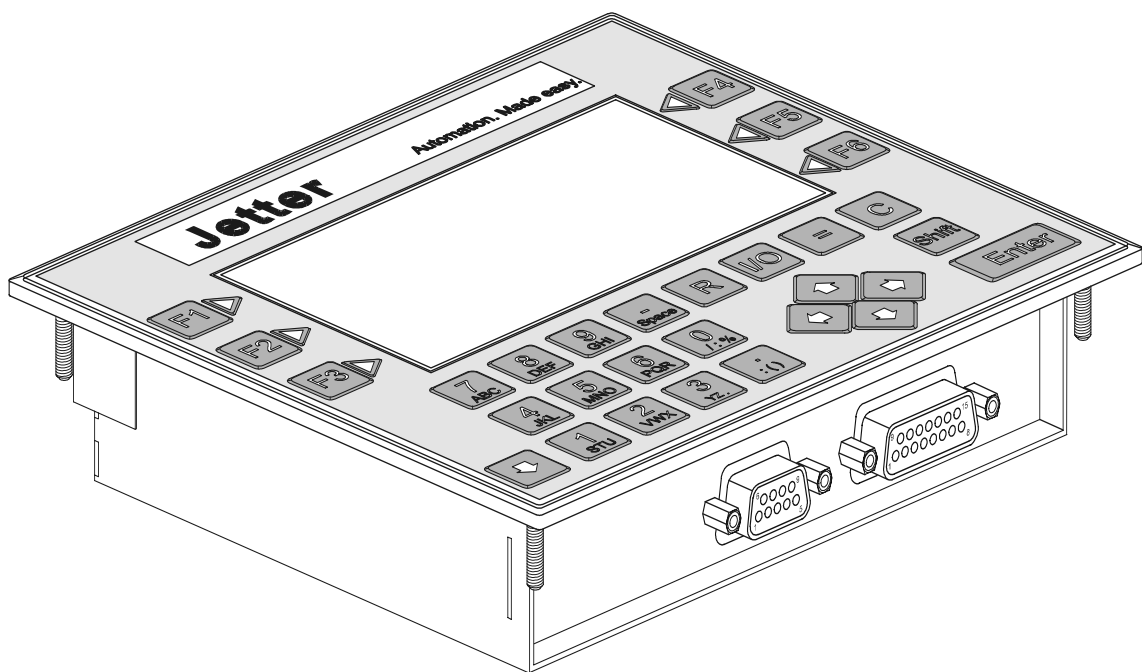


LCD 19

User Interface



PROCESS PLC

Operator's Manual



Edition 1.01

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This Operator's Manual is an Integral Part of the LCD 19:

Model: _____
Serial No: _____
Year of Manufacture: _____
Order No: _____



To be entered by the customer:

Inventory No: _____
Place of operation: _____

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Significance of this Operator's Manual

This manual is an integral part of the LCD 19 user interface and

- must be kept in a way that it is always at hand until the LCD 19 user interface will be disposed of.
- If the LCD 19 user interface is sold, alienated or loaned, this manual must be handed over.

In any case you encounter difficulties to clearly understand the manual, please contact the manufacturer.

We would appreciate any kind of suggestion and contributions on your part and would ask you to contact us. This will help us to produce manuals that are more user-friendly and to address your wishes and requirements.

Unavoidable residual risks for persons and material may result from the LCD 19 user interface. For this reason, any person who has to deal with the operation, transport, installation, maintenance and repair of the LCD 19 user interface must have been familiarised with it and must be aware of these dangers.

Therefore, this person must carefully read, understand and observe this manual, and especially the safety instructions.

Missing or inadequate knowledge of the manual results in the loss of any claim of liability on part of Jetter AG. Therefore, the operating company is recommended to have the instruction of the persons concerned confirmed in writing.

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1 Safety Instructions

The LCD 19 user interface is in line with the current state of the art. The LCD 19 user interface complies with the safety regulations and standards in effect. Special emphasis was given to the safety of the users.

Of course, the following regulations apply to the user:

- relevant accident prevention regulations;
- accepted safety rules;
- EC guidelines and other country-specific regulations.

Usage as Agreed Upon

Usage as agreed upon includes operation in accordance with the operating instructions.

The LCD 19 user interface is designed and permitted for operation in the electric cabinet only. The LCD 19 user interface only works with a PROCESS-PLC by Jetter AG and serves to control machinery such as dosing and hardening equipment, stage technique and logistic centres.

Usage Other Than Agreed Upon

The LCD 19 user interface must not be used in technical systems which to a high degree have to be fail-safe, e.g. ropeways and aeroplanes. If the LCD 19 user interface is to be run under operating conditions, which differ from the conditions mentioned in chapter 3, page 15, the manufacturer is to be contacted beforehand.

Who is Permitted to Operate the LCD 19 User Interface?

Only instructed, trained and authorised persons are permitted to operate the LCD 19 user interface.

Mounting and backfitting may only be carried out by specially trained personnel, as specific know-how will be required.

Maintaining the LCD 19 User Interface

The LCD 19 user interface is maintenance-free. Therefore, no inspection or maintenance are required for the operation of the user interface.

Decommissioning and Disposing of the LCD 19 User Interface

Decommissioning and disposing of the LCD 19 user interface are subject to the environmental legislation of the respective country in effect for the operator's premises.

Description of Symbols



Danger

This sign is to indicate a possible impending danger of serious physical damage or death.



Caution

This sign is to indicate a possible impending danger of light physical damage. This sign is also to warn you of material damage.



Important!

This sign is to indicate a possible impending situation which might bring damage to the product or to its surroundings.



Note!

This sign is to indicate an application, e.g installation, and other useful information.

· / -

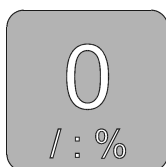
Enumerations are marked by full stops, strokes or scores.



Operating instructions are marked by this arrow.



Automatically running processes or results to be achieved are marked by this arrow.



Keys on the user interface.

Ensure Your Own Safety

Isolate the LCD 19 user interface or the PROCESS-PLC from the mains if maintenance works have to be carried out. By doing so, you will prevent accidents resulting from electric voltage and moving parts.

Modifications and Alterations to the Module

- For safety reasons, no modifications and changes to the LCD 19 user interface and its functions are permitted. Any modifications to the LCD 19 user interface not expressly authorised by the manufacturer will result in a loss of any liability claims to Jetter AG.
- The original parts are specially designed for the LCD 19 user interface. Parts and equipment of other manufacturers are not tested on our part, and are, therefore, not released by us. The installation of such parts may impair the safety and the proper functioning of the LCD 19 user interface .
- For any damages resulting from the **use of non original parts and equipment**, any claims with respect to liability of Jetter AG are excluded.

Malfunctions

- Malfunctions or other damages are to be reported to an authorised person at once.
- Safeguard the LCD 19 user interface against misuse or accidental use.
- Only qualified experts are allowed to carry out repairs.
- Safety and protective devices, e.g. the barrier and cover of the terminal box must not in any case be shunted or by-passed.
- Dismantled safety devices must be reattached prior to commissioning and checked for proper functioning.

Information Signs and Labels

- Writings, information signs, and labels always have to be observed and kept readable.
- Damaged or unreadable information signs and labels are to be exchanged.

Instructions on EMI

The noise immunity of a system corresponds to the weakest component of the system. For this reason, correct wiring and shielding of the cables is important.



Important!

Measures for increasing immunity to interference:

- Only use **shielded cables**, especially as bus cables.
- Shield **both sides** of the cables.
- The **entire** shield must be drawn behind the isolation, and then be clamped under a strain relief with the **greatest possible surface area**.
- When **connecting the signal line to the terminal block** it is important that the strain relief is directly connected to a grounded surface with the greatest possible surface area.
- When **using connectors**, metallised connectors are to be used only, e.g. SUB-D connectors with metallised housing according to Fig. 1. Make sure that the strain relief is directly connected to the housing here as well.
- On principle, **physical separation** should be maintained between signal and power lines.

Male/Female SUB-D Connectors (9, 15 or 25 pins) with Metallised Housing.

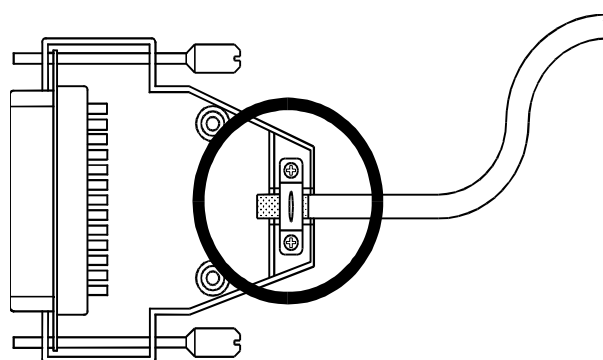


Fig. 1: Shielding in conformity with EMC standards



Important!

To avoid malfunctions the following must be ensured:

- The shielding must be clamped under a strain relief with the greatest possible surface area.
- The connection between the housing and the shielding must be electrically conducting.
- The distance between unshielded conductor ends must be as short as possible.

Residual Dangers

Hazards during Operation



Danger resulting from electric shock!

If the LCD 19 is not connected-up correctly and is not isolated from the mains, for example during installation, maintenance, and repair, you can get an electric shock.

Please observe the following precautions in order to avoid injuries such as muscle cramps, burns, unconsciousness, respiratory standstill, and possibly death:

- Isolate the LCD 19 from the mains (pull out the mains plug) when working on the control system.
- Do not touch the female connectors during operation.
- Have works on the electric and electronic system performed by qualified personnel only.

2 Installing the User Interface

Scope of Delivery

- LCD 19 User Interface
- Gasket
- Operator's Manual
- MMIEDIT Installation Disk

Installation Steps

- Please check the delivery package for completeness.
- Create an aperture and drilling template for the front panel, see fig. 2, page 12.
- Determine the mounting position for the LCD 19 user interface on your electric cