BT 5 AM

Operator Panel

for Stepper Motor Control Units

OMC and TMC,

MCC-1 and MCC-2

User Manual

TRANSLATION OF THE GERMAN ORIGINAL MANUAL

Phytron GmbH

Industriestraße 12

82194 Gröbenzell, Germany

Tel.: +49(0)8142/503-0

Fax: +49(0)8142/503-190

Every possible care has been taken to ensure the accuracy of this technical manual. All information contained in this manual is correct to the best of our knowledge and belief but cannot be guaranteed. Furthermore we reserve the right to make improvements and enhancements to the manual and / or the devices described herein without prior notification.

We appreciate suggestions and criticisms for further improvement. Please send your comments to the following
E-mail address: doku@phytron.de

Contents

1 Legal Instructions

This manual:

Read this manual very carefully before mounting, installing and operating the device and if necessary further manuals related to this manual.

- Please pay special attention to instructions that are marked as follows:

 **DANGER – Serious injury!**	*Indicates a high risk of serious injury or death!*
 **DANGER – Serious injury from electric shock!**	*Indicates a high risk of serious injury or death from electric shock!*
 **WARNING – Serious injury possible!**	*Indicates a possible risk of serious injury or death!*
 **WARNING – Serious injury from electric shock!**	*Indicates a possible risk of serious injury or death from electric shock!*
 **CAUTION – Possible injury!**	*Indicates a possible risk of personal injury.*
CAUTION – Possible damage!	*Indicates a possible risk of damage to equipment.*
 **CAUTION – Possible damage due to ESD!**	*Refers to a possible risk of equipment damage from electrostatic discharge.*
”Any heading“	*Refers to an important paragraph in the manual.*

2 Safety Instructions

The fuse may only be changed by qualified and trained personnel!

In electrical systems dangerous voltages may exist.

When touching powered components there is the **danger of electric shock**!

Electrostatic discharging can destroy electronic components! ESD protective measures should be respected!

3 The BT 5 AM Operator Panel

Fig.1 BT 5 AM Operator panel

Type BT 5 AM operator panels may be connected to the service port connector of OMC or TMC stepper motor control units or to the X5 Com interface of the MCC controller.

During production, the operator can do some entries enabled for change: e.g. select other machine programs, adjust throughput, change quantities etc.

If required, the operator panel displays text lines or error messages. Function keys can be individually labelled.

In the Remote/Terminal mode you can enter motion commands, set outputs or display status messages.

With multi-axis systems, the operator panel should be connected to the master OMC or TMC. All slaves connected can be operated and monitored with only one operator panel.

4 Control Elements

4.1 Editing Keys

	The key **0 and ()°** is used for changing data in the editor. The (,) and ° characters can be entered when configuring the **Shift** or **ShiftCase** system variables.
	The key **1 and STU** is used for changing data in the editor. The S, T and U characters can be entered when configuring the **Shift** or **ShiftCase** system variables.
	The key **2 and VWX** is used for changing data in the editor. The V, W and Y characters can be entered when configuring the **Shift** or **ShiftCase** system variables.
	The key **3 and YZ%** is used for changing data in the editor. The Y, Z and % characters can be entered when configuring the **Shift** or **ShiftCase** system variables.
	The key **4 and JKL** is used for changing data in the editor. The J, K and L characters can be entered when configuring the **Shift** or **ShiftCase** system variables.
	The key **5 and MNO** is used for changing data in the editor. The M, N and O characters can be entered when configuring the **Shift** or **ShiftCase** system variables.
	The key **6 and PQR** is used for changing data in the editor. The P, Q and R characters can be entered when configuring the **Shift** or **ShiftCase** system variables.
	The key **7 and ABC** is used for changing data in the editor. The A, B and C characters can be entered when configuring the **Shift** or **ShiftCase** system variables.
	The **key 8 and DEF** is used for changing data in the editor. The D, E and F characters can be entered when configuring the **Shift** or **ShiftCase** system variables.
	The key **9 and GHI** is used for changing data in the editor. The G, H and I characters can be entered when configuring the **Shift** or **ShiftCase** system variables.
	The key **Decimal point and :?!** is used for changing data in the editor. The characters :, ? and ! can be entered when configuring the **Shift** or **ShiftCase** system variables.

	The **key Plus and <=>** is used for changing data in the editor. The characters <, = and > can be entered when configuring the **Shift** or **ShiftCase** system variables.
	The key **Minus and */** is used for changing data in the editor. The characters \, * and / can be entered when configuring the **Shift** or **ShiftCase** system variables.

4.2 Control Keys

	**Cursor left** In the editor, it moves the cursor one character to the left (character selection). This function corresponds to the system variable **KeyCursLeft**.
	**Cursor right** In the editor, it moves the cursor one character to the right (character selection). This function corresponds to the system variable **KeyCursRight**.
	**Cursor down** In the editor, it moves the cursor down one variable (variable selection). This function corresponds to the system variable **KeyCursDown**.
	**Cursor up** In the editor, it moves the cursor up one variable (variable selection). This function corresponds to the system variable **KeyCursUp**.
	**Cursor home** In the editor it returns the cursor to the first input variable position. This function corresponds to the system variable **KeyHome**.
	**Page down** This function corresponds to the system variable **TabPgDn**.

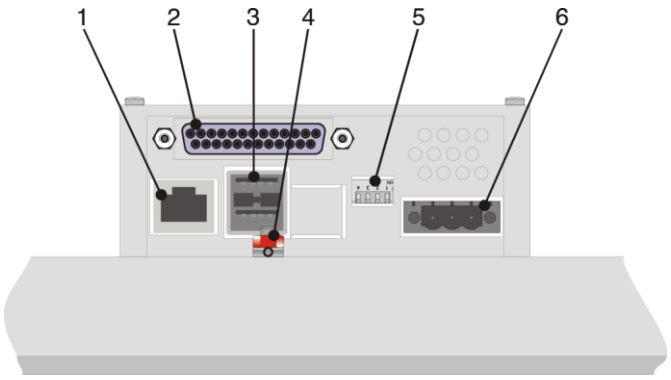
	The question mark key is not assigned.
	The key **Data Release** changes from the menu into the editor. The integrated LED is lit during edit mode. Pressing this key in edit mode exits the editor.
	The key **Enter** is used to complete data entry. Pressing this key while the start up screen is displayed opens the setup screen.
	The key **Delete** deletes the character beneath the cursor in the editor.
	The **Print** key is not assigned.

4.3 Function Keys

The operator panel has six function keys F1 to F6. When pressing a function key the mode described below will be active. Now you can do several inquiries or inputs described in the following chapters.

	Manual mode
	Diagnosis / Status
	Auto boot
	Not used
	Registers
	Parameters

5 Panel Settings



1 Female connector X5 (Ethernet)
2 Female connector X6 (Serial interface)
3 Female connectors X9, X10 (USB Host - type A)
4 Threaded bolt for protective grounding
5 Termination switch (RS422/RS485)
6 Connector X1 (Supply voltage)

Fig.2 Interfaces

6 Connecting the Control Unit

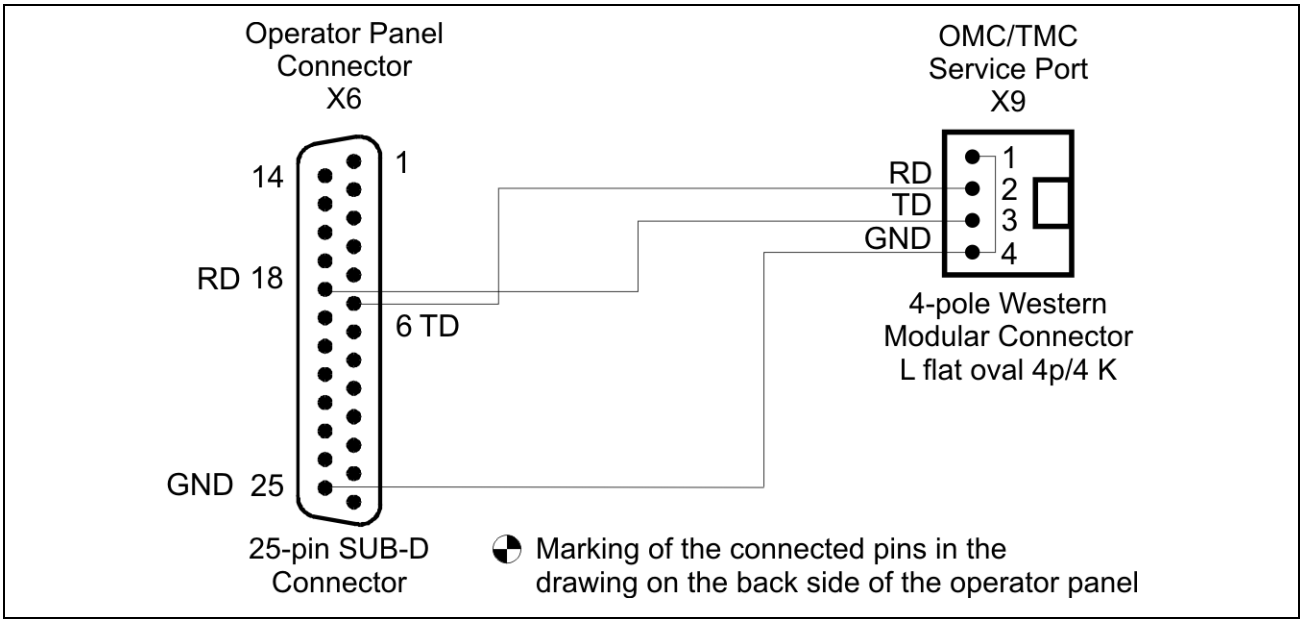


Fig.3 Cable operator panel – OMC/TMC control unit

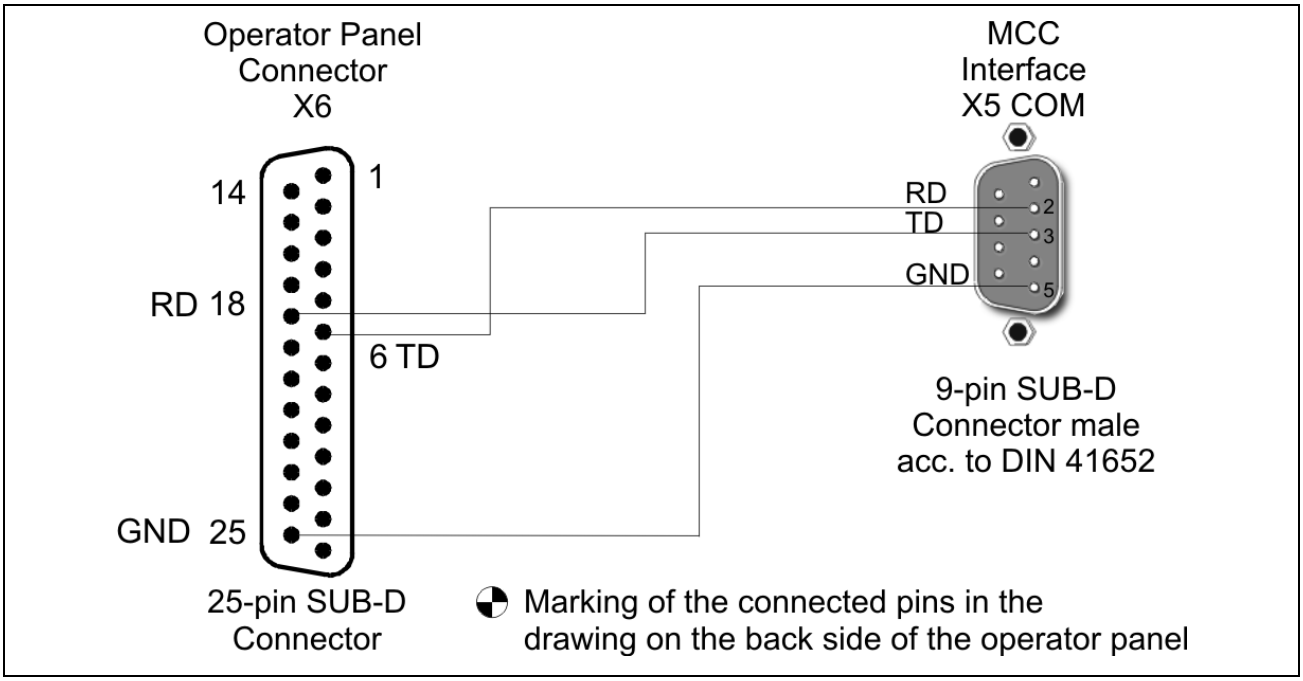


Fig.4 Cable operator panel – MCC control unit

i	**Termination switch**	*During operation of the interface as RS232 the termination switch should be switched to ‚OFF' (fig.2).*

7 Communication with the Control Unit

As soon as control unit and operator panel are connected (see chapter above) you can switch on the power supplies of all units.

READY	*The operator panel is ready after 25 sec power on.* *The baud rate is set to 38400 baud.*

Dependent on the controller's operating mode (Remote/Local switch), one of the following messages will be shown on the operator panel's display:

Position of Remote/Local Switch (OMC/TMC)	Display (terminal)	
Remote	Remote / Terminal	Function keys F1 to F6 are active.
Local	Local	The displayed text can be generated by a MINILOG program (see MINILOG programming manual).

If there is no communication with the control unit, please check the cabling.

7.1 F1: Manual mode

After pressing **F1** the display shows 'Manual Mode'. In this mode, several functions are available:

Reference run

Press key 0.

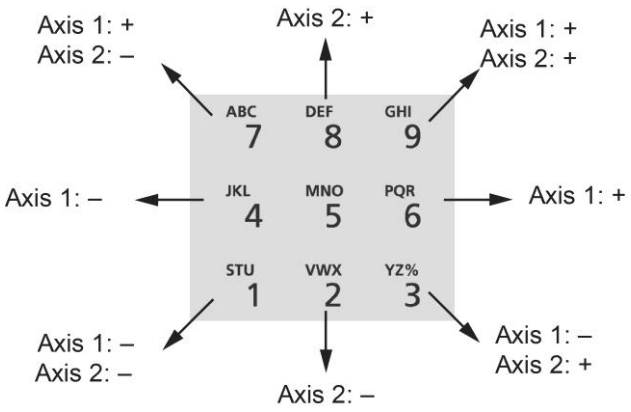
Now you will be asked to select an axis for reference run.
Display: **Axis ?**
Input: Digits 1 to 8


Press the ENTER key. Reference run will be started.

Abort reference run: Press any key.

Manual mode

With the numerical keys the motors (here: axes 1 and 2) can be driven according to the scheme below:



Change axes:

With the arrow keys


and

you can change to two other axes. Always the next two axes can be selected.

At systems with an odd number of axes, finally only one axis will be displayed, e.g. at 3 axes the 3rd axis.

+ = plus direction
– = minus direction

The direction of rotation depends on the stepper motor wiring. To change the direction of rotation, you only have to change the leads of one motor phase (e.g. A and B).

Enter MINILOG Instructions

In the manual operation mode, you can directly enter and execute MINILOG or DIN instructions (see MINILOG programming manual). For ex., you can enter drive instructions such as 'drive 100 steps in the plus direction'.

You can enter instructions after the operator panel's input mode has been enabled:

 Press INPUT key

In the display a cursor is visible under the first digit of the lower line. The green LED at the INPUT key shines.

Now you can enter MINILOG or DIN instructions at the key pad. This is done similar to mobile phone operation:

Press **1** times: number	e.g. **7**
Press **2** times: 1rst letter	e.g. **A**
Press **3** times: 2nd letter	e.g. **B**
Press **4** times: 3rd letter	e.g. **C**

 Press ENTER key to confirm the input. The instruction is executed.
If the lower line is empty, the mode will be finished without executing an instruction.

 Press the CLEAR key to delete the sign above the cursor.

 Press the HOME key to delete the complete lower line of the display.

How to leave the input mode:

 Press the INPUT key

7.2 F2: Diagnosis / Status

As soon as this mode is active, several submenus can be selected with the function keys:

F1	Inquire and change output status
F2	Inquire input status
F3	Inquire limit switch status
F4	Power stage diagnosis
F5	Display version
F6	Reset control unit

7.2.1 Submenu F1: Output Status

Select the submenu 'output status' with key **F1** from the menu 'diagnosis/status'. Now the output status can be inquired or changed.

The outputs are displayed in groups of eight: **0000 0001**
In this example: The outputs 1 to 7 are off. Output 8 is set.

With the arrow keys and the SCROLL key you can display all outputs one group after another.

For changing the output status the input mode has to be enabled:

Press the INPUT key

The green LED on the input key shines. In the display the cursor blinks at the first sign of the selected group of outputs.

< >	Move the cursor to the output which has to be changed (input mode)
^	Move the cursor to the previous group of outputs

	Move the cursor to the next group of outputs
	Change output status (input mode): 0 = off 1 = output set
	Leave the input mode and transmit the actual state to the controller
	Leave the mode 'output status' without storing the changes

7.2.2 Submenu F2: Input Status

From the menu 'Diagnosis/Status' you can select the submenu 'Input Status' with the key **F2**. The states of all available inputs are displayed in groups of 16 (OMC/TMC) or in groups of 8 (MCC) for example: **0000 0000 0000 0001, 0000 0001**

In example OMC/TMC the inputs 1 to 15 are off, input 16 is on, in example MCC the inputs 1 to 7 are off, input 8 is on.

	Scroll from input group to the next or previous input group.
	Change to the next input group
	Leave the mode 'Input Status'

7.2.3 Submenu F3: Limit Switch Status (Initiator Status)

From the menu F2 'Diagnosis/Status' you can select the submenu 'Limit switch status' with the key **F3**. The states of all available limit switches (initiators) are displayed.

I = 0 Limit switch is supplied with 24 V, but not damped (free)

I = + Limit switch + direction is damped

I = – Limit switch – direction is damped

I = 2 no limit switch connected or both limit switches are damped

Example: **I = 02+–**
The system has 4 axes, limit switch of axis 1 is free, for axis 2 no limit switch is connected, the limit switch of the direction + of axis 3 is damped, and the direction – limit switch of axis 4 is damped, too.

	Leave the limit switch status mode

7.2.4 Submenu F4: Power Stage Diagnosis

From the menu F2 'Diagnosis/Status' you can select the submenu 'Power stage diagnosis' with the key **F4**. The states of all available power stages are displayed as follows:

No. of power stage = status code number

The power stages are numbered serially: **1, 2, 3** etc

Power stage status code number	Meaning
1	Over current error
2	Under voltage error
4	Over temperature error
7	No power stage
8	Power stage is activated
0	Power stage is not activated

Example: 1 = 4 2 = 4 3 = 7

In this example, over temperature is displayed for power stages 1 and 3. The power stage of axis 3 is not connected or not recognized.

	Leave the mode power stage status

7.2.5 Submenu F5: Display Version

From the menu F2 'Diagnosis/Status' you can select the submenu 'Display version' with the key **F4**. Now the program version numbers of the controller are displayed:

BIOS = version no.

SYS = version no.

Indexer = version no. (MCC)

	Leave the mode display version

7.2.6 Submenu F6: Reset Controller

From the menu F2 'Diagnosis/Status' you can select the submenu 'Reset controller' with the key **F6**. Now the following inputs are valid:

	Key ENTER: Resets the controller
	Key CLEAR: Leave the mode 'Reset controller' without reset.

7.3 F3: Auto Boot

After you press the **F3** key the display shows the register for the program which is set at auto boot. In addition, another register can be selected as an auto boot program.

7.4 F4: Without Function

In the actual program version this key is without function.

7.5 F5: Registers

After pressing **F5** the display shows a register list. In this mode several functions are available:

With the arrow keys and the SCROLL key you can display all available registers.

For changing the register values the input mode has to be enabled:

 Press the INPUT key

The green LED on the input key shines. In the display the cursor blinks on the first sign of the register value. With the numeral keys register values can be entered or edited.

	Scroll from register to register
	Scroll groups of ten registers up and down
	Scroll up groups of ten registers
	Scroll up groups of hundred registers
	Enable the register edit input mode, the cursor is displayed under the first digit of the value.
	Set register to **0** (input mode)

 	Move the cursor (input mode)
	Confirm register value (input mode)
	Leave the 'Register' mode

7.6 F6: Parameters

After pressing **F6** the display shows a list of controller specific parameters. There is a separate list for each axis.

First parameter 1 of the first axis is displayed. With the arrow keys you can scroll the parameter list.

For changing the parameter values you have to enable the input mode:

 Press the INPUT key

The green LED on the input key shines. At the display the cursor blinks on the first digit of the parameter value. With the numeral keys parameter values can be entered or edited..

	Scroll through the parameter list of an axis
	Change to the parameter list of the next or the previous axis
	Enable the input mode for editing parameter values. The cursor is at the first digit of the value.
	Parameter is set to **0** (input mode)
	Move the cursor (input mode)
	Confirm the parameter value (input mode)
	Leave the 'Parameter' mode

8 Montage

By means of the attached holding clamps the terminal can be integrated into switching tables or else with 1 to 14 mm thickness. Mounting material and a sealing frame are delivered with the device.

The terminal has to be inserted into the mounting cut-out and fastened to the mounting wall from the rear side with the holding clamps. Hang up the holding clamps into both slots at the sides of the terminal. Arrest them with the setscrews at the mounting wall.

Around the terminal a free space of at least 30 mm is required to ensure sufficient air circulation.

Front panel dimensions (H x W x D)	168 x 120 x 4 mm
Mounting cut-out (H x W)	160 x 112 mm (+1 mm, – 0 mm)
Mounting depth	46 mm

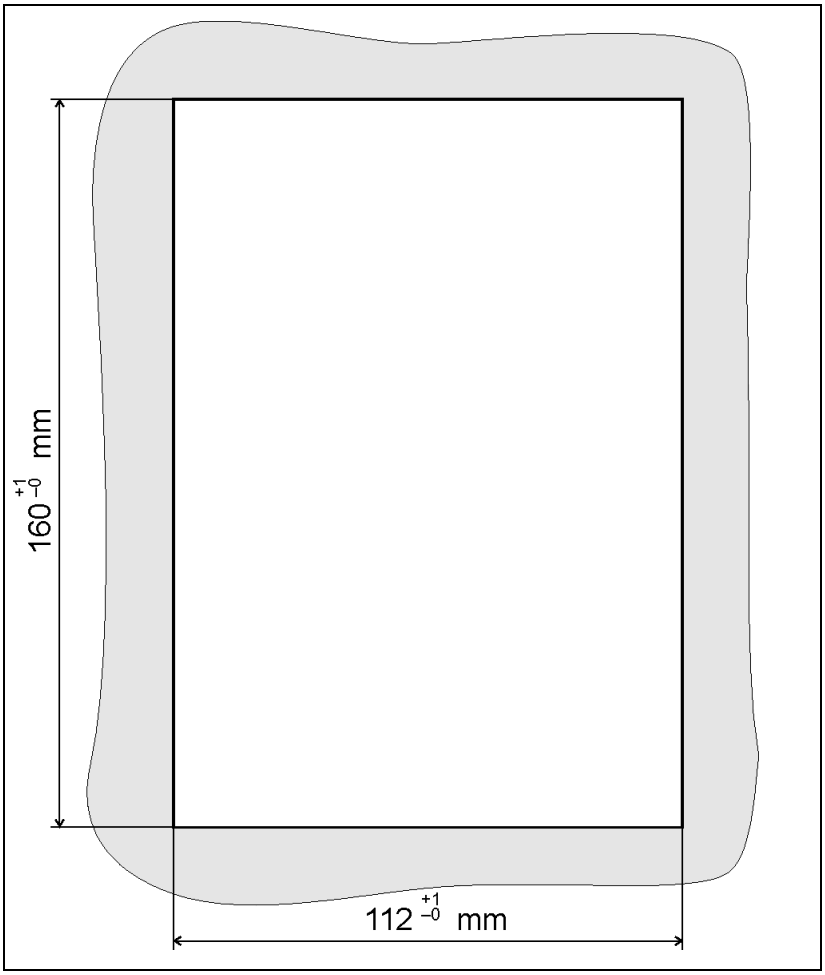


Fig.5 Mounting cut-out

9 Technical Data

Keyboard	
Type	Membrane keyboard
Number of keys	30
Key area (raised)	11 mm (H x B)
Actuator travel	0.3 mm
Actuating force	3 N
Switch cycles	Approx. 3 million under the following conditions: Pressing element: test plunger (DIN 42115) Pressing force: 10 N Pressing frequency: 1 Hz
Lifetime (min.)	2 million switch cycles
Display elements (status LEDs)	9
Display	
Type	FSTN (mono)
Resolution (pixels)	160 x 80
Colours	5 Shades of gray
Reading angle	80°
Contrast setting	Temperature compensated
Half-life backlighting	50.000 h
Brightness in cd/m2	45
Display area (H x W) in mm (Inch)	33.6 x 67.2

Electrical Data	
Supply voltage	24 V DC (SELV / PELV in accordance with DIN EN 61131)
Residual ripple	10% maximum
Minimum voltage	18 V
Maximum voltage	30 V
Power consumption (typical at 24V)	0.25 A
Power consumption (maximum))	0.35 A
Connected load	6 W
Fuse	Semiconductor fuse, self-resetting
Protection against polarity reversal	Integrated
Serial Interface	
Baud rate: 38400	
X2 RS232	In accordance with DIN 66259 T1, CCITT V.28Transmission length: 0 - 15 m, conductors layered in strands, shielded, electrically isolated
Central Processing Unit	
Central processing unit	RISC ARM9
Clock frequency	200 MHz
Other features	Watchdog timer, real-time clock, battery monitoring

Memory	
Application memory (option)	3 MByte (14 MByte)
Flash (option)	16 MByte (32 MByte)
SDRAM (option)	32 MByte (64 MByte)
SRAM (option)	512 KByte (512 KByte)
Connection System	
D-SUB female and male connector strips, 9 pin and 25 pin	
Female and male connector strips, Phoenix COMBICON / MINI COMBICON, 3 pin	
Male connector strip, Phoenix COMBICON, 5 pin	
RJ45 female connector	
USB female connector A	
Environmental Conditions	
Temperature during operation	0°C to 50°C
Temperature during storage, transport	-25°C to +70°C
Relative air humidity for operation and storage	20% to 85%, no condensation
Application area	Degree of pollution 2, overvoltage category III

Standards and Guidelines	
Interference immunity	DIN EN 61000-4-2 DIN EN 61000-4-3 DIN EN 61000-4-4 DIN EN 61000-4-5 DIN EN 61000-4-6 DIN EN 61000-6-2
Emitted interference	DIN EN 55011 limit value class A DIN EN 55022 limit value class A DIN EN 61000-6-4
Equipment requirements	DIN EN 61131-2
Storage and transportation	DIN EN 61131-2
Power supply	DIN EN 61131-2
Electromagnetic compatibility	2004/108/EG
Degrees of protection	DIN EN 60529
Impact load, shocks	DIN EN 60068-2-27
Sinusoidal vibrations	DIN EN 60068-2-6
Approvals	
CE, UL, cUL	

Front Panel and Enclosure	
Enclosure	Steel sheet, galvanised
Front panel material	Aluminium, brushed, anodized natural finish
Front panel (HxWxD) in mm (Inch)	168 x 120 x 5 (6.614 x 8.333 x 0.197)
Front panel cover	Polyester foil
Seal	Circumferential rubber seal on the rear
Mounting cutout (HxW) in mm (Inch)	160 x 112 (6.299 x 4.409)
Mounting depth	About 43 mm (1.693") Standard / field bus device: about 55 mm (2.165")
Degree of protection	Front: IP65 Rear: IP20
Total weight	About 500 g

Phytron GmbH • Industriestraße 12 • 82194 Gröbenzell, Deutschland
Tel. +49 8142 503-0 • Fax +49 8142 503-190 • info@phytron.de

Please visit our website: www.phytron.de