box PC P1/P2 or for multi HMI systems. FS153 panels provide 22 function keys and are available with or without Qwerty keyboard (dimension varies) and with or without touch screen.
FS184 18.5" 	FS184 is a 18.5" display, glass protected, fitted with a capacitive multi-touch screen system. Durable, modern front end for machine control.it features an IP65 degree of protection at the front, and IP20 at the rear. It can be landscape or portrait mounted.
FS244 24" 	FS244 is a 24" display, glass protected, fitted with a capacitive multi-touch screen system. Durable, modern front end for machine control.it features an IP65 degree of protection at the front, and IP20 at the rear. It can be landscape or portrait mounted.

Machine Panels	
MP06 	MP06 and MP08 interfaced on EtherCAT panel are used for control of manual movements, production initiation and intervention during machining. Four versions are available for MP06 and two version for MP08, with analog potentiometer or 25 positions selectors for axis and spindle overrides, with or without handwheel for MP06.
MP08 	These panels also includes on the back 12 digital inputs and 12 digital outputs. This configurable machine panel includes 63 keys with LEDs, 2 potentiometers or 2 selector switches (multi-switches), an emergency stop pushbutton ⁽¹⁾, a three position key-switch and an optional handwheel ⁽¹⁾. MP06 is designed fit with the FS153 / FS154 family. MP08 is designed fit with the FS122 family. (1) Not available on MP08.
MP07 	MP07 is identical to MP06 but designed to fit the FS184 panel. In addition to MP06 it provides an USB port (not wired) and the location for two additional push buttons.
Box PC P1 G4A - Box PC P2 G4	
	Industrial box PC are an alternative to FS154i / FS194i operator panels. Two performance levels P1 and P2 are available. The required PLC functions are handled by the external Box PC (with dedicated PLC) linked by Ethernet to the external PC.
Portable Handwheel HBA-X	
	The portable handwheel HBA-X for FlexiumPro provides a number of operation function like Axis selection, Hand mode and speed selection, movements forward/backward and speed override.

External keyboard	
USB QWERTY keyboard 	The external USB QWERTY keyboard are adapted to FS153 panels. The keyboard is available for horizontal or vertical mounting.
NUM EtherCAT terminal CTMG, CTMT 	The EtherCAT terminals are common I/O components based on EtherCAT technology. Each I/O group begins with a CTMG Gateway which receives the EtherCAT field bus and propagate the message to the different devices by means of internal E-bus. Up to 65535 devices can be connected with a distance between gateways of up to 100m. For more detailed informations on the NUM EtherCAT terminals please refer to NUM EtherCAT terminals CTMG and CTMT Operating manual M00032. For more detailed informations on the NUMSafe terminals please refer to chapter "9".
NUMSmartBackup 	The NUMSmartBackup system is an own developed tool to backup or restore all NUM BoxPC.or Flexium Panel with iPC. Please refer to chapter 10.1 for more detailed information.

2.3 FlexiumPro 6, FlexiumPro 8 and FlexiumPro 68 systems overview

2.3.1 FlexiumPro 6

- CNC with choice of kinematic structure: milling or turning.
- For CNC for up to 4 axes and 1 spindle.
- One CNC channel.
- Interpolates up to 4 axes simultaneously (more complex interpolations such as Spline or NURBS require FlexiumPro 8 or FlexiumPro 68).
- Options packages available: Milling: M0 or Turning: T.

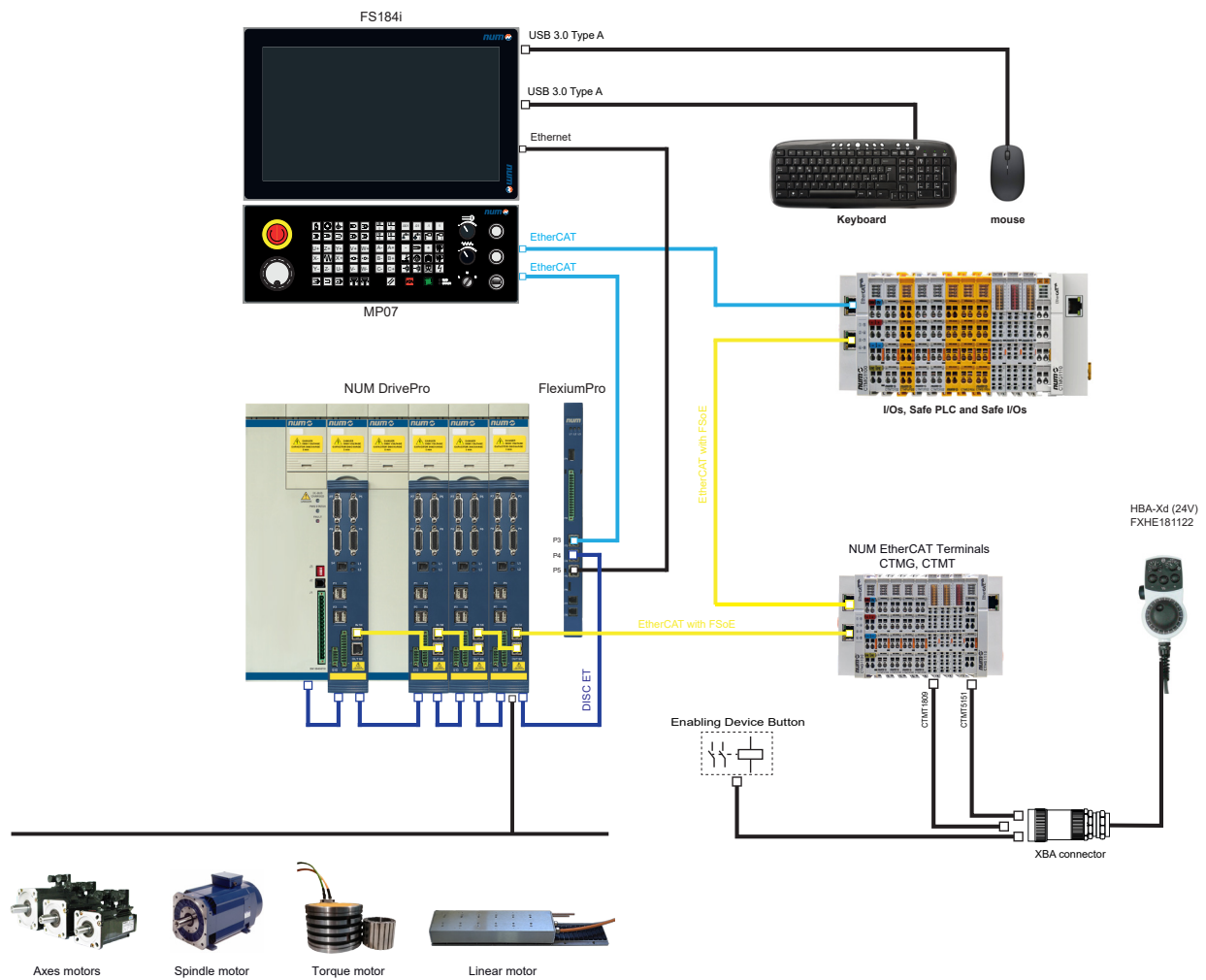
2.3.2 FlexiumPro 8

- For CNC for up to 5 axes or 4 axes and 1 spindle.
- One channel is standard, a second is optionnaly available.
- Interpolates up to 4 axes simultaneously.
- Various options and technology packages are available.

2.3.3 FlexiumPro 68 fully scalable system

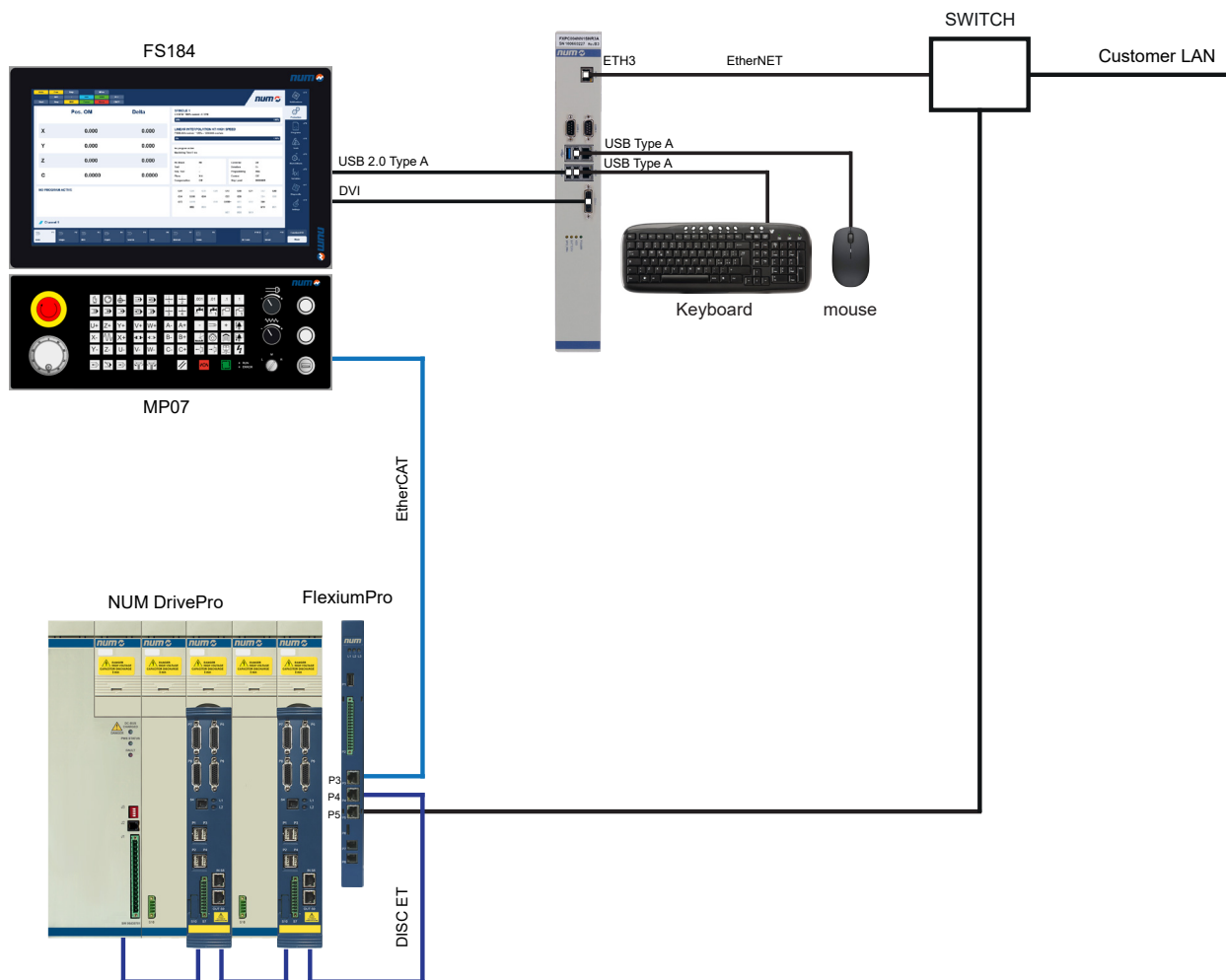
- CNC for 5 axes + spindles in standard version, up to 32 axes/spindles as an option.
- One channel is standard, 2, 4, 6 up to 32 channels as option.
- Interpolates 4 axes par channel as standard, up to 9 interpolated axes per channel as option (more complex interpolations such as Spline or NURBS available as options)
- All technology packages are available as options.

FlexiumPro systems application example



2.3.4 Configuration with Industrial PC

Industrial Box PC as PLC



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3 FlexiumPro RTK (Real Time Kernel)

FlexiumPro RTK is the heart of the system. It is based on a Multicore ARM architecture with hard Real Time Operating System and integrates all real time components: PLC (CODESYS V3) and CNC. By means of EtherCAT it can pilot up to 32 axes driven by NUM DrivePro servodrives.

A dedicated EtherCAT field bus is used for connecting I/O terminals and peripherals, Safe PLC and Safe I/Os (with Fail Safe over EtherCAT).

As alternative, CANopen field bus is also supported.

FlexiumPro RTK locally integrates analogue outputs and inputs, 4 fast digital inputs (for probing) and 4 x opto-isolated outputs.

Super capacitors, which keep the system alive, avoid losing data during hard power off cycles.

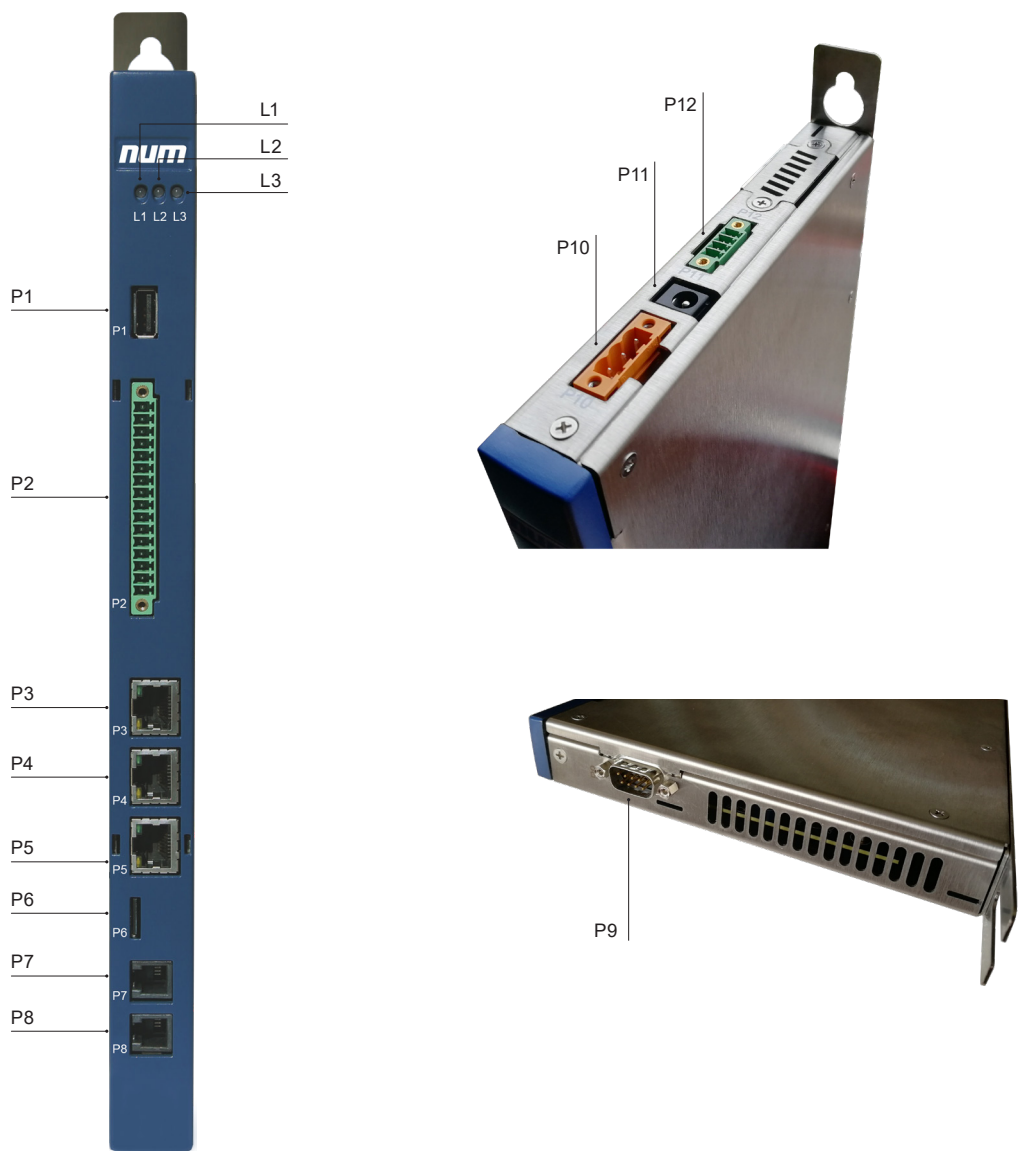
Some features such as handwheels management require a software option.



3.1 Characteristics

FlexiumPro RTK		
Power Supply (P10)	Rated voltage	24 VDC (-20% / +10%)
	Power consumption	10W (+ output load)
Analog Inputs	2 analog inputs available	
	Input impedance	20kΩ
	Resolution	-/+ 12 bits
	Input voltage range	-10V / +10V
Analog Outputs	2 analog outputs available	
	Minimum load	2kΩ
	Resolution	-/+ 12 bits
	Output voltage range	-10V / +10V
Digital Inputs (probing inputs)	4 digital input available	
	Rated voltage	24 VDC
	Voltage limits	0V to 30 V
	Maximum current	6mA per input
	Operating voltage ranges	- Low-level: < 5V (current < 6mA) - High-level: >18V <30 V (current < 6mA)
	Reverse voltage withstand	30 VDC permanent
	Response time	100μs
	Sampling period	≥ CNC-Cycle Time
	Logic	Positive (current sink)
	Protection	Complying with: IEC 62000-4-5, IEC 61000-4-4, IEC 61000-4-6
Digital Outputs	4 digital output available	
	Rated voltage	24 VDC (- 15% / + 20% external power supply)
	Voltage range	0V - 24Vdc (+20%)
	Rated current	500 mA per output
	Overload Protection for each output	internal
Ambient Conditions	Operating temperature range	0°C to 40°C
	Climatic conditions storage	-25°C to 70°C
	Relative humidity non condensing	max 75%
Protection Class		IP 20
Weight		1.2Kg
Dimensions	W x H x D	25 x 310 (365) x 160 mm

3.2 Module description



Connector	Description
L1, L2, L3	L1 = Power supply present, L2 = RTK Signaling, L3 = PLC Signaling
P1	2.0 Type A
P2	24 V I/O connector
P3	PLC Ethercat
P4	NUM DrivePro bus connection
P5	Company Network
P6	SD-Card
P7	RS-232 PLC Service Port
P8	RS-232 RTK Service Port
P9	CAN-Bus Connection
P10	24Vdc (-20% / +10%) Input
P11	Power supply Jack (optional) (+5Vdc 0% / +5% alternative to +24Vdc supply)
P12	Watchdog Relay

3.2.1 System configuration and options

The system configuration is stored on a dedicated component of the RTK. The configuration is delivered on a flash drive and must be stored during the initial startup. This operation is detailed in the FlexiumPro Commissioning manual M00071EN

3.2.2 LED status signalling

Three status LEDs are located on the front panel of the RTK. When powering up is complete, the green LED should be on steady. If other LEDs are lit, then there is an error in the system.

A LED can be OFF, ON or Blinking. There are several different possible LED blinking variants. They are described here below.



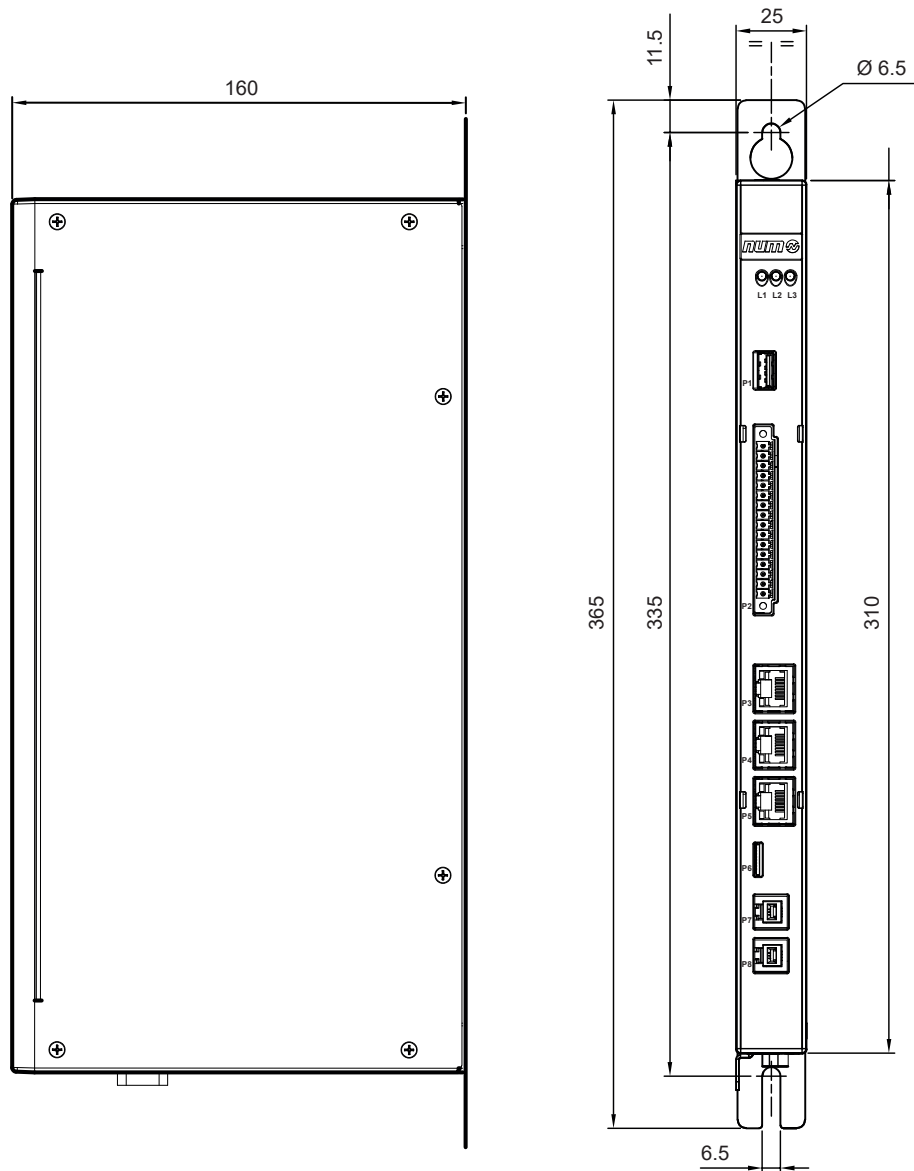
LEDs	Description
L1	Power supply and PLC wink
L2	RTK Signaling
L3	PLC Signaling

The different errors and their associated LED states are described in the table below.

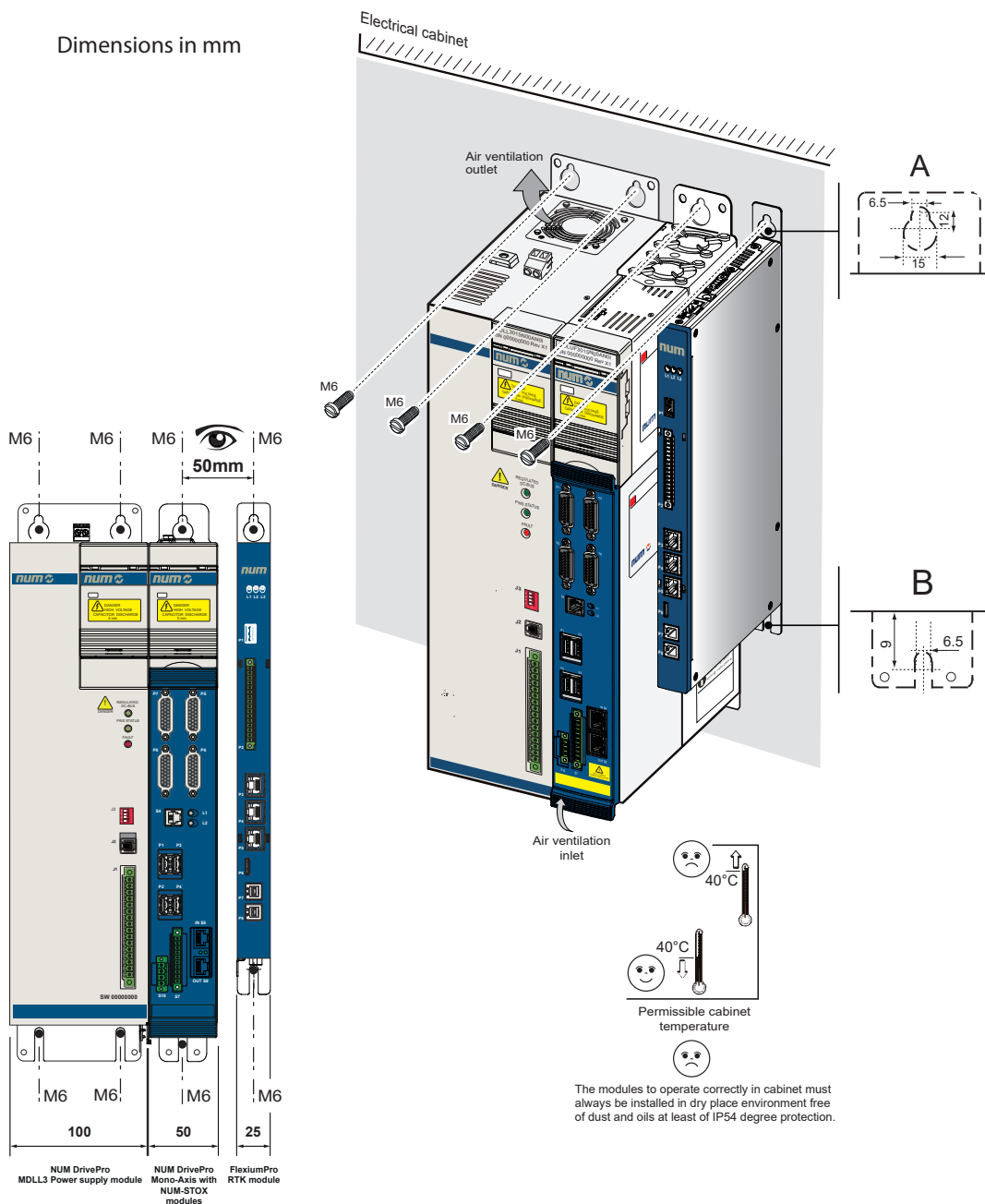
L1 POWER AND PLC WINK		
Green ON	Device is powered on and software is running.	
RGB pulse	Device has been winked by the Flexium Pro Tools network scanning tool.	
L2 CNC LED		
Green fast pulse	CNC running, communication with drives OK, communication with PLC OK.	
Red ON	Failure detected by the CN hardware monitoring / CN Watchdog expired.	
Orange pulse	CN in error with CNC_READY reset flag.	
L3 PLC LED		
Green slow double pulse	PLC running, application loaded	
Green slow pulse	PLC running, no application	
Green fast pulse	PLC running, application loaded, application running	
Red and green double pulse	PLC running, application loaded, application has an exception	

3.3 Overall dimensions

Dimensions in mm



3.4 Assembly RTK in electrical cabinet



The RTK and the other modules must be installed in the electrical cabinet using the fixing points as shown in the figure. They must always be mounted vertically. The RTK module must always be installed on the rightmost side of the drives unit.

To facilitate sufficient air circulation and ensure an adequate heat exchange in the system it is recommended that a minimum clearance of 100mm is left at top and bottom when installing the modules in the electrical cabinet. Do not cover the ventilation grilles with cables or anything else, this may cause the rise temperature inside the modules.

Please also refer to the M00027 manual Cabinet layout and EMC Guide for more detailed information.

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4 FlexiumPro Panels FS - Operators panels

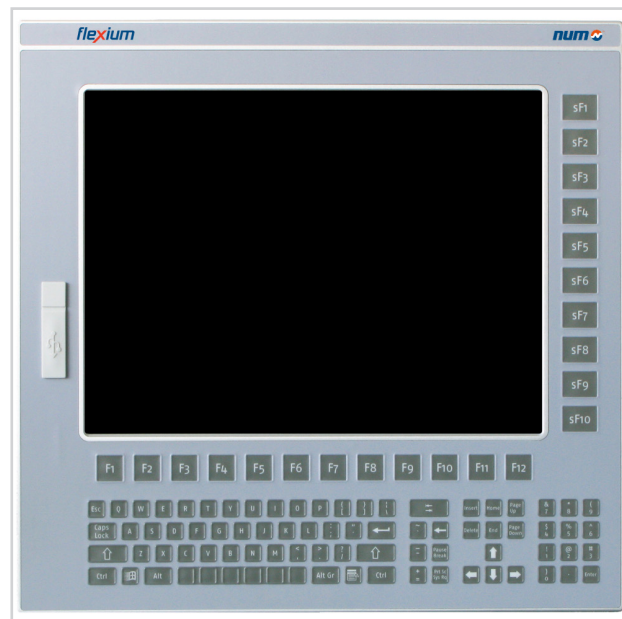
4.1 FS154i Operator panel with Integrated PC

FS154i PC panels provide a powerful and ergonomic platform for Flexium+ HMI, enabling you to interact with the machine in a simple and logical manner. The integrated PCs use modern dual-core processors.

Depending on the application, you can choose one of three physical user interfaces:

- With 22 large function keys (keyboard option F)
- With 22 large function keys and an expanded QWERTY keyboard (keyboard option Q).
- With Touch screen available as option.

The display quality of their 15.1" screen makes them very legible even in poorly-lit environments. Compact, they are also very rugged and sealed (IP 65) for compatibility with the most severe industrial environments.



Machine builders and end users are not allowed to install on this NUM industrial PC, software which performs "Desktop Functions" other than through, in support of, and operating as a part of, the Embedded Application. "Desktop Functions" means consumer or business tasks or processes performed by a computer or computing device. This includes email, word processing, spreadsheets, database, network/Internet browsing, scheduling, and personal finance. Desktop Functions may include features and functions derived from the MS Binaries or the Company Binaries.

4.1.1 Ordering code

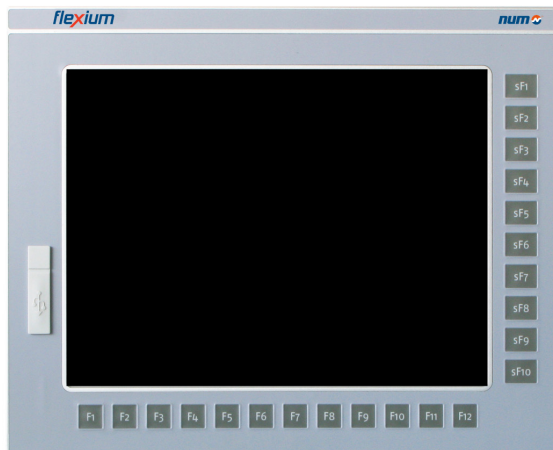
FS154i Version	Ordering Codes
FS154i-FK P2 SSD W10 2016	FXPC154NF2SNR20
FS154i-FK P2 SSD W10 2021	FXPC154NF2SNR40
FS154i-FQ P2 SSD W10 2016	FXPC154NQ2SNR20
FS154i-FQ P2 SSD W10 2021	FXPC154NQ2SNR40
FS154i-FK TS P2 SSD W10 2016	FXPC154RF2SNR20
FS154i-FK TS P2 SSD W10 2021	FXPC154RF2SNR40
FS154i-FQ TS P2 SSD W10 2016	FXPC154RQ2SNR20
FS154i-FQ TS P2 SSD W10 2021	FXPC154RQ2SNR40

	FXPC	15	4	N	F	2	S	N	R	2	0
Display Unit											
• LCD 15"		15									
Panel/Mechanical Variant											
• Fourth Generation			4								
Display Sensor											
• Touch screen resistive				R							
• No Sensor				N							
Keyboard Type											
• 22 Function keys					F						
• 22 Function keys + Qwerty Keyboard					Q						
IPC Mother Board, Processor											
• Performance level P2						2					
Mass Memory Type											
• SSD (Solid State Disc)							S				
Option Board											
• No								N			
Fixed Value									R		
Operating System											
• Windows 10 IoT Enterprise LTSC 2016 64 bits										2	
• Windows 10 IoT Enterprise LTSC 2021 64 bits										4	
Spare Number											0

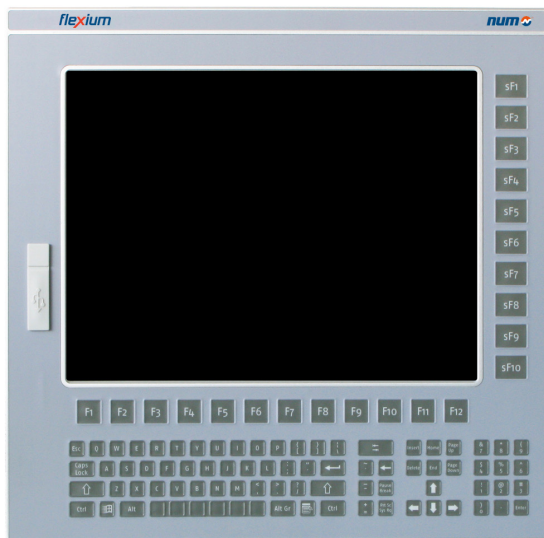
4.1.2 Characteristics

		FXPC154xx2SxR20, FXPC154xx2SxR40
Screen	User interface options	Active panel with integrated PC with: • 22 Function Keys • 22 Function Keys and Qwerty Keyboard • Touch Screen (resistive)
	Technology	15" TFT LCD (16.9 million colors)
	Resolution	1024 x 768 from 60Hz to 75Hz
	Size	304 x 228 mm (12 x 9 inch)
	Backlight	LED, Contr. 700:1 (Type)
Main PC Features	CPU	Intel® i5-6500TE 2.3GHz Quad Core 6th generation
	RAM	8 GB
	Mass storage	SSD 64 GB
	Operating system	...R20 Windows 10 IoT Enterprise LTSC 2016 64 bits ...R40 Windows 10 IoT Enterprise LTSC 2021 64 bits
Communication Interfaces	Ethernet (ETH)	3 x Gigabit LAN / RTE
	USB front	1 x USB 2.0 Type A
	USB rear	2 x USB 2.0 Type A / 4 x USB 3.0 Type A
	Serial interface	2 x COM
	DVI interface	1 DVI-D
	HDMI	Yes
Power Supply	Rated voltage	24 VDC (+15%/-15%) SELV
	Protection against reverse polarity	Yes
	Protection against over voltage	Yes
	Potential insulation	No, the 0V pin is connected to the digital GND
	Power consumption	typ. 48 W max. 96 W (4A)
Ambient Conditions	Climatic conditions operation	0..45°C, 70% rel. air humidity, non-condensing
	Climatic storage conditions	-20...60°C, 70% rel. air humidity, non-condensing
	Climatic conditions transport	-20...60°C, 90% rel. air humidity, non-condensing
Degree of Protection	Front	IP 65
	Rear	IP 20
	Pollution degree	2
Weight	ca. 6.1 kg Function Key version ca. 6.5 kg Full Qwerty version	
Dimensions	W x H x D	410 x 330 (400) x 72.3mm
Fan	Type	With fan

4.1.3 Panel options



Panel with 22 Function Key
Reference with PC Panel coding «F»)



Panel with 22 Function Keys and QWERTY-Keyboard
Reference with PC Panel coding «Q»)

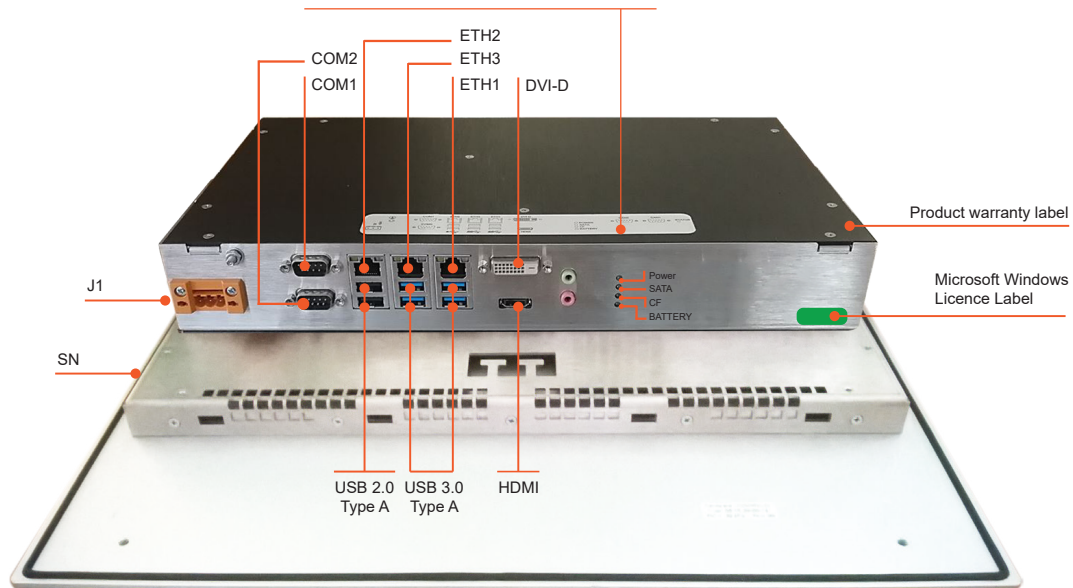
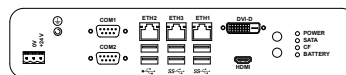
Both configurations are available with touch screen coding “R”.

4.1.4 Module description

FS154i front view



Connections label

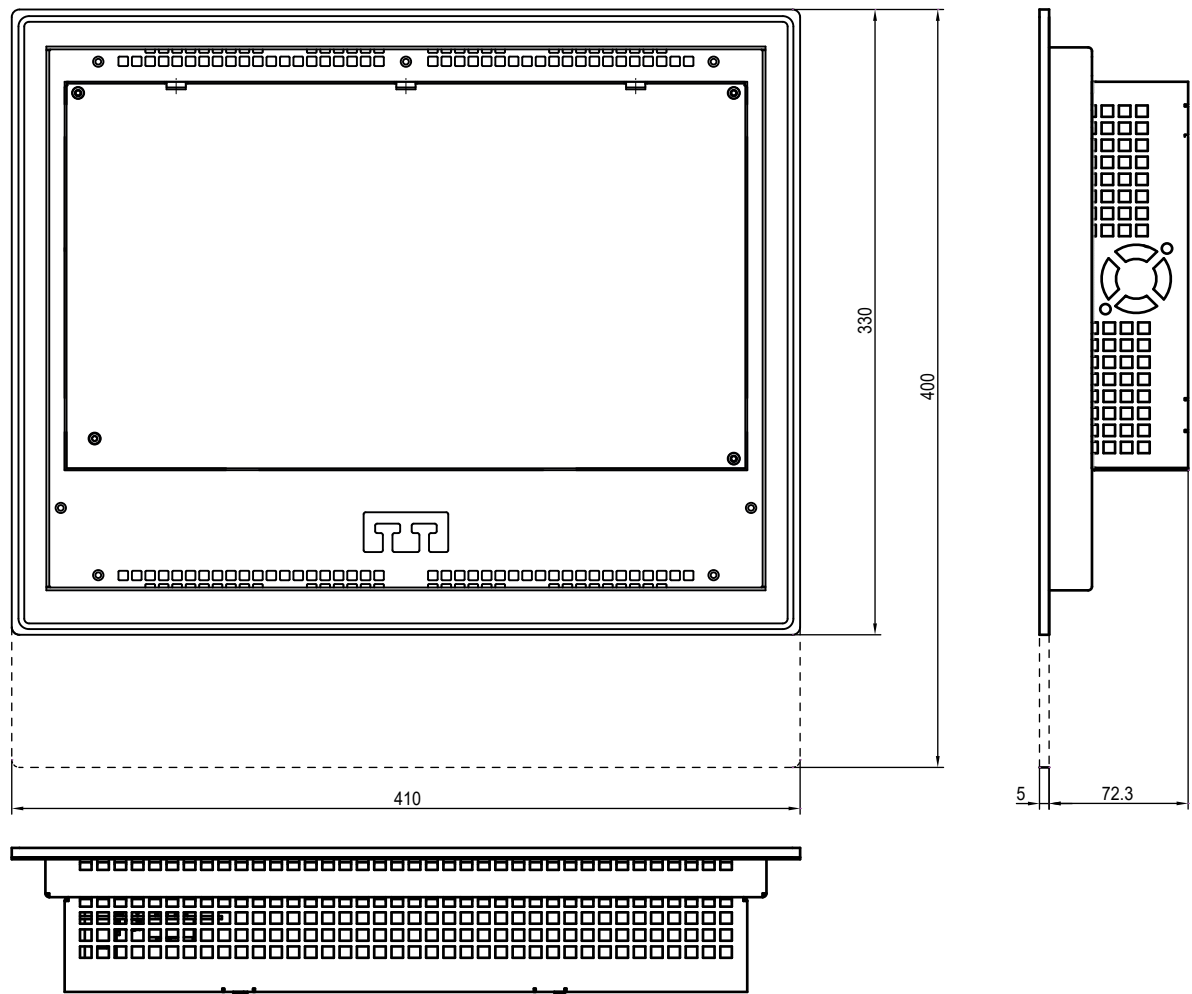


FS154i rear view

Connector	Type	Description
J1	3 screws pins F	Power supply connections
COM1 / COM2	RS232 Sub D 9 pins M	Serial interface. General user purpose
ETH1	RJ45 (8P/8C)	FlexiumPro RTK Ethernet connections
ETH2	RJ45 (8P/8C)	Free
ETH3	RJ45 (8P/8C)	Company LAN
DVI-D	Standard DVI	Digital Video interface connection
HDMI		High-Definition Multimedia Interface
USB (Front)	1 x USB 2.0 Type A	General user purpose. (Mouse and all USB devices)
USB (Rear)	2 x USB 2.0 Type A, 4 x USB 3.0 Type A	
Mic-in		
Line-out		

4.1.5 Overall dimensions

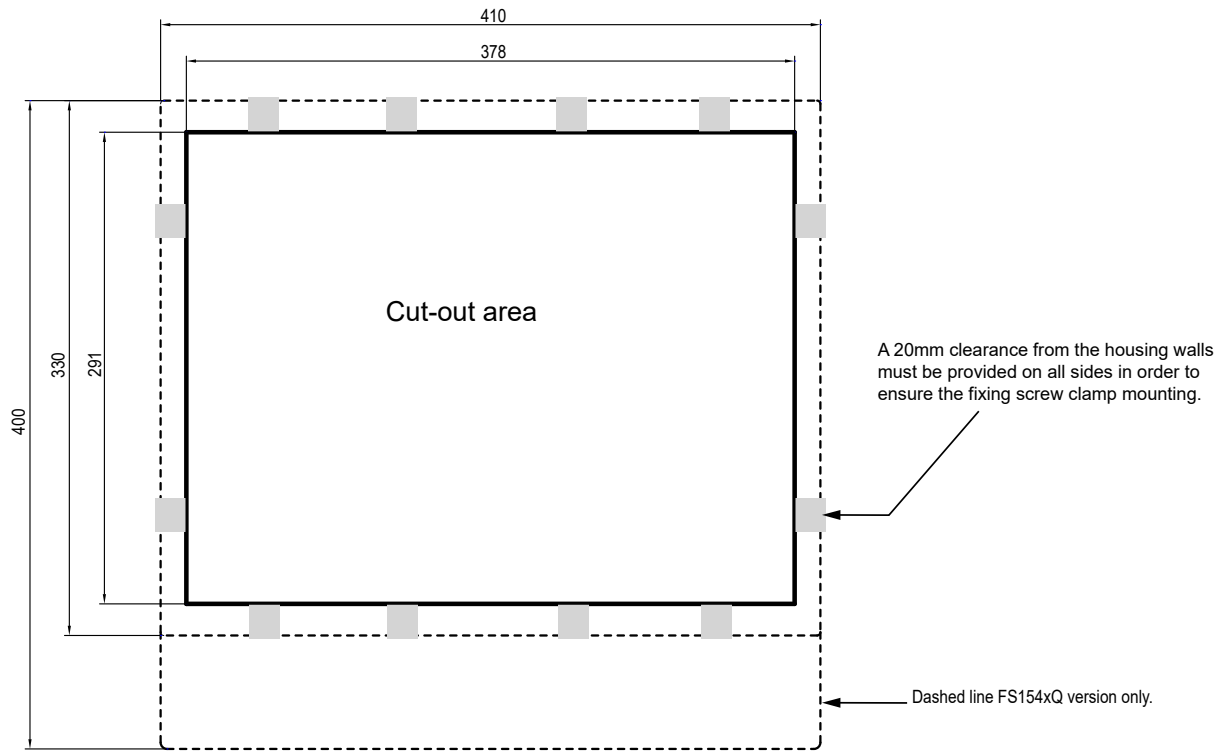
Dimensions in mm



Dashed line FS154xQ version only.

4.1.6 Cut-out area

Dimensions in mm



4.1.7 Power up and shutdown

FS154i starts automatically when Power up is applied. There is no Power up button.

To Power up the system after a shut down it is necessary to switch the power off and on again. Such OFF/ON sequence should be separated by a minimum delay of 20 seconds.

Shut Down:

To keep the system safe and running, never switch off the power directly but use a shutdown procedure.

4.1.8 Diagnostics

Leds	Meaning
POWER	Power supply OK
SATA	HDD/SSD access
CF	Not used
BATTERY	Change battery

Symptom	Possible cause and remedy
Dark screen during power-up	- Check power supply. - Loss of setup data. - Connect an external video display for diagnosis.
White screen after switch off and re-switch on again	- The ATX-power supply doesn't switch on properly because the switch off time was shorter than 20s.
Date/time not correct	Replace battery (See chapter 4.1.9.4)
Ethernet connection missing	- Incorrect Ethernet cable fitted (crossover/direct) - LINK-LED is lit if the connection is correct - ACT LED if the data transfer is correct (flashes during the transfer) - Incorrect/invalid IP address set.

4.1.9 Maintenance and Repair

4.1.9.1 Repairs

Repairs to FS154i Operator panels must only be carried out by the manufacturer.
(Manufacturer address see list of NUM agencies on chapter [1.5](#))

4.1.9.2 Transport

Only the original packaging must be used for transporting the device.
The climatic conditions (see previous pages) must be observed.

4.1.9.3 Storage

The device must only be stored in the climatic conditions described in the previous pages.
It should be remembered that a high storage temperature reduces the lifespan of the real time clock battery. It is recommended to store the device at room temperature.

4.1.9.4 Battery replacement

The battery is used to back up the clock circuit. The battery should be changed every 5 years in order to prevent any date/time loss. The battery code is EIV6003972.
There is a danger of explosion if battery is incorrectly replaced.



Only trained personnel are allowed to replace the battery.
For replacing, the back cover has to be removed.
Caution : Breaking the warranty label or removing the cover voids the warranty.



Pay attention to ESD safety protections when changing the battery.

4.1.10 Panel connections

Please refer to chapter [8.8](#) for more detailed information upon the Panels connections.

4.1.11 Mounting instructions

The operator panel is installed from the front, for example, into a control cabinet. They are fixed at the rear with screw clamp.

The operator panel can be operated at a maximum ambient temperature of 45°C. The ambient temperature is based on the temperature of the area 5cm above the panel with the device mounted vertically at a height of 2000m above sea level.

The operator panel can be mounted in a completely closed housing, provided that the ambient temperature (in the housing) is taken into account. A 20mm clearance from the housing walls must be provided on all sides in order to ensure sufficient air circulation.

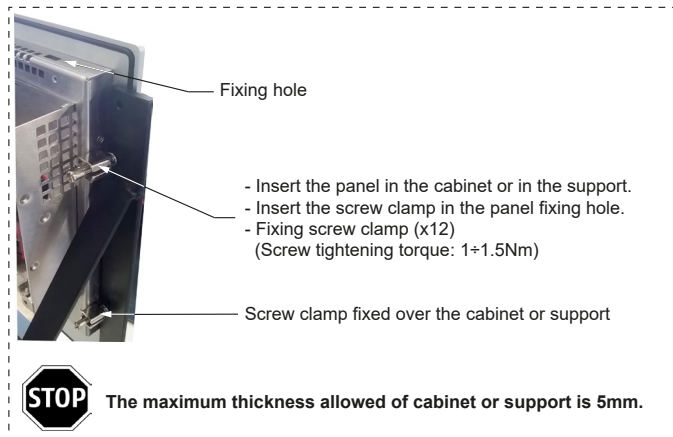
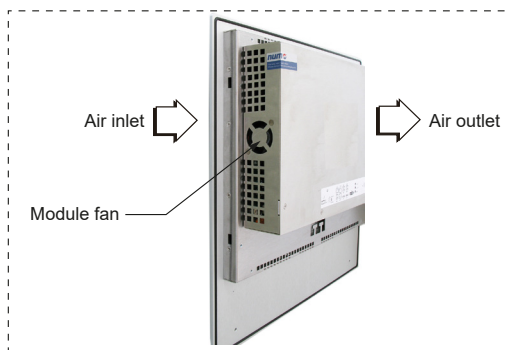
A minimum clearance of 75mm must be provided to active elements such as power supplies, transformers etc.



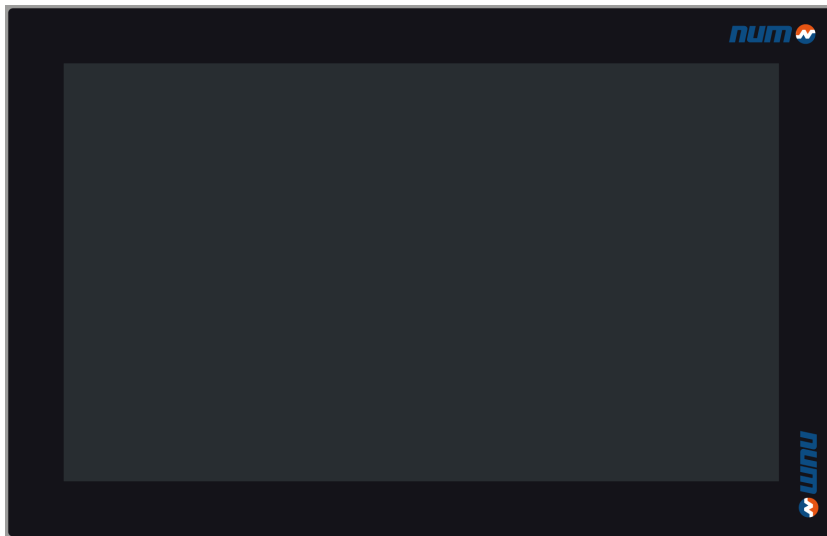
Prevention of overheating during operation:
- A forced airflow increases the overall reliability.

4.1.11.1 FS154i P2 mounting example

Panel ventilation



4.2 FS184i Operator Panel with Integrated PC



FS184i is a 18.5" display, glass protected, fitted with a capacitive multi-touch screen system. It includes an i5-6500TE 2.3GHz Quad Core 6th generation processor and an SSD mass memory

Durable, modern front end for machine control. It features an IP65 degree of protection at the front, and IP20 at the rear.

It can be landscape or portrait mounted.



Machine builders and end users are not allowed to install on this NUM industrial PC, software which performs "Desktop Functions" other than through, in support of, and operating as a part of, the Embedded Application. "Desktop Functions" means consumer or business tasks or processes performed by a computer or computing device. This includes email, word processing, spreadsheets, database, network/Internet browsing, scheduling, and personal finance. Desktop Functions may include features and functions derived from the MS Binaries or the Company Binaries.

4.2.1 Ordering code

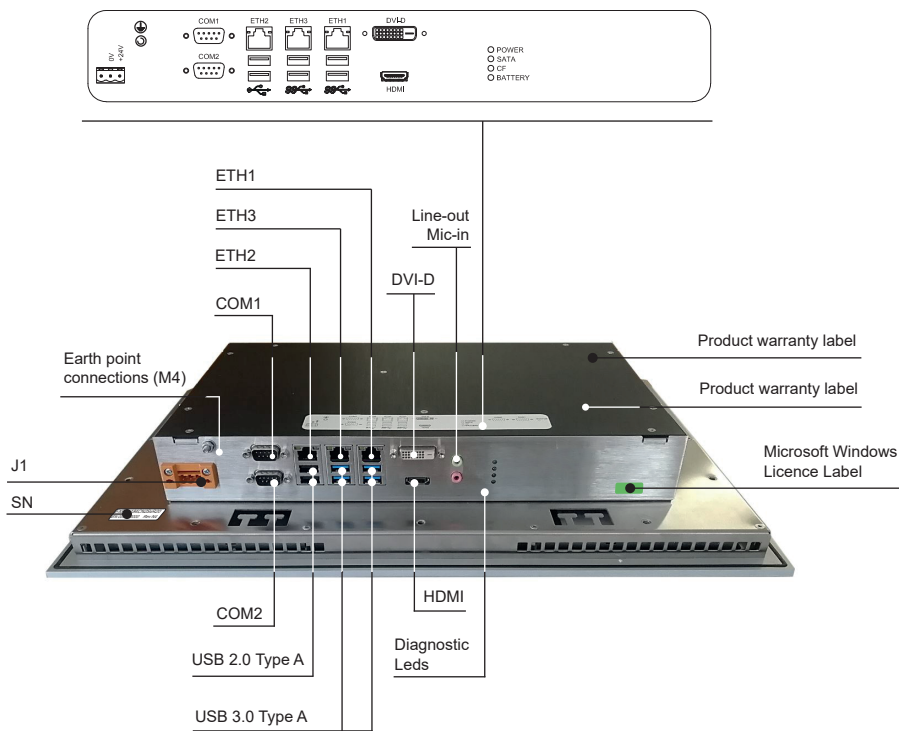
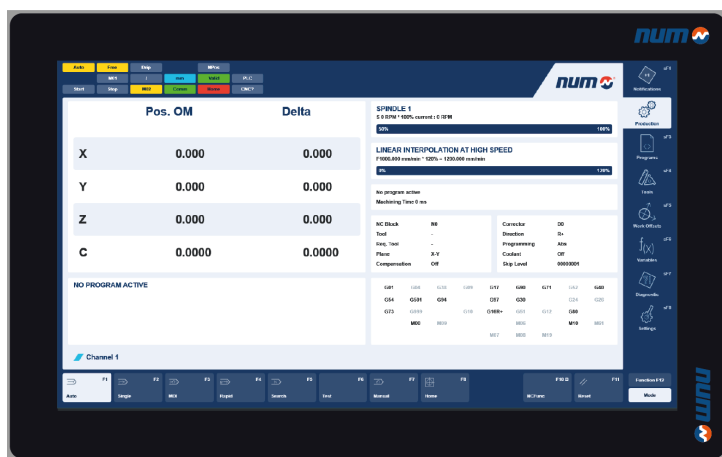
FS184i version	Ordering code
FS184i - P2 SSD W10 2016	FXPC184CN2SNR20
FS184i - P2 SSD W10 2021	FXPC184CN2SNR40

	FXPC	18	4	C	N	2	S	N	R	2	0
Display Unit											
• LCD 18.5"		18									
Panel/Mechanical Variant											
• Fourth Generation			4								
Display Sensor											
• Touch screen (proj.) capacitive				C							
Keyboard Type											
• No keyboard, no function keys					N						
IPC Mother Board, Processor											
• Performance level P2						2					
Mass Memory Type											
• SSD (Solid State Disc)							S				
Option Board											
• None								N			
Fixed Value									R		
Operating System											
• Windows 10 IoT Enterprise LTSC 2016 64 bits										2	
• Windows 10 IoT Enterprise LTSC 2021 64 bits										4	
Spare Number											0

4.2.2 Characteristics

		FXPC184CN2SNR20 FXPC184CN2SNR40
Screen	User interface	Projected capacitive touch screen with glass protection
	Technology	18.5" TFT LCD (16.9 million colors)
	Resolution	1366 x 768
	Size	409.8 x 230.4mm
	Backlight	LED, Contr. 1000:1
Main PC Features	CPU	i5-6500TE 2.3GHz Quad Core 6th generation
	RAM	8 GB
	Mass storage	SSD 64 GB
	Operating system	...R20 Windows 10 IoT Enterprise LTSC 2016 64 bits ...R40 Windows 10 IoT Enterprise LTSC 2021 64 bits
Communication Interfaces	Ethernet (ETH)	3 x Gigabit LAN / RTE
	USB	2 x USB 2.0 Type A / 4 x USB 3.0 Type A (rear)
	Serial interface	2 x COM
	DVI-D	1
	HDMI	1
Power Supply	Rated voltage	24VDC (+15%/-15%) SELV
	Protection against reverse polarity	Yes
	Protection against over voltage	Yes
	Potential isolation	No. (The 0V-pin of the PS is connected to the digital GND)
	Power consumption	55 W typ., max. 120 W (5 A)
Ambient Conditions	Climatic conditions operation	5..45°C, 70% rel. air humidity, non-condensing
	Climatic storage conditions	-20...60°C, 70% rel. air humidity, non-condensing
	Climatic conditions transport	-20...60°C, 90% rel. air humidity, non-condensing
Degree of Protection	Front	IP 65
	Rear	IP 20
Weight		6.7 kg
Dimensions	W x H x D	488 x 309 x 71 mm
Cooling		With fan

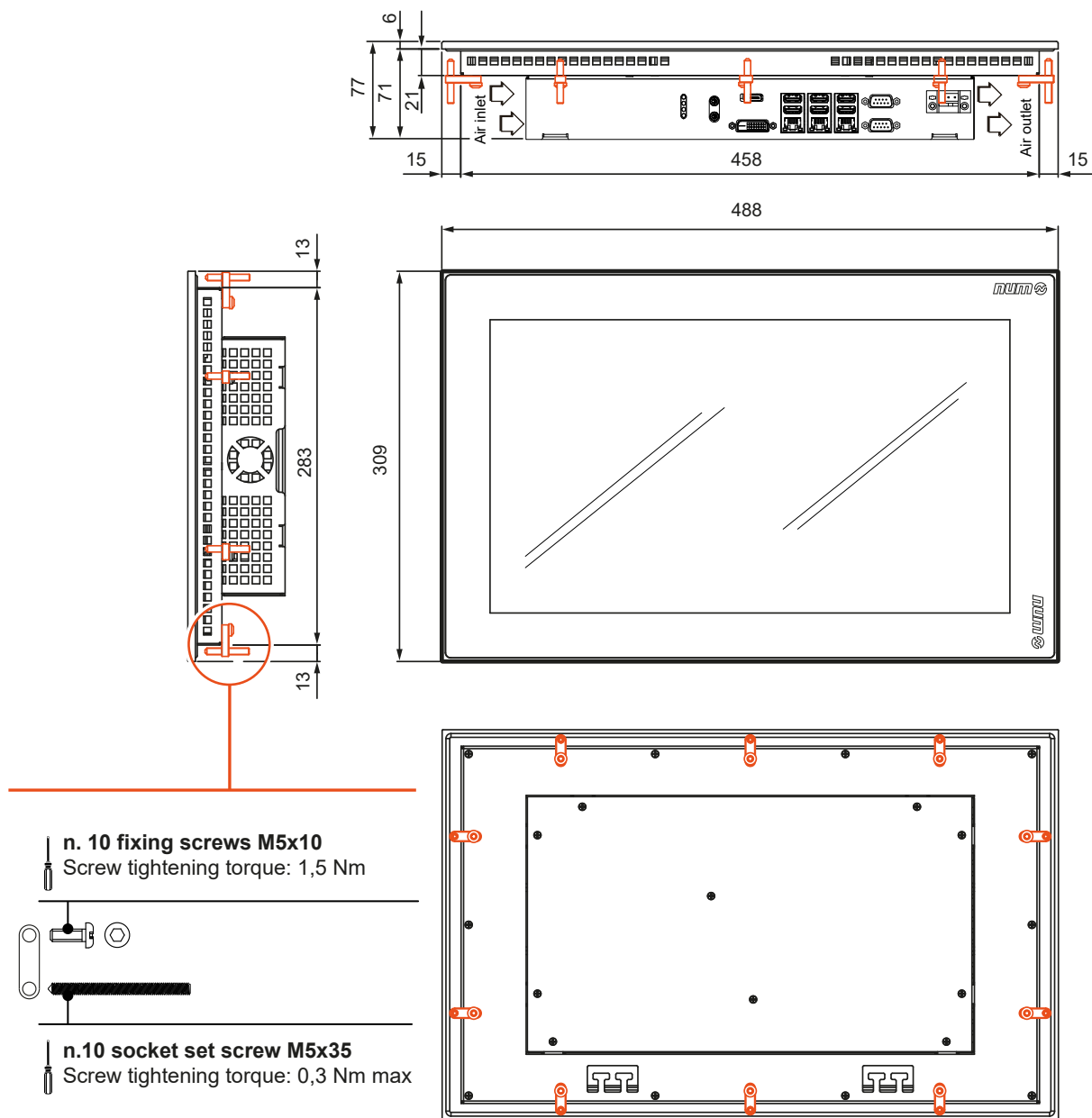
4.2.3 Module description



Connector	Type	Description
J1	3 screws pins F	Power supply connections
COM1	RS232 Sub D 9 pins M	Serial interface. General user purpose
COM2		
ETH1	RJ45 (8P/8C)	FlexiumPro RTK Ethernet connections
ETH2	RJ45 (8P/8C)	Free
ETH3	RJ45 (8P/8C)	Company LAN
DVI-D	Standard DVI	Digital Video interface connection
HDMI		High-Definition Multimedia Interface
USB	2 x USB 2.0 Type A, 4 x USB 3.0 Type A	General user purpose. (Mouse and all USB devices)

4.2.4 Overall dimension

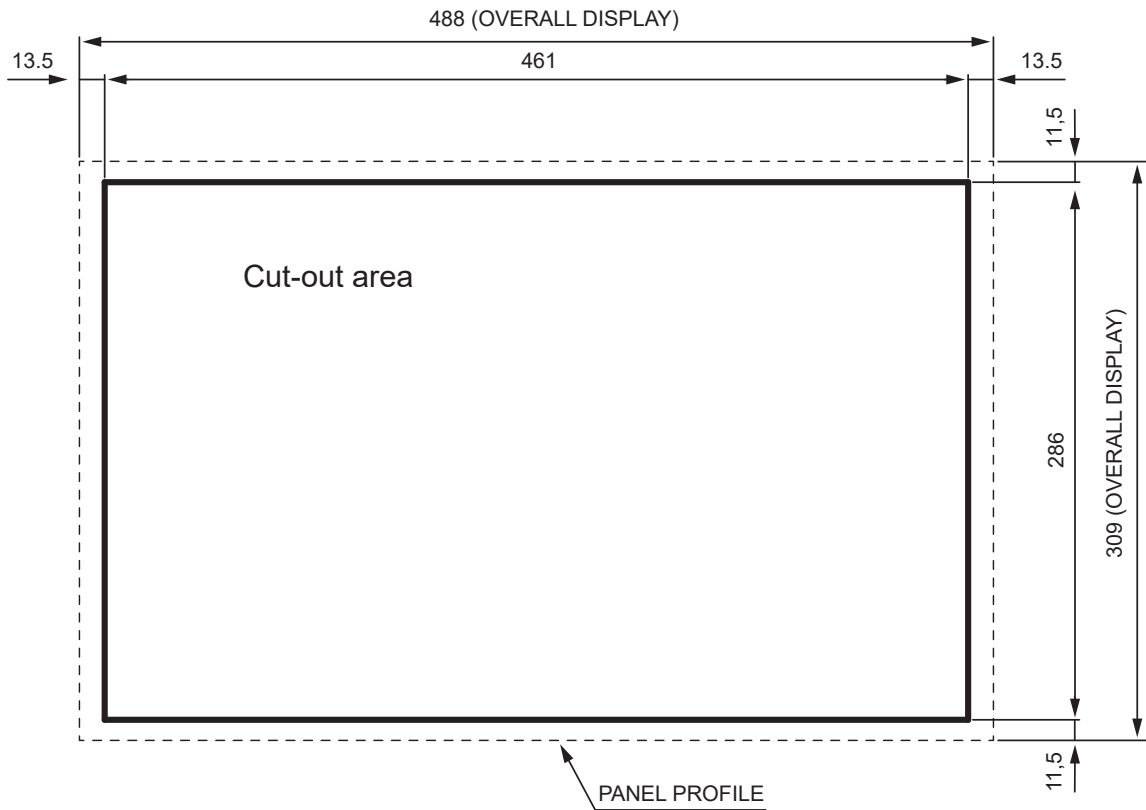
Dimensions in mm



Fixing kit, screws and brackets, for FS184i panel. Assembly to be carried out by the customer.

4.2.5 Cut-out area

Dimensions in mm



4.2.6 Power up and shutdown

FS184i starts automatically when Power up is applied. There is no Power up button.

To Power up the system after a shut down it is necessary to switch the power off and on again.

Such OFF/ON sequence should be separated by a minimum delay of 20seconds.

Shut Down: To keep the system safe and running never switch off the power directly but use a shutdown procedure. A shutdown can be initialised by the PLC program or by windows itself.

4.2.7 Diagnostics

Leds	Meaning
POWER	Power supply OK
HDD	HDD/SSD access
BATTERY	Change battery
GPO_PR4	Not used

Symptom	Possible cause and remedy
Dark screen during power-up	- Check power supply. - Loss of setup data. - Connect an external video display for diagnosis.
White screen after switch off and re-switch on again	- The ATX-power supply doesn't switch on properly because the switch off time was shorter than 20s.
Date/time not correct	Replace battery (see chapter 4.2.8.4)
Ethernet connection missing	- Incorrect Ethernet cable fitted (crossover/direct) - LINK-LED is lit if the connection is correct - ACT LED if the data transfer is correct (flashes during the transfer) - Incorrect/invalid IP address set.

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4.2.8 Maintenance and Repair

4.2.8.1 Repairs

Repairs to FS184i Operator panels must only be carried out by the manufacturer.
(Manufacturer address see list of NUM agencies on chapter [1.5](#))

4.2.8.2 Transport

Only the original packaging must be used for transporting the device.
The climatic conditions must be observed.

4.2.8.3 Storage

The device must only be stored in the climatic conditions described in the previous pages.
It should be remembered that a high storage temperature reduces the lifespan of the real time clock battery. It is recommended to store the device at room temperature.

4.2.8.4 Battery replacement

The battery is used to back up the clock circuit. The battery should be changed every 5 years in order to prevent any date/time loss. The battery code is EIV6003972.
There is a danger of explosion if battery is incorrectly replaced.



Only trained personnel are allowed to replace the battery.
For replacing, the back cover has to be removed.
Caution : Breaking the warranty label or removing the cover voids the warranty.



Pay attention to ESD safety protections when changing the battery.

4.2.9 Panel connections

Please refer to chapter [8.8](#) for more detailed information upon the panels connections.

4.2.10 Mounting instructions

The operator panel is installed from the front, for example, into a control cabinet. They are fixed at the rear with screw (see chapter 4.2.4)

The operator panel can be operated at a maximum ambient temperature of 45°C. The ambient temperature is based on the temperature of the area 5cm above the panel with the device mounted vertically at a height of 2000m above sea level.

The operator panel can be mounted in a completely closed housing, provided that the ambient temperature (in the housing) is taken into account. A 20mm clearance from the housing walls must be provided on all sides in order to ensure sufficient air circulation.

A minimum clearance of 75mm must be provided to active elements such as power supplies, transformers etc.



Prevention of overheating during operation:

- A forced airflow increases the overall reliability.

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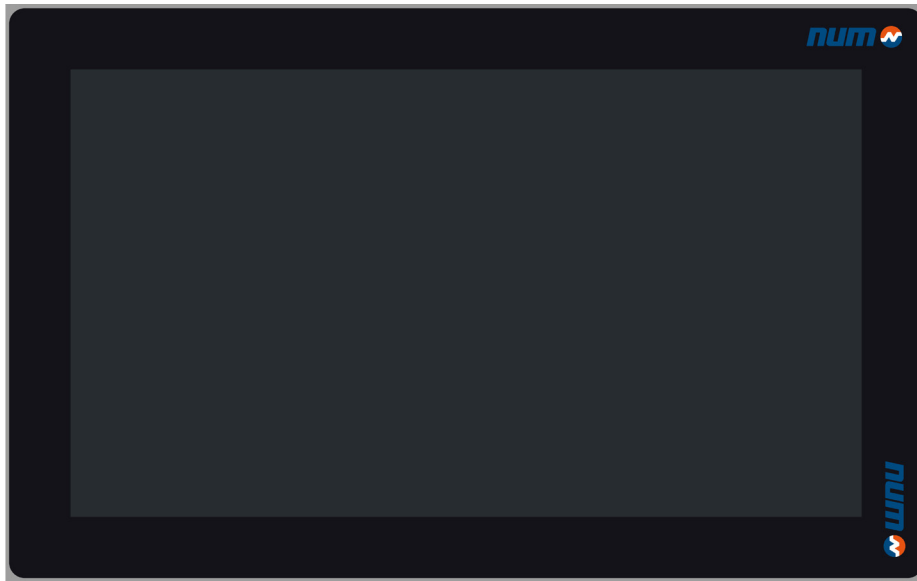
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FS244i is a 24" display, glass protected, fitted with a capacitive multi-touch screen system. It includes an i5-6500TE 2.3GHz Quad Core 6th generation processor and an SSD mass memory

Durable, modern front end for machine control. It features an IP65 degree of protection at the front, and IP20 at the rear.

It can be landscape or portrait mounted.



Machine builders and end users are not allowed to install on this NUM industrial PC, software which performs "Desktop Functions" other than through, in support of, and operating as a part of, the Embedded Application. "Desktop Functions" means consumer or business tasks or processes performed by a computer or computing device. This includes email, word processing, spreadsheets, database, network/Internet browsing, scheduling, and personal finance. Desktop Functions may include features and functions derived from the MS Binaries or the Company Binaries.

4.3.1 Ordering code

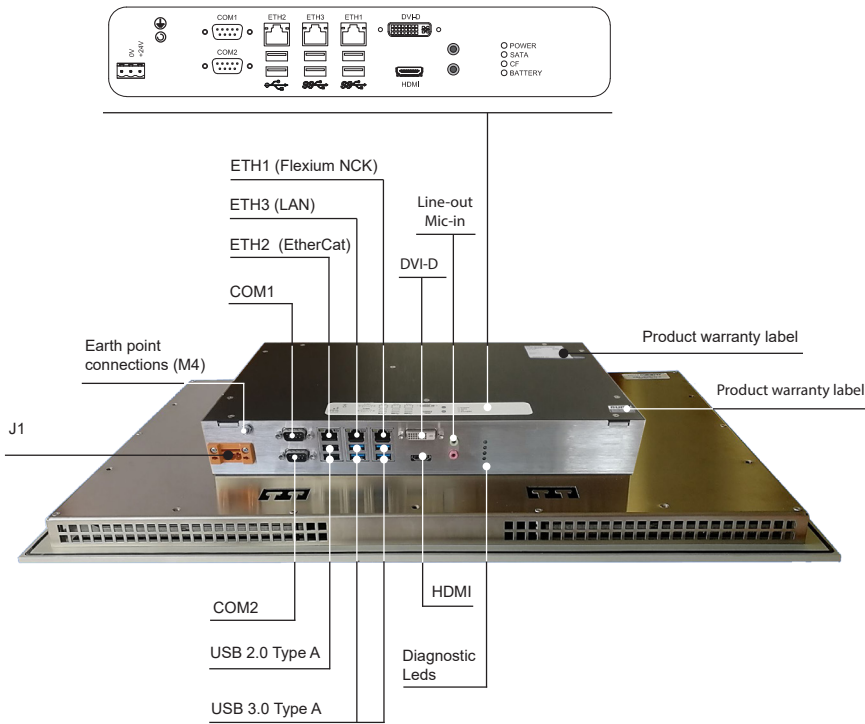
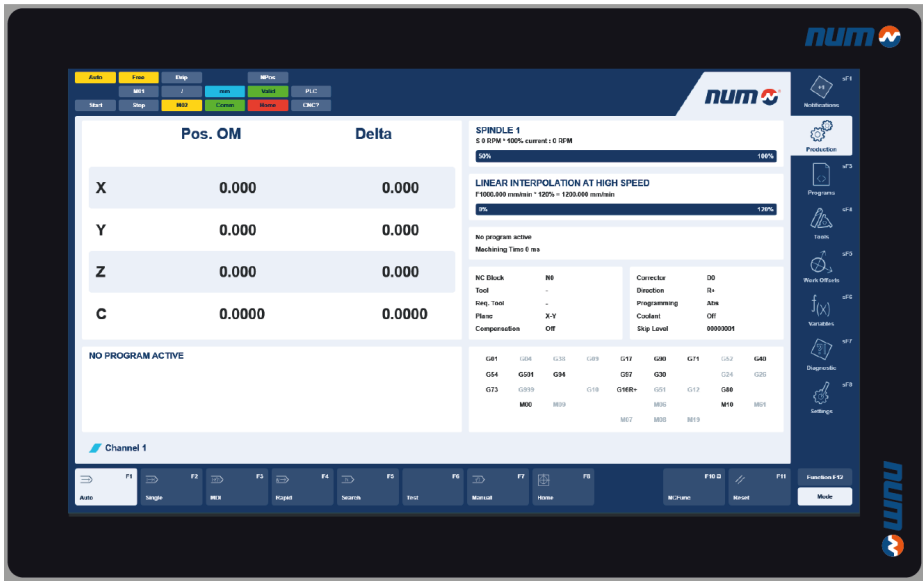
FS244i version	Ordering code
FS244i - P2 SSD W10 2016	FXPC244CN2SNR20
FS244i - P2 SSD W10 2021	FXPC244CN2SNR40

	FXPC	24	4	C	N	2	S	N	R	2	0
Display Unit											
• LCD 24"		24									
Panel/Mechanical Variant											
• Fourth Generation			4								
Display Sensor											
• Touch screen (proj.) capacitive				C							
Keyboard Type											
• No keyboard, no function keys					N						
IPC Mother Board, Processor											
• Performance level P2						2					
Mass Memory Type											
• SSD (Solid State Disc)							S				
Option Board											
• None								N			
Fixed Value									R		
Operating System											
• Windows 10 IoT Enterprise LTSC 2016 64 bits										2	
• Windows 10 IoT Enterprise LTSC 2021 64 bits										4	
Spare Number											0

4.3.2 Characteristics

		FXPC244CN2SNR20 FXPC244CN2SNR40
Screen	User interface	Projected capacitive touch screen with glass protection
	Technology	24" TFT LCD (16.9 million colors)
	Resolution	1920 x 1080
	Size	531.3 x 298.8mm
	Backlight	LED, Contr. 5000:1
Main PC Features	CPU	i5-6500TE 2.3GHz Quad Core 6th generation
	RAM	8 GB
	Mass storage	SSD 64 GB
	Operating system	...R20 Windows 10 IoT Enterprise LTSC 2016 64 bits ...R40 Windows 10 IoT Enterprise LTSC 2021 64 bits
Communication Interfaces	Ethernet (ETH)	3 x Gigabit LAN / RTE
	USB	2 x USB 2.0 Type A / 4 x USB 3.0 Type A (rear)
	Serial interface	2 x COM
	DVI-D	1
	HDMI	1
Power Supply	Rated voltage	24VDC (+15%/-15%) SELV
	Protection against reverse polarity	Yes
	Protection against over voltage	Yes
	Potential isolation	No. (The 0V-pin of the PS is connected to the digital GND)
	Power consumption	63 W typ., max. 120 W (5A)
Ambient Conditions	Climatic conditions operation	5..45°C, 70% rel. air humidity, non-condensing
	Climatic storage conditions	-20...60°C, 70% rel. air humidity, non-condensing
	Climatic conditions transport	-20...60°C, 90% rel. air humidity, non-condensing
Degree of Protection	Front	IP 65
	Rear	IP 20
Weight		8.9 kg
Dimensions	W x H x D	621.5 x 389 x 76 mm
Cooling		With fan

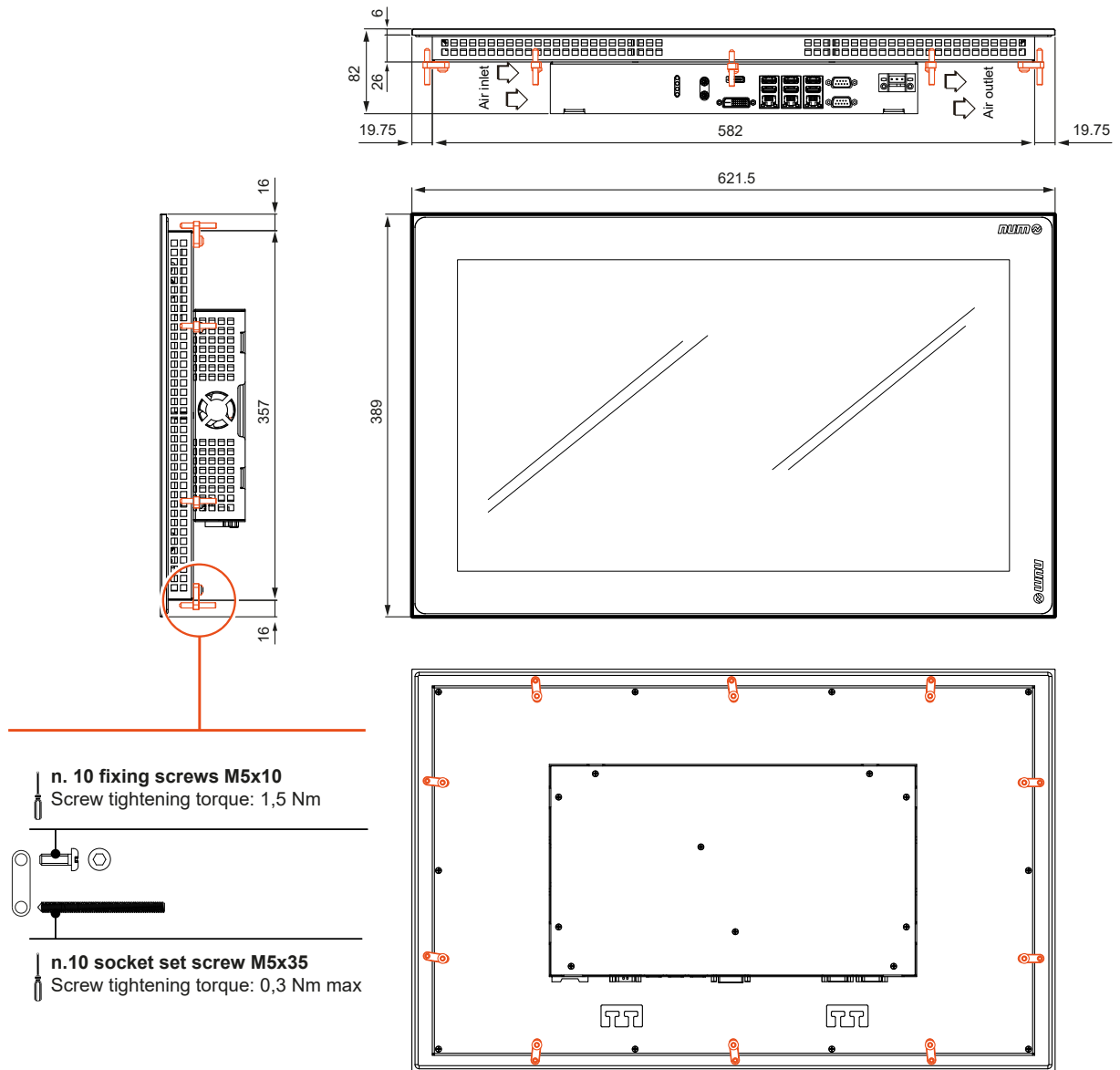
4.3.3 Module description



Connector	Type	Description
J1	3 screws pins F	Power supply connections
COM1 / COM2	RS232 Sub D 9 pins M	Serial interface. General user purpose
ETH1	RJ45 (8P/8C)	FlexiumPro RTK Ethernet connections
ETH2	RJ45 (8P/8C)	Free
ETH3	RJ45 (8P/8C)	Company LAN
DVI-D	Standard DVI	Digital Video interface connection
USB	2 x USB 2.0 Type A, 4 x USB 3.0 Type A	General user purpose. (Mouse and all USB devices)
HDMI		High-Definition Multimedia Interface
Mic-in		
Line-out		

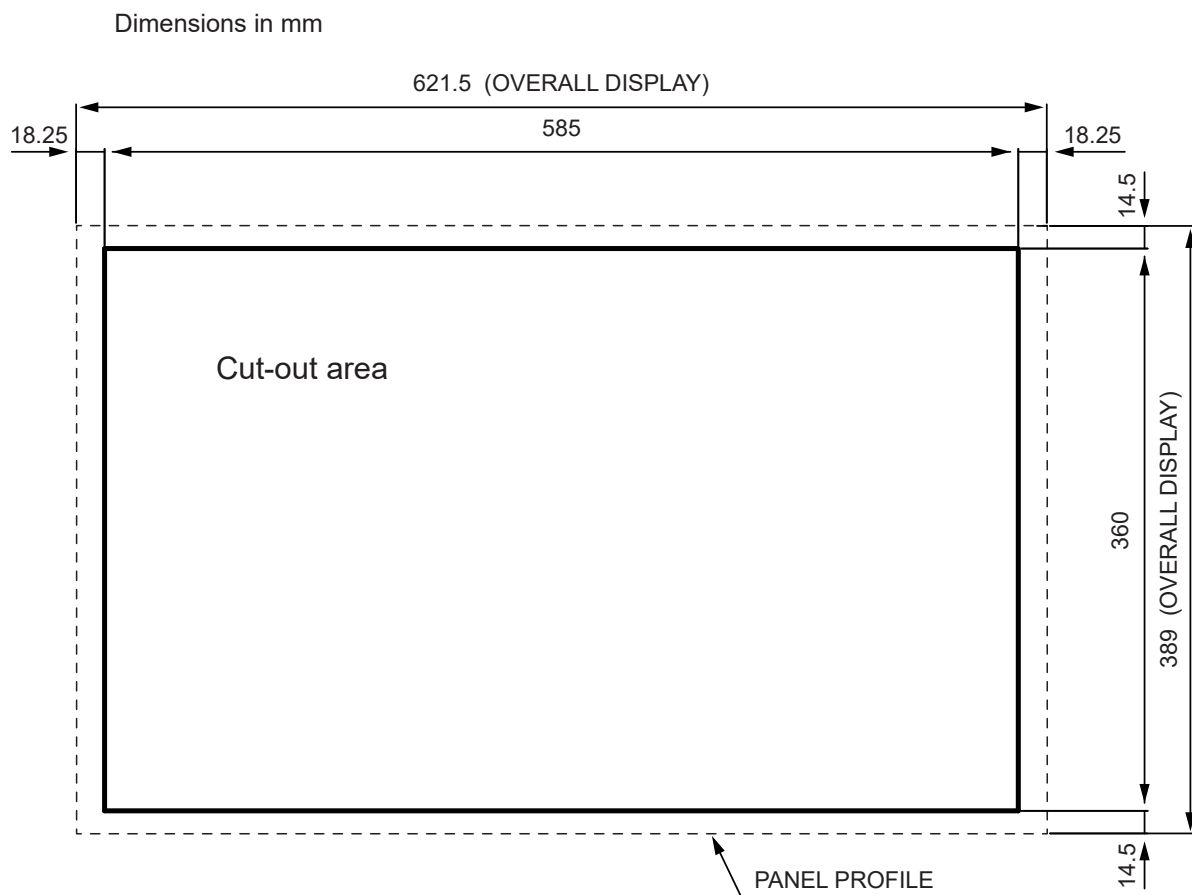
4.3.4 Overall dimensions

Dimensions in mm



Fixing kit, screws and brackets, for FS244i panel. Assembly to be carried out by the customer.

4.3.5 Cut-out area



4.3.6 Power up and shutdown

FS244i starts automatically when Power up is applied. There is no Power up button.

To Power up the system after a shut down it is necessary to switch the power off and on again.

Such OFF/ON sequence should be separated by a minimum delay of 20seconds.

Shut Down: To keep the system safe and running never switch off the power directly but use a shut-down procedure. A shutdown can be initialised by the PLC program or by windows itself.

4.3.7 Diagnostics

Leds	Meaning
POWER	Power supply OK
SATA	HDD/SSD access
CF	Not used
BATTERY	Change battery

Symptom	Possible cause and remedy
Dark screen during power-up	- Check power supply. - Loss of setup data. - Connect an external video display for diagnosis.
White screen after switch off and re-switch on again	- The ATX-power supply doesn't switch on properly because the switch off time was shorter than 20s.
Date/time not correct	Replace battery (see chapter 4.3.8.4)
Ethernet connection missing	- Incorrect Ethernet cable fitted (crossover/direct) - LINK-LED is lit if the connection is correct - ACT LED if the data transfer is correct (flashes during the transfer) - Incorrect/invalid IP address set.

4.3.8 Maintenance and Repair

4.3.8.1 Repairs

Repairs to FS244i Operator panels must only be carried out by the manufacturer.
(Manufacturer address see list of NUM agencies on chapter [1.5](#))

4.3.8.2 Transport

Only the original packaging must be used for transporting the device.
The climatic conditions must be observed.

4.3.8.3 Storage

The device must only be stored in the climatic conditions described in the previous pages.
It should be remembered that a high storage temperature reduces the lifespan of the real time clock battery. It is recommended to store the device at room temperature.

4.3.8.4 Battery replacement

The battery is used to back up the clock circuit. The battery should be changed every 5 years in order to prevent any date/time loss. The battery code is EIV6003972.

There is a danger of explosion if battery is incorrectly replaced.



Only trained personnel are allowed to replace the battery.
For replacing, the back cover has to be removed.
Caution : Breaking the warranty label or removing the cover voids the warranty.



Pay attention to ESD safety protections when changing the battery.

4.3.9 Panel connections

Please refer to chapter 8.8 for more detailed information upon the Panels connections.

4.3.10 Mounting instructions

The operator panel is installed from the front, for example, into a control cabinet. They are fixed at the rear with screw (see chapter 4.3.4)

The FS244i can be operated at a maximum ambient temperature of 45°C.

The device can be mounted in a completely closed housing, provided that the ambient temperature (in the case) is taken into account. A 20mm clearance from the housing walls must be provided on all sides in order to ensure sufficient air circulation and the fixing screw clamp mounting.

A minimum clearance of 75mm must be provided to active elements such as power supplies, transformers etc.



Prevention of overheating during operation:
- A forced airflow increases the overall reliability.

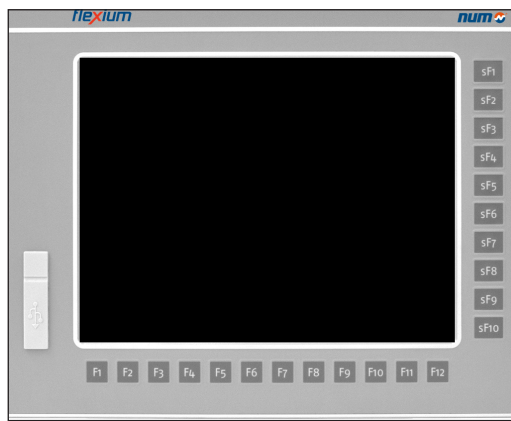
4.4 FS122 Operator Panel (without integrated PC)

FS122 Operator Panel is a 12-inch passive control panels for Flexium that are designed for use with an external PC or NUM Industrial Box PC P1 / P2.

Please refer to chapter 6 to give more detailed information on Box PC P1 / P2.

The passive panels FS122 are available with and without touch screen. Both versions have got 22 functional keys.

The display quality makes the panels very legible, even in poorly-lit environments. Compact and very rugged, the panels are sealed (IP65) and suitable for use in severe industrial environments.



4.4.1 Ordering code

FS122 version	Ordering code
FS122-FK-TS	FXPC122RFNNNN00
FS122-FK	FXPC122NFNNNN00

FXPC	12	2	R	F	N	N	N	N	0	0
Display Unit										
- LCD 12"	12									
Panel/Mechanical Variant										
- Second generation		2								
Display Sensor										
- Touch screen resistive			R							
- No touch Sensor			N							
Keyboard Type										
- 22 Function keys				F						
IPC Mother Board, Processor										
- No IPC, just operator panel					N					
Mass Memory Type										
- No IPC, just operator panel						N				
Option Board										
- No fieldbus, just operator panel							N			
Flexium RTS										
- No RTS, just operator panel								N		
Operating System										
- No IPC, just operator panel									0	
Spare Number										0

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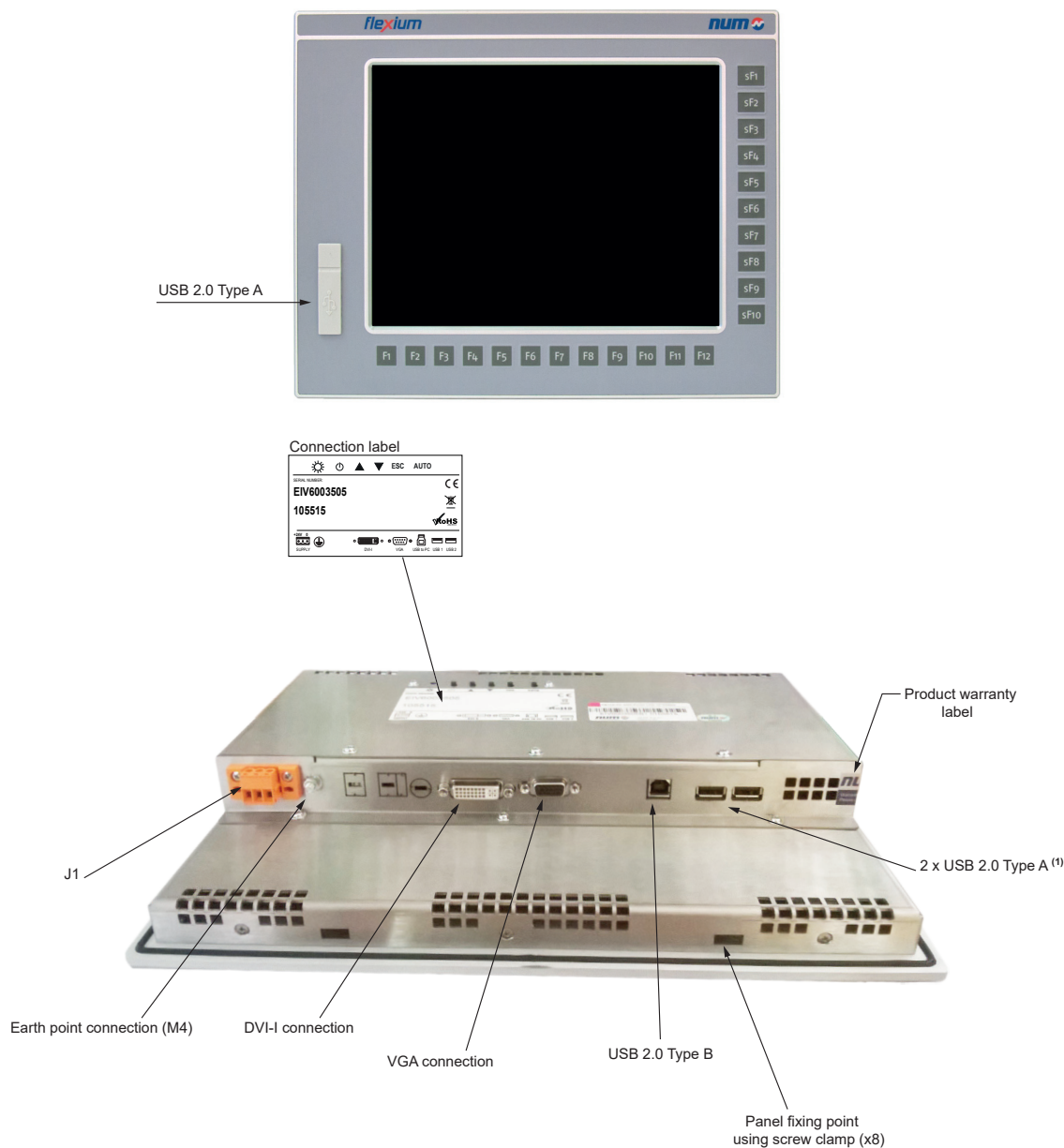
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4.4.2 Characteristics

FXPC122xFNNNN00		
Screen	User interface	Operator panel without integrated PC: - 22 Function Keys - Resistive touch screen available as option
	Technology	12.1" LED
	Resolution	1024 x 768 on 60 Hz till 75Hz
	Size	Diagonal 307 mm
	Backlight	Contr. 700:1
	Brightness	600cd/m ²
Communication Interfaces	USB front	1 x USB 2.0 Type A
	USB rear	2 x USB 2.0 Type A (only 1 x USB 2.0 Type A in case of touch version) + 1 x USB 2.0 Type B
	DVI-I interface	1
	VGA interface	1
Power supply	Rated voltage	24 VDC SELV, safety extra low voltage. Protection class III / 4A.
	Voltage range	24VDC +20% -15% supplied by the customer.
	Protection against reverse polarity	Yes
	Protection against over voltage	Yes
	Potential isolation	No. (The 0V-pin of the PS is connected to the digital GND)
	Power consumption	ca. 25W As point of reference, the 24V-power supply should be rated for 4A continuous load.
Ambient conditions	Climatic conditions operation	0..50°C 10...90% rel. air humidity, non-condensing. The measuring point is defined 5cm over the top of the PC case in the middle of the vent holes. It is recommended to ensure enough air circulation.
	Climatic conditions storage	-20...60°C, 10...90% rel. air humidity, non-condensing
	Climatic conditions, transport	Class 2K3 EN50178 (reduced) -20...60°C, 10...90% rel. air humidity, non-condensing.
EMC	EMC immunity	Industry EN 61000-6-2
	EMC emission	Residential area EN 61000-6-3
Degree of protection	Front	IP 65
	Rear	IP 20
Weight		ca. 3.45 kg
Dimensions	W x H x D:	347 x 276 x 52mm

4.4.3 Module description



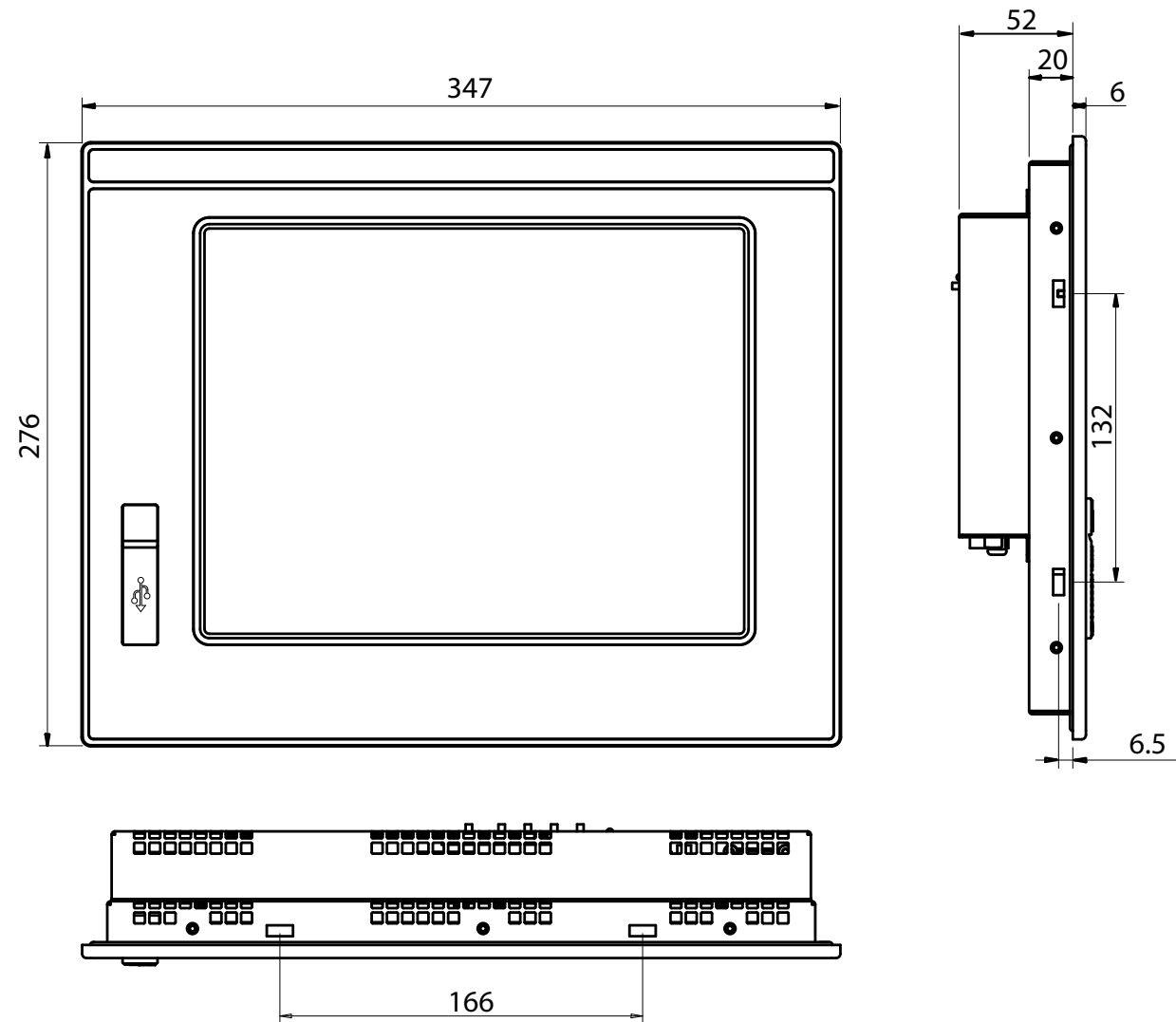
Connector	Type	Description
J1	3 screws pins F	Power supply connections
USB (Front)	USB 2.0 Type A	General user purpose. (Memory stick, Mouse and all USB devices)
USB (Rear)		
USB (to PC)	USB 2.0 Type B	Interface to PC connections
DVI-I	Standard DVI	Digital Video interface connection
VGA	VGA interface	Standard VGA interface



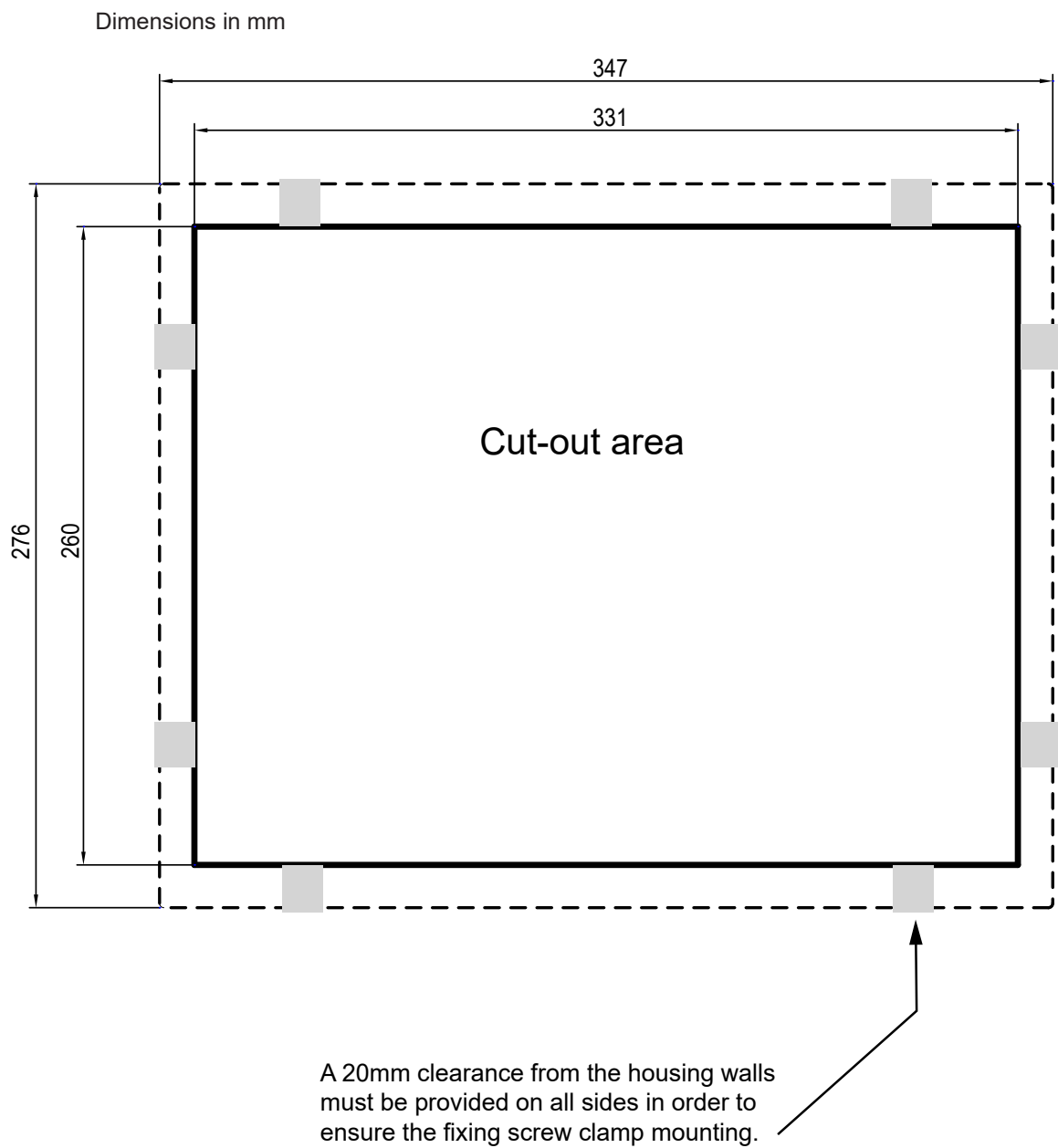
(1) Only 1 x USB 2.0 Type A in case of touch version.

4.4.4 Overall dimensions

Dimensions in mm



4.4.5 Cut-out area



4.4.6 Diagnostics

Symptom	Possible cause and remedy
Dark screen during power-up	- Check power supply. - Check diagnostics LEDs; all three power must be lit. - No video data present; the DVI Panel switches to a safe mode.
Faults on the screen	- Rotary switch not optimally set for cable length compensation. - Check DVI cable.
Reset of the DVI Panel during operation	- Voltage drop in the power supply / touch cable too large; feed local 24V.

4.4.7 Maintenance and Repair

4.4.7.1 Repairs

Repairs to FS122 Operator panels must only be carried out by the manufacturer.
(Manufacturer address see list of NUM agencies on chapter [1.5](#))

4.4.7.2 Transport

Only the original packaging must be used for transporting the device.
The climatic conditions (see previous pages) must be observed.

4.4.7.3 Storage

The device must only be stored in the climatic conditions described in the previous pages.
It should be remembered that a high storage temperature reduces the lifespan of the real time clock battery. It is recommended to store the device at room temperature.

4.4.8 Panel connections

Please refer to chapter [8.8](#) for more detailed information upon the panels connections.

4.4.9 Mounting instructions

The operator panel is installed from the front, for example, into a control cabinet. They are fixed at the rear with screw clamp.

The operator panel can be operated at a maximum ambient temperature of 45°C. The ambient temperature is based on the temperature of the area 5cm above the panel with the device mounted vertically at a height of 2000m above sea level.

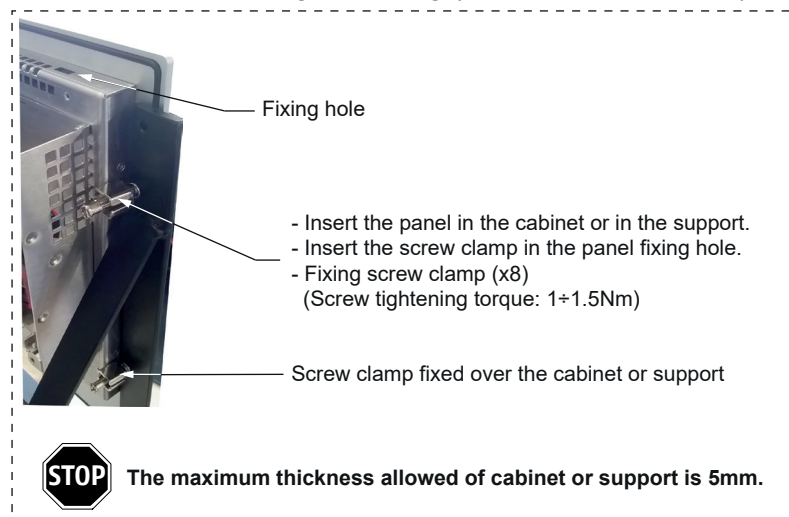
The operator panel can be mounted in a completely closed housing, provided that the ambient temperature (in the housing) is taken into account. A 20mm clearance from the housing walls must be provided on all sides in order to ensure sufficient air circulation.

A minimum clearance of 75mm must be provided to active elements such as power supplies, transformers etc.



Prevention of overheating during operation:
- A forced airflow increases the overall reliability.

FS122 Panel mounting and fixing (example with support)



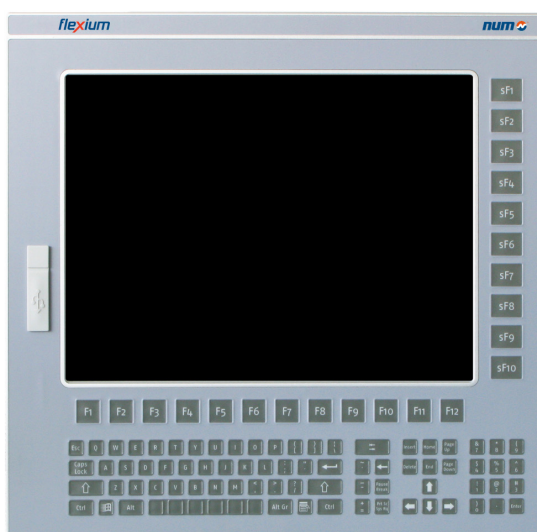
4.5 FS153 Operator Panel (without integrated PC)

FS153 Operator Panel is a 15-inch passive control panels for Flexium that are designed for use with an external PC or NUM Industrial Box PC P1 / P2.

Please refer to chapter 6 to give more detailed information on Box PC P1 / P2.

The FS153 panels FS153-FK (keyboard option F) and FS153-FQ (keyboard option Q) share the physical dimensions with the above panels but have no integrated PC.

The display quality of their 15-inch screen makes them very legible even in poorly-lit environments. Compact, they are also very rugged are sealed (IP 65) for compatibility with the most severe industrial environments.



4.5.1 Ordering code

FS153 version	Ordering code
FS153-FK	FXPC153NFNNNN00
FS153-FK TS	FXPC153RFNNNN00
FS153-FQ	FXPC153NQNNNN00

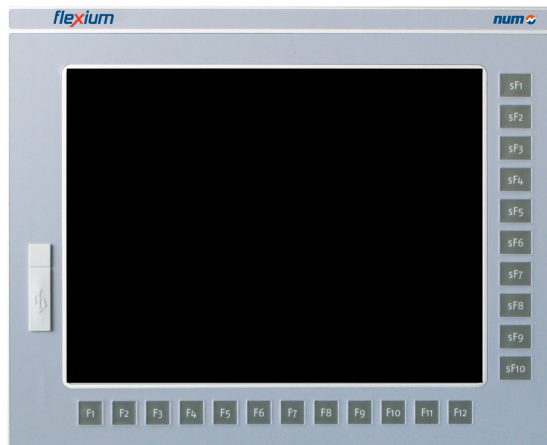
	FXPC	15	3	R	F	N	N	N	N	0	0
Display Unit											
- LCD 15"		15									
Panel/Mechanical Variant											
- Third generation 1			3								
Display Sensor											
- Touch screen resistive				R							
- No touch Sensor				N							
Keyboard Type											
- 22 Function keys					F						
- 22 Function keys + Qwerty keyboard					Q						
IPC Mother Board, Processor											
- No IPC, just operator panel						N					
Mass Memory Type											
- No IPC, just operator panel							N				
Option Board											
- No fieldbus, just operator panel								N			
Flexium RTS											
- No RTS, just operator panel									N		
Operating System											
- No IPC, just operator panel										0	
Spare Number											0

4.5.2 Characteristics

		FXPC153NFNNNN00, FXPC153RFNNNN00 FXPC153NQNNNN00
Screen	User interface	Operator panel without integrated PC: - 22 Function Keys (version FXPC153NFNNNN00) - 22 Function Keys and Qwerty Keyboard (version FXPC153N-QNNNN00) - Resistive touch screen available as option (version FXPC153R-FNNNN00)
	Technology	15" TFT LCD (16.9 million colors)
	Resolution	1024 x 768 from 60Hz to 75Hz
	Size	304 x 228 mm (12 x 9 inch)
	Backlight	LED, Contr. 700:1 (Typ)
Communication Interfaces	USB front	1 x USB 2.0 Type A
	USB rear	2 x USB 2.0 Type A (only 1 x USB 2.0 Type A in case of touch version) + 1 x USB 2.0 Type B
	DVI-D interface	1
	VGA interface	1
Power supply	Rated voltage	24 VDC SELV, safety extra low voltage. Protection class III / 4A.
	Voltage range	24VDC +20% -15% supplied by the customer.
	Protection against reverse polarity	Yes
	Protection against over voltage	Yes
	Potential isolation	No. (The 0V-pin of the PS is connected to the digital GND)
	Power consumption	ca. 25W As point of reference, the 24V-power supply should be rated for 4A continuous load.
Ambient conditions	Climatic conditions operation	0..50°C 70% relative air humidity, non-condensing.
	Climatic conditions storage	-20...60°C, 10...70% rel. air humidity, non-condensing
	Climatic conditions, transport	-20...60°C, 90% relative air humidity, non-condensing
EMC	EMC immunity	Industry EN 61000-6-2
	EMC emission	Residential area EN 61000-6-3
Degree of protection	Front	IP 65
	Rear	IP 20
	Pollution degree	2
Weight		ca. 5.3 kg Function Key version ca. 5.7 kg Full Qwerty version
Dimensions	W x H x D:	410 x 330 (400) x 52 mm

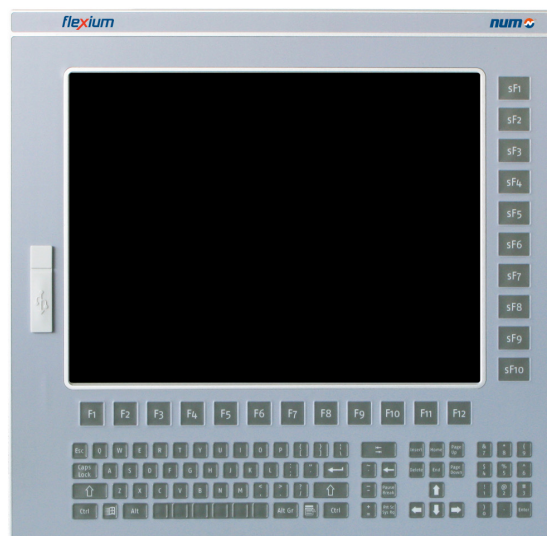
4.5.3 Panel options

Panel with 22 Function Keys



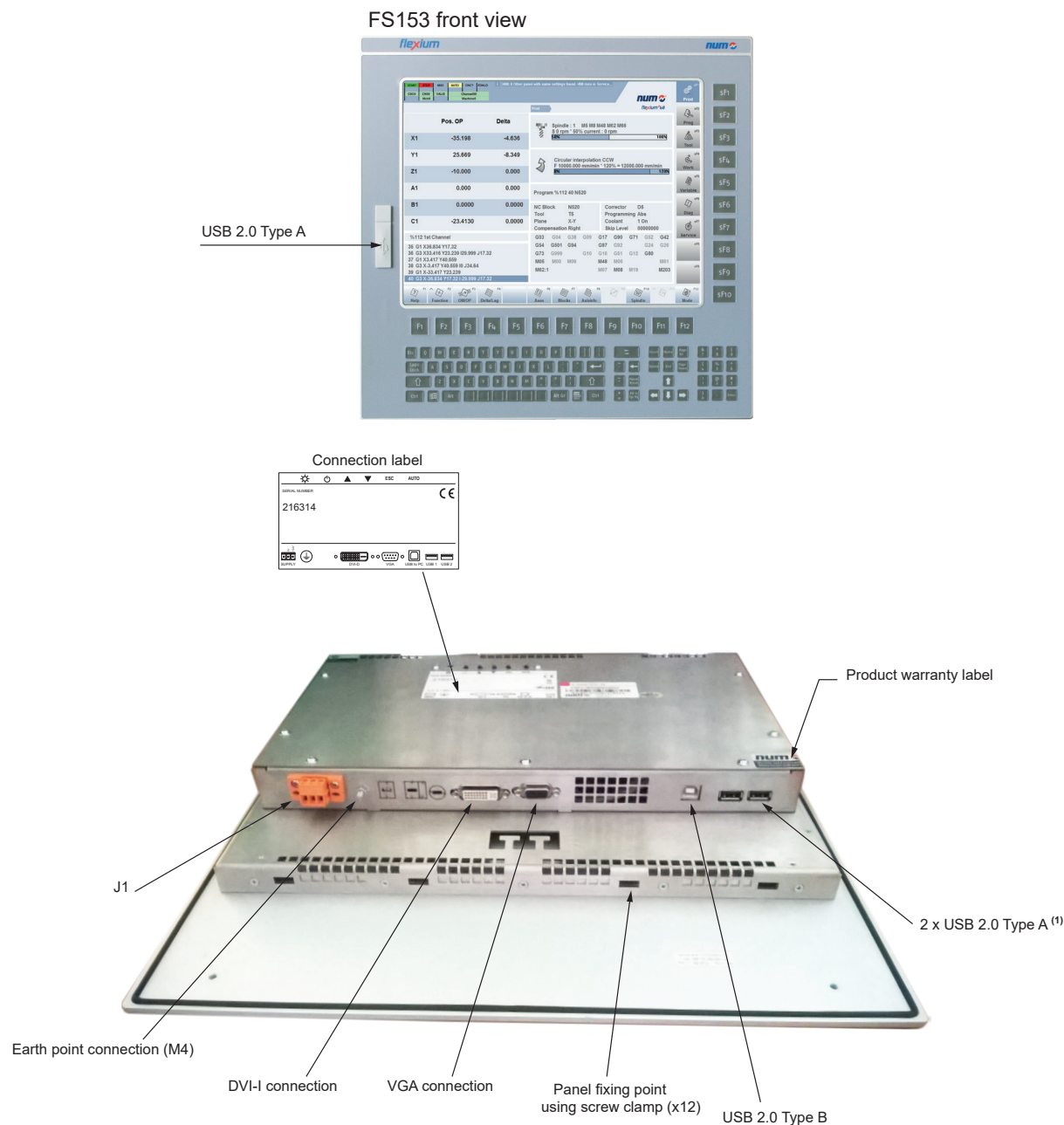
Reference with PC Panel coding «F»)

Panel with 22 Function Keys and



QWERTY-Keyboard Reference with PC
Panel coding «Q»)

4.5.4 Module description



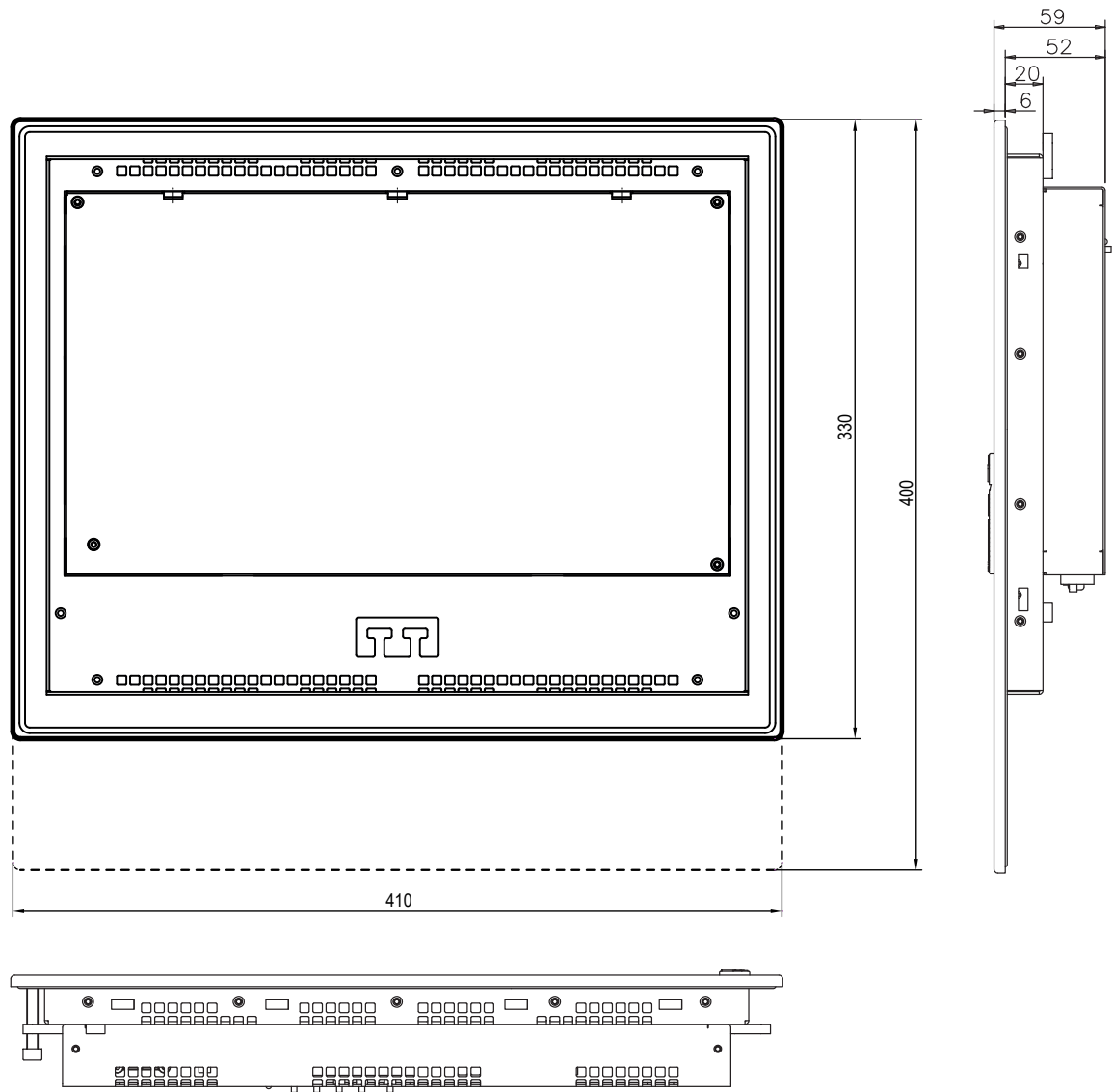
Connector	Type	Description
J1	3 screws pins F	Power supply connections
USB (Front)	USB 2.0 Type A	General user purpose. (Memory stick, Mouse and all USB devices)
USB (Rear)		
USB (to PC)	USB 2.0 Type B	Interface to PC connections
DVI-I	Standard DVI	Digital Video interface connection
VGA	VGA interface	Standard VGA interface



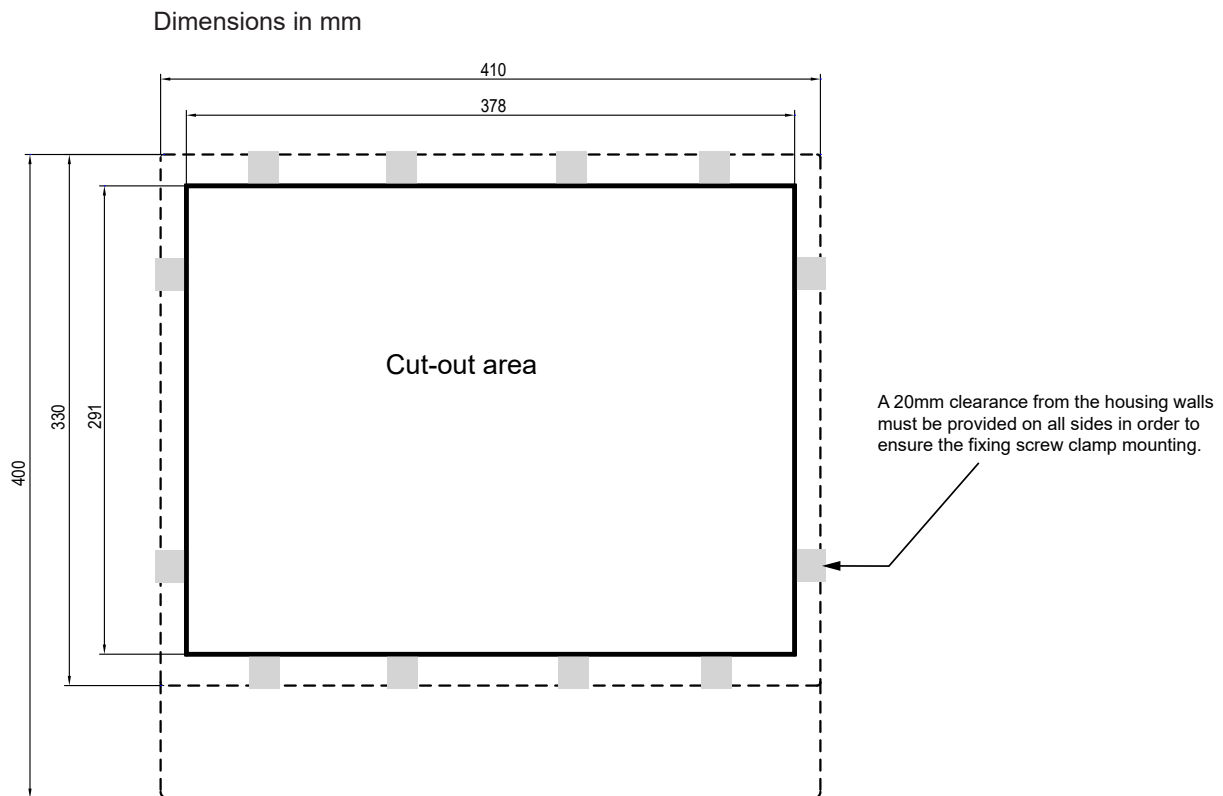
(1) Only 1 x USB 2.0 Type A in case of touch version.

4.5.5 Overall dimensions

Dimensions in mm



4.5.6 Cut-out area



4.5.7 Diagnostics

Symptom	Possible cause and remedy
Dark screen during power-up	- Check power supply. - Check diagnostics LEDs; all three power must be lit. - No video data present; the DVI Panel switches to a safe mode.
Faults on the screen	- Rotary switch not optimally set for cable length compensation. - Check DVI cable.
Reset of the DVI Panel during operation	- Voltage drop in the power supply / touch cable too large; feed local 24V.

4.5.8 Backlight

The brightness of the backlight can be adjusted via potentiometer at the back side.

4.5.8.1 Fuse

The device is protected internally by means of a self-healing fuse.

If this fuse is tripped, the FS153 Panel must be disconnected from the power supply, all faults must be rectified and the reset time (approx. 1min) must be allowed to elapse.

4.5.9 Maintenance and Repair

4.5.9.1 Repairs

Repairs to FS153 Operator panels must only be carried out by the manufacturer.
(Manufacturer address see list of NUM agencies on chapter 1.5)

4.5.9.2 Transport

Only the original packaging must be used for transporting the device.
The climatic conditions (see previous pages) must be observed.

4.5.9.3 Storage

The device must only be stored in the climatic conditions described in the previous pages.
It should be remembered that a high storage temperature reduces the lifespan of the real time clock battery. It is recommended to store the device at room temperature.

4.5.10 Panel connections

Please refer to chapter 8.8 for more detailed information upon the panels connections.

4.5.11 Mounting instructions

The operator panel is installed from the front, for example, into a control cabinet. They are fixed at the rear with screw clamp.

The FS153 can be operated at a maximum ambient temperature of 50°C. The ambient temperature is based on the temperature of the area 5 cm.

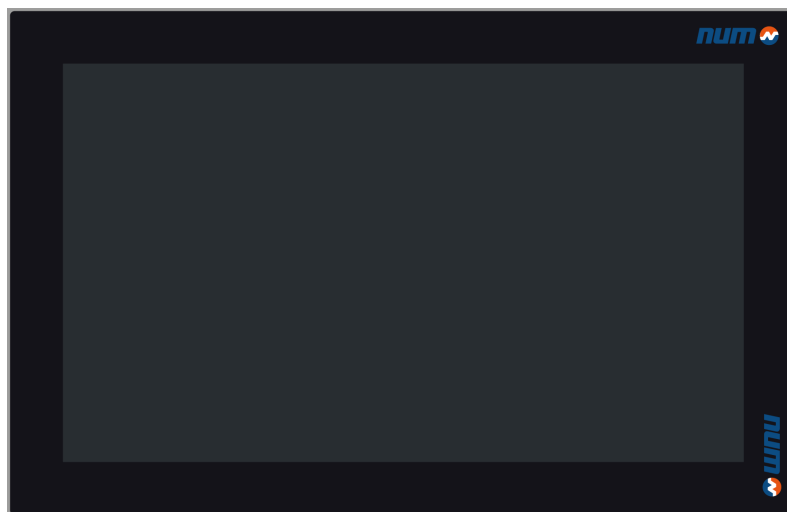
The device can be mounted in a completely closed housing, provided that the ambient temperature (in the case) is taken into account. A 20mm clearance from the housing walls must be provided on all sides in order to ensure sufficient air circulation and the fixing screw clamp mounting.

A minimum clearance of 75mm must be provided to active elements such as power supplies, transformers etc.



Prevention of overheating during operation:
- A forced airflow increases the overall reliability.

4.6 FS184 Operator panel (without integrated PC)



FS184 is a 18.5" display, glass protected, fitted with a capacitive multi-touch screen system.

Durable, modern front end for machine control.it features an IP65 degree of protection at the front, and IP20 at the rear.

It can be landscape or portrait mounted.

4.6.1 Ordering code

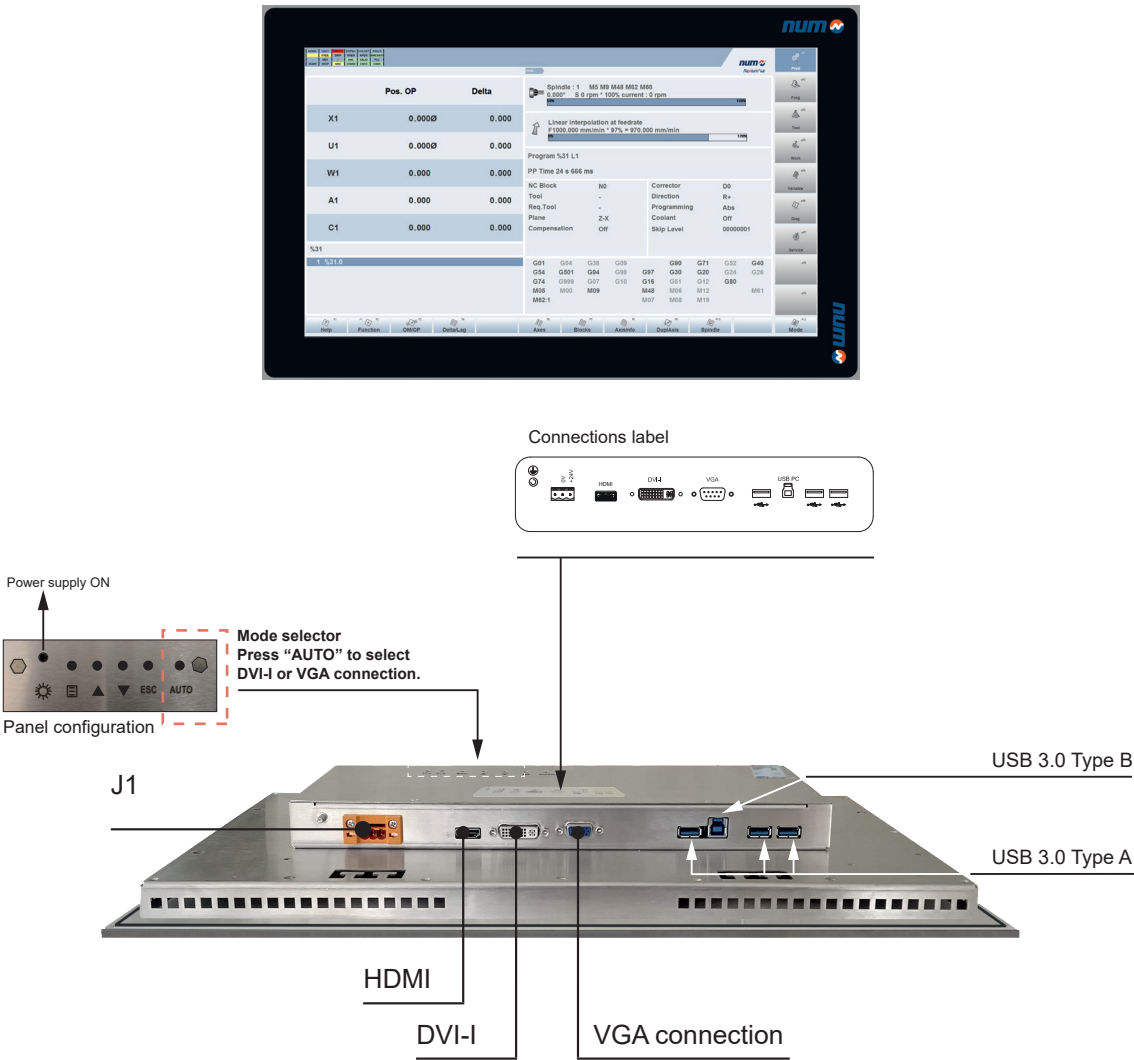
FS184 version	Ordering code
FS184 - TS	FXPC184CNNNNN00

	FXPC	18	4	C	N	N	N	N	N	0	0
Display Unit											
• LCD 18.5"		18									
Panel/Mechanical Variant											
• Fourth Generation			4								
Display Use											
• Touch Screen projective capacitive				C							
Keyboard Type											
• No keyboard, no function keys					N						
IPC Mother Board, Processor											
• No IPC, just operator panel						N					
Mass Memory Type											
• No iPC, just operator panel							N				
Option Board											
• None								N			
Fixed Value									N		
Operating System											
• No iPC, just operator panel										0	
Spare Number											0

4.6.2 Characteristics

		FXPC184CNNNNN00
Screen	User interface	Projected capacitive touch screen with glass protection
	Technology	18.5" TFT LCD (16.9 million colors)
	Resolution	1366 x 768
	Size	409.8 x 230.4mm
	Backlight	LED, Contr. 1000:1
Communication Interfaces	USB	3 x USB 3.0 Type A / 1 x USB 3.0 Type B (rear)
	DVI-I	1
	VGA Connection	1
	HDMI	1
Power Supply	Rated voltage	24VDC (+15%/-15%) SELV
	Protection against reverse polarity	Yes
	Protection against over voltage	Yes
	Potential isolation	No. (The 0V-pin of the PS is connected to the digital GND)
	Power consumption	24 W typ., max. 48 W (2 A)
Ambient Conditions	Climatic conditions operation	5..45°C, 70% rel. air humidity, non-condensing
	Climatic storage conditions	-20...60°C, 70% rel. air humidity, non-condensing
	Climatic conditions transport	-20...60°C, 90% rel. air humidity, non-condensing
Degree of Protection	Front	IP 65
	Rear	IP 20
Weight		5.3 kg
Dimensions	W x H x D	488 x 309 x 51 mm

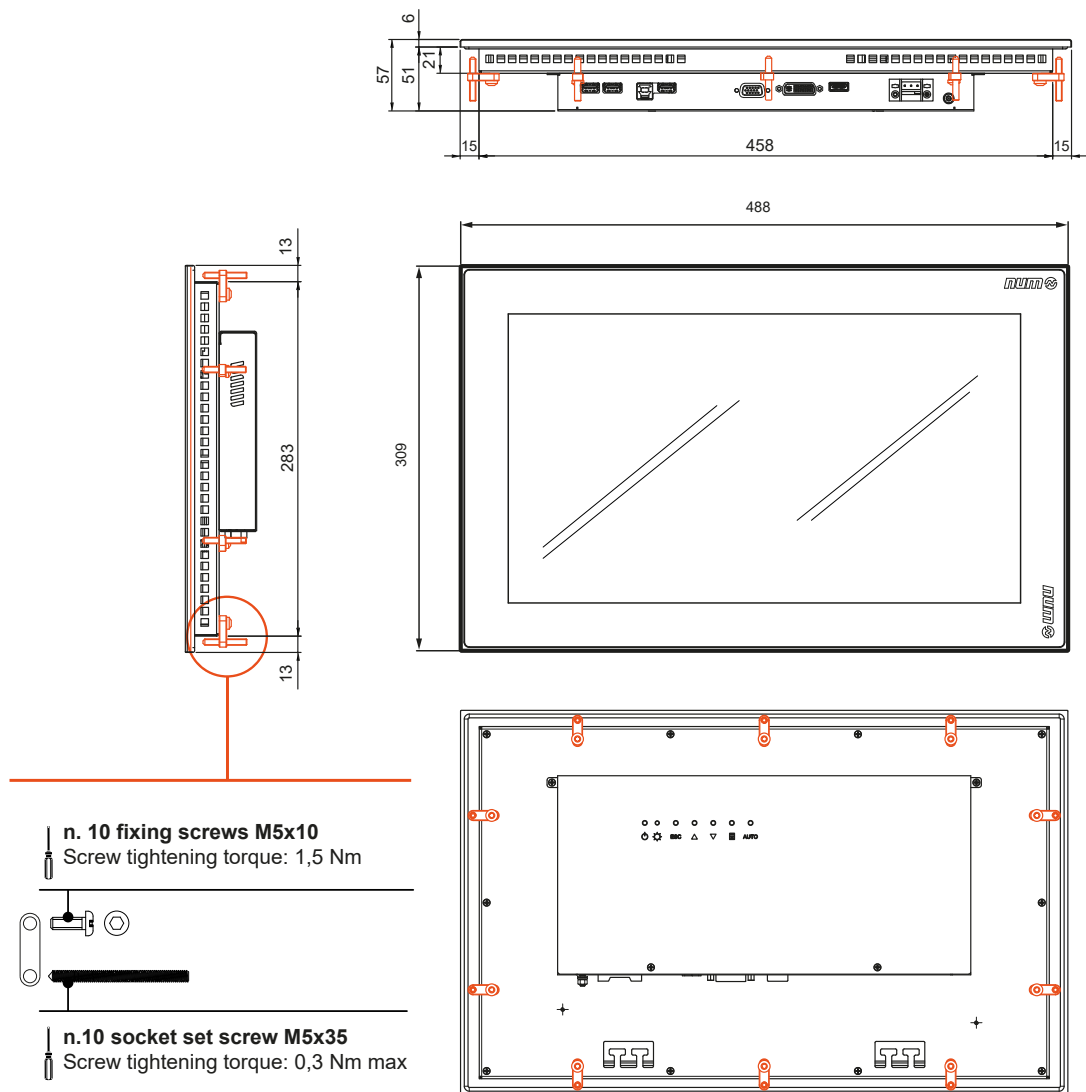
4.6.3 Module description



Connector	Type	Description
J1	3 screws pins F	Power supply connections
DVI-I	Standard DVI	Digital Video interface connection
VGA	VGA interface	Standard VGA interface connection
USB	3 x USB 3.0 Type A, 1 x USB 3.0 Type B	General user purpose. (Mouse and all USB devices) Interface to PC connections
HDMI		High-Definition Multimedia Interface

4.6.4 Overall dimensions

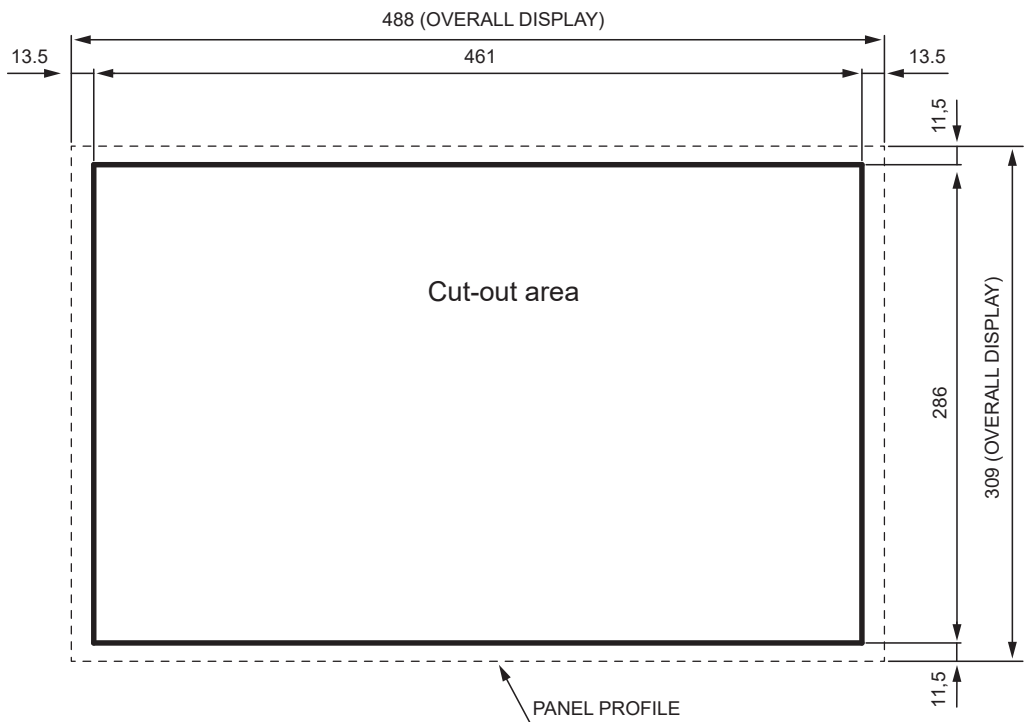
Dimensions in mm



Fixing kit, screws and brackets, for FS184 panel. Assembly to be carried out by the customer.

4.6.5 Cut-out area

Dimensions in mm



4.6.6 Diagnostics

Symptom	Possible cause and remedy
Dark screen during power-up	- Check power supply. - Check diagnostics LEDs; all three power must be lit. - No video data present; the DVI Panel switches to a safe mode.
Faults on the screen	- Rotary switch not optimally set for cable length compensation. - Check DVI cable.
Reset of the DVI Panel during operation	- Voltage drop in the power supply / touch cable too large; feed local 24V.

4.6.7 Maintenance and Repair

4.6.7.1 Repairs

Repairs to FS184 Operator panels must only be carried out by the manufacturer.
(Manufacturer address see list of NUM agencies on chapter [1.5](#))

4.6.7.2 Transport

Only the original packaging must be used for transporting the device.
The climatic conditions must be observed (see previous pages).

4.6.7.3 Storage

The device must only be stored in the climatic conditions described in the previous pages.
It should be remembered that a high storage temperature reduces the lifespan of the real time clock battery. It is recommended to store the device at room temperature.

4.6.8 Panel connections

Please refer to chapter [8.8](#) for more detailed information upon the panels connections.

4.6.9 Mounting instructions

The operator panel is installed from the front, for example, into a control cabinet. They are fixed at the rear with screw (see chapter [4.6.4](#))

The FS184 can be operated at a maximum ambient temperature of 45°C. The ambient temperature is based on the temperature of the area 5 cm.

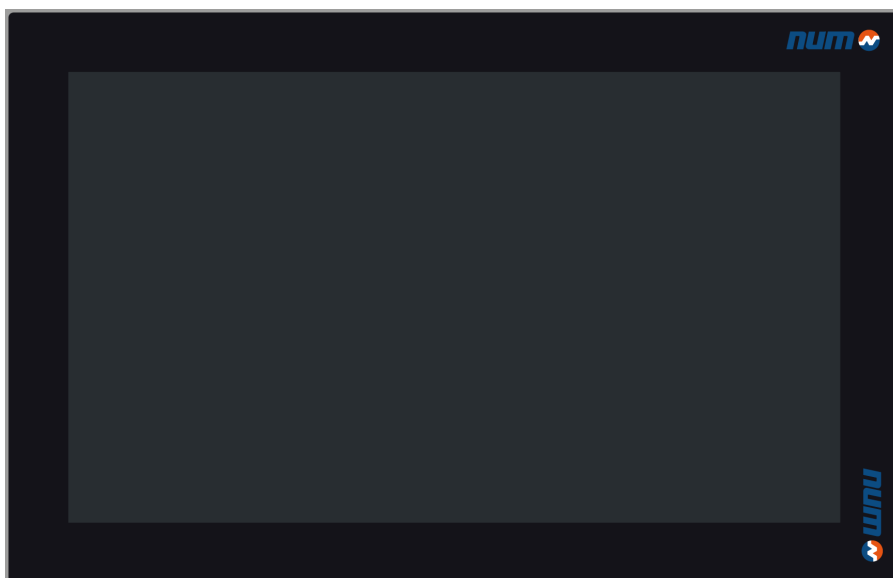
The device can be mounted in a completely closed housing, provided that the ambient temperature (in the case) is taken into account. A 20mm clearance from the housing walls must be provided on all sides in order to ensure sufficient air circulation.

A minimum clearance of 75mm must be provided to active elements such as power supplies, transformers etc



Prevention of overheating during operation:
- A forced airflow increases the overall reliability.

4.7 FS244 Operator panel (without integrated PC)



FS244 is a 24" display, glass protected, fitted with a capacitive multi-touch screen system.

Durable, modern front end for machine control. It features an IP65 degree of protection at the front, and IP20 at the rear.

It can be landscape or portrait mounted.

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4.7.1 Ordering code

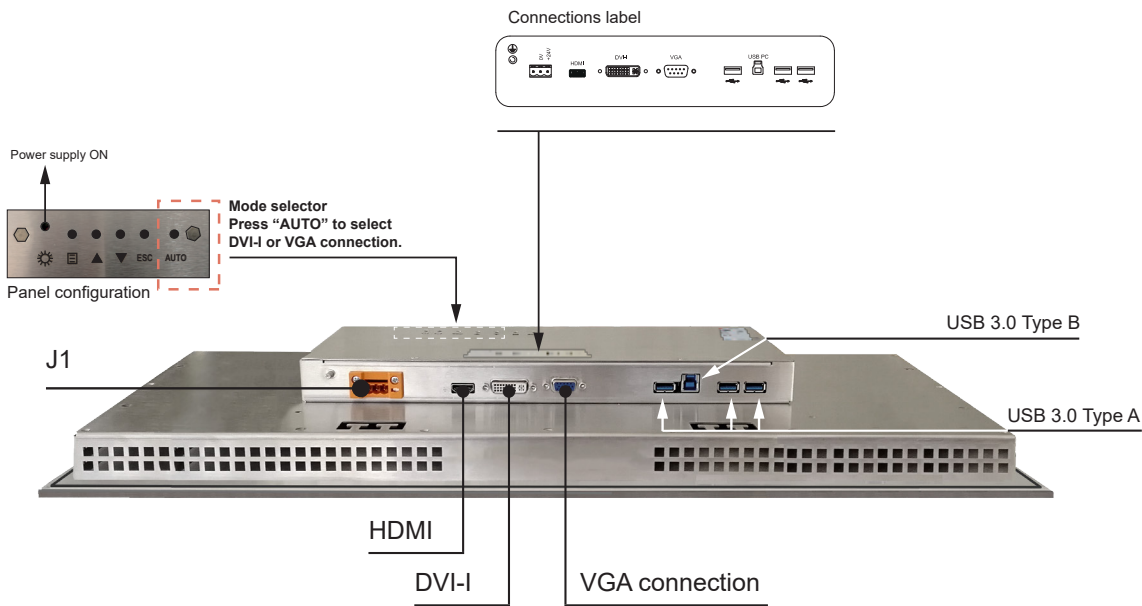
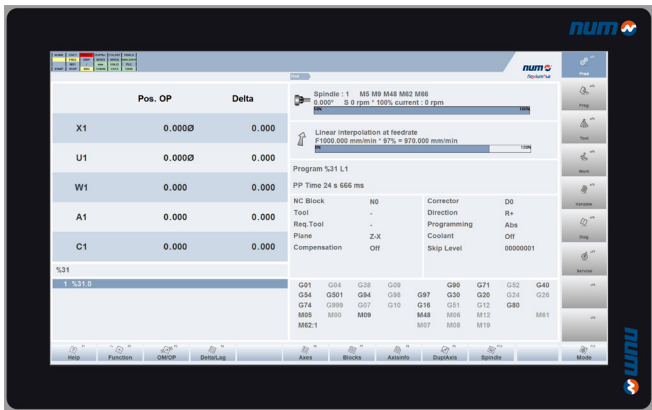
FS244i version	Ordering code
FS244 - TS	FXPC244CNNNNN00

	FXPC	24	4	C	N	N	N	N	N	0	0
Display Unit											
• LCD 24"		24									
Panel/Mechanical Variant											
• Fourth Generation			4								
Display Sensor											
• Touch Screen projective capacitive				C							
Keyboard Type											
• No keyboard, no function keys					N						
IPC Mother Board, Processor											
• No IPC, just operator panel						N					
Mass Memory Type											
• No IPC, just operator panel							N				
Option Board											
• None								N			
Fixed Value									N		
Operating System											
• No IPC, just operator panel										0	
Spare Number											0

4.7.2 Characteristics

		FXPC244CNNNNN00
Screen	User interface	Projected capacitive touch screen with glass protection
	Technology	24" TFT LCD (16.9 million colors)
	Resolution	1920 x 1080
	Size	531.3 x 298.8mm
	Backlight	LED, Contr. 5000:1
Communication Interfaces	Ethernet (ETH)	3 x Gigabit LAN / RTE
	USB	3 x USB 3.0 Type A / 1 x USB 3.0 Type B (rear)
	DVI-I	1
	VGA Connection	1
	HDMI	1
Power Supply	Rated voltage	24VDC (+15%/-15%) SELV
	Protection against reverse polarity	Yes
	Protection against over voltage	Yes
	Potential isolation	No. (The 0V-pin of the PS is connected to the digital GND)
	Power consumption	28 W typ., max. 60 W (2.5 A)
Ambient Conditions	Climatic conditions operation	5..45°C, 70% rel. air humidity, non-condensing
	Climatic storage conditions	-20...60°C, 70% rel. air humidity, non-condensing
	Climatic conditions transport	-20...60°C, 90% rel. air humidity, non-condensing
Degree of Protection	Front	IP 65
	Rear	IP 20
Weight		7,5 kg
Dimensions	W x H x D	621.5 x 389 x 56 mm

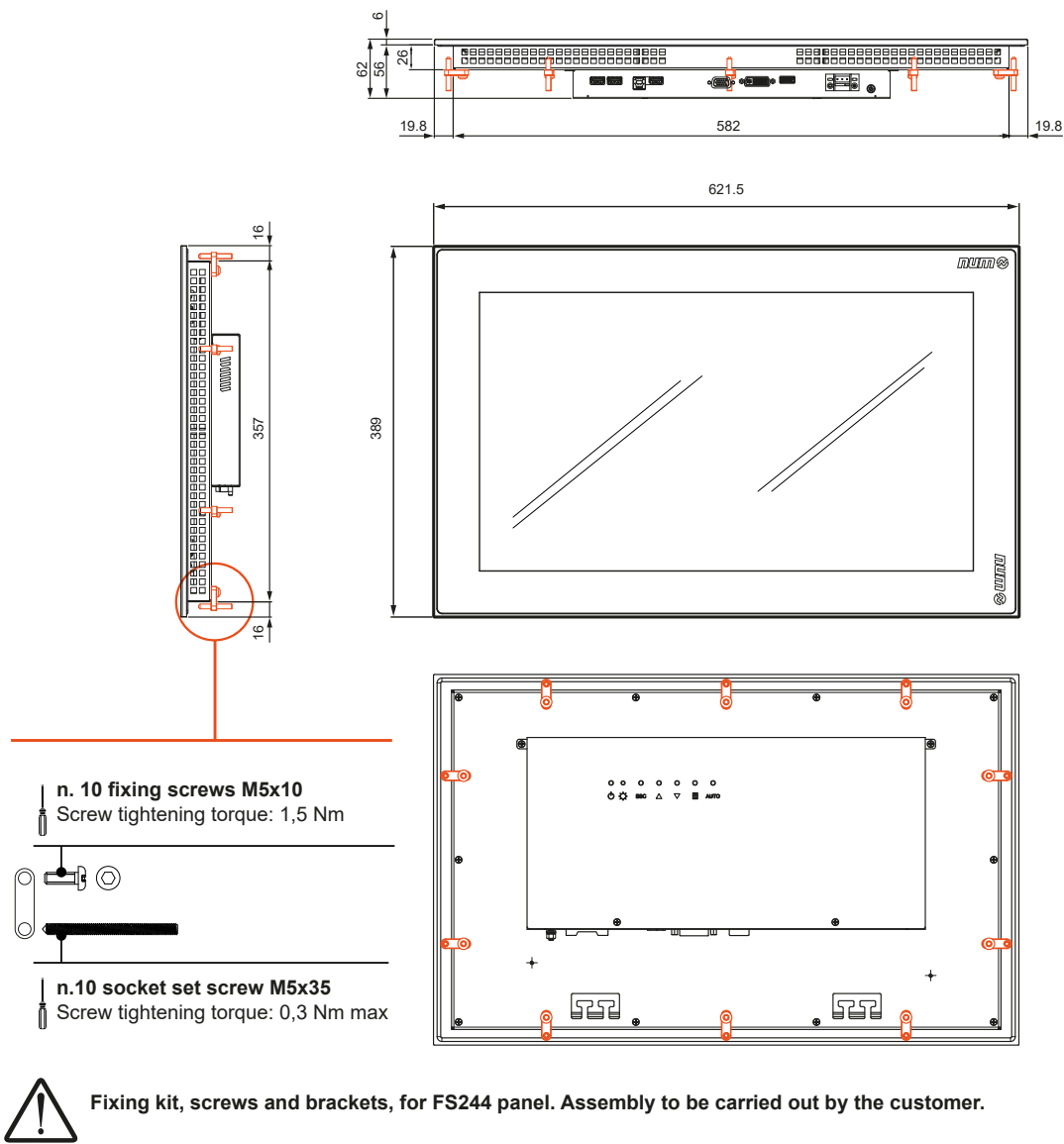
4.7.3 Module description



Connector	Type	Description
J1	3 screws pins F	Power supply connections
DVI-I	Standard DVI	Digital Video interface connection
VGA	VGA interface	Standard VGA interface connection
USB	3 x USB 3.0 Type A, 1 x USB 3.0 Type B	General user purpose. (Mouse and all USB devices) Interface to PC connections
HDMI		High-Definition Multimedia Interface

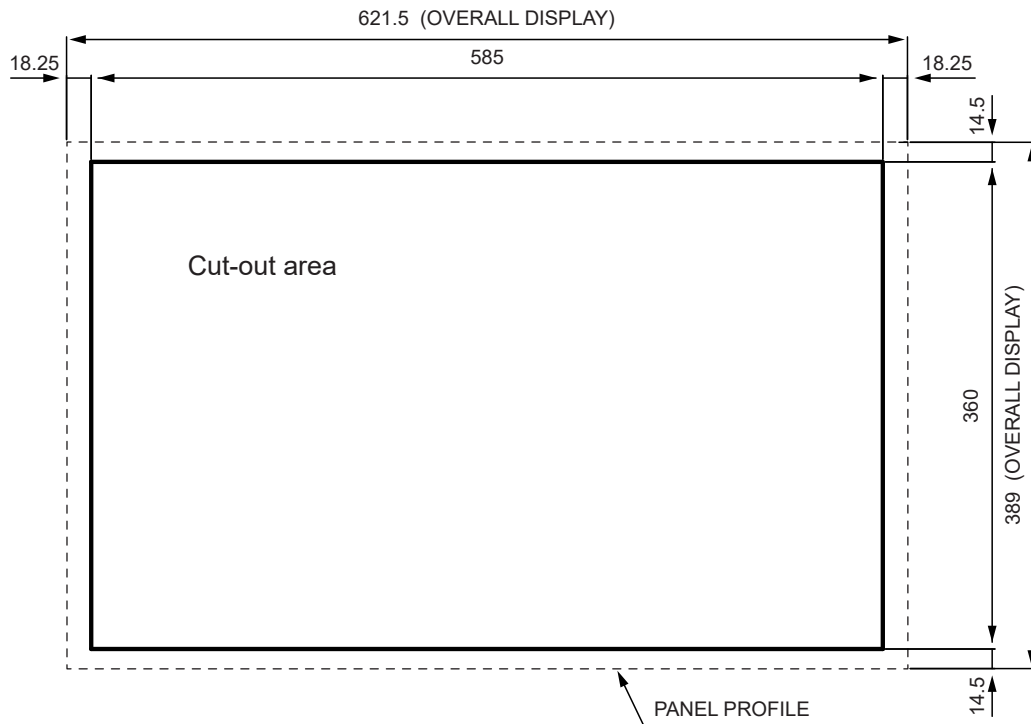
4.7.4 Overall dimensions

Dimensions in mm



4.7.5 Cut-out area

Dimensions in mm



4.7.6 Diagnostics

Symptom	Possible cause and remedy
Dark screen during power-up	- Check power supply. - Check diagnostics LEDs; all three power must be lit. - No video data present; the DVI Panel switches to a safe mode.
Faults on the screen	- Rotary switch not optimally set for cable length compensation. - Check DVI cable.
Reset of the DVI Panel during operation	- Voltage drop in the power supply / touch cable too large; feed local 24V.

4.7.7 Maintenance and Repair

4.7.7.1 Repairs

Repairs to FS244 Operator panels must only be carried out by the manufacturer.
(Manufacturer address see list of NUM agencies on chapter 1.5)

4.7.7.2 Transport

Only the original packaging must be used for transporting the device.
The climatic conditions must be observed (see previous pages).

4.7.7.3 Storage

The device must only be stored in the climatic conditions described in the previous pages.
It should be remembered that a high storage temperature reduces the lifespan of the real time clock battery. It is recommended to store the device at room temperature.

4.7.8 Panel connections

Please refer to chapter 8.8 for more detailed information upon the panels connections.

4.7.9 Mounting instructions

The operator panel is installed from the front, for example, into a control cabinet. They are fixed at the rear with screw (see chapter 4.7.4)

The FS244 can be operated at a maximum ambient temperature of 45°C. The ambient temperature is based on the temperature of the area 5 cm.

The device can be mounted in a completely closed housing, provided that the ambient temperature (in the case) is taken into account. A 10mm clearance from the housing walls must be provided on all sides in order to ensure sufficient air circulation.

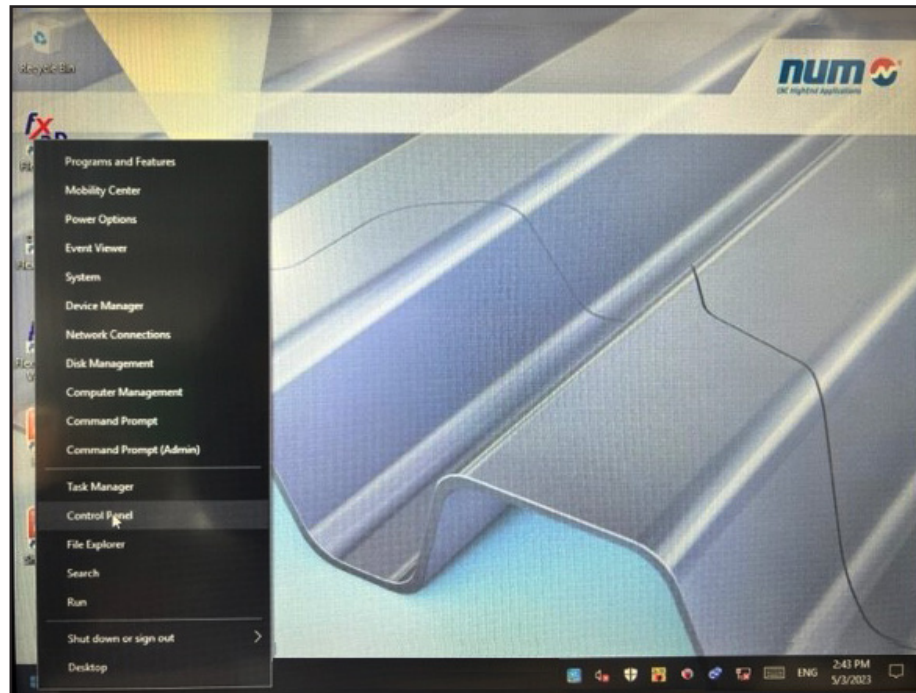
A minimum clearance of 75mm must be provided to active elements such as power supplies, transformers etc.



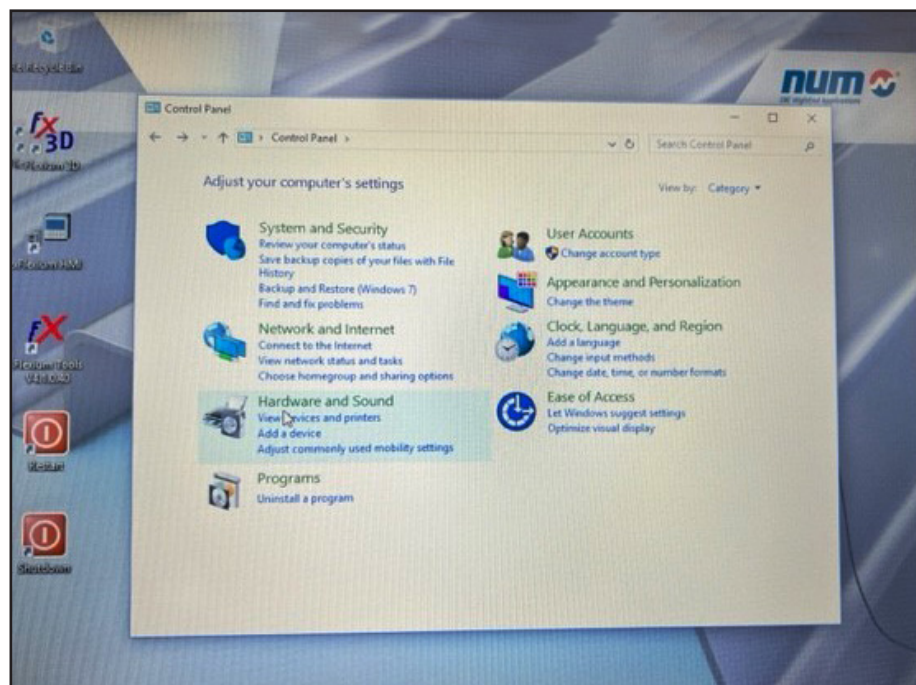
Prevention of overheating during operation:
- A forced airflow increases the overall reliability.

4.8 How to calibrate the touch screen in Windows 10, 8.1, 8 or 7

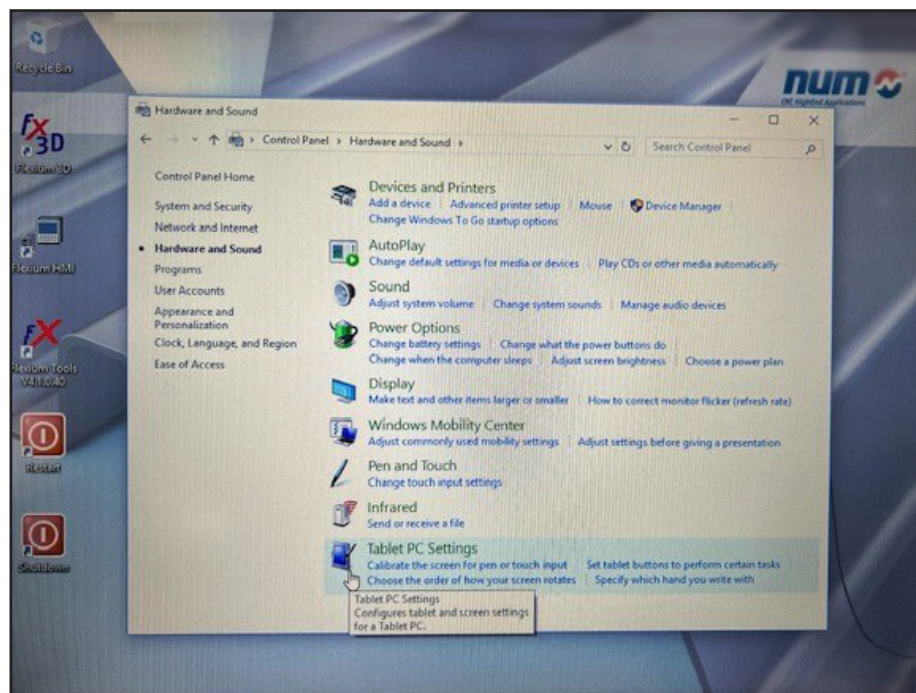
1. Open **Control Panel**



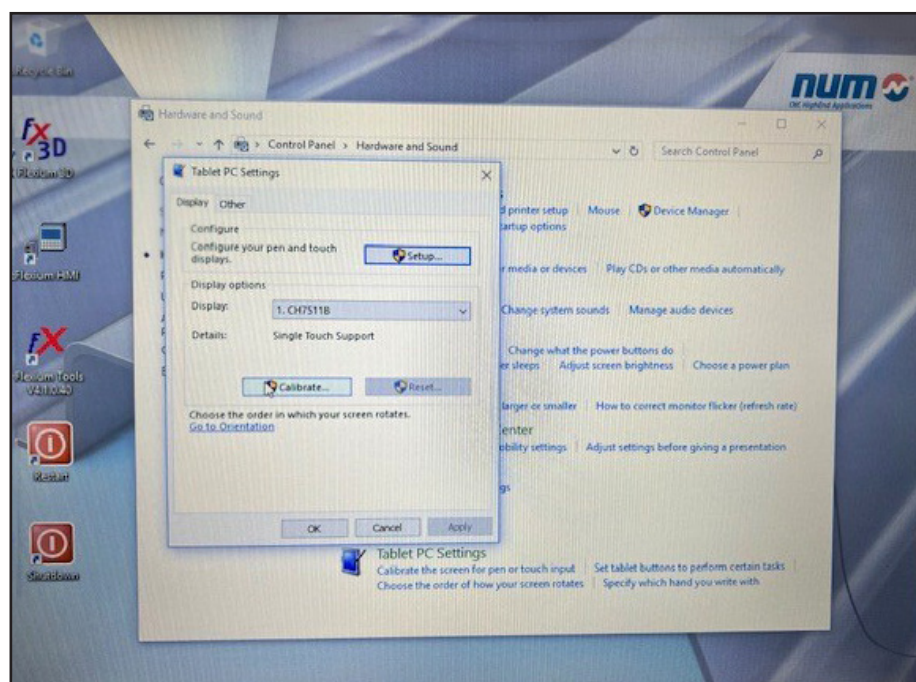
2. Click **Hardware and Sound**.



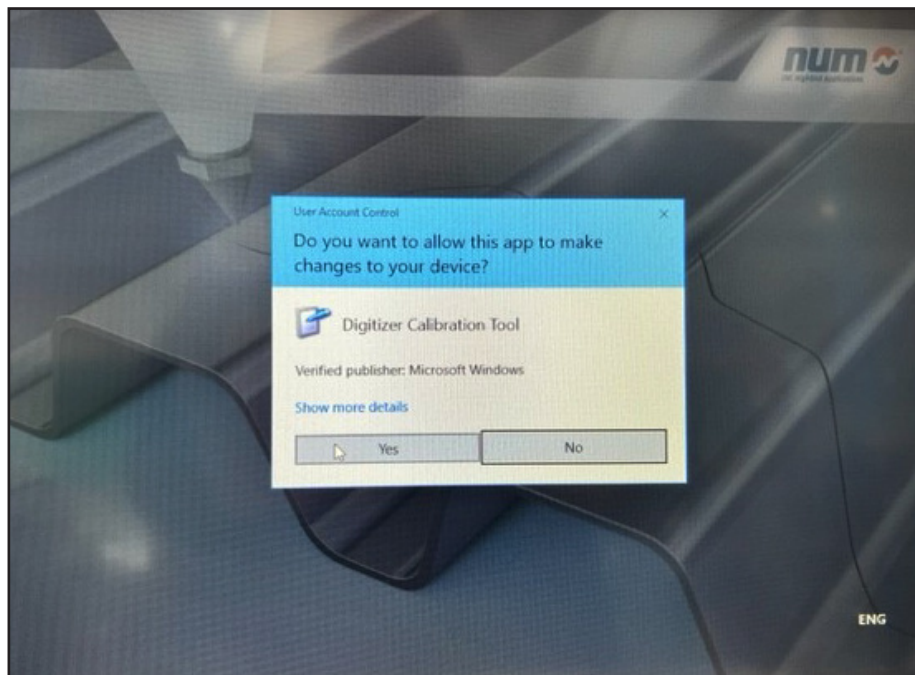
3. Under **Tablet PC Settings**, click the **Calibrate the screen for pen or touch input**.



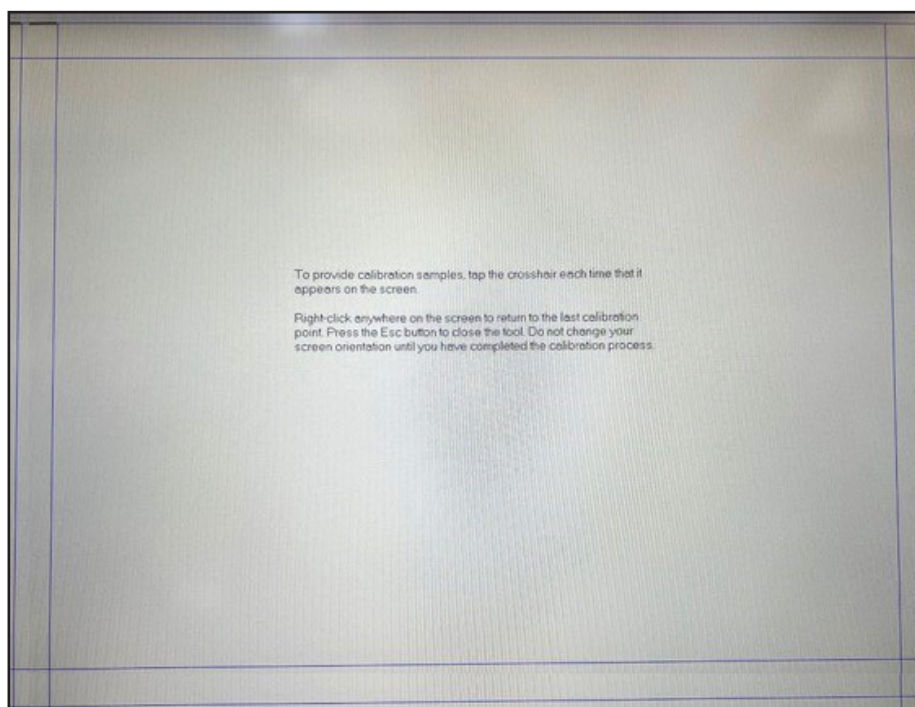
4. In the **Tablet PC Settings** windows, click the **Calibrate**.



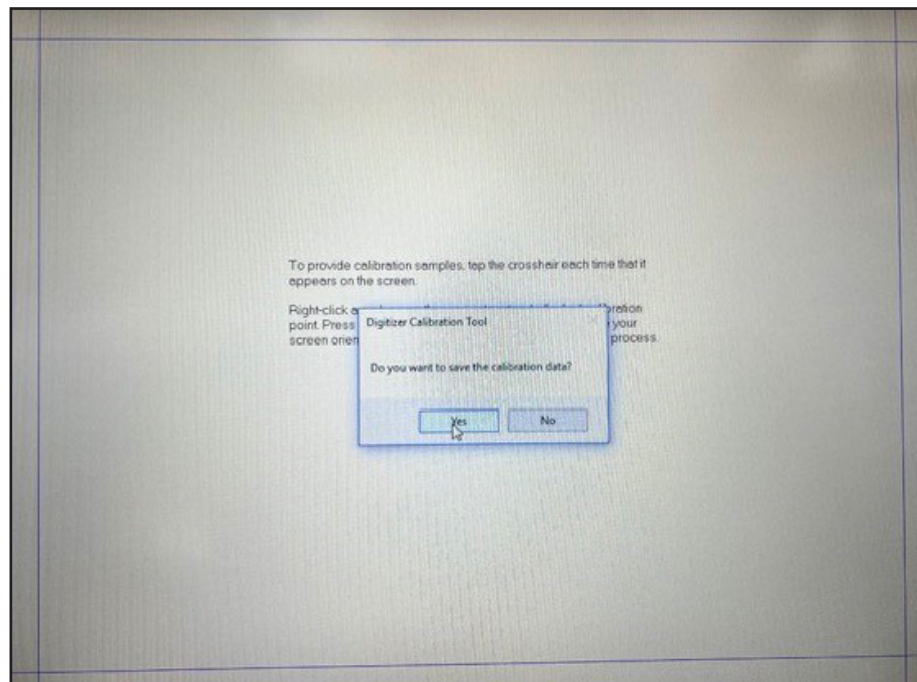
5. Select **Touch input** and **Calibrate**



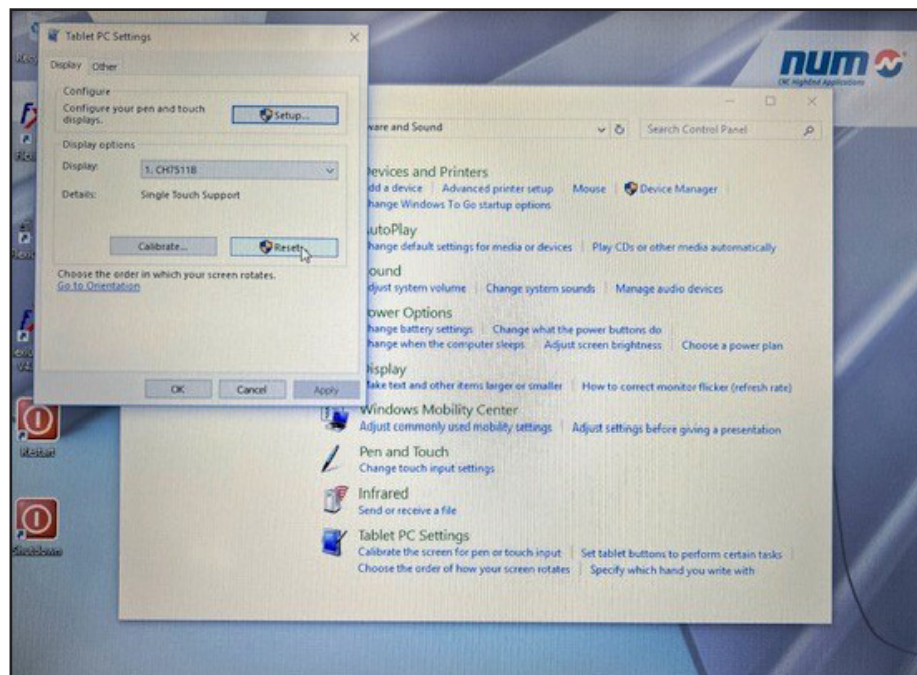
6. In the white screen, tap the crosshair each time it appears on the screen, and do not change the resolution during this process.



7. Click **Yes** when you are prompted to save the calibration data.

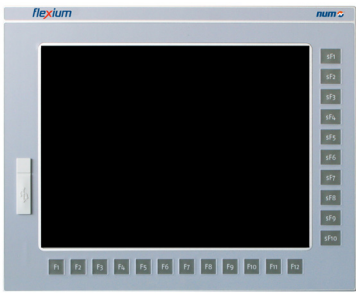
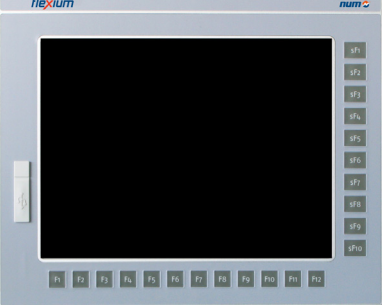


8. Click **OK** to confirm. If you want repeat the complete procedure, please push **Reset**



4.9 USB QWERTY keyboard (Horizontal and Vertical external keyboard)

4.9.1 General characteristics

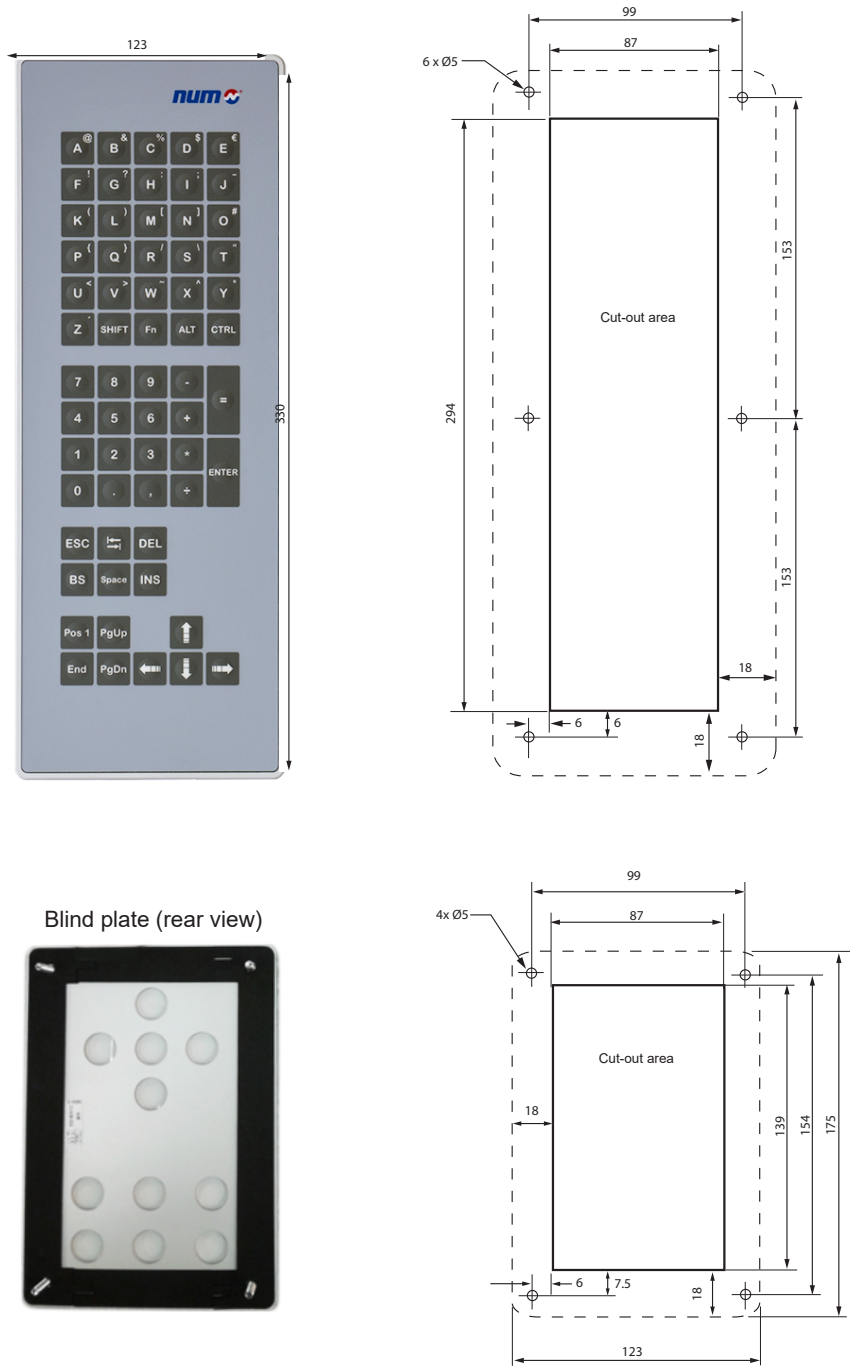
Keyboard	FXHE000248 (Vertical keyboard)	FXHE000249 (Horizontal keyboard)
Main keyboard features	62 keys with mechanic key under membrane	100 keys with mechanic key under membrane
	1 USB V2.0 Type A	1 USB V2.0 Type A
	Front keyboard in polyester - IP65	Front keyboard in polyester - IP65
	Outer Dimensions : 123mm x 330mm	Outer Dimensions : 410mm x 160mm
	Fixing nr. 6 pins M4x18	Fixing nr. 10 pins M4x18
	Weight with blind plate: 0.8kg	Weight: 1.3kg
	Design adapted for FS153 panels and MP06 machine panels (410mm x 330mm). See next pages.	
FS153 Panels  USB keyboard  Machine panel MP06  Blind plate 		FS153 Panels  USB keyboard 

The vertical keyboard is always completed by a blind plate with location for 11 push buttons under membrane.

4.9.2 Installation of the keyboards

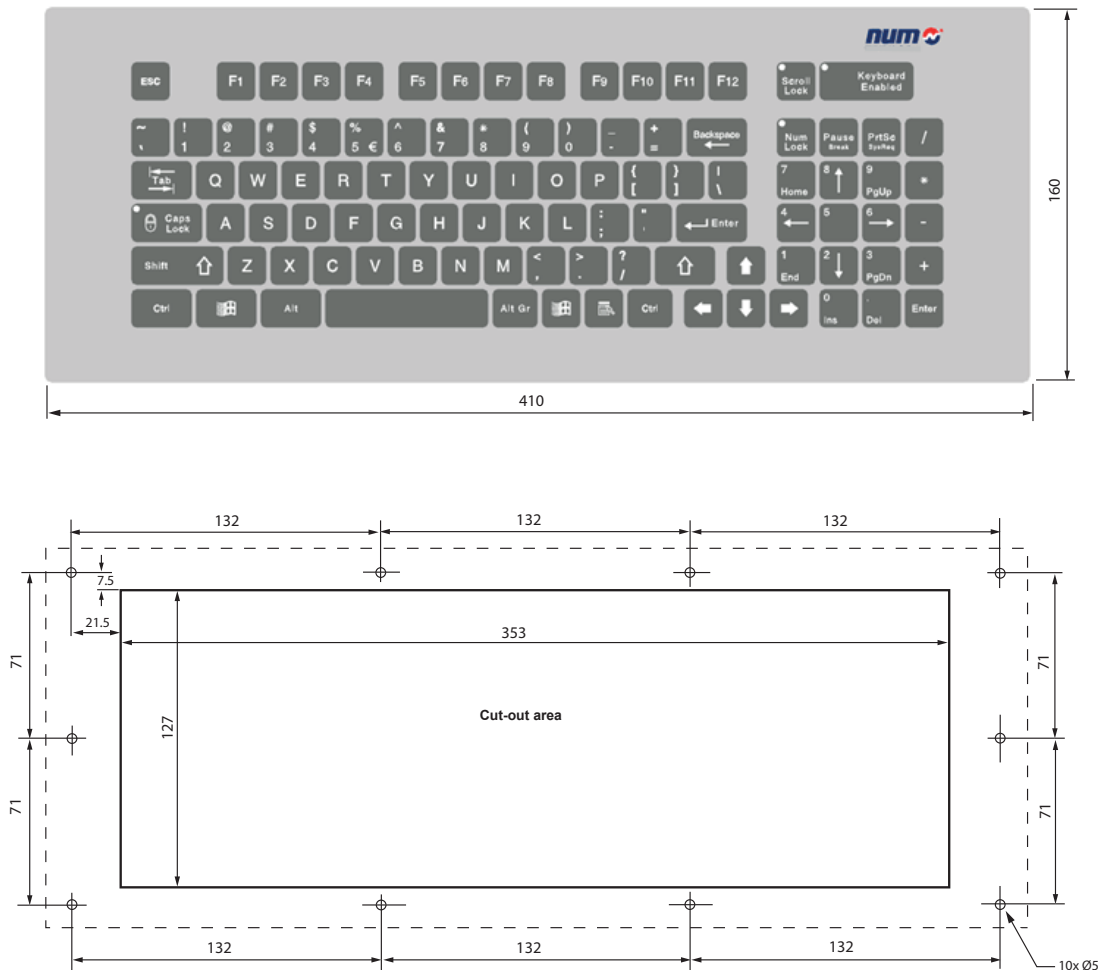
4.9.2.1 Vertical keyboard overall dimensions, hole pattern and cut-out area

Dimensions in mm



4.9.2.2 Horizontal keyboard overall dimensions, hole pattern and cut-out area

Dimensions in mm



4.9.3 USB keyboard connections

Please refer to chapter [8.10](#) for more detailed information upon the USB keyboards connections.

4.9.4 Mounting instruction

The USB keyboard can be operated at a maximum ambient temperature of 45°C. The ambient temperature is based on the temperature of the area 5 cm above the panel with the device horizontal mounting at a height of 2000 m above sea level.

The device can be mounted in a completely closed housing, provided that the ambient temperature (in the case) is taken into account. A 10mm clearance from the housing walls must be provided on all sides in order to ensure sufficient air circulation.

A minimum clearance of 75mm must be provided to active elements such as power supplies, transformers etc.

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5 FlexiumPro Panels MP - Machine panel

5.1 MP06 and MP06_M Machine panel

5.1.1 MP06

MP06 Machine panel is used for control of manual movements, production initiation and intervention during machining and it is available with / without handwheel.

Four versions are available as indicated in the following sections.

MP06 is designed to fit FS154i / FS153 operator panel dimensions..

MP06 includes:

- 60 configurable buttons with blue LEDs
- 2 Overrides potentiometers or selectors for spindle speed and feed rate
- 1 Handwheel (as optional)
- 1 Emergency stop button
- 1 Three-position key switch
- 3 Dedicated buttons: Reset (white LED) Cycle Stop (Red LED), Cycle Start (green LED)
- 2 Dedicated LEDs for EtherCAT state: RUN and ERROR
- 12 digital inputs and 12 digital outputs on the back



MP06 with key button caps

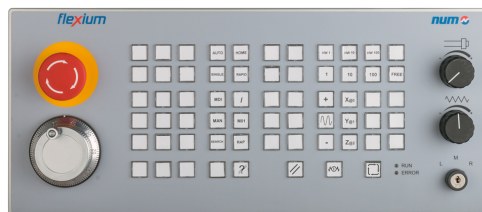
5.1.2 MP06_M

MP06_M the button caps are substituted by a membrane that cover all the machine panel. The customization of the button icon is possible inserting them from the back.



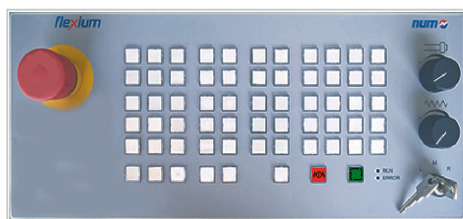
MP06_M with with a membrane that covers all MP06

5.1.3 Machine panel options



Machine Panel MP06-H (with handwheel)

- EtherCAT interface
- 63 free configurable buttons with LEDs
- With potentiometers or selectors
- Handwheel
- Same width as FS154i/FS153



Machine Panel MP06-W (without handwheel)

- EtherCAT interface
- 63 free configurable buttons with LEDs
- With potentiometers or selectors
- Same width as FS154i/FS153

5.1.4 Ordering code

MP06 version	Ordering code
Machine Panel MP06–W without handwheel and potentiometers	FXHE02ARE1WE000
Machine Panel MP06–H with handwheel and potentiometers	FXHE02ARE1HE000
Machine Panel MP06–W without handwheel and selectors	FXHE02ARE2WE000
Machine Panel MP06–H with handwheel and selectors	FXHE02ARE2HE000

MP06_M version	
Machine Panel MP06–W without handwheel and potentiometers	FXHE02AME1WE000
Machine Panel MP06–H with handwheel and potentiometers	FXHE02AME1HE000
Machine Panel MP06–W without handwheel and selectors	FXHE02AME2WE000
Machine Panel MP06–H with handwheel and selectors	FXHE02AME2HE000

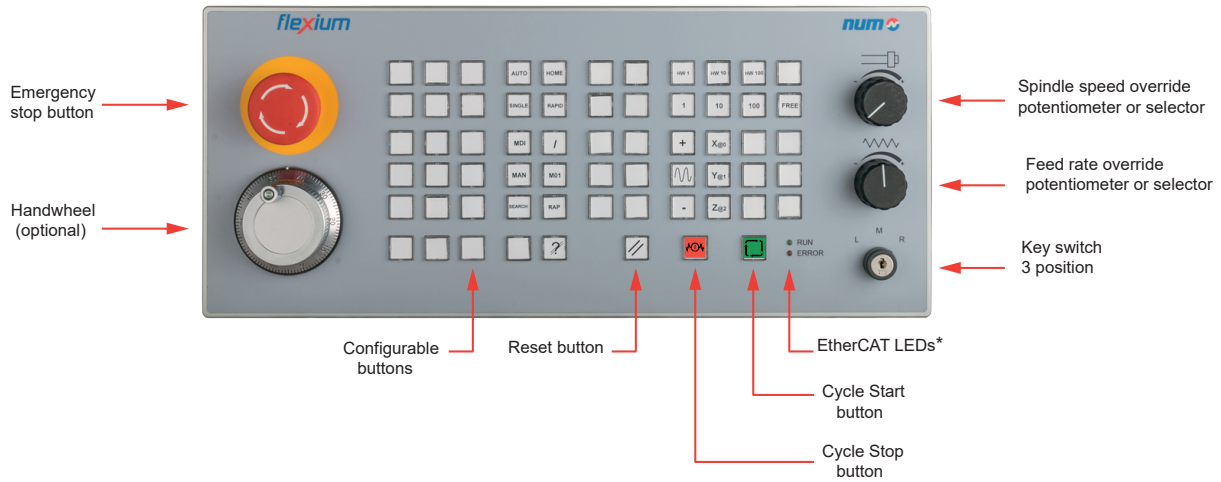
	FXHE	02	A		R	E	1	H	E	0	0	0
Index / Mechanical variant												
• MP06 (x FS154i / FS153)		02										
Integrated I/Os												
• 12 digital inputs and 12 digital outputs			A									
Keys number and technology												
• 63 x keys with real switches and button caps				R								
• 63 x keys with real switches and membrane				M								
Buttons number and technology												
• 63 x buttons with real switches				M	R							
Safety functions												
• E-STOP + 3 positions key switch						E						
Override feedrate and spindle												
• 2 potentiometers							1					
• 2 selectors with mechanical indexing							2					
Handwheel												
• None								W				
• Handwheel								H				
Connections Technology												
• EtherCAT									E			
Spare Number										0		
Spare Number											0	
Spare Number												0

5.1.5 Characteristics

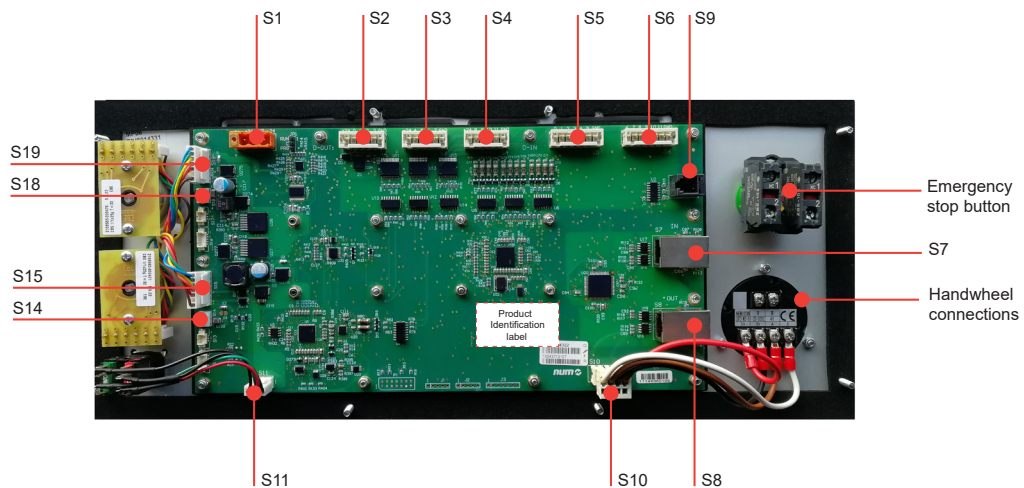
MP06 MP06_M		FXHE02ARE1WE000 FXHE02AME1WE000	FXHE02ARE1HE000 FXHE02AME1HE000	FXHE02ARE2WE000 FXHE02AME2WE000	FXHE02ARE2HE000 FXHE02AME2HE000
Interfaces	Communication interface	Standard EtherCAT 2xRj45			
	Handwheel input	1 input for 5 VDC handwheel with A & B push-pull signal connected to handwheel when present.			
	Key switch	1 key switch with 3 positions			
	Potentiometers	2 potentiometers 10 kOhm, 8 Bit resolution (For spindle speed and feed rate override)		Not present	
	Selectors	Not present		2 switch selectors with 25 positions	
	Handwheel	Not present	Yes (100 Pulse per rev.)	Not present	Yes (100 Pulse per rev.)
	Emergency stop	1			
Push buttons	Free configurable	60 buttons with mechanical switches with LEDs			
	Cycle start, cycle stop and reset	3 buttons with mechanical switches with LEDs			
Digital inputs	Digital inputs	12 organized in 2 groups of terminals			
	Operating voltage	24V –15% / +10%			
	Logic 0 / Logic 1	0 < 6 VDC (<= 3mA) 1 > 10 VDC up to 30 VDC (5 mA up to 15 mA)			
	Reaction time	8ms typical (debounced)			
Digital outputs	Digital outputs	12 organized in 3 groups of terminals			
	Operating voltage	24V –15% / +10%			
	Rated current	500 mA maximum per output			
	Outputs simultuneously active	100%			
	Protection	Short-circuit and permanent overloads (trip device)			
Power supply	Rated voltage	24VDC SELV, safety extra low voltage. Protection class III /1A			
	Voltage range	24VDC +20% -15% supplied by the customer.			
	Protection against reverse polarity	Yes			
	Protection against over voltage	Yes			
	Potential isolation	No. (The 0V-pin of the PS is connected to the digital GND)			
	Power consumption	15W max			
Ambient conditions	Climatic conditions operation	0..45°C, 70% rel. air humidity, non-condensing			
	Climatic conditions storage	-40...60°C, 70% rel. air humidity, non-condensing			
	Climatic conditions, transport	-20...60°C, 70% rel. air humidity, non-condensing			
Degree of protection	Front	IP 65			
	Rear	IP 00			
Weight		1.2 kg	1.4 kg	1.2 kg	1.4 kg
Dimensions	W x H x D:	410 x 175 x 55 mm			

5.1.6 Machine panel description

MP06 Machine Panels front view



MP06 Machine Panels rear view

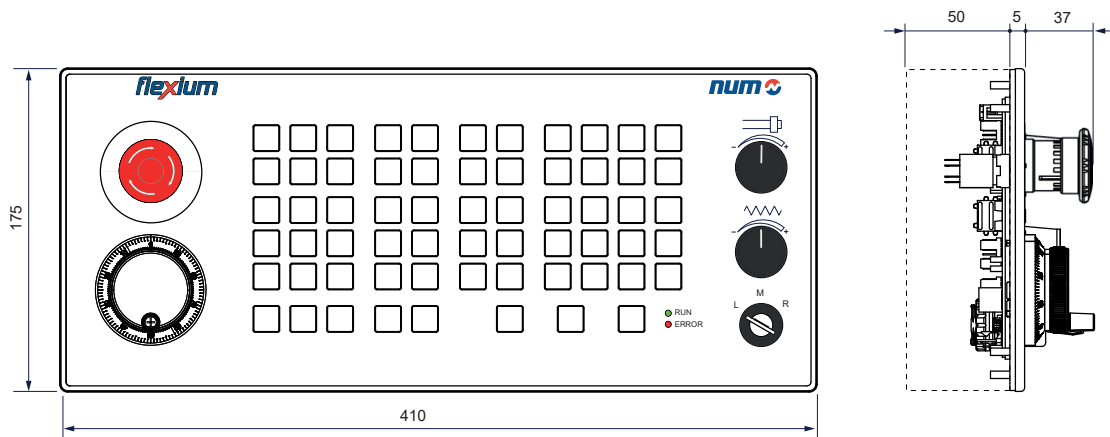


* see chapter [5.1.12](#)

Connector	Type	Description
S1	3 screws pins F	Power supply connection
S2, S3, S4	6 pins spring-loaded terminal	12 Digital outputs connection
S5, S6	7 pins spring-loaded terminal	12 Digital inputs connection
S7, S8	Rj45 connector	EtherCAT IN / OUT connection
S9	Rj11 connector	Service NUM only
S10	4 pins terminal	Handwheel connection
S11	4 pins terminal	Key switch connection
S14, S18	3 pin spring-loaded terminal	Potentiometers connection
S15, S19	7 pin spring-loaded terminal	Rotary switches connection

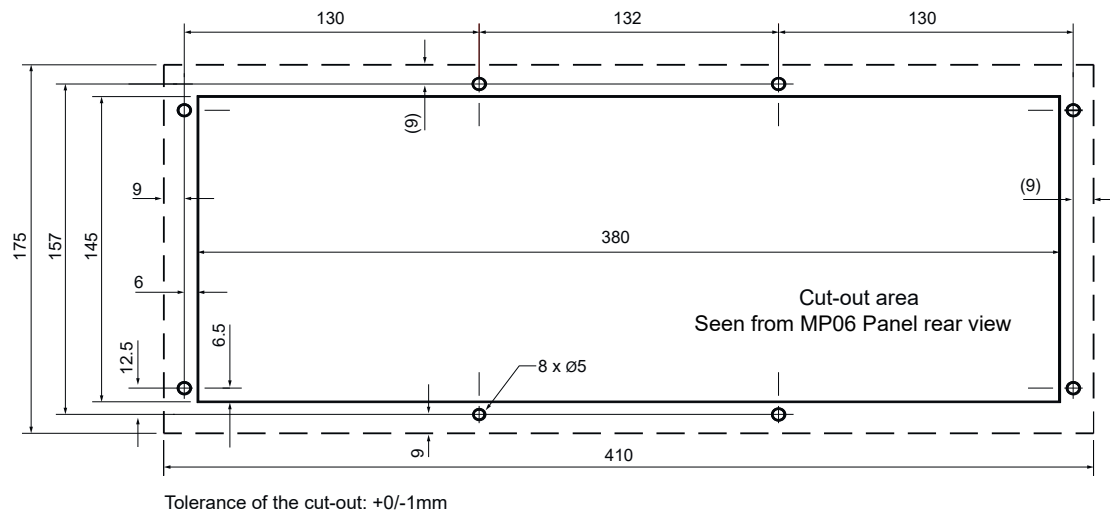
5.1.7 MP06 Overall dimensions

Dimensions in mm



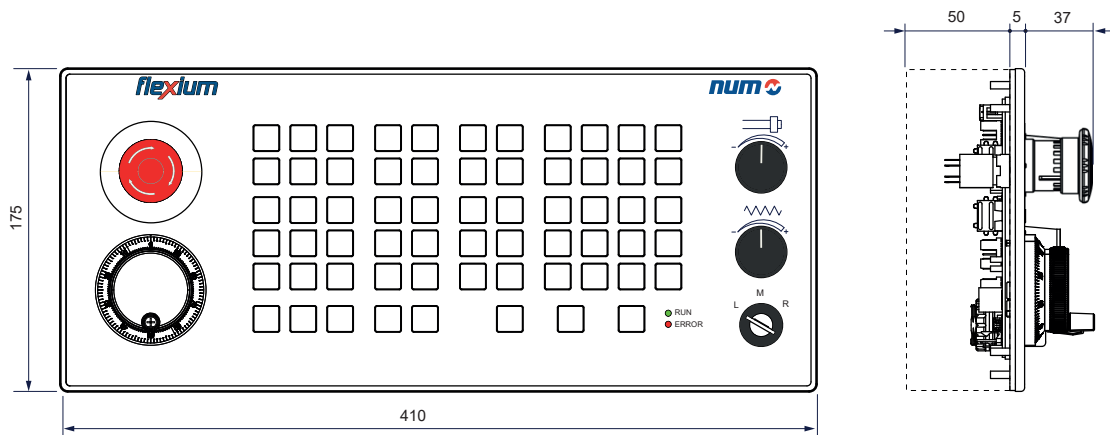
5.1.8 MP06 Cut-out area and hole pattern

Dimensions in mm



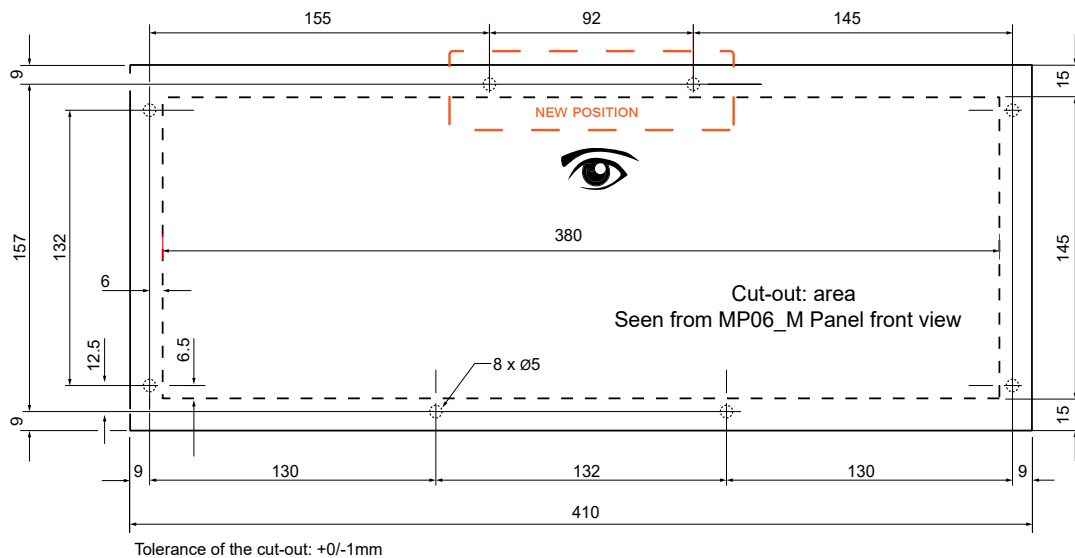
5.1.9 MP06_M Overall dimensions

Dimensions in mm



5.1.10 MP06_M Cut-out area and hole pattern

Dimensions in mm



5.1.11 PLC configuration

Please refer to FlexiumPro Commissioning manual M00071.

5.1.12 Diagnostics

5.1.12.1 EtherCAT RUN indicator state

Indicator state	Slave State	Description
OFF	INITIALISATION	The device is in state INIT
Blinking	PRE-OPERATIONAL	The device is in state PRE-OPERATIONAL
Single flash	SAFE-OPERATIONAL	The device is in state SAFE-OPERATIONAL
ON	OPERATIONAL	The device is in state OPERATIONAL

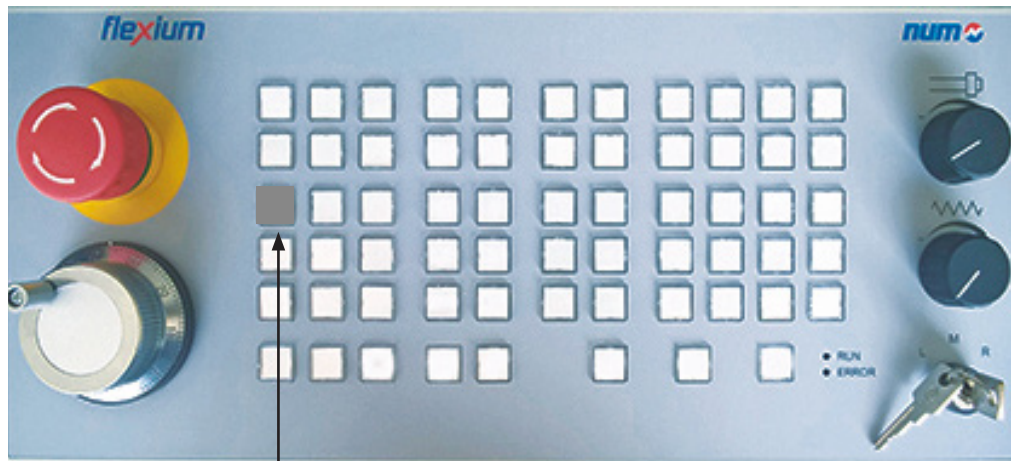
5.1.12.2 EtherCAT ERROR indicator state

Indicator state	ERROR Name	Description	Example
ON	Application controller failure	An critical communication or application controller error has occurred.	Application controller is not responding any more (PDI Watchdog Timeout detected by ESC)
n Flashes	Reserved	Reserved for future use	-
Triple Flash	Reserved	Reserved for future use	-
Double Flash	Processor Data Watchdog Timeout / EtherCAT Watchdog Timeout	An application watchdog timeout has occurred	Sync Manager Watchdog timeout
Single Flash	Local Error	Slave device application has changed the EtherCAT state autonomously, due to local error (see ETG.1000 part 6 EtherCAT State Machine). Error indicator bit is set to 1 in AL Status register.	Device changes its EtherCAT state from Op to SafeOpError due to a synchronization error.
Blinking	Invalid configuration	General Configuration Error.	State change commanded by master is impossible due to register or object settings, or invalid hardware configuration (pin sharing violation detected by ESC).
Flickering	Booting Error	Bootin Error was detected. INIT state reached, but Error indicator bit setto 1 in AL Status register.	Checksum error in Application controller flash memory.
OFF	No Error	The EtherCAT communication of the device is in working condition.	

5.1.12.3 Test program

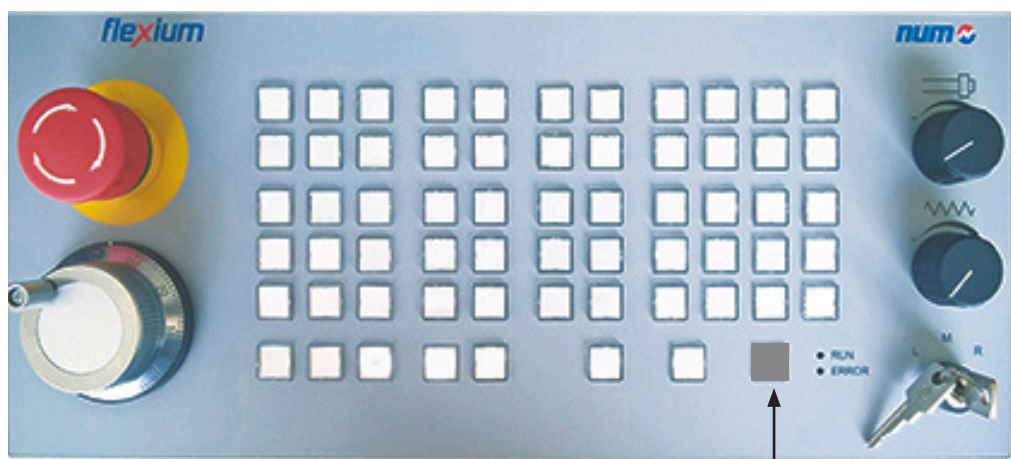
The MP06 has an integrated test program to test the LEDs, the keys, the potentiometers, the handwheel, the IOs and the firmware.

1. Switch off the power of the MP06.
2. Press the button “*Start test*”, hold it depressed and switch power on.
After 250ms the test procedure starts. The “*Start test*” button may now be released.



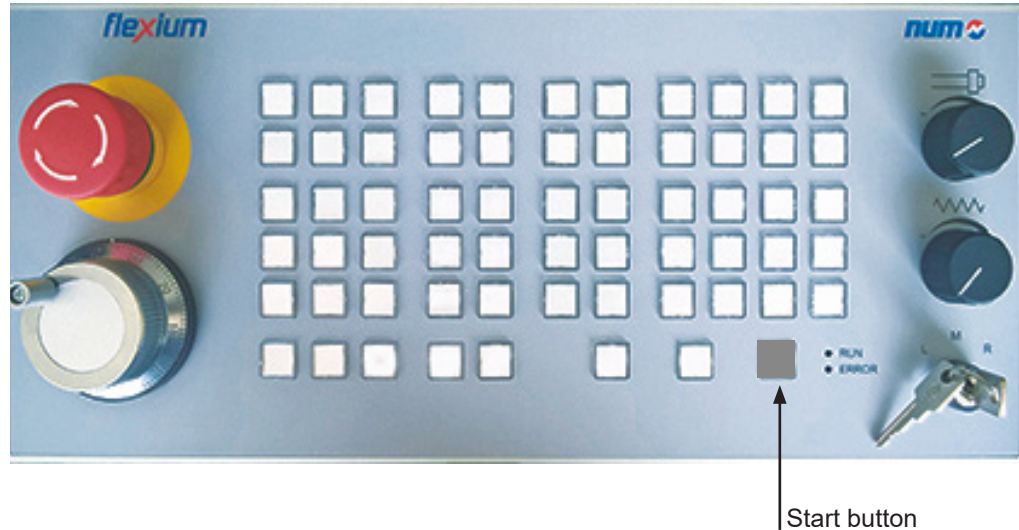
Start test button

3. All LEDs will light up for 250ms one after another. So the function of the LEDs can be checked. After completion of this test, the LED of the “*Start*” button will flash.

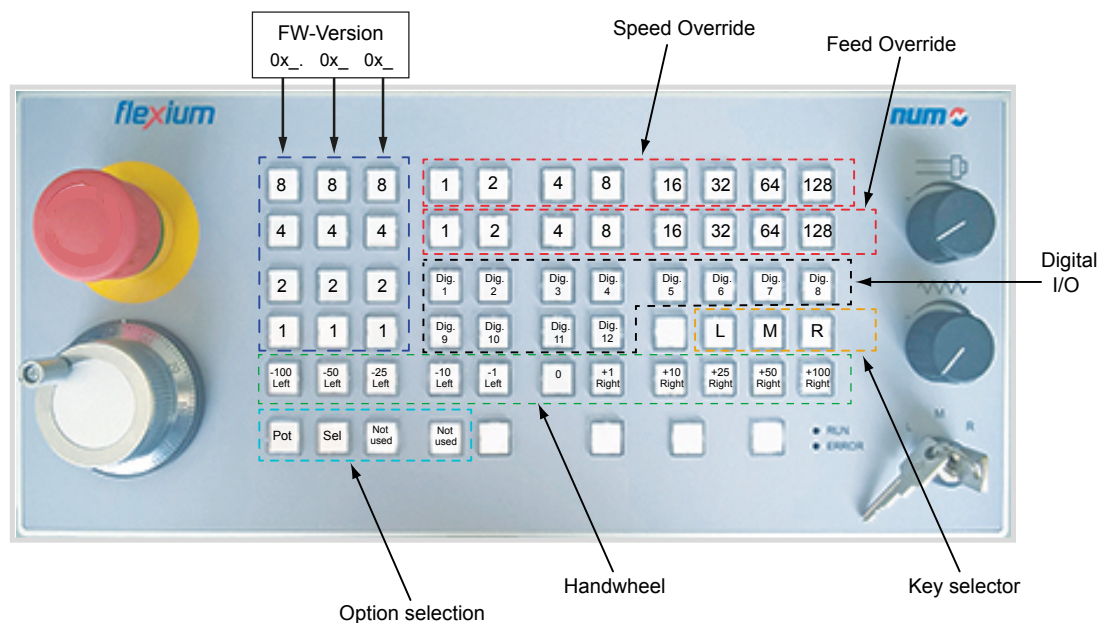


Start button flash

4. Now the buttons can be tested by pressing them.
If the button is working properly the LED of the key lights up.
5. To select the next test, press the “Start” button.



6. The areas shown below display the states and values of the hardware.



The values displayed are:

FW-Version (software version) (see Blue area)	Firmware version of the MP06 panel. The version is displayed in Hexadecimal code. (0.00)
Handwheel (see Green area)	By turning the handwheel clockwise the LEDs will light up one after the other from left to right as indicated in the picture above. (anticlockwise = right to left)
SPEED Override FEED Override (see Red area)	By turning the corresponding knob the LEDs will light in binary code: - Potentiometers version: 0 ÷ 255 values displayed. - Selectors version: 0 ÷ 24 values displayed.
Digital I/O ⁽¹⁾ (see Black area)	By pressing a key the relevant digital output will be forced. The LEDs shows the state of the digital inputs.
Key Selector ⁽¹⁾ (see Orange area)	Shows the 3 switches positions of the key as indicated in the picture above. (L, M, R key positions)
Options Selection (see Blue azure area)	By pressing this keys we can change the "override option", under test. "Pot" for override potentiometer, "Sel" for override selectors. The values are displayed in override areas (see Speed and Feed override for details).
⁽¹⁾ This test can be performed just with EtherCAT in OP-state, the RUN led in front panel is light on.	

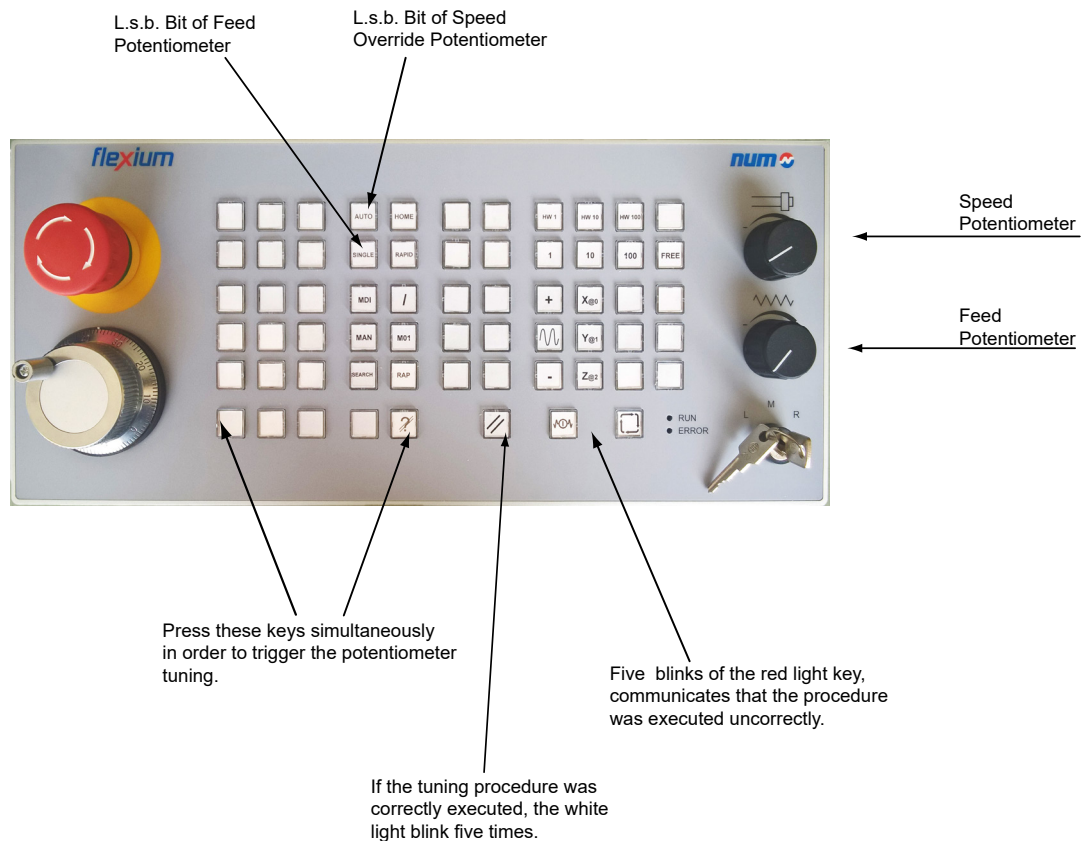
7. To restart the test, press the "Start" button with the flashing LED again.

8. To exit the test mode, switch off the power of the MP06.

9. Potentiometers Tuning (Starting from the SW version 3.06)

Starting from the SW version 3.06 the MP0x offers the feature to set the max value reach by Spindle and Feed potentiometers.

It's possible to set the biggest dynamic of the potentiometers when the MP06 runs in Test Program.



9.1 Procedure

1. When the test procedure enter in the step of visualization of Fw version and inputs status (see step 6 of previously paragraph), if the L.s.b keys blink, then the corresponding potentiometer is not tune and the current full scale is set to default value.
2. Set the potentiometers in the position corresponding to the full scale (clockwise end travel).
3. Press simultaneously the fist key and fifth key of last key row.
4. The tuning was execute:
 - a. If the procedure was correct the key with white light blink five times.
 - b. If the value of the potentiometer was too low, then the procedure is deemed not correct and the key with red light, blink five times. After this you can see the L.s.b of the corresponding knob to blink, in order to signal what potentiometer was incorrectly positioned.

5.1.13 Maintenance and Repair

5.1.13.1 Repairs

Repairs to MP06 Panels must only be carried out by the manufacturer.
(Manufacturer address see list of NUM agencies on chapter [1.5](#))

5.1.13.2 Transport

Only the original packaging must be used for transporting the device.
The climatic conditions must be observed (see chapter [5.1.5](#)).

5.1.13.3 Storage

The device must only be stored in the climatic conditions described in chapter [5.1.5](#).
It should be remembered that a high storage temperature reduces the lifespan of the product.
It is recommended to store the device at room temperature.

5.1.14 Connections

Please refer to chapter [8.11.1](#) for more detailed information upon the panels connections.

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5.1.15 Mounting instructions

MP06 and MP06_M are installed from the front, for example, into a control cabinet. They are fixed at the rear with embedded threaded bolts.

MP06 and MP06_M can be operated at a maximum ambient temperature of 45°C. The ambient temperature is based on the temperature of the area 5cm above the panel.

The device can be mounted in a completely closed housing, provided that the ambient temperature (in the HOUSING) is taken into account. A 10mm clearance from the housing walls must be provided on all sides in order to ensure sufficient air circulation



Prevention of overheating during operation:

- A forced airflow increases the overall reliability.

- Insert the MP06 and MP06_M from the front into the panel cut-out.
- The front seal must be flat and evenly positioned between the front plate and the front panel.
- Fasten the rear of the device to the supplied fixing frame using the 8 M4 locking nuts (Thereby is to observe that the seal bar gets constricted only slightly, on maximal half size of its original thickness).



Ensure that the seal is seated correctly on the front panel.

Avoid torques higher than 0.5Nm, as this may damage the device.

The thickness of the cabinet must not exceed 7mm.

5.1.16 Protection for the MP06 keyboard with and without handwheel opening

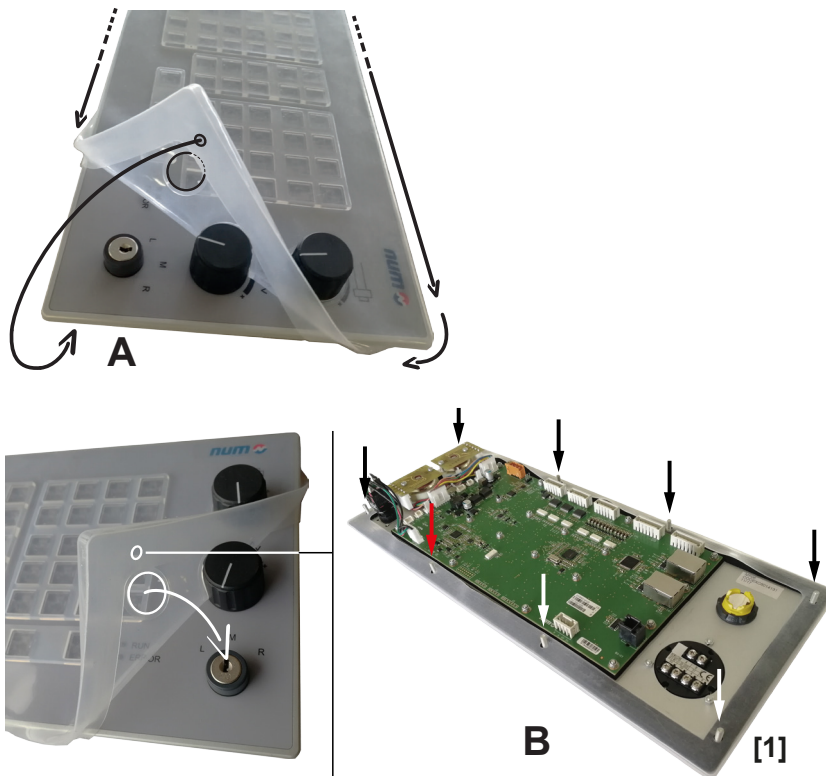
5.1.16.1 Assembly procedure:



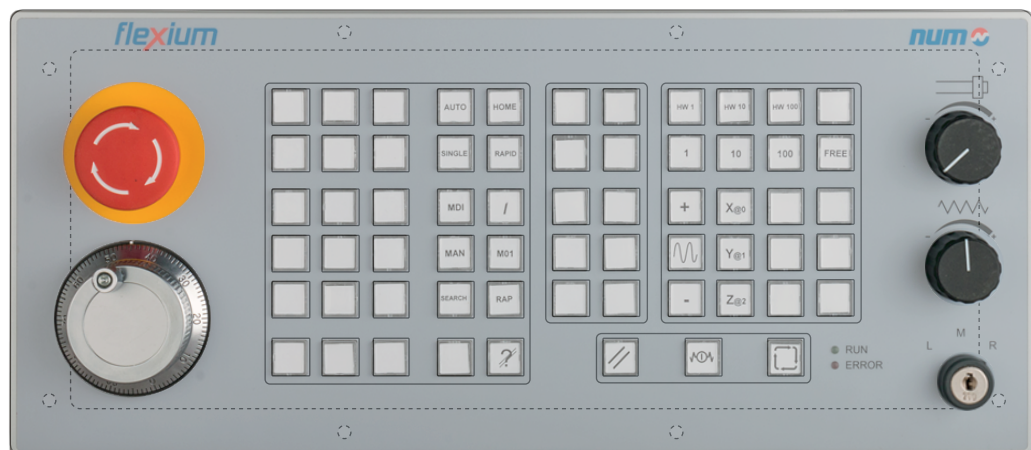
NOTE

The silicone protection used to cover the MP06 model keyboard is easy to apply thanks to the silicone properties which make it extensible, facilitating correct positioning on the keyboard **without removing any part mounted on it**.

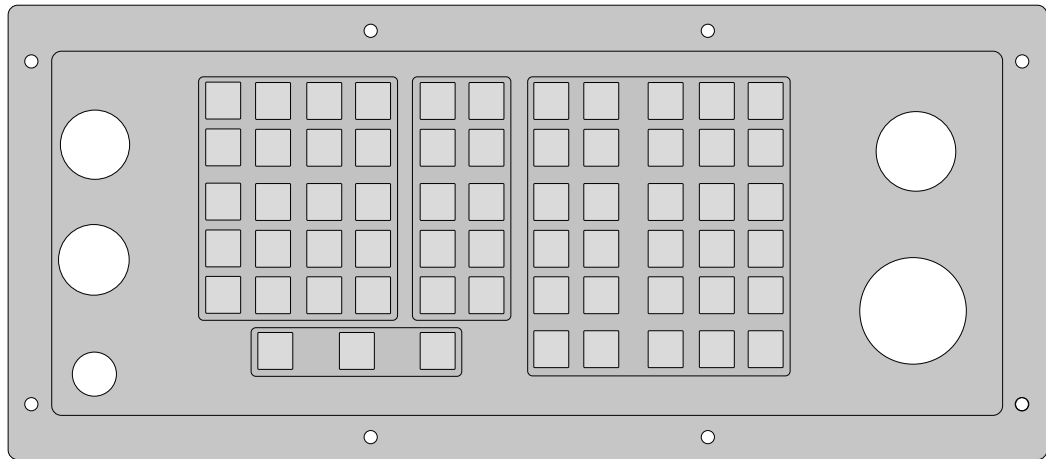
3. Apply the silicone protection starting from a corner of the keyboard and adjust the whole profile as shown in figure **A**;
4. On the back of the keyboard there are 8 threaded inserts **[1]** used for fixing the keyboard to the machine panel: the same inserts will be used to fix the protection to the keyboard as shown in figure **B**.



MP06 with protection mounting front view

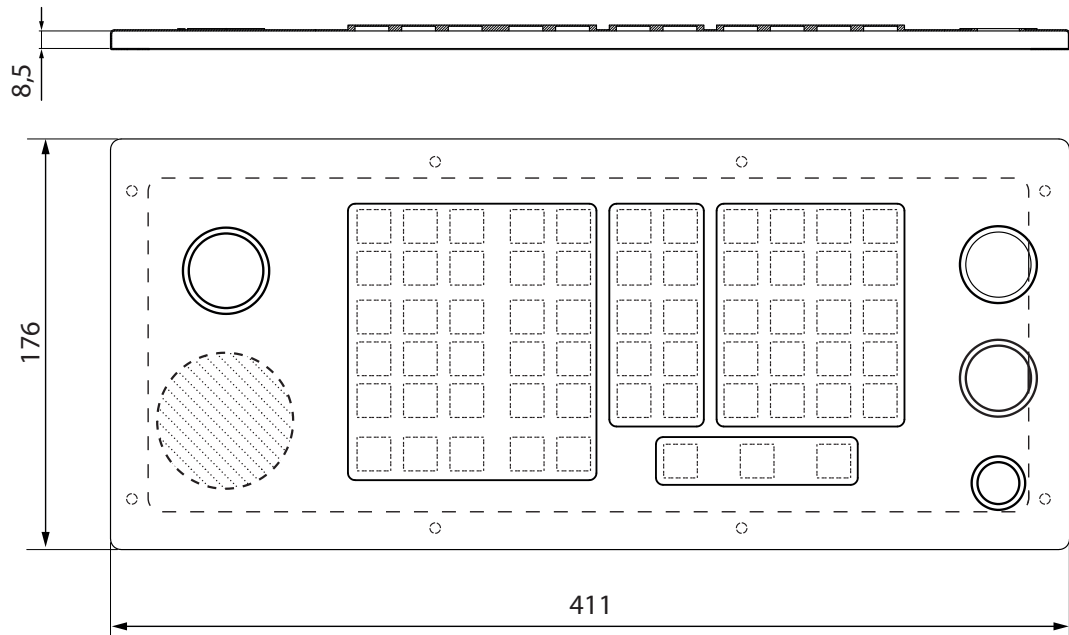


Backside view of the protection with handwheel opening



Front view of the MP06 protection and overall main dimension

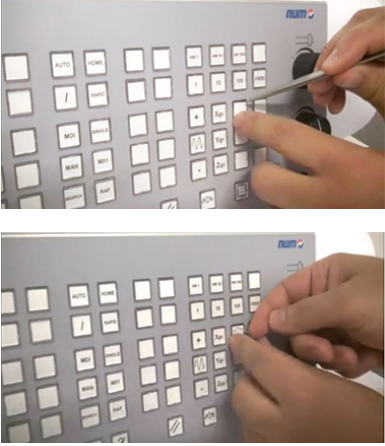
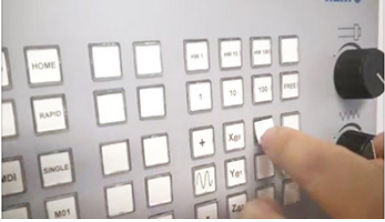
Dimensions in mm



The protection is also available as spare part with following part number:

Part number	Description
EIV6014400	Protection with Handwheel opening
EIV6014402	Protection without Handwheel opening

Change key label

Remove the plastic button cover using small pincers or by mean a small screwdriver.	
Grasp the label.	
Remove the label.	
Place the new label.	
Replace the plastic button cover.	

5.1.17.2 MP06_M

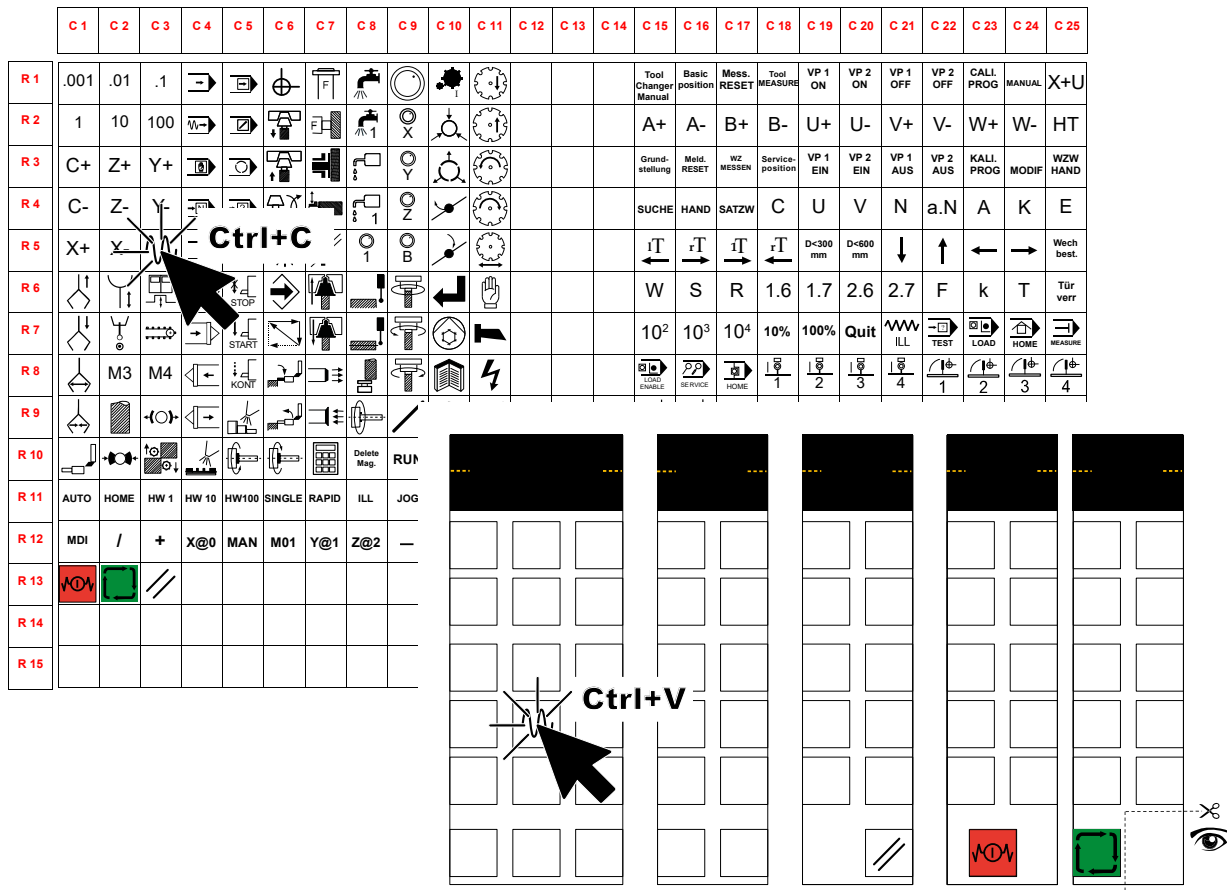
MP06 Machine Panels with keys option "M" compared to option "R" have the following specific differences:

The keys look like a membrane type, but the key switches are the same. Only the graphic configuration is new;



The MP06 machine panel is supplied with buttons not set, then icons have to be printed by the Customer.

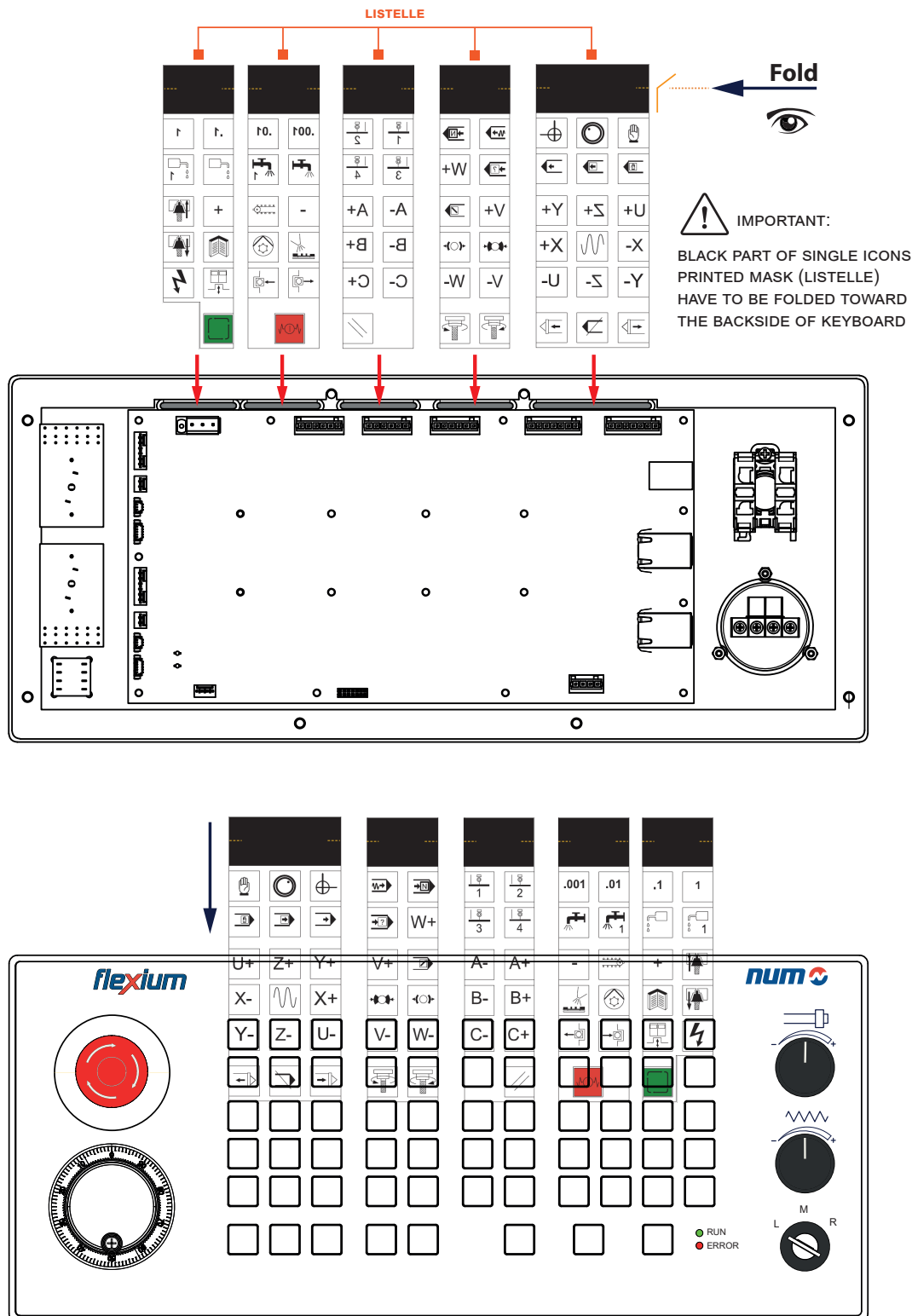
About that, it is available the package file “MP06 M option label template.zip” you can download https://ftp.num.com/Web_Client/Customer_Support/Client_Common/TechnicalDocumentation/MachinePanelMP/MP06_M_Labels. First file (A3 sheet.docx) shows a table with complete icons set; second file (A4 sheet.docx) shows the printing mask to be filled with the necessary icons by the Customer, picking them from first file.



File package “MP06_M option label template.zip” is available upon request to your local NUM Customer Service.

1. Open both files A3 sheet and A4 sheet (word format);
2. Copy the icons from complete table in A3 sheet (icons palette) and paste them in the mask in A4 sheet as shown above;
3. Once printing mask has been completely filled with all necessary icons, print it using a 0.1÷0.125 mm thick polyester sheet;
4. Carefully cut out each single box of labels (listelle) of the printable mask, also following the scissors icon (presence of LEDs in that area);
5. Once you've got listelle cut out, fold the black part following the dotted lines;
6. Insert each listella in its own slot on the backside of the keyboard as shown in the following page.

Insertion of masks in the prepared slots



5.2 MP07 Machine panel

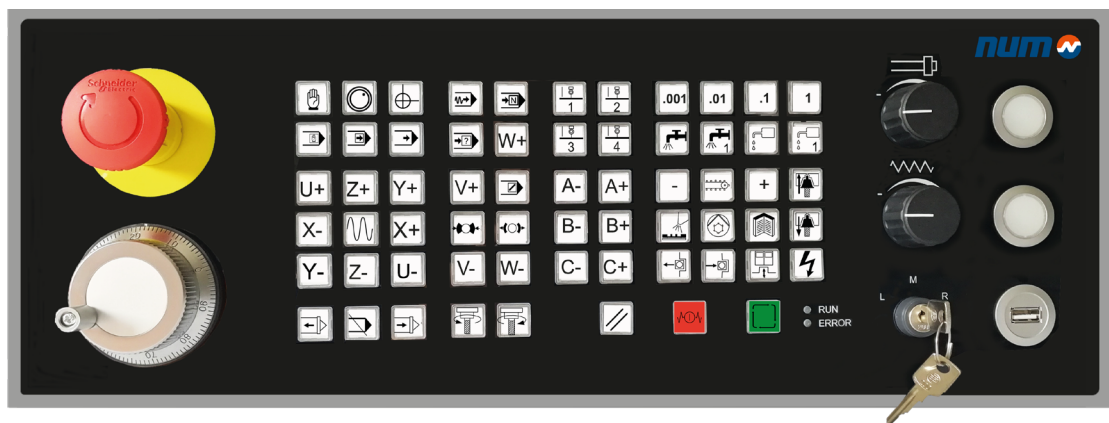
MP07 Machine panel is used for control of manual movements, production initiation and intervention during machining and is available with / without handwheel.

Four versions are available as indicated in the following sections.

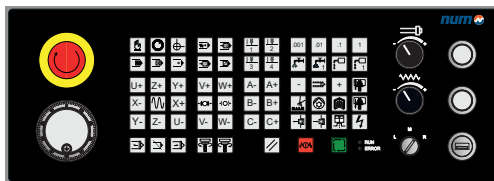
MP07 is designed to fit FS184i / FS184 operator panel dimension.

MP07 includes:

- 60 configurable buttons with blue LEDs
- 2 Overrides potentiometers or selectors for spindle speed and feed rate
- 1 Handwheel (as optional)
- 1 Emergency stop button
- 1 Three-position key switch
- 3 Dedicated buttons: Reset (white LED), Cycle Stop (Red LED) and Cycle Start (green LED)
- 2 Dedicated LEDs for EtherCAT state: RUN and ERROR
- 1 USB 2.0 Type A extender
- 2 holes Ø 22.3mm (with caps) where the standard button can be mounted
- 12 digital inputs and 12 digital outputs on the back.

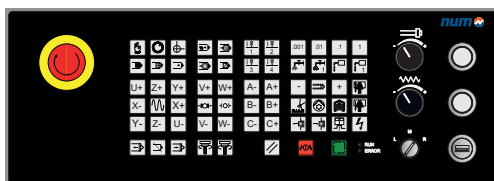


5.2.1 Machine panel options



Machine Panel MP07-H (with handwheel)

- EtherCAT interface
- 63 free configurable buttons with LEDs
- With potentiometers or selectors
- Handwheel
- Same width as FS184i / FS184



Machine Panel MP07-W (without handwheel)

- EtherCAT interface
- 63 free configurable buttons with LEDs
- With potentiometers or selectors
- Same width as FS184i / FS184

5.2.2 Ordering code

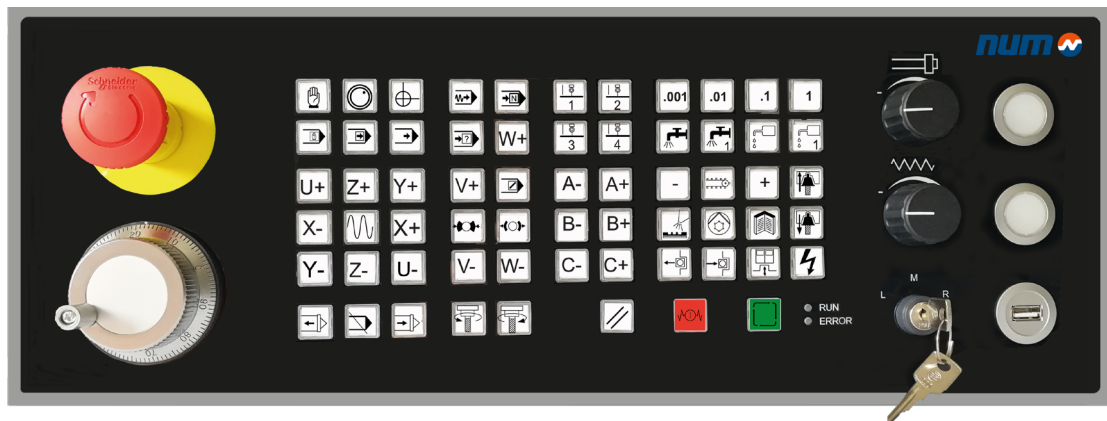
MP07 version	Ordering code
Machine Panel MP07–W without handwheel and potentiometers	FXHE04ARE1WE100
Machine Panel MP07–H with handwheel and potentiometers	FXHE04ARE1HE100
Machine Panel MP07–W without handwheel and selectors	FXHE04ARE2WE100
Machine Panel MP07–H with handwheel and selectors	FXHE04ARE2HE100

	FXHE	04	A	R	E	1	H	E	1	0	0
Index / Mechanical variant MP07 (x FS184i / FS184)		04									
Integrated I/Os • 12 digital inputs and 12 digital outputs			A								
Buttons number and technology • 63 x buttons with real switches				R							
Safety functions • E-STOP + 3 positions key switch					E						
Override feedrate and spindle • 2 potentiometers • 2 selectors with mechanical indexing						1 2					
Handwheel • None • Handwheel							W H				
Connections Technology EtherCAT								E			
USB 2.0 Type A extender									1		
Spare Number										0	
Spare Number											0

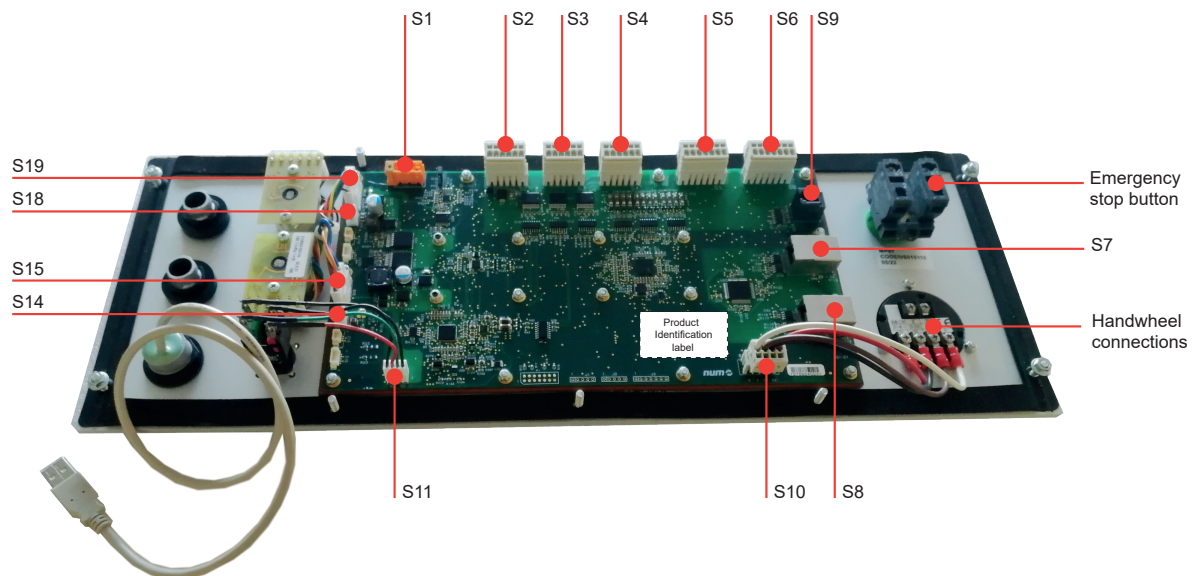
5.2.3 Characteristics

		FXHE04ARE1WE100	FXHE04ARE1HE100	FXHE04ARE2WE100	FXHE04ARE2HE100
Interfaces	Communication interface	Standard EtherCAT 2xRj45			
	Handwheel input	1 input for 5 VDC handwheel with A & B push-pull signal connected to handwheel when present			
	Key switch	1 key switch with 3 positions			
	Potentiometers	2 potentiometers 10 kOhm, 8 Bit resolution (For spindle speed and feed rate override)		Not present	
	Selectors	Not present		2 switch selectors with 25 positions	
	Handwheel	Not present	Yes (100 Puls. per rev.)	Not present	Yes (100 Puls. per rev.)
	Emergency stop	1			
Push buttons	Free configurable	60 buttons with mechanical switches with LEDs			
	Cycle start, cycle stop and reset	3 buttons with mechanical switches with LEDs			
Digital inputs	Digital inputs	12 organized in 2 groups of terminals			
	Operating voltage	24V –15% / +10%			
	Logic 0 / Logic 1	0 < 6 VDC (<= 3mA) 1 > 10 VDC up to 30 VDC (5 mA up to 15 mA)			
	Reaction time	8ms typical (debounced)			
Digital outputs	Digital outputs	12 organized in 3 groups of terminals			
	Operating voltage	24V –15% / +10%			
	Rated current	500 mA maximum per output			
	Outputs simultaneously active	100%			
	Protection	Short-circuit and permanent overloads (trip device)			
Power supply	Rated voltage	24VDC SELV, safety extra low voltage. Protection class III /1A			
	Voltage range	24VDC +20% -15% supplied by the customer.			
	Protection against reverse polarity	Yes			
	Protection against over voltage	Yes			
	Potential isolation	No. (The 0V-pin of the PS is connected to the digital GND)			
	Power consumption	15W max			
Ambient conditions	Climatic conditions operation	0..45°C, 70% rel. air humidity, non-condensing			
	Climatic conditions storage	-40...60°C, 70% rel. air humidity, non-condensing			
	Climatic conditions, transport	-20...60°C, 70% rel. air humidity, non-condensing			
Degree of protection	Front	IP 65			
	Rear	IP 00			
Weight		1.3 kg	1.5 kg	1.3 kg	1.5 kg
Dimensions	W x H x D:	488 x 175 x 55 mm			

5.2.4 Machine panel description



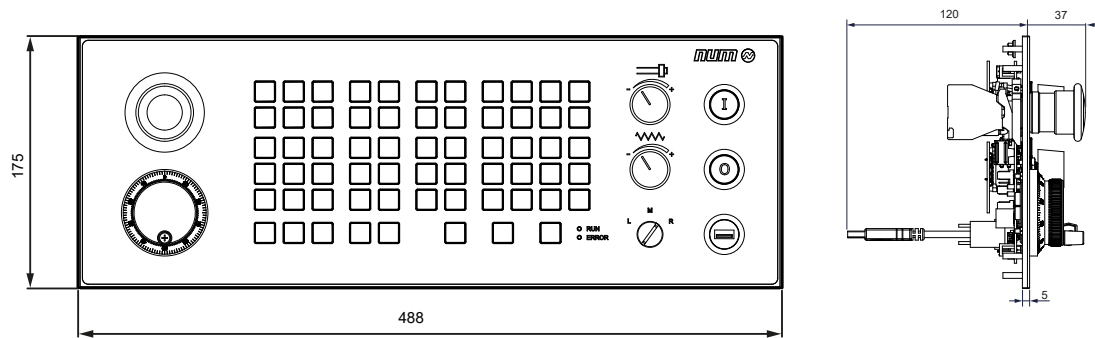
MP07 Machine Panels rear view



Connector	Type	Description
S1	3 screws pins F	Power supply connection
S2, S3, S4	6 pins spring-loaded terminal	12 Digital outputs connection
S5, S6	7 pins spring-loaded terminal	12 Digital inputs connection
S7, S8	Rj45 connector	EtherCAT IN / OUT connection
S9	Rj11 connector	Service NUM only
S10	4 pins terminal	Handwheel connection
S11	4 pins terminal	Key switch connection
S14, S18	3 pin spring-loaded terminal	Potentiometers connection
S15, S19	7 pin spring-loaded terminal	Rotary switches connection

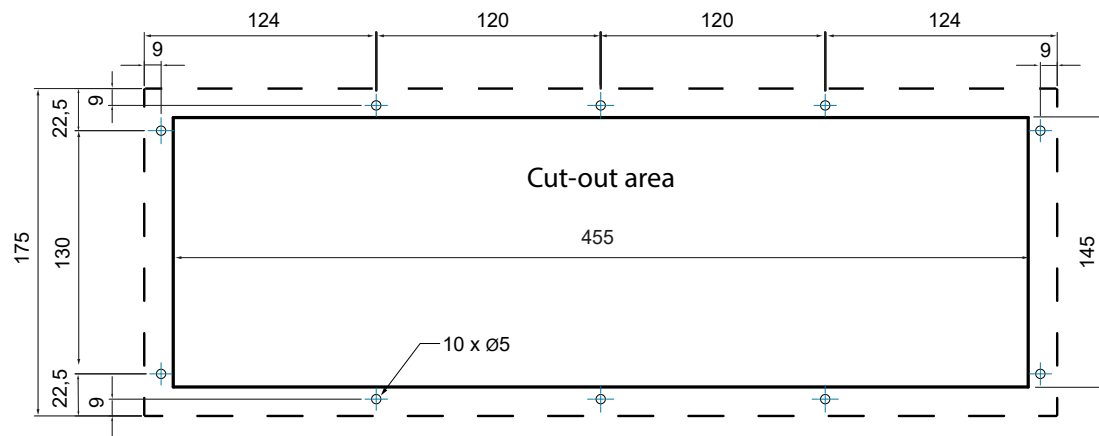
5.2.5 Overall dimensions

Dimensions in mm



5.2.6 Cut-out and hole pattern

Dimensions in mm



Tolerance of the cut-out: +0/-1mm

5.2.7 PLC configuration

Please refer to FlexiumPro Commissioning manual M00071.

5.2.8 Diagnostics

5.2.8.1 EtherCAT RUN indicator state
See chapter [5.1.12.1](#)

5.2.8.2 EtherCAT ERROR indicator state
See chapter [5.1.12.2](#)

5.2.8.3 Test program
See chapter [5.1.12.3](#)

5.2.9 Maintenance and Repair

5.2.9.1 Repairs
Repairs to MP07 Panels must only be carried out by the manufacturer.
(Manufacturer address see list of NUM agencies on chapter [1.5](#))

5.2.9.2 Transport
Only the original packaging must be used for transporting the device.
The climatic conditions must be observed (see chapter [5.2.3](#))

5.2.9.3 Storage
The device must only be stored in the climatic conditions described in chapter [5.2.3](#).
It should be remembered that a high storage temperature reduces the lifespan of the product.
It is recommended to store the device at room temperature.

5.2.10 Connections

Please refer to chapter [8.11.2](#) for more detailed information upon the panel connections.

5.2.11 Mounting instructions

See chapter [5.1.15](#)

5.2.12 Installing the personalization button labels

See chapter [5.1.17](#)

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5.3 MP08 Machine panel

MP08 Machine panel is used for control of manual movements, production initiation and intervention during machining.

Two versions are available as indicated in the following sections.

MP08 is designed to fit FS122 operator panel dimensions.

MP08 includes:

- 60 configurable buttons with blue LEDs
- 2 Overrides potentiometers or selectors for spindle speed and feed rate
- 1 Three-position key switch.
- 3 Dedicated buttons: Reset (white LED) Cycle Stop (Red LED), Cycle Start (green LED)
- 2 Dedicated LEDs for EtherCAT state: RUN and ERROR.
- 12 digital inputs and 12 digital outputs on the back.



5.3.1 Ordering code

Machine Panel	Ordering Codes
MP08 with potentiometers	FXHE01ARD1WE000
MP08 with selectors	FXHE01ARD2WE000

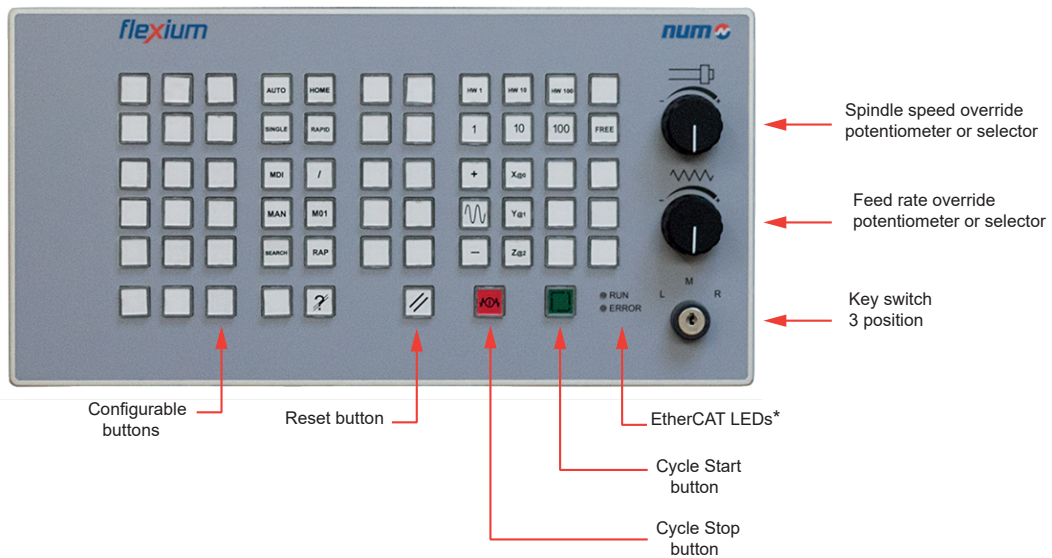
FXHE	01	A	R	D	1	W	E	0	0	0
Index / Mechanical variant										
• MP08 (x FS122)	01									
Integrated I/Os										
• 12 digital inputs and 12 digital outputs		A								
Buttons number and technology										
• 63 x buttons with real switches			R							
Safety functions										
3 positions key switch				D						
Override feedrate and spindle										
• 2 potentiometers					1					
• 2 selectors with mechanical indexing					2					
Handwheel										
None						W				
Connections Technology										
• EtherCAT							E			
Spare Number								0		
Spare Number									0	
Spare Number										0

5.3.2 Characteristics

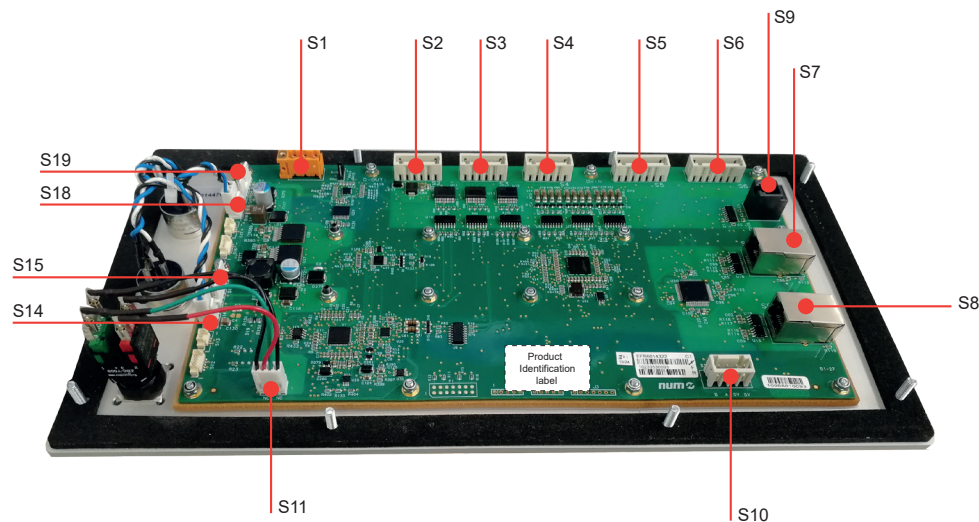
		FXHE01ARD1WE000	FXHE01ARD2WE000
Interfaces	Communication interface	Standard EtherCAT 2xRj45	
	Handwheel input	1 input for 5 VDC handwheel with A & B push-pull signal	
	Key switch	1 key switch with 3 positions	
	Potentiometers	2 potentiometers 10 kOhm, 8 Bit resolution (For spindle speed and feed rate override)	Not present
	Selectors	Not present	2 switch selectors with 25 positions
	Handwheel	Not present	
	Emergency stop	Not present	
Push buttons	Free configurable	60 buttons with mechanical switches with LEDs	
	Cycle start, cycle stop and reset	3 buttons with mechanical switches with LEDs	
Digital inputs	Digital inputs	12 organized in 2 groups of terminals	
	Operating voltage	24V –15% / +10%	
	Logic 0 / Logic 1	0 < 6 VDC (<= 3mA) 1 > 10 VDC up to 30 VDC (5 mA up to 15 mA)	
	Reaction time	8ms typical (debounced)	
Digital outputs	Digital outputs	12 organized in 3 groups of terminals	
	Operating voltage	24V –15% / +10%	
	Rated current	500 mA maximum per output	
	Outputs simultaneously active	100%	
	Protection	Short-circuit and permanent overloads (trip device)	
Power supply	Rated voltage	24VDC SELV, safety extra low voltage. Protection class III /1A	
	Voltage range	24VDC +20% -15% supplied by the customer.	
	Protection against reverse polarity	Yes	
	Protection against over voltage	Yes	
	Potential isolation	No. (The 0V-pin of the PS is connected to the digital GND)	
	Power consumption	15W max	
Ambient conditions	Climatic conditions operation	0..45°C, 70% rel. air humidity, non-condensing	
	Climatic conditions storage	-40...60°C, 70% rel. air humidity, non-condensing	
	Climatic conditions, transport	-20...60°C, 70% rel. air humidity, non-condensing	
Degree of protection	Front	IP 65	
	Rear	IP 00	
Weight		1.2 kg	
Dimensions	W x H x D:	347 x 175 x 55 mm	

5.3.3 Machine panel description

MP08 Machine Panels front view



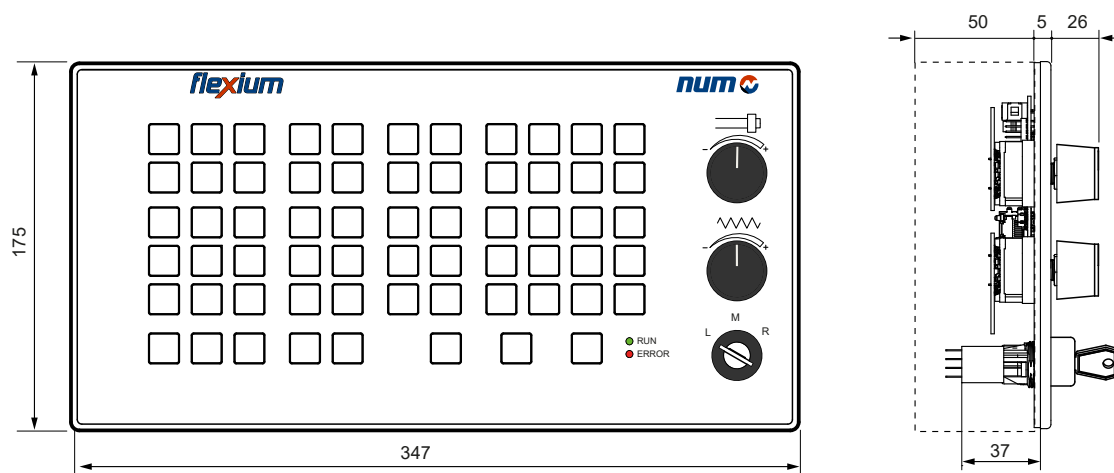
MP08 Machine Panels rear view



Connector	Type	Description
S1	3 screws pins F	Power supply connection
S2, S3, S4	6 pins spring-loaded terminal	12 Digital outputs connection
S5, S6	7 pins spring-loaded terminal	12 Digital inputs connection
S7, S8	Rj45 connector	EtherCAT IN / OUT connection
S9	Rj11 connector	Service NUM only
S10	4 pins terminal	Handwheel connection
S11	4 pins terminal	Key switch connection
S14, S18	3 pin spring-loaded terminal	Potentiometers connection
S15, S19	7 pin spring-loaded terminal	Rotary switches connection

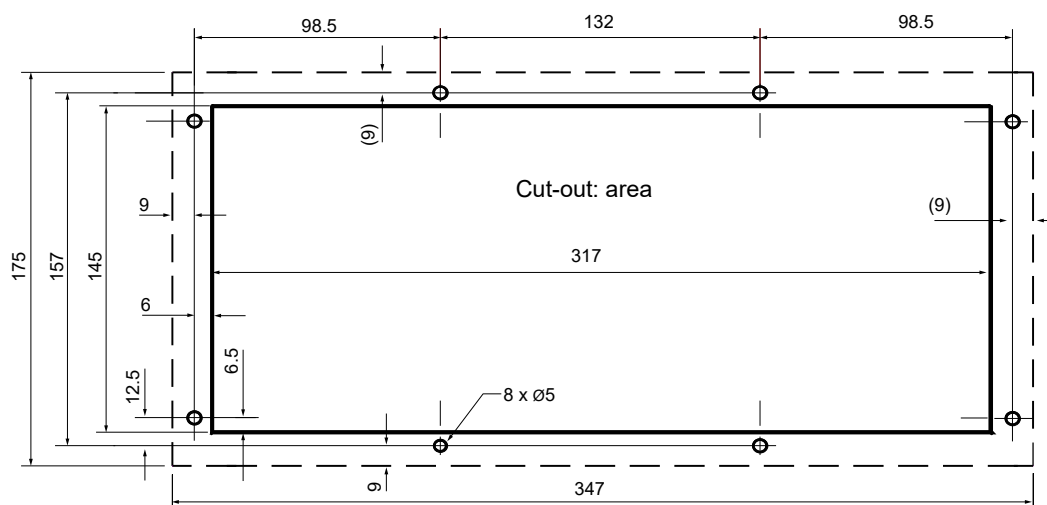
5.3.4 Overall dimensions

Dimensions in mm



5.3.5 Cut-out and hole pattern

Dimensions in mm



Tolerance of the cut-out: +0/-1mm

5.3.6 PLC configuration

Please refer to FlexiumPro Commissioning manual M00071.

5.3.7 Diagnostics

5.3.7.1 EtherCAT RUN indicator state

See chapter [5.1.12.1](#)

5.3.7.2 EtherCAT ERROR indicator state

See chapter [5.1.12.2](#)

5.3.7.3 Test program

See chapter [5.1.12.3](#)

5.3.8 Maintenance and Repair

5.3.8.1 Repairs

Repairs to MP08 Panels must only be carried out by the manufacturer.
(Manufacturer address see list of NUM agencies on chapter [1.5](#))

5.3.8.2 Transport

Only the original packaging must be used for transporting the device.
The climatic conditions must be observed (see chapter [5.3.2](#))

5.3.8.3 Storage

The device must only be stored in the climatic conditions described in chapter [5.3.2](#).
It should be remembered that a high storage temperature reduces the lifespan of the product.
It is recommended to store the device at room temperature.

5.3.9 Connections

Please refer to chapter [8.11.3](#) for more detailed information upon the panel connections.

5.3.10 Mounting instructions

See chapter [5.1.15](#)

5.3.11 Installing the personalization button labels

See chapter [5.1.17](#)

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6 NUM Industrial Box PC

6.1 Box PC P1 G4A

NUM Industrial Box PC can be used in two different ways:

- In case of very demanding application where a powerfull workstation is needed (e.g. when CAD/CAM are used), Industrial Box PC acts as a PLC only.
- Industrial Box PC P1 can also deal as Flexium HMI platform together with a FS122, FS153, FS184, FS194L or FS244 passive panels.



Machine builders and end users are not allowed to install on this NUM industrial PC, software which performs “Desktop Functions” other than through, in support of, and operating as a part of, the Embedded Application.

“Desktop Functions” means consumer or business tasks or processes performed by a computer or computing device. This includes email, word processing, spreadsheets, database, network/Internet browsing, scheduling, and personal finance. Desktop Functions may include features and functions derived from the MS Binaries or the Company Binaries.

6.1.1 Ordering code

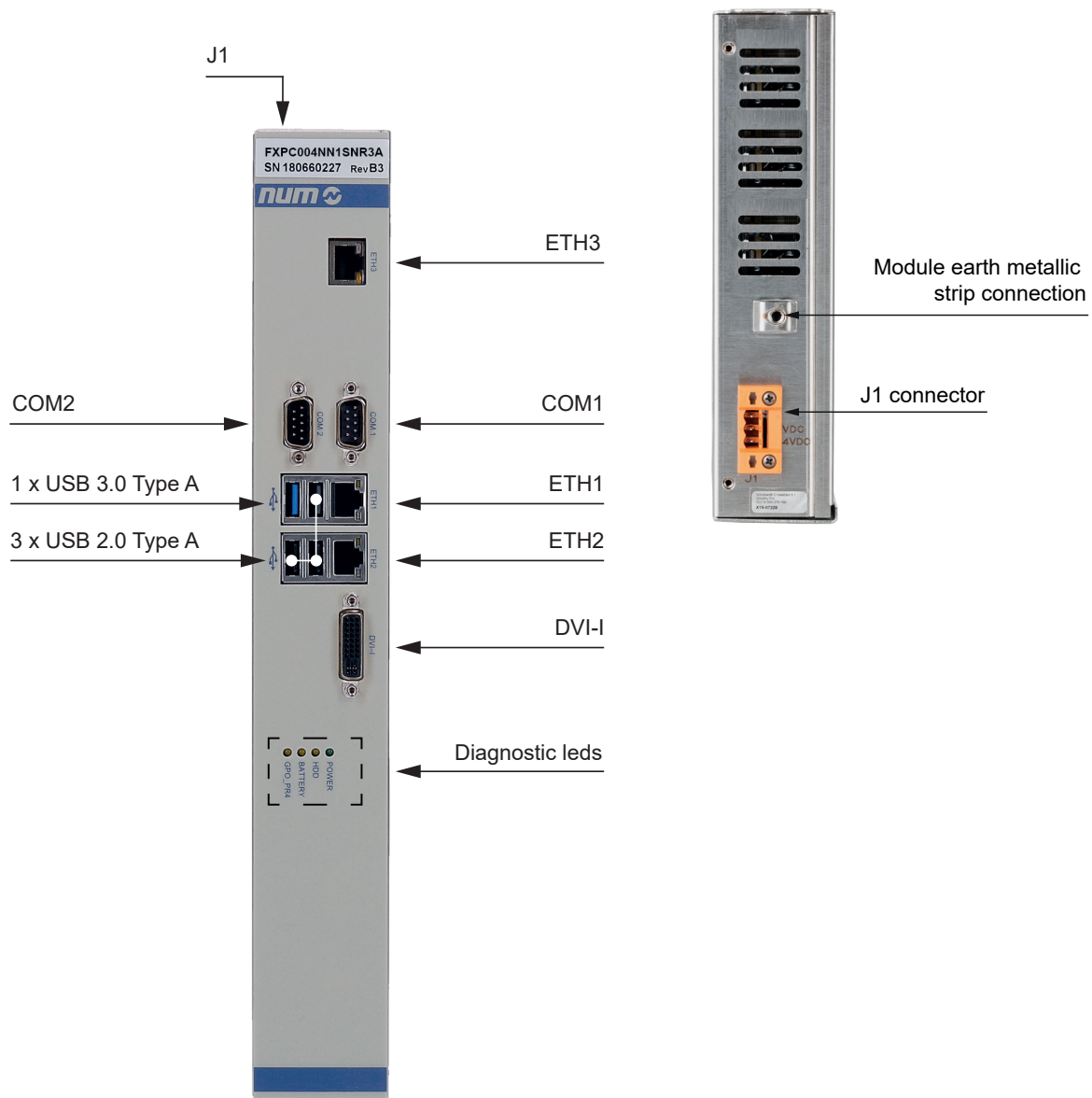
Box PC Version	Ordering Codes
Box PC P1 G4A SSD	FXPC004NN1SNR3A

	FXPC	00	4	N	N	1	S	N	R	3	A
Display Unit											
• Industrial Box PC		00									
Panel/Mechanical Variant											
• Fourth generation			4								
Display Sensor											
• No touch sensor, just Box PC				N							
Keyboard Type											
• No keyboard, just Box PC					N						
IPC Mother Board, Processor											
• Performance level P1						1					
Mass Memory Type											
• SSD (Solid State Disc)							S				
Option Board											
• None								N			
Fixed value											
									R		
Operating System											
• Windows 10 IoT Enterprise LTSC 2019 64 bits										3	
Versions											
• P1 G4A											A

6.1.2 Characteristics

		FXPC004NN1SNR3A (P1 G4A)
Main PC Features	CPU	Intel® Celeron™ CPU J1900 @ 2GHz Quad Core
	RAM	2 GB
	Mass storage	Industrial SSD 64 GB
	Operating system	Windows 10 IoT Enterprise LTSC 2019 64 bits
Communication Interfaces	Ethernet (ETH)	3 x Gigabit LAN / RTE
	USB	3 x USB 2.0 Type A and 1 x USB 3.0 Type A
	COM	2
	DVI-I	1
	HDMI	No
Power Supply	Rated voltage	24 VDC (+15%/-15%)
	Power consumption	typ. 21 W max. 50 W (2.1 A)
Ambient Conditions	Climatic conditions operation	0...45°C, 70% rel. air humidity, non-condensing
	Climatic conditions storage	-20...60°C, 70% rel. air humidity, non-condensing
	Environmental conditions installation	Requires protection to at least IP54
	Climatic conditions transport	-20...60°C, 10...90% rel. Air humidity, noncondensing
Degree of Protection		IP20
Pollution Degree		2
Weight		ca. 2.4 kg
Dimensions	W x H x D	50 x 355 (410) x 206 mm See chapter 6.1.4

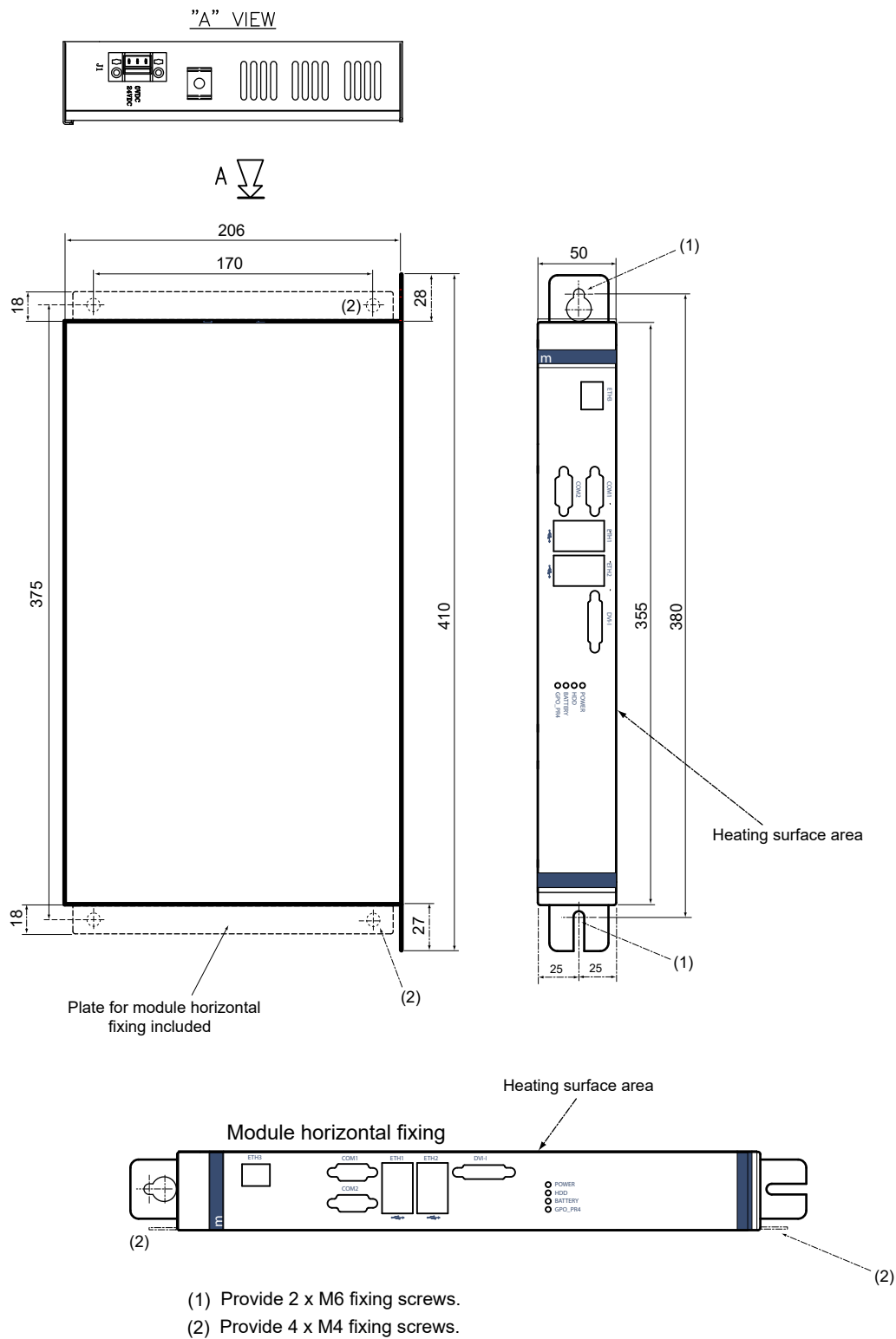
6.1.3 Module description



Connector	Type	Description
J1	3 screws pins F (0VDC 24VDC)	FS154i power supply connections
ETH1	RJ45 (8P/8C)	FlexiumPro RTK Ethernet connections
ETH2	RJ45 (8P/8C)	Free
ETH3	RJ45 (8P/8C)	Company LAN
COM1	RS232 Sub D 9 pins M	Serial interface. General user purpose
COM2		
USB	1x USB 3.0 Type A	General user purpose. (Mouse and all USB devices)
USB	3 x USB 2.0 Type A	
DVI-I	Standard DVI	Digital Video interface connection

6.1.4 Overall dimensions

Dimensions in mm



6.1.5 Power up and shutdown

The PC starts automatically when Power up is applied. There is no Power up button.

To Power up the system after a shut down it is necessary to switch the power off and on again.

Such OFF/ON sequence should be separated by a minimum delay of 20 seconds.

Shut Down: To keep the system safe and running never switch off the power directly but use a shutdown procedure. A shutdown can be initialized by the PLC program or by Windows itself.

6.1.6 Diagnostics

Leds	Meanings
POWER	Power supply OK
HDD	HDD/SSD access
BATTERY	Change battery
GPO_PR4	Not used

Symptom	Possible cause and remedy
Dark screen during power-up	- Check power supply. - Loss of setup data. - Connect an external video display for diagnosis.
White screen after switch off and re-switch on again	- The ATX-power supply doesn't switch on properly because the switch off time was shorter than 20s.
Date/time not correct	Replace battery (See chapter 6.1.7.4)
Ethernet connection missing	- Incorrect Ethernet cable fitted (crossover/direct) - LINK-LED is lit if the connection is correct - ACT LED if the data transfer is correct (flashes during the transfer) - Incorrect/invalid IP address set.

6.1.7 Maintenance and Repair

6.1.7.1 Repairs

Repairs to Box PC devices must only be carried out by the manufacturer.

(Manufacturer address see list of NUM agencies on chapter [1.5](#))

6.1.7.2 Transport

Only the original packaging must be used for transporting the device.

The climatic conditions must be observed (see chapter [6.1.2](#))

6.1.7.3 Storage

The device must only be stored in the climatic conditions described in chapter [6.1.2](#).

It should be remembered that a high storage temperature reduces the lifespan of the product.

It is recommended to store the device at room temperature.

6.1.7.4 Battery replacement

The battery is used to back up the clock circuit. The battery should be changed every 5 years in order to prevent any date/time loss. The battery code is EIV6003971.

There is a danger of explosion if battery is incorrectly replaced.



Replace only with the same type recommended by NUM.

Attention: Opening the back cover or breaking the warranty labels voids the warranty.



Pay attention to ESD safety protections when changing the battery.

6.1.8 Box PC connections

Please refer to chapter 8 for more detailed information upon the Industrial Box PC connections.

6.1.9 Mounting instructions

The Box PC is installed from the front, for example, into a control cabinet. They are fixed at the rear with screw (see chapter 6.1.4)

The Box PC can be operated at a maximum ambient temperature of 45°C. The ambient temperature is based on the temperature of the area 5cm above the panel with the device mounted vertically at a height of 2000m above sea level.

The Box PC can be mounted in a completely closed housing, provided that the ambient temperature (in the housing) is taken into account.

It is recommended that a minimum ventilation clearance of 100mm is left in the fan area and at top and bottom side when installing the modules in the electrical cabinet.

Do not cover the ventilation grilles with cables or anything else, this may cause the rise temperature inside the Box PC.

A minimum clearance of 75mm must be provided to active elements such as power supplies, transformers etc.

6.2 Box PC P2 G4

NUM Industrial Box PC can be used in two different ways:

- In case of very demanding application where a powerfull workstation is needed (e.g. when CAD/CAM are used), Industrial Box PC acts as a PLC only.
- Industrial Box PC P2 can also deal as Flexium HMI platform together with a FS122, FS153, FS184, FS194L or FS244 passive panels.



Machine builders and end users are not allowed to install on this NUM industrial PC, software which performs “Desktop Functions” other than through, in support of, and operating as a part of, the Embedded Application.

“Desktop Functions” means consumer or business tasks or processes performed by a computer or computing device. This includes email, word processing, spreadsheets, database, network/Internet browsing, scheduling, and personal finance. Desktop Functions may include features and functions derived from the MS Binaries or the Company Binaries.

6.2.1 Ordering code

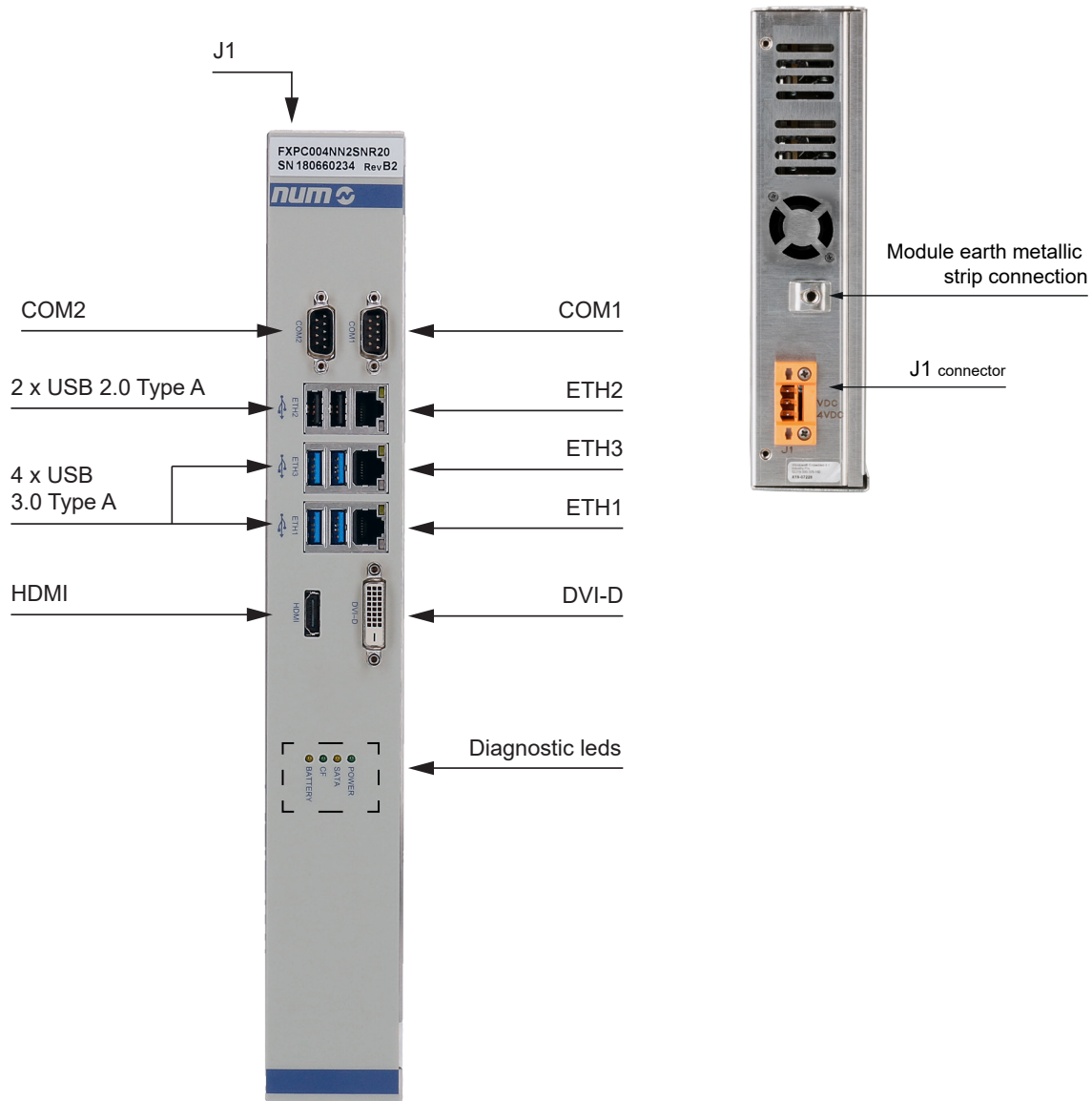
Box PC Version	Ordering Codes
Box PC P2 G4 SSD W10 2016	FXPC004NN2SNR20
Box PC P2 G4 SSD W10 2021	FXPC004NN2SNR40

	FXPC	00	4	N	N	2	S	N	R	2	0
Display Unit		00									
• Industrial Box PC											
Panel/Mechanical Variant			4								
• Fourth generation											
Display Sensor				N							
• No touch sensor, just Box PC											
Keyboard Type					N						
• No keyboard, just Box PC											
IPC Mother Board, Processor						2					
• Performance level P2											
Mass Memory Type							S				
• SSD (Solid State Disc)											
Option Board								N			
• None											
Fixed value									R		
Operating System											
• Windows 10 IoT Enterprise LTSC 2016 64 bits										2	
• Windows 10 IoT Enterprise LTSC 2021 64 bits										4	
Versions											0
• P2 G4											

6.2.2 Characteristics

		FXPC004NN2SNR20 FXPC004NN2SNR40
Main PC Features	CPU	Intel® Celeron™ CPU J1900 @ 2GHz Quad Core
	RAM	2 GB
	Mass storage	Industrial SSD 64 GB
	Operating system	...R20 Windows 10 IoT Enterprise LTSC 2016 64 bits ...R40 Windows 10 IoT Enterprise LTSC 2021 64 bits
Communication Interfaces	Ethernet (ETH)	3 x Gigabit LAN / RTE
	USB	3 x USB 2.0 Type A and 1 x USB 3.0 Type A
	COM	2
	PS2	0
	VGA	0
	DVI interface	1 DVI-I
	HDMI	No
Power Supply	Rated voltage	24 VDC (+15%/-15%)
	Power consumption	typ. 21 W max. 50 W (2.1 A)
Ambient Conditions	Climatic conditions operation	0...45°C, 70% rel. air humidity, non-condensing
	Climatic conditions storage	-20...60°C, 70% rel. air humidity, non-condensing
	Environmental conditions installation	Requires protection to at least IP54
	Climatic conditions transport	-20...60°C, 10...90% rel. Air humidity, noncondensing
Degree of Protection		IP20
Pollution Degree		2
Cooling Type		Fan-less
Weight		ca. 2.4 kg
Dimensions	W x H x D	50 x 355 (410) x 206 mm

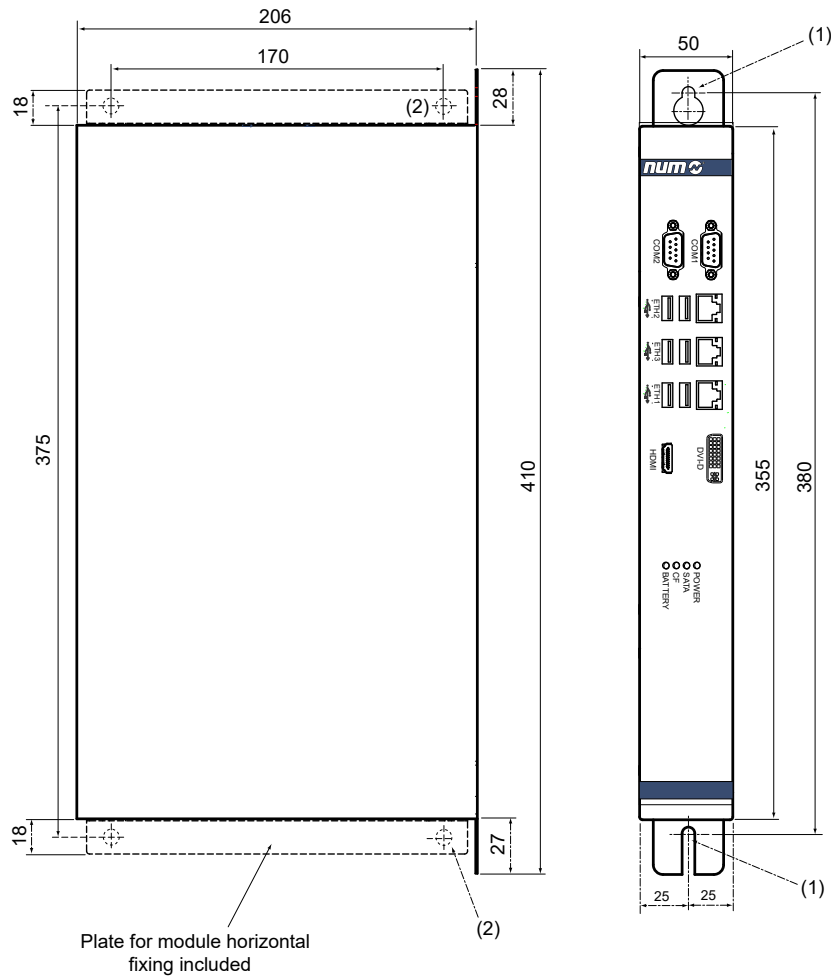
6.2.3 Module description



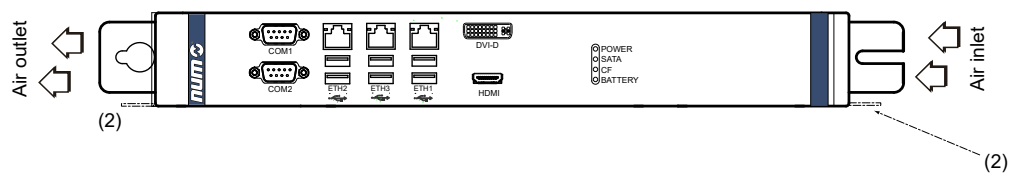
Connector	Type	Description
J1	3 screws pins F	Power supply connections
ETH1	RJ45 (8P/8C)	FlexiumPro RTK Ethernet connections
ETH2	RJ45 (8P/8C)	Free
ETH3	RJ45 (8P/8C)	Company LAN
COM COM2	RS232 Sub D 9 pins M	Serial interface. General user purpose
USB	4 x USB 3.0 Type A	General user purpose. (Mouse and all USB devices)
USB	2 x USB 2.0 Type A	
DVI-D	Standard DVI	Digital Video interface connection
HDMI	Standard HDMI	High-Definition Multimedia Interface

6.2.4 Overall dimensions

Dimensions in mm



Module horizontal fixing



- (1) Provide 2 x M6 fixing screws.
- (2) Provide 4 x M4 fixing screws.



To facilitate sufficient air circulation and so ensure an adequate heat exchange in the system, it is recommended that a minimum ventilation clearance of 100mm is left in the fan area and at top and bottom side when installing the modules in the electrical cabinet.

Do not cover the ventilation grilles with cables or anything else, this may cause the rise temperature inside the drives. Please also refer to the M00027 manual for more detailed information.

6.2.5 Power up and shutdown

See chapter [6.1.5](#)

6.2.6 Diagnostics

Leds	Meanings
POWER	Power supply OK
SATA	HDD/SSD access
CF	Not used
BATTERY	Change battery

Symptom	Possible cause and remedy
Dark screen during power-up	- Check power supply. - Loss of setup data. - Connect an external video display for diagnosis.
White screen after switch off and re-switch on again	- The ATX-power supply doesn't switch on properly because the switch off time was shorter than 20s.
Date/time not correct	Replace battery (See chapter 6.2.7.4)
Ethernet connection missing	- Incorrect Ethernet cable fitted (crossover/direct) - LINK-LED is lit if the connection is correct - ACT LED if the data transfer is correct (flashes during the transfer) - Incorrect/invalid IP address set.

6.2.7 Maintenance and Repair

6.2.7.1 Repairs

Repairs to Box PC devices must only be carried out by the manufacturer.
(Manufacturer address see list of NUM agencies on chapter [1.5](#))

6.2.7.2 Transport

Only the original packaging must be used for transporting the device.
The climatic conditions must be observed (see chapter [6.2.2](#))

6.2.7.3 Storage

The device must only be stored in the climatic conditions described in chapter [6.2.2](#).
It should be remembered that a high storage temperature reduces the lifespan of the product.
It is recommended to store the device at room temperature.

6.2.7.4 Battery replacement

The battery is used to back up the clock circuit. The battery should be changed every 5 years in order to prevent any date/time loss. The battery code is EIV6003972.

There is a danger of explosion if battery is incorrectly replaced.



Only trained personnel are allowed to replace the battery.

For replacing, the back cover has to be removed.

Caution : Breaking the warranty label or removing the cover voids the warranty.



Pay attention to ESD safety protections when changing the battery.

6.2.8 Box PC connections

Please refer to chapter [8](#) for more detailed information upon the Industrial Box PC connections

6.2.9 Mounting instructions

The Box PC is installed from the front, for example, into a control cabinet. They are fixed at the rear with screw (see chapter [6.1.4](#))

The Box PC can be operated at a maximum ambient temperature of 45°C. The ambient temperature is based on the temperature of the area 5cm above the panel with the device mounted vertically at a height of 2000m above sea level.

The Box PC can be mounted in a completely closed housing, provided that the ambient temperature (in the housing) is taken into account.

It is recommended that a minimum ventilation clearance of 100mm is left in the fan area and at top and bottom side when installing the modules in the electrical cabinet.

Do not cover the ventilation grilles with cables or anything else, this may cause the rise temperature inside the Box PC.

A minimum clearance of 75mm must be provided to active elements such as power supplies, transformers etc.

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7 Portable Handwheel HBA-X

The portable handwheel HBA-X for FlexiumPro provides a number of operation functions:

- Axis selection
- Hand mode and speed selection
- Movements forward/backward and speed override
- Handwheel
- 3 step acknowledge button (Enabling Device “dead-man’s button”)
- Connection to the system for FlexiumPro 6, 8 and 68 via cable and IO modules.
- Buttons and switches: via I/Os
- Handwheel: To be connected to Encoder counter using a PLC module
- Enabling Device (Dead-man’s) button: into the safety circuit.



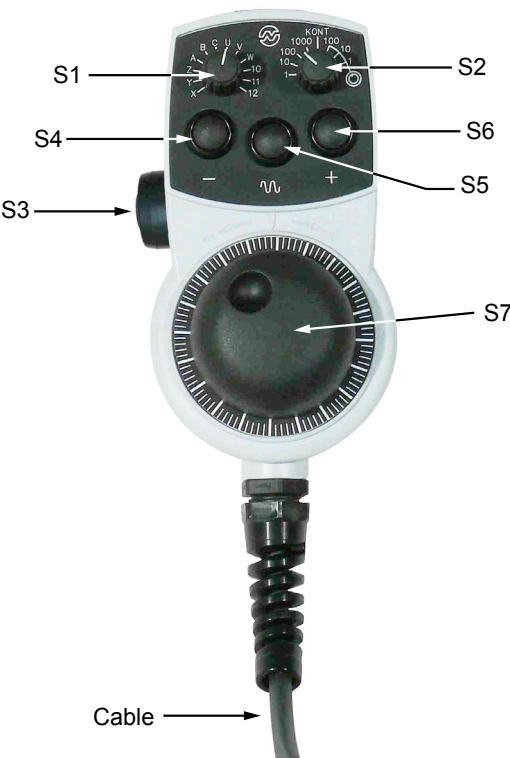
7.1 Ordering code

Portable Handwheel version	Ordering Codes
Portable Handwheel HBA-Xc (5V)	FXHE181121
Portable Handwheel HBA-Xd (24V)	FXHE181122

7.2 Characteristics

Handwheel	• Pulse per revolution : 100 • Supply voltage : 5VDC $\pm$ 5% for HBA-Xc / 24VDC $\pm$ 5% for HBA-Xd • Output circuit : 5VDC or 24VDC
Push Button	• Control element : 3 single closure • Switching voltage max : 30VDC • Switching current max : 100mA • Switching power max : 1W
Acknowledge button 3-step	• Control element : 1 double closure • Switching voltage max : 30VDC • Switching current max : 1mA • Switching power max : 0.25W
Connection ^{(1) (2)}	• 23-pins connector • Cable 5m
Housing	• Material : Plastic (polycarbonate) • Colour : Grey RAL 7040 • Starting current: 250mA @ 24V • Power consumption: 3.12W (typ) = 130mA @ 24V • Electrical insulation: No
Overall dimensions (L, H, W) in mm	160 x 85 x 67
Weight	Approx. 1.3kg
Temperature	• Operating temperature: 0 to +50°C • Transport and storage temperature: -20° to +50°C
Relative humidity	• Operating: Max 95% non-condensing • Transport: Max 95% non-condensing
Operating Altitude	Max 3000m
Degree of protection	IP 65
(1) For different OEM handwheel places connections it is possible to required an additional socket FXHE181310. (2) Standard cable length is: - 5m for straight cable - 2m for spiral cable Maximum distance from PLC counter module is 40m.	

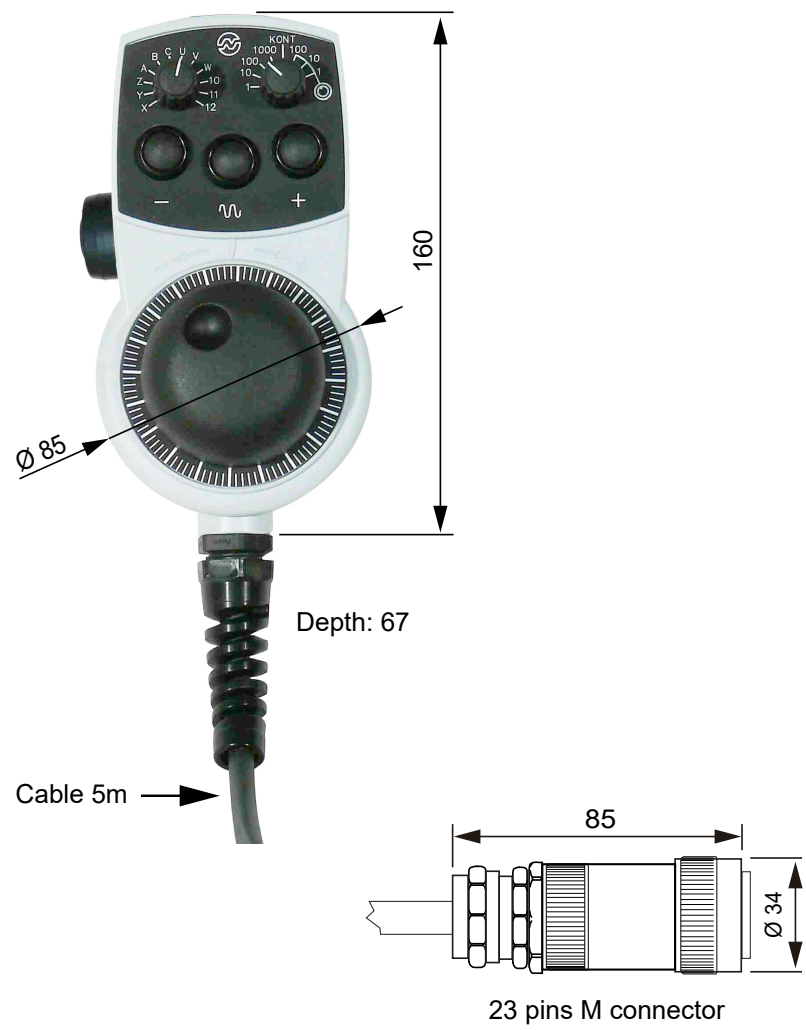
7.3 Portable Handwheel description



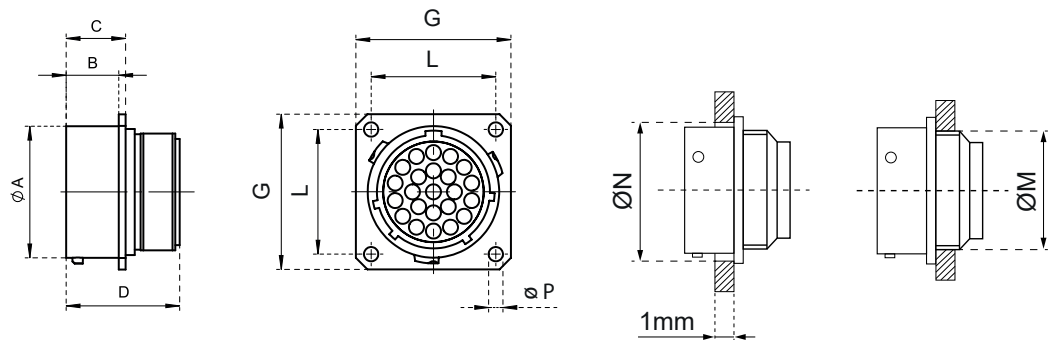
S1	Selector switch (12 positions axis selection)
S2	Selector switch (8 position incremental selection and rate multiplier)
S3	3 stage acknowledge button Enabling Device (dead-man's button)
S4	Push button (negative)
S5	Push button (fast)
S6	Push button (positive)
S7	Handwheel
Cable	HBA-X cable + plug connector (23 pins M) Moreover one socket 23 pins F connector.

7.4 Overall Dimensions

Dimensions in mm



7.5 Cut out for socket FXHE181310



	A	B	C	D	G	L	M	N	P
[mm]	28.5	11.4	13.3	24.1	33.6	27	27.8	31.3	3.1

7.6 Portable handwheel connections

Please refer to chapter [8.7](#) for more detailed information upon the Portable Handwheel HBA-X connections.

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Summary

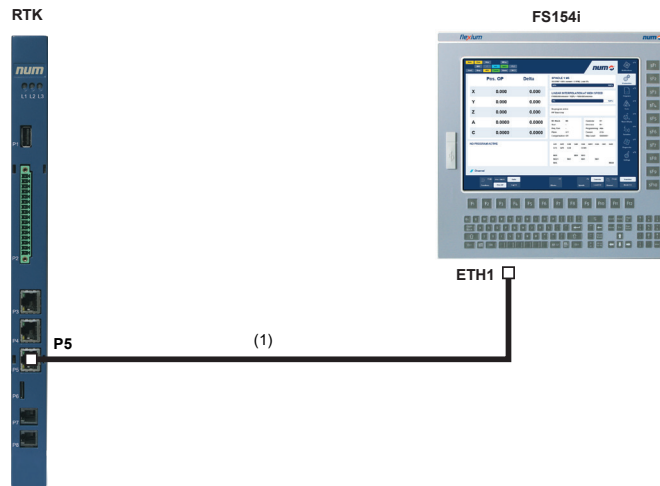
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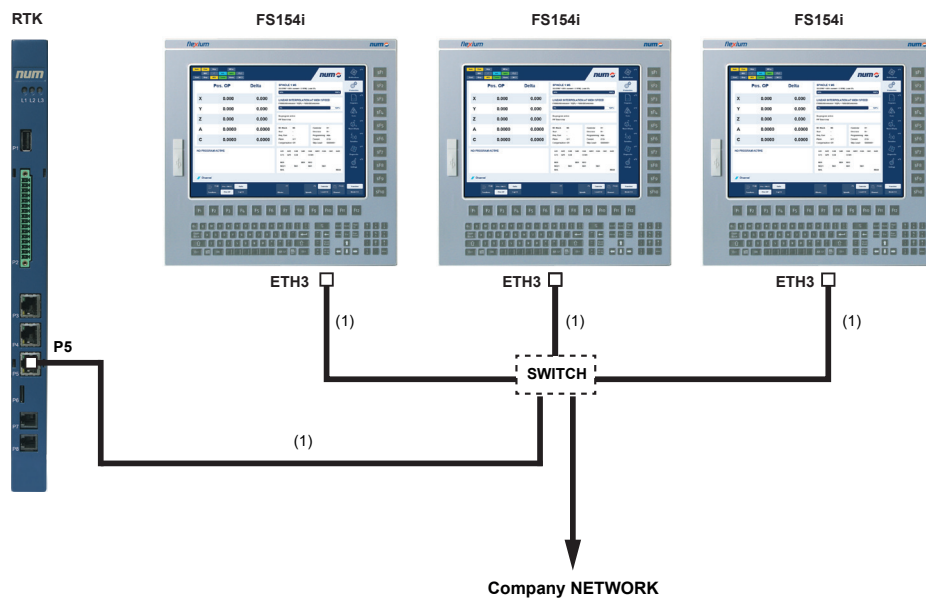
8 FlexiumPro connections

8.1 RTK to Operator's panel

8.1.1 RTK to Operator's panels with integrated PC



Multipanel configuration

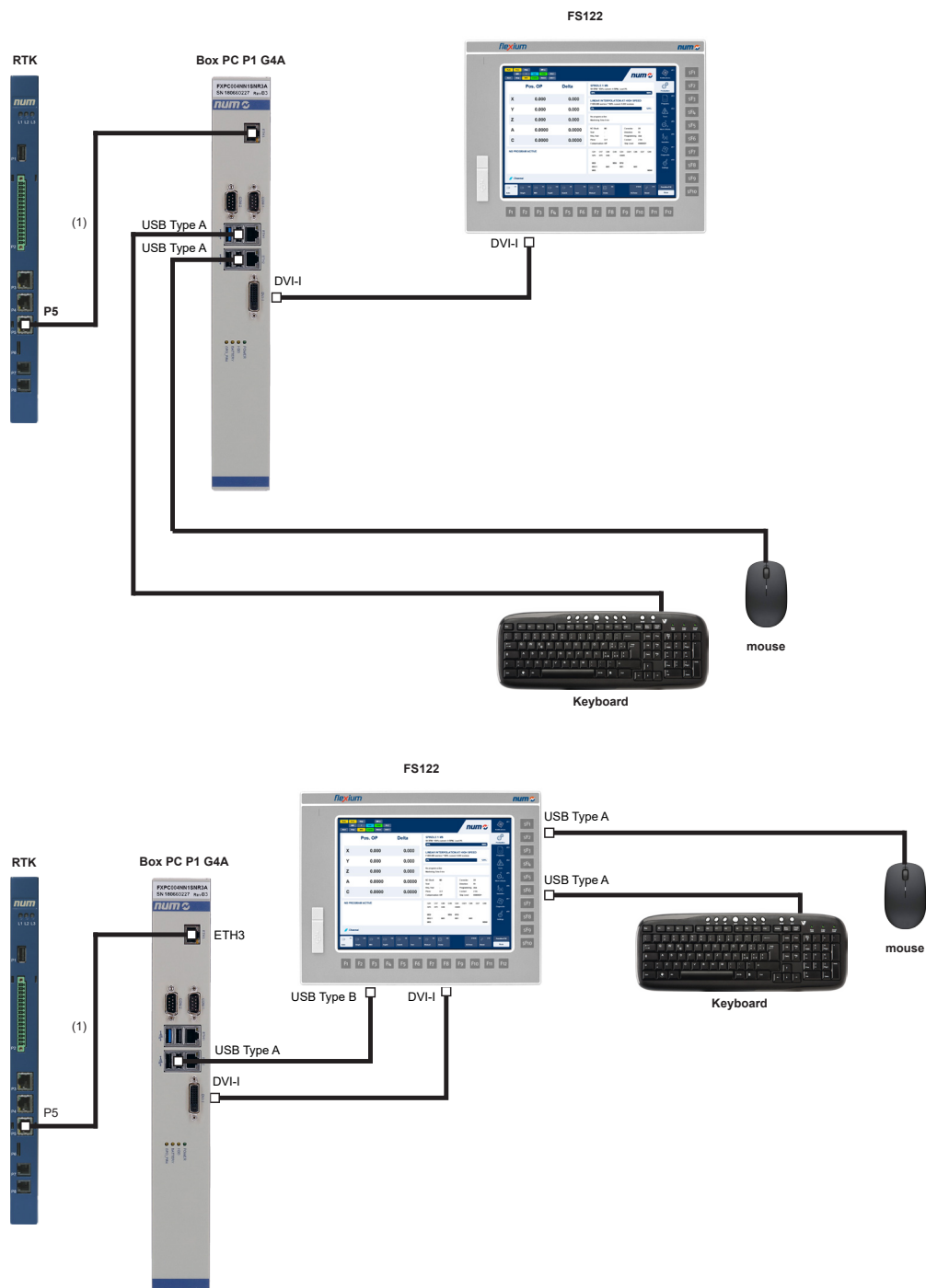


(1)	AEOFRU018Mxxxx
SWITCH	Switch module supplied by the customer (100/10 Mbit sec).
ETH3	Please refer to chapter 4.1.4
P5	Please refer to chapter 3.2



Same configurations could be done using FS184i or FS244i instead of FS154i

8.1.2 RTK to Operator's panels without integrated PC

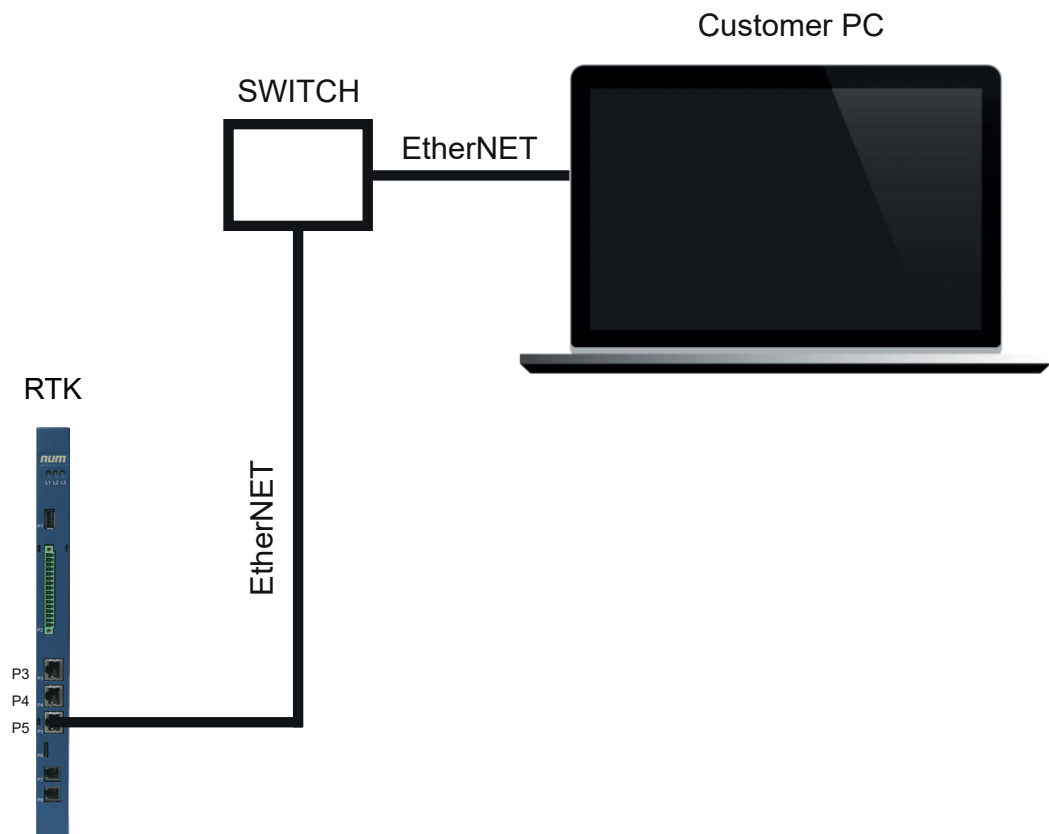


(1)	AEOFRU018Mxxxx
ETH3	Please refer to chapter 4.1.4
P5	Please refer to chapter 3.2



Same configurations could be done using Box PC P2 G2 instead of Box PC P1 G4A and FS153 or FS184 or FS194L or FS244 instead of FS122.

8.1.3 RTK to customer PC



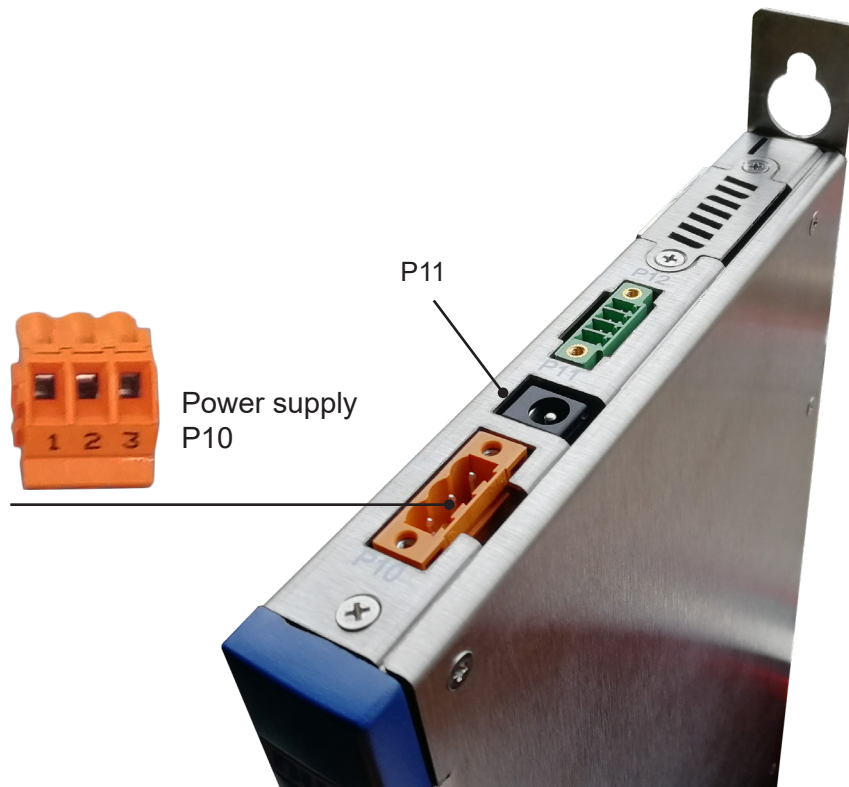
P5 Please refer to chapter [3.2](#)

8.2 RTK Power Supply Connection

The RTK must be powered connecting 24VDC. (supplied by the customer)

The power supply connector is located on top of the RTK module as indicated below.

Pin Number	Description
1	+24VDC (-20% / +10%) 0.5A
2	0VDC
3	Not Connected



It is absolutely necessary to insert a fast-blow 2A fuse in the RTK P10 powering line.

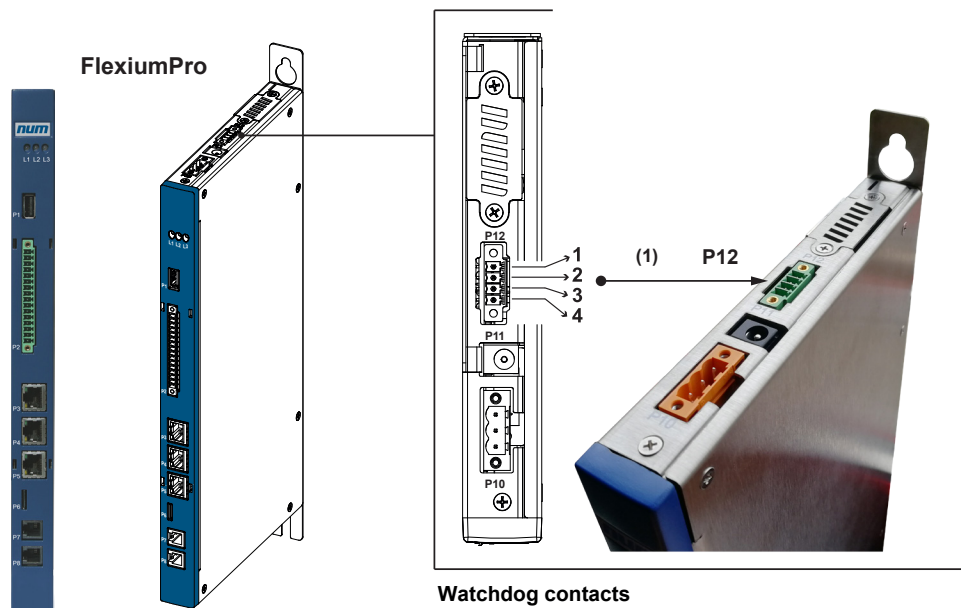


For desk office test, as alternative to P10 supply, it is possible supply RTK by means of P11 connector (5VDC 2A). A protection fuse 3A on the +5VDC is required.



DO NOT SUPPLY simultaneously P10 and P11
Using P11 to supply RTK, when 5VDC is removed the data/parameter/ part-program backup on SDCard is not activated losing all the modification done from the last previous backup.

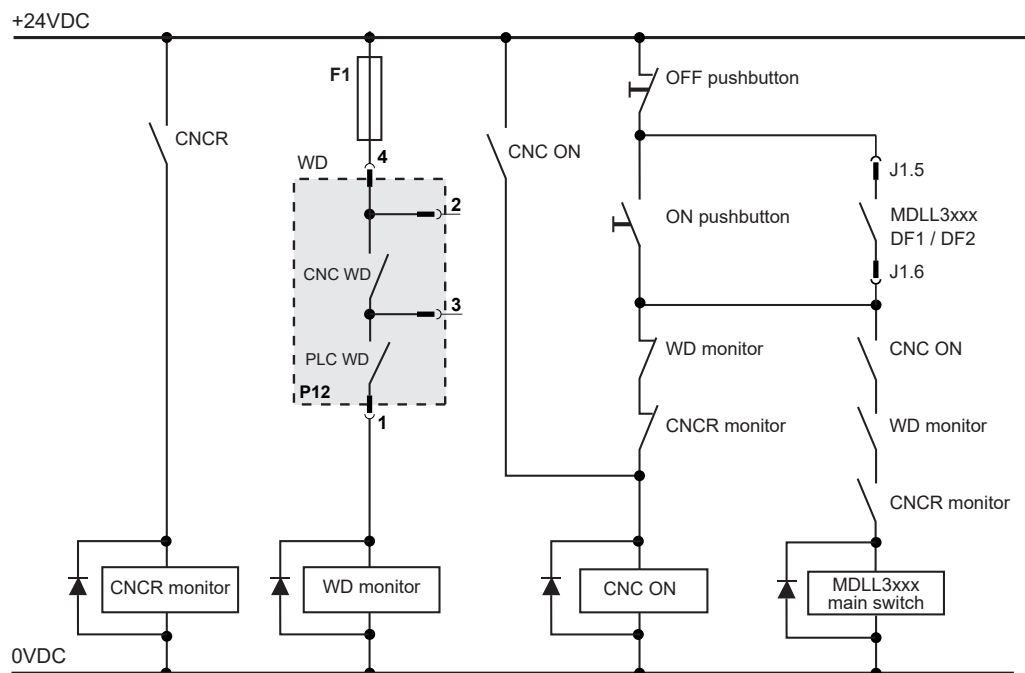
8.3 RTK Watchdog connections



Watchdog contacts

(1) Cable 0.5mm² supplied by the customer.

Screw tightening torque: Min. 0.5Nm / Max. 0.6Nm



F1: Protection fuse 250V/1A gL, gG type

WD: watchdog

CNC: Computer Numerical Control

CNCR: CNC Ready signal = FlexiumPro-NCK.RCNC.General.CncReady



To prevent CND WD and PLC WD contacts damage, a protection fuse must be placed in the circuit as indicated in the diagram above.



The watchdog CNC WD and PLC WD are managed as described in the FlexiumPro Commissioning manual M00071



The RTK may continue sending commands to the drives when the WD is open, which could cause problems (collisions, etc.).

The contacts of watchdog relays must therefore be wired in the safety chain so that when the watchdog triggers, power supply to the drives is cut off.

The control system should remain powered to allow troubleshooting and setting of certain logic inputs (which are not the only possible causes of system failure).



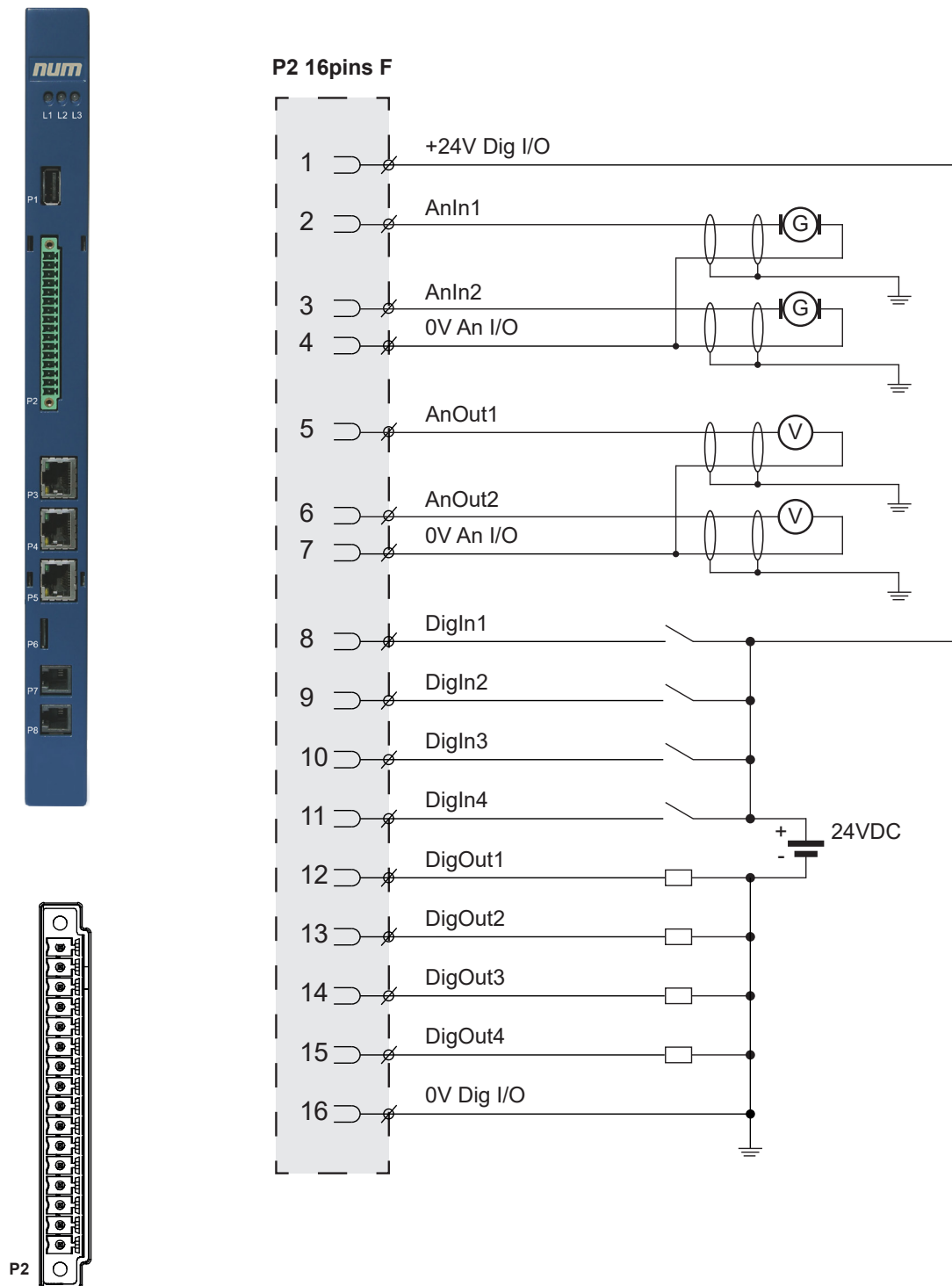
To avoid unsafe movements, take all due precautions in case of deactivation of the power contactor (e.g. loss of RTK ready signal, watchdog trigger, or emergency stop):

- Immediately stop the axes at maximum torque if this option is available on the drive, otherwise deassert speed and torque enable signals.
- In case of unbalanced axis, immediately stop and activate the holding brake motors.

8.4 Digital and Analogue inputs/outputs connections

The FlexiumPro RTK module receives input signals and sends output signals via the front panel input / output connector (P2). 4 digital inputs, 4 digital outputs, 2 analog input and 2 analog outputs are available.

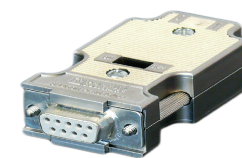
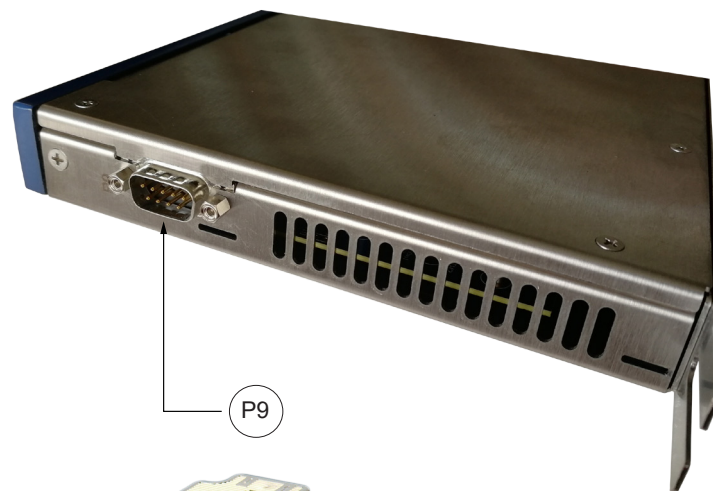
They have to be wired directly to the connector as indicated in the diagram below.



Pin	Signal	I/O	P2 Description
1	+24V Dig I/O	IN	24 VDC (-20% / +10%) / 0.5A +Out-Load external power supply (Supplied by the customer) for Digital I/O
2	AnOut1	OUT	-10V/+10V Analog Output (characteristics in chapter 3.2.2) PLC signal: FlexiumPro_NCK.WCNC.IO.AnalogOutput[1].Value (See Commissioning Manual M00071)
3	AnOut2	OUT	-10V/+10V Analog Output (characteristics in chapter 3.2.2) PLC signal: FlexiumPro_NCK.WCNC.IO.AnalogOutput[2].Value (See Commissioning Manual M00071)
4	0V An I/O	IN	Insulated 0V for Analog I/O to be not connected to 0V Dig I/O
5	AnIn1	IN	-10V/+10V Analog Input (characteristics in chapter 3.2.2) PLC signal: FlexiumPro_NCK.RCNC.IO.AnalogInput[1].Value (See Commissioning Manual M00071)
6	AnIn2	IN	-10V/+10V Analog Input (characteristics in chapter 3.2.2) PLC signal: FlexiumPro_NCK.RCNC.IO.AnalogInput[2].Value (See Commissioning Manual M00071)
7	0V An I/O	IN	Insulated 0V for Analog I/O to be not connected to 0V Dig I/O
8	DigIn1	IN	Digital input, to be used also as probing input (characteristics in chapter 3.2.2) PLC signal: FlexiumPro_NCK.RCNC.IO.DigitalInput[1].Value or PLC signal: FlexiumPro_NCK.TouchProbe... (See Commissioning Manual M00071)
9	DigIn2	IN	Digital input, to be used also as probing input (characteristics in chapter 3.2.2) PLC signal: FlexiumPro_NCK.RCNC.IO.DigitalInput[2].Value or PLC signal: FlexiumPro_NCK.TouchProbe... (See Commissioning Manual M00071)
10	DigIn3	IN	Digital input, to be used also as probing input (characteristics in chapter 3.2.2) PLC signal: FlexiumPro_NCK.RCNC.IO.DigitalInput[3].Value or PLC signal: FlexiumPro_NCK.TouchProbe... (See Commissioning Manual M00071)
11	DigIn4	IN	Digital input, to be used also as probing input (characteristics in chapter 3.2.2) PLC signal: FlexiumPro_NCK.RCNC.IO.DigitalInput[4].Value or PLC signal: FlexiumPro_NCK.TouchProbe... (See Commissioning Manual M00071)
12	DigOut1	OUT	Digital output (characteristics in chapter 3.2.2) PLC signal: FlexiumPro_NCK.WCNC.IO.DigitalOutput[1].Value
13	DigOut2	OUT	Digital output (characteristics in chapter 3.2.2) PLC signal: FlexiumPro_NCK.WCNC.IO.DigitalOutput[2].Value
14	DigOut3	OUT	Digital output (characteristics in chapter 3.2.2) PLC signal: FlexiumPro_NCK.WCNC.IO.DigitalOutput[3].Value
15	DigOut4	OUT	Digital output (characteristics in chapter 3.2.2) PLC signal: FlexiumPro_NCK.WCNC.IO.DigitalOutput[4].Value
16	0V Dig I/O	IN	0V for Digital I/O
Screw tightening			Screw tightening torque: Min. 0.5Nm / Max. 0.6Nm
Cable			0.5mm ² cable supply by the customer

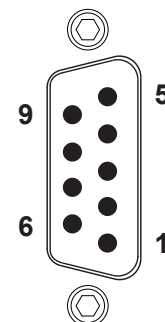
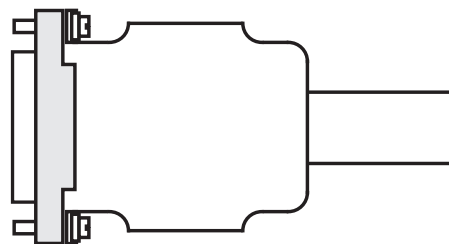
8.5 RTK CAN Connections

RTK Bottom view



FXHE181200

**RTK side - P9
Sub D 9 pins M**



P9 CAN-Bus Connection

Pin	Description
1	-
2	CAN_L (Low)
3	CAN_GND
4	-
5	SHIELD
6	CAN_GND
7	CAN_H (High)
8	-
9	-

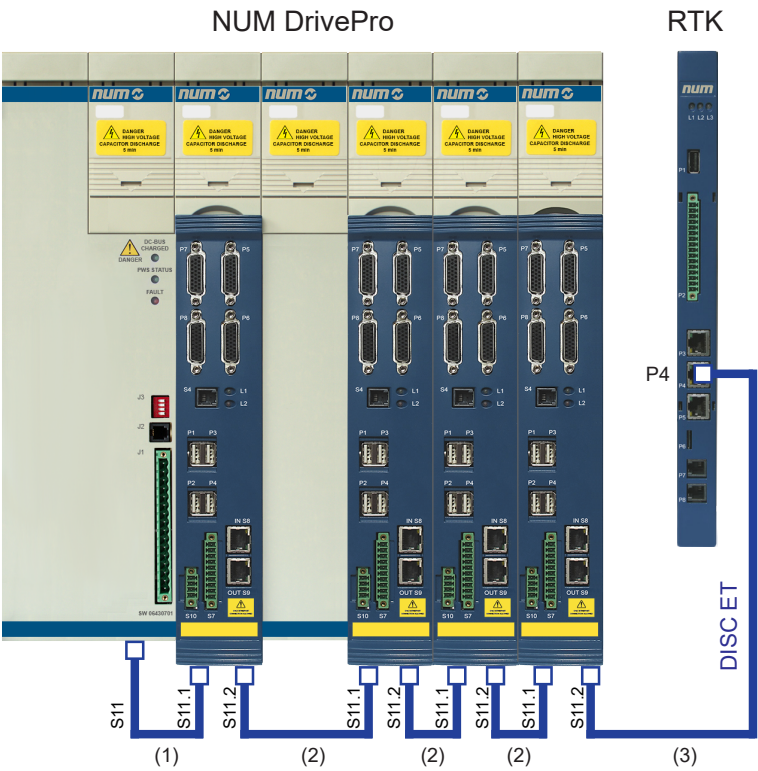


For correct interference suppression in the system, the cable shielding must be earthed in accordance with Cabinet layout and EMC Guide manual M00027.

8.6 RTK to NUM DrivePro

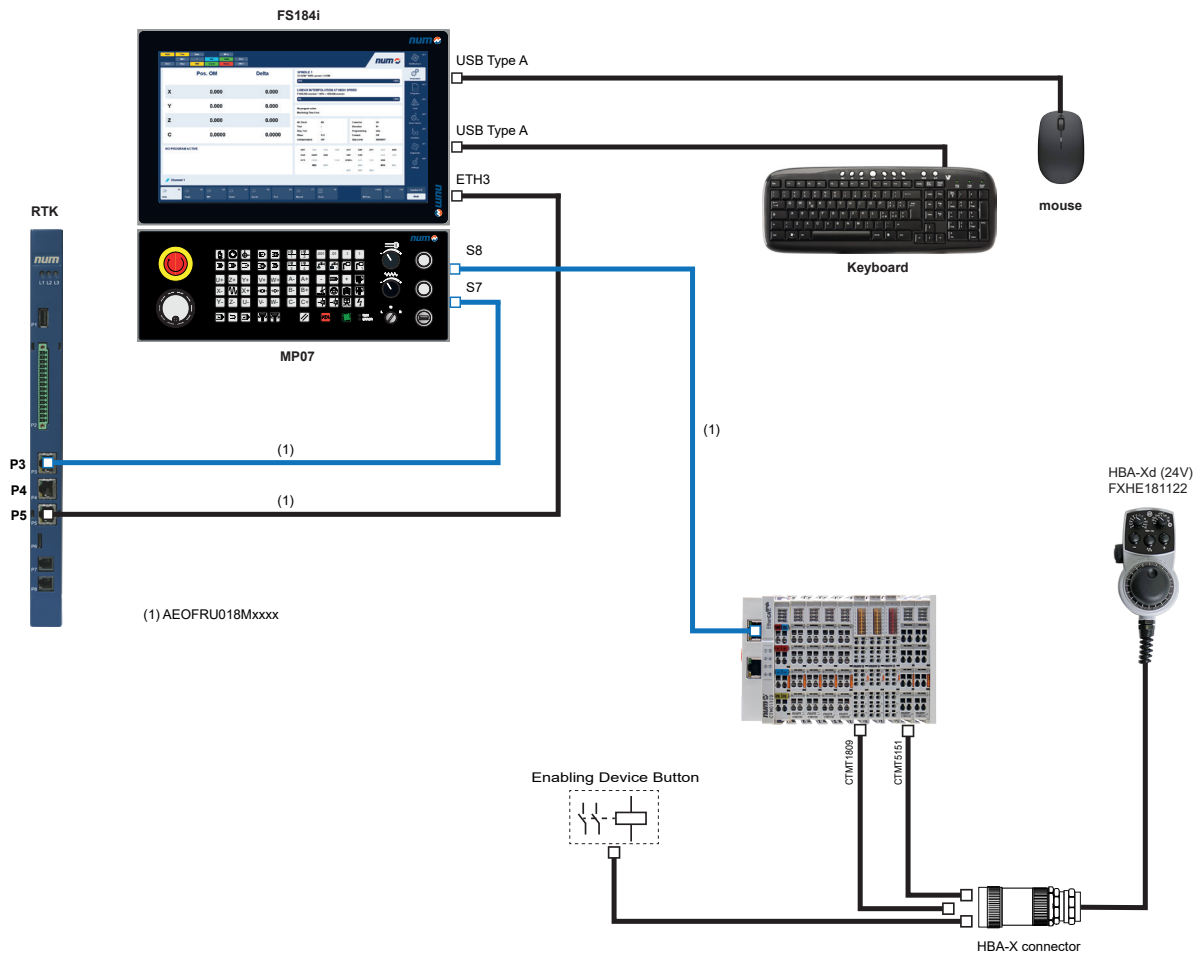
The RTK to NUM DrivePro connections is possible using the connector P4 on the front of the RTK panel. The FlexiumPro RTK can control up to 32 digital axes.

For other type of connections due to a different applications. Please refer to NUM DrivePro Installation manual M00067

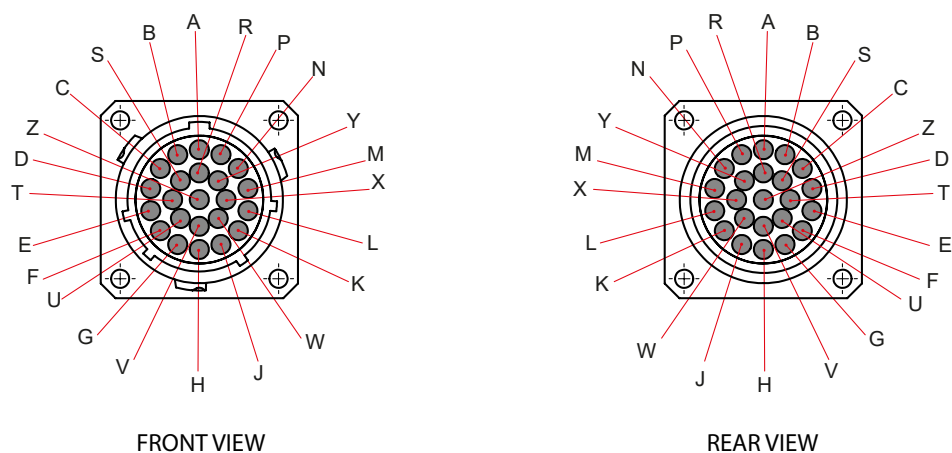


S11	MDLL3 Power supply to Drive module connector
S11.1 / S11.2	Module / Module interconnections. Please refer to the NUM DrivePro Installation manual M00067
(1)	AEOFU016Mxxxx
(2)	AEOFU018Mxxxx
(3)	AEOFU017Mxxxx
DISC ET	Digital bus communication type. Refer to chapter 10 for the cable length.

8.7 HBA-X Handwheel connections

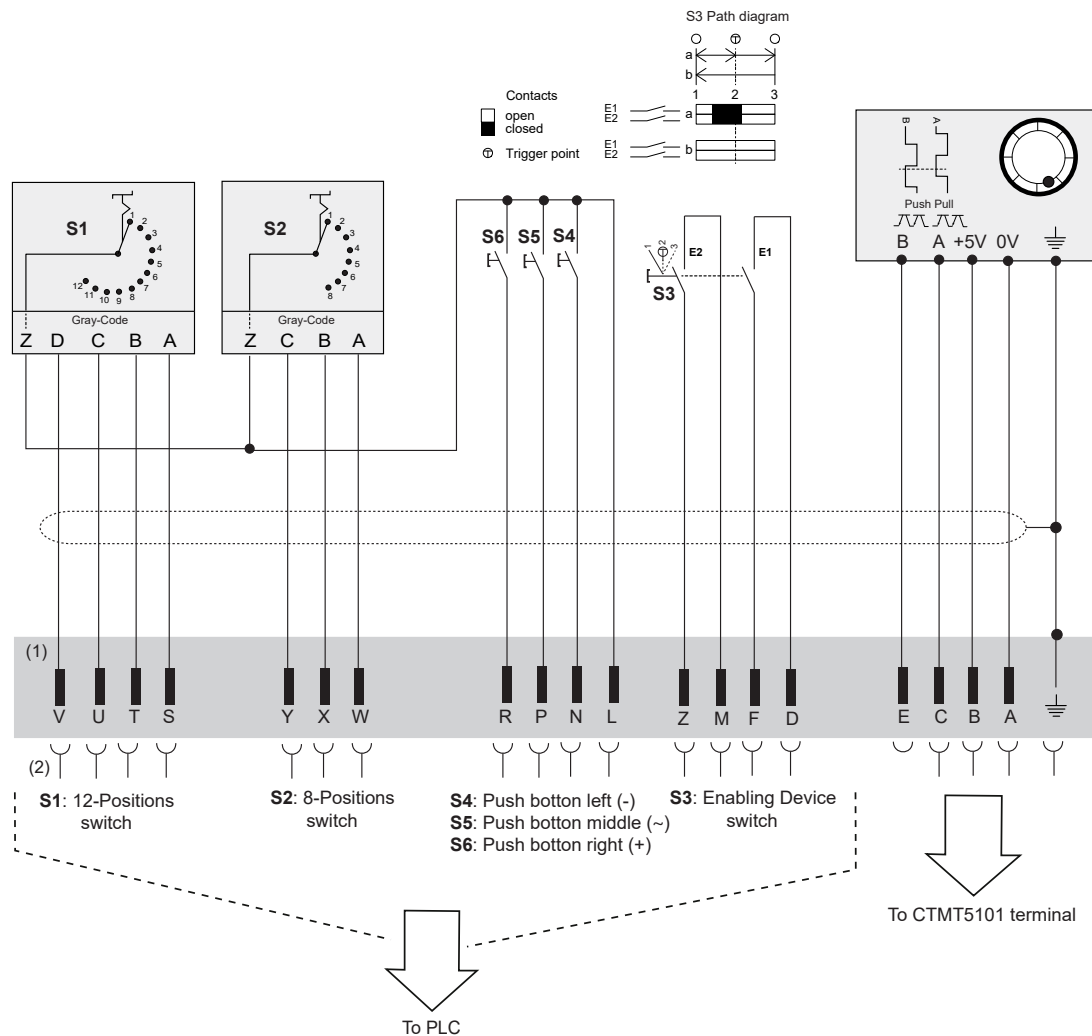


8.7.1 Socket for HBA-X 23 pins F connector FXHE181310 pin-out



8.7.2 HBA-Xc (5V) handwheel connections

The HBA-Xc portable handwheel can be connected to a PLC counter module CTMT5101



(1) HBA-X 23 pins M connector.

(2) Socket for HBA-X 23 pins F connector code FXHE181310.

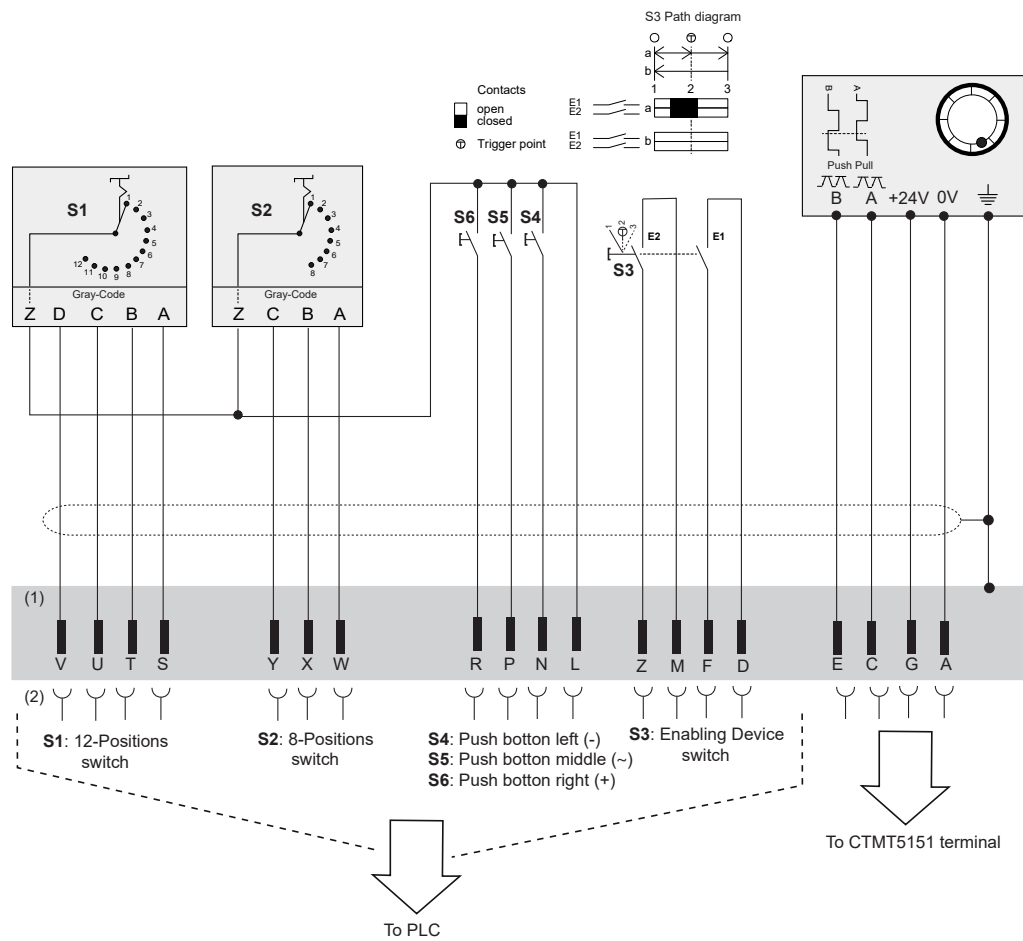
For the Gray-Code table selection and CTMT informations please refer to the next page.



For more detailed informations upon the CTMT terminals please refer to M00032 manual.

8.7.3 HBA-Xd (24V) handwheel connections

The HBA-Xd portable handwheel must be connected only to a PLC counter module CTMT5151.



(1) HBA-X 23 pins M connector

(2) Socket for HBA-X 23 pins F connector code FXHE181310

Gray-Code table				
Position	D	C	B	A
1	0	0	0	0
2	0	0	0	1
3	0	0	1	1
4	0	0	1	0
5	0	1	1	0
6	0	1	1	1
7	0	1	0	1
8	0	1	0	0
9	1	1	0	0
10	1	1	0	1
11	1	1	1	1
12	1	1	1	0



For more detailed informations upon the CTMT terminals please refer to M00032 manual.

8.8 Operator panel connections

8.8.1 Connecting the power supply J1

The system must be fed with an SELV 24VDC (safety extra-low voltage) supply by the customer. The power supply is not electrically isolated and the 0V terminal is directly connected to the housing potential.

The power supply is protected by a self resettable fuse.

The relevant national regulations must be observed when connecting the operator panel.

The connection should be made as follows:

- The cross-section of the power supply cable must be between 0.75mm² and 1.5mm².
- The current consumption must be taken into account for the power supply (see chapter 4).
- The functional ground is not compulsory for operation. It may help to prevent interference and potential differences.
- The 0V pin is directly connected to the housing potential.

The plug connector (socket strip with screw terminals) for the terminal is supplied with the device.

Pin	Designation	Function
1	+24VDC	24VDC SELV, safety extra low voltage. Protection class III / 4A.
2	0V	0V power supply
3	-	Not connected

J1 Power connector

3 pins M



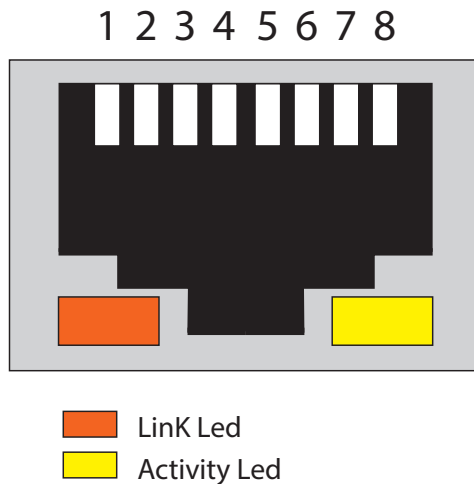
J1 Power connector 3 pins screw F



8.8.2 ETH1, ETH2 and ETH3 Ethernet connections

The connection to a HUB is implemented using a cable Cat 5 cable with RJ45 (8P/8C) connections. For ETHx connectors two diagnostics LEDs are provided:

- LINK (Connection to HUB or other device)
- ACTIVITY (Send or Receive)



Activity Led	
Status	Activity
Light OFF	No connection
Light ON fixed	Connected without data transmission
Light ON flashing	Connected with data transmission

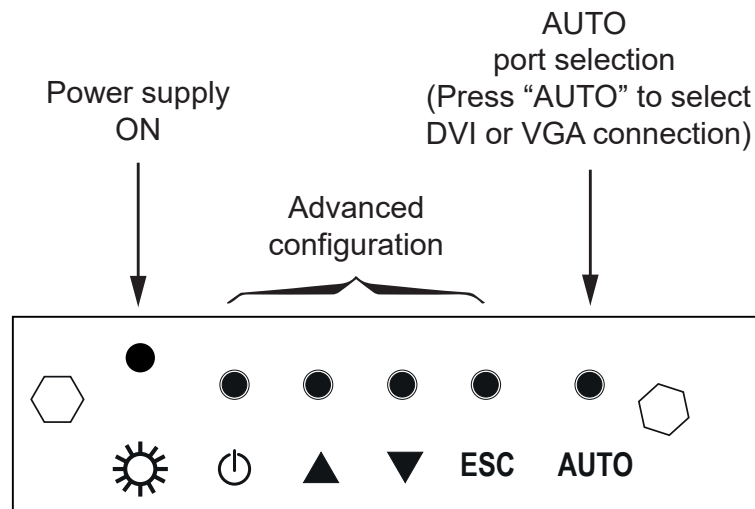
Link Led	
Status	Description
Light OFF	10Mbps connection
Light ON orange	100Mbps connection
Light ON green	1Gbps connection

Cables connected to the Ethernet interface must be routed separately from low-voltage cables.

Connector	Type	Description
ETH1	RJ45 (8P/8C)	FlexiumPro RTK Ethernet connections
ETH2	RJ45 (8P/8C)	Free
ETH3	RJ45 (8P/8C)	Company LAN

8.9 Operator panel (without integrated PC)

8.9.1 Panel configuration



8.10 USB QWERTY keyboards connections



Verical USB QWERTY keyboard
FXHE000248



Connect to USB port type A



Horizontal USB QWERTY keyboard
FXHE000249



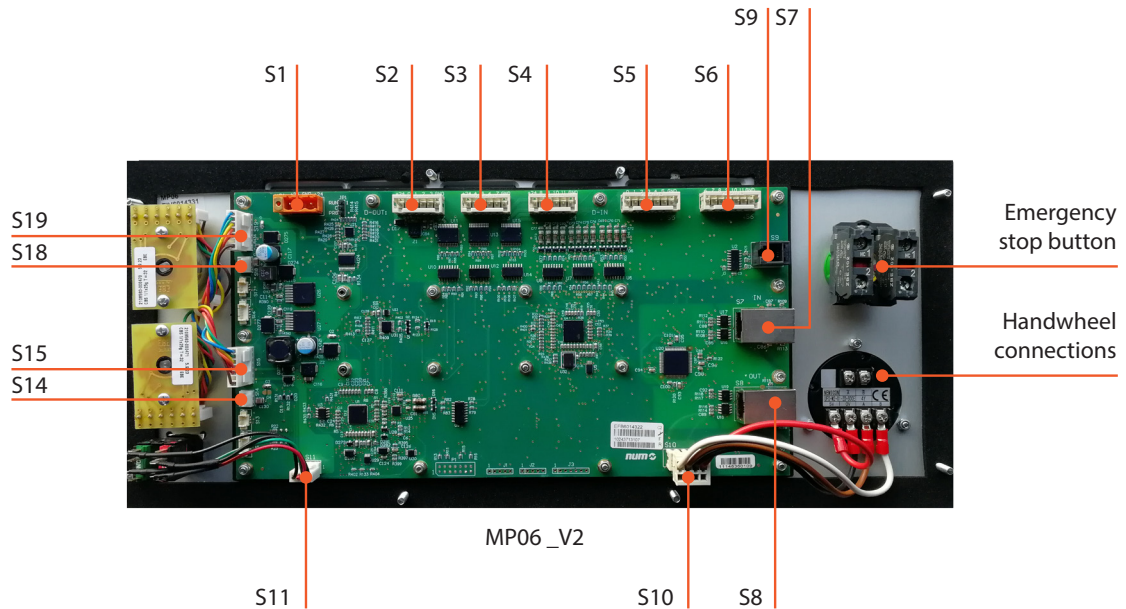
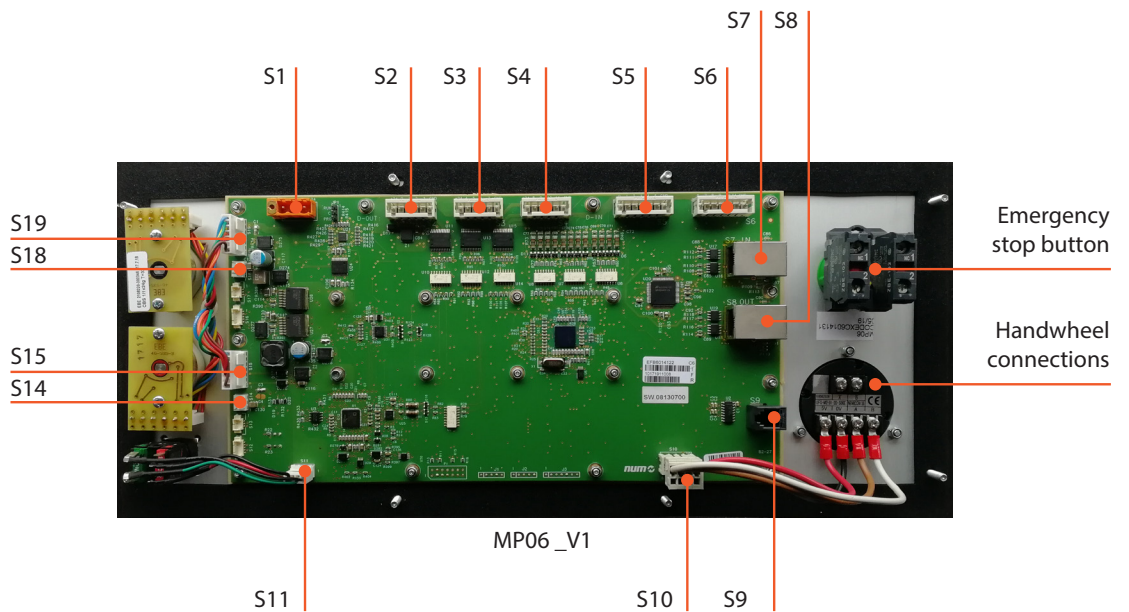
Connect to USB port type A



The keyboards must be connected directly to the USB type A port.

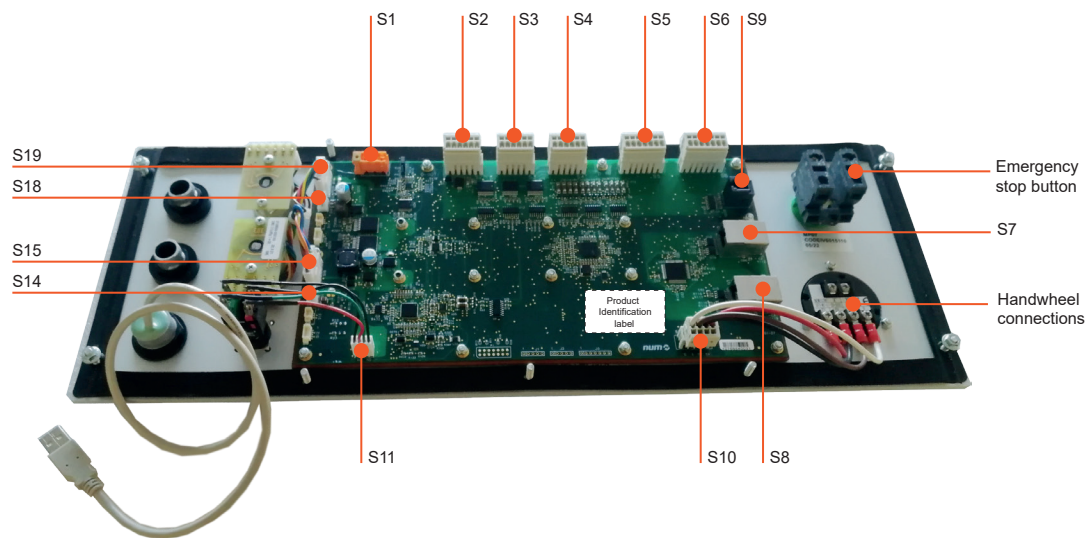
8.11 MP06 MP06_M Machine panel connections

8.11.1 Connectors lay-out



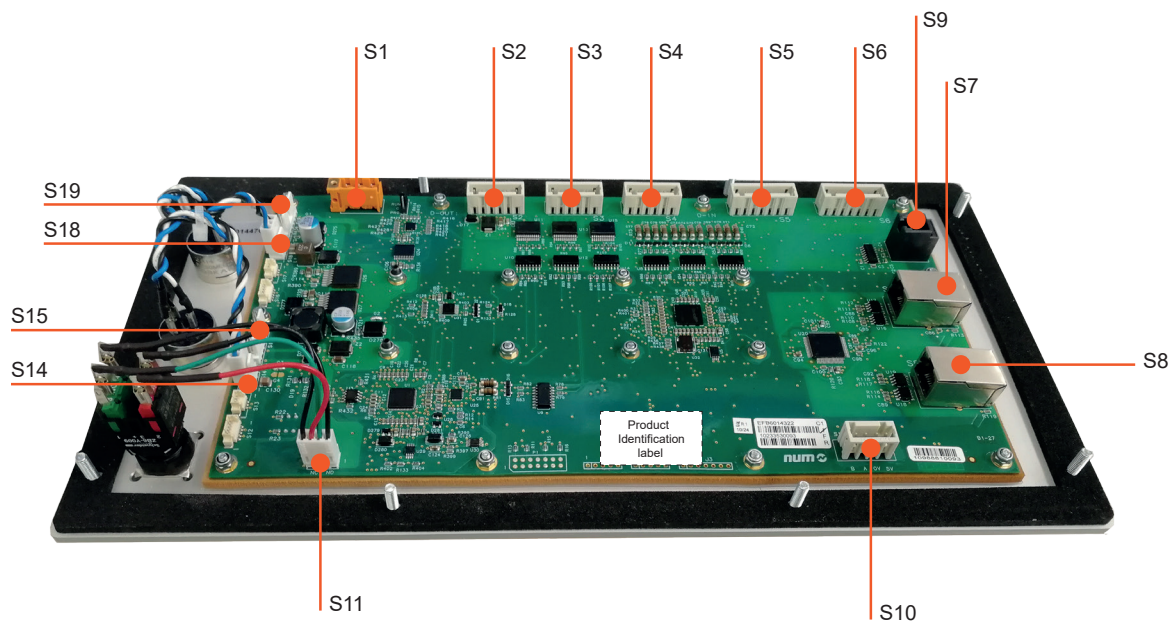
The panel connections are available as indicated in the following pages.

8.11.2 MP07 connectors lay-out



The panel connections are available as indicated in the following pages.

8.11.3 MP08 connectors lay-out



The panel connections are available as indicated in the following pages.

8.11.4 Connecting the power supply (S1)

The MP machine panel is a device compliant with protection class 3.

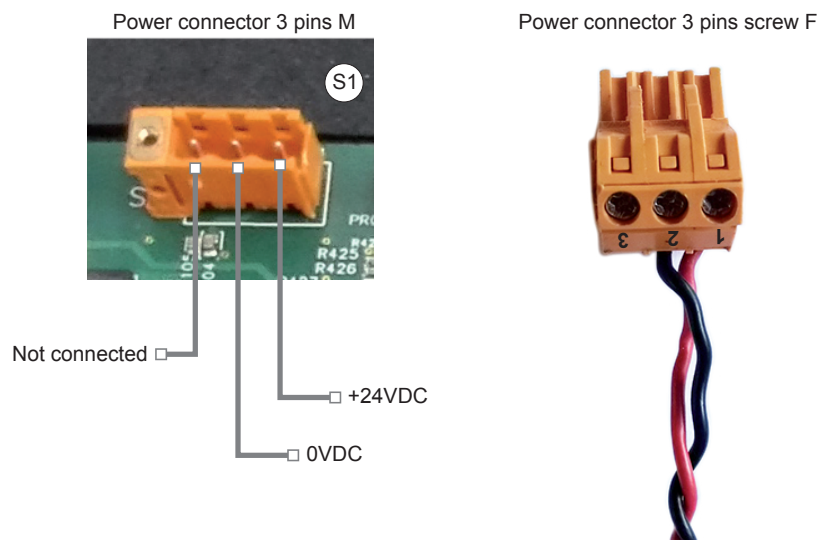
The system must be fed with an SELV 24VDC (safety extra-low voltage) supply.

The power supply is not electrically isolated. The GND terminal is directly connected to the housing potential. A safety diode protects the power supply against reversed polarity connection.

The relevant national regulations must be observed when connecting the MP machine panel.

The connection should be made as follows:

- The cross-section of the power supply cable must be between 0.75mm² and 1.5mm².
- The current consumption must be taken into account for the power supply. (See chapter 5)
- The 0V pin is directly connected to the housing potential.
- The two connection cables must be attached to each other close to the plug in order to ensure a safe connection. (see below).
- A protection fuse (1A) must be foreseen by the customer, on the +24Vdc supplying line of S1.



If the polarity is reversed a safety diode in the power supply prevents a damage to the power supply.

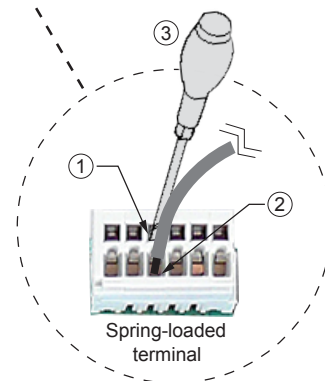
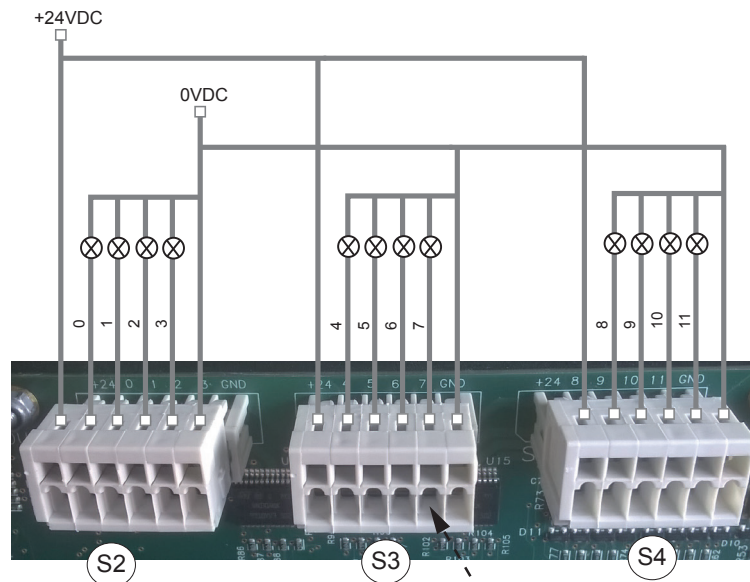
8.11.5 Digital outputs connections (S2, S3, S4)

12 digital outputs are available. +24VDC and 0VDC are common to the 3 groups.

Cable connection

1. Open a spring-loaded terminal by slightly pushing with a screwdriver or a rod into the square opening above the terminal.
2. The wire can now be inserted into the round terminal opening without any force.
3. The terminal closes automatically when the pressure is released, holding the wire safely and permanently.

Cable supplied by the customer	
Wire cross section	0.08 ... 1.5mm ²
Strip length	8 ... 9mm



Each output cannot provide more than 500mA.

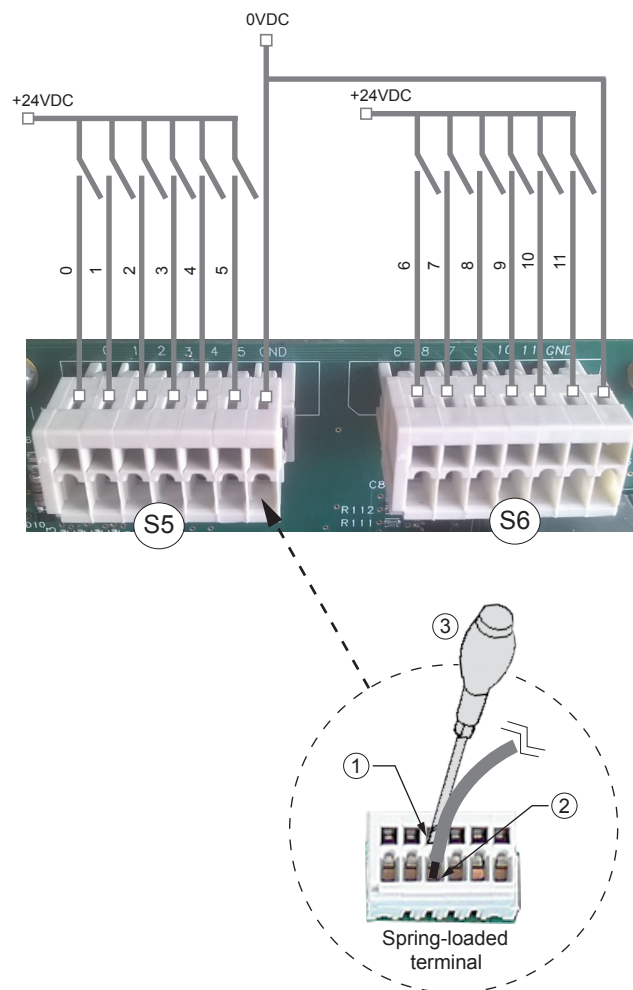
8.11.6 Digital inputs connections (S5, S6) connections

12 digital inputs are available. Each group needs a separate infeed (+24VDC) and return path (0VDC).

Cable connection

1. Open a spring-loaded terminal by slightly pushing with a screwdriver or a rod into the square opening above the terminal.
2. The wire can now be inserted into the round terminal opening without any force.
3. The terminal closes automatically when the pressure is released, holding the wire safely and permanently.

Cable supplied by the customer	
Wire cross section	0.08 ... 1.5mm ²
Strip length	8 ... 9mm

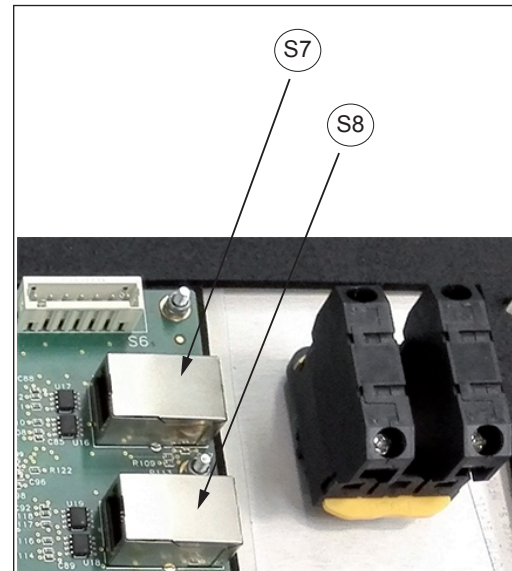


8.11.7 EtherCAT connection (S7 IN / S8 OUT)

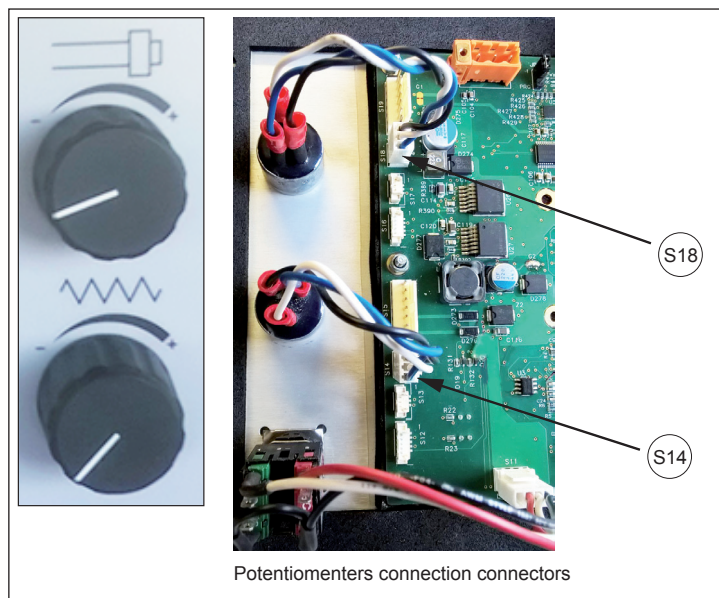
This is a standard EtherCAT interface.

To connect the EtherCAT cable it is mandatory to use the NUM cable FXHC18104x .

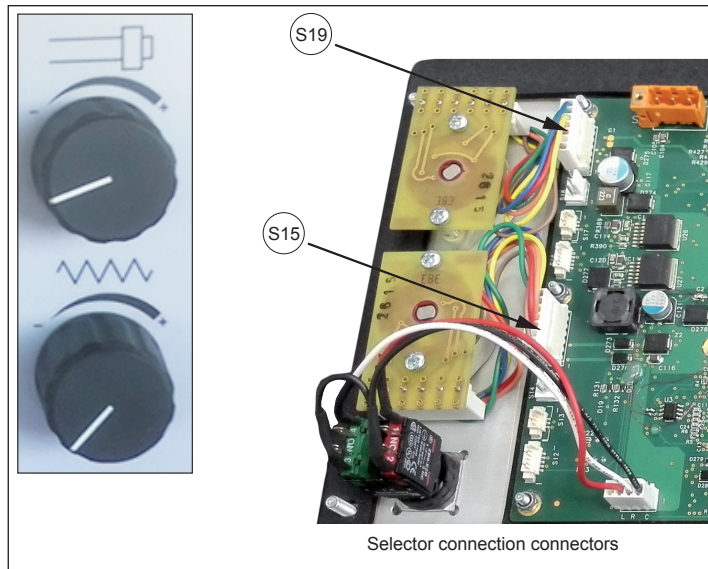
S7 / S8 Diagnostic LEDs	
Green LED: LinkAct Led	
OFF	No link
Blinking	Link and activity
ON	Link without activity
Orange LED PERR(x) port error	
Port receive error indicators PERR(x), displays physical layer RX errors. The PERR(x) LEDs flash once if a physical layer RX error occurs.	



8.11.8 Spindle speed and feed rate override potentiometer connections (S14 / S18)



8.11.9 Spindle speed and feed rate override selector connections (S15 / S19)

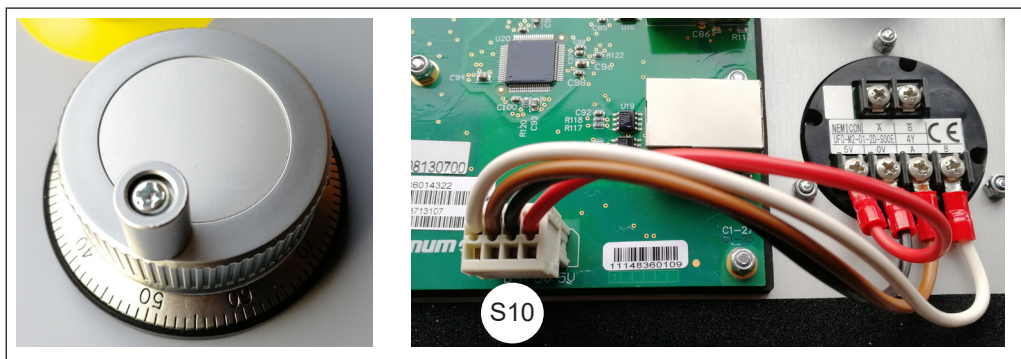


8.11.10 Emergency stop button

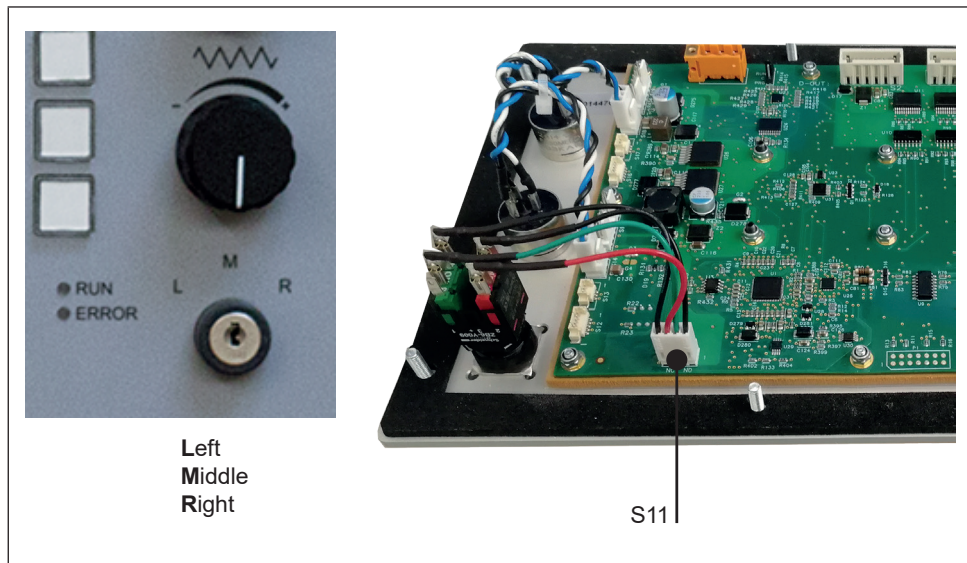
You need to connect the emergency stop directly into the two channel emergency circuit. The two contacts are normally closed. (24V/8A resistive load or 24V/4A inductive load)



8.11.11 Handwheel connections (S10)



8.11.12 Three - position Key switch (S11)



8.11.13 MP Machine Panel to PLC configuration

Please refer to FlexiumPro Commissioning manual M00071.

8.12 MP07 Panel connections

MP07 connections are identical to those of MP06. The dimensions are adapted to the FS184i operator's panel. Please refer to "MP06 Machine panel connections" chapter 8.11 for detailed information

upon the panel connections.

MP07 provides an USB extender plug and two cap mounted homes where standard pushbuttons can be fitted

MP07 provides an USB extender plug and two cap mounted homes where standard pushbuttons can be fitted

8.13 MP08 Machine panel connections

MP08 and MP06 connections are identical except that MP08 does not feature Handwhell nor Emergency stop buttons. Please refer to "MP06 Machine panel connections" chapter 8.11 for detailed information upon the panel connections.

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9 NUMSafe devices

Due to certification requirements, the Safety components instructions are given in dedicated manuals. Please refer to the following list

M00033	NUMSafe CTMP6900 Operating manual
M00034	NUMSafe CTMS 1904 Digital inputs terminal Operating manual
M00035	NUMsafe CTMS 2904 Digital outputs terminal Operating manual
M00069	NUM SAMX Safety module Instruction manual
M00037	NUMsafe CTMP 6900 Logical terminal Programming manual
M00038	NUMSafe Application Guide
M00060	NUMSafe CTMP 1960-2600 Compact controller Operating manual
M00061	NUMSafe CTMS 2912 Digital outputs terminal Operating manual

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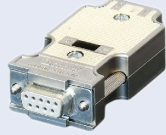
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10 Available accessories

10.1 FlexiumPro accessories list

Accessories	Order Code	Description	
MDLL3 / MDLUF	AEOF RU016M0002 AEOF RU016M0003 AEOF RU016M0004	MDLUF size 1 - 2 MDLUF size 3 MDLUF size 4 - 6	
EtherCAT Cable (yellow RJ45) for NUM-SAMX Connections	AEOF RU012M0001 AEOF RU012M0002 AEOF RU012M00A2 AEOF RU012M0003 AEOF RU012M0004 AEOF RU012M0015 AEOF RU012M0020 AEOF RU012M0030	MDLUF size 1 MDLUF size 2 MDLUF size 3 MDLUF size 4 MDLUF size 6 Cable length 1.5 m Cable length 2 m Cable length 3m	
Cable for Tandem: • Anti-Backlash • Torque Duplication • Winding Duplication	AEOF RU013M0001 AEOF RU013M0002 AEOF RU013M00A2 AEOF RU013M0003 AEOF RU013M0004	MDLUF size 1 MDLUF size 2 MDLUF size 3 MDLUF size 4 MDLUF size 6	
Ethernet cable (RJ45) for: MDLUF to MDLUF, NUM- STOX to NUM-STOX, RTK to PC, EtherCAT Gateway interconnection, RTK to EtherCAT Gateway	AEOF RU018M0001 AEOF RU018M0002 AEOF RU018M00A2 AEOF RU018M0003 AEOF RU018M0004 AEOF RU018M0010 AEOF RU018M0025 AEOF RU018M0050 AEOF RU018M0100	MDLUF size 1 MDLUF size 2 MDLUF size 3 MDLUF size 4 MDLUF size 6 Cable length 1 m Cable length 2.5 m Cable length 15 m Cable length 10 m	
RTK to MDLUF Cable	AEOF RU017M0006 AEOF RU017M0010 AEOF RU017M0025 AEOF RU017M0050	Cable length 0.6 m Cable length 1 m Cable length 2.5 m Cable length 5 m	
CAN Cable PVC, Purple, Shielded in Pairs	FXHC181060	Cable only. Required length must be specified in the order.	

Accessories	Order code	Description	
NUMSmartBackup 64GB	FXHE557102	The NUMSmartBackup system is an own developed tool to backup or restore all FlexiumPro.	
CAN connector	FXHE181200	CAN Female connector axial	
CAN connector	FXHE181201	CAN Female connector 90°	
CAN connector	FXHE181202	CAN Male / Female connector 90° with prog. unit	
Socket for portable HBA-X	FXHE181310	HBA-X connector. The socket FXHE181310 is an OEM additional 23 pins F connector to connected the handwheel on different places on the machine. See chapter 7.5	

10.2 CAN Cable and CAN connectors connection

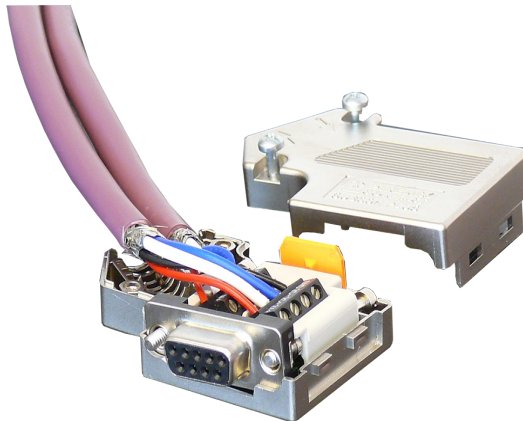
10.2.1 CAN cable FXHC181060



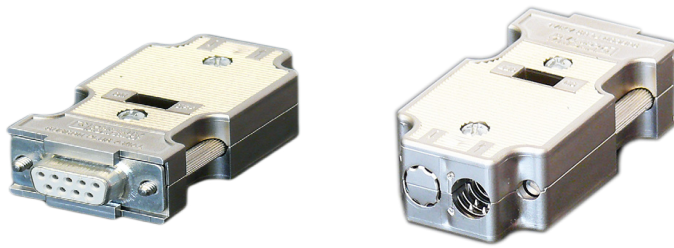
Wire colour	CAN connections
Blank	Shield
Red	V+
Black	V-
White	CAN-H
Blue	CAN-L

10.2.2 CAN plugs

With the following plugs the end resistor is included (ON/OFF switchable) and the cable connections are screw terminated.



10.2.2.1 Plug axial connector FXHE181200

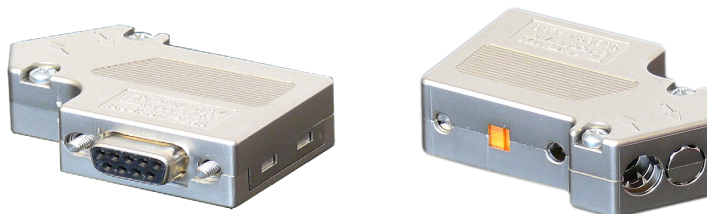


Wire colour	BUS IN connections	BUS OUT connections
Blank	Shield	Shield
Black	GND	GND
White	1C+	2C+
Blue	1C-	2C-

Always connect the incoming bus cable (BUS IN) to the connection points GND/1C-/1C+ (also at the starting point of the bus system).

The outgoing bus cable (BUS OUT) is always connected to the terminals GND/2C-/2C+/2V+ .

10.2.2.2 Plug 90° angled without connection for programmable unit FXHE181201



Wire colour	BUS IN connections	BUS OUT connections
Blank	Shield	Shield
Red	1V+	2V+
Black	GND	GND
White	1C+	2C+
Blue	1C-	2C-

Always connect the incoming bus cable (BUS IN) to the connection points GND/1C-/1C+/1V+ (also at the starting point of the bus system).

The outgoing bus cable (BUS OUT) is always connected to the terminals GND/2C-/2C+/2V+ .

10.2.2.3 Plug 90° angled with connection for programmable unit FXHE181202



Wire colour	BUS IN connection	BUS OUT connection
Blank	Shield	Shield
Red	1V+	2V+
Black	GND	GND
White	1C+	2C+
Blue	1C-	2C-

Always connect the incoming bus cable (BUS IN) to the connection points GND/1C-/1C+/1V+ (also at the starting point of the bus system).

The outgoing bus cable (BUS OUT) is always connected to the terminals GND/2C-/2C+/2V+ .

Selector configuration:

- selector in ON = 1 cable IN bus IN use only.
- selector OFF = If IN /OUT used

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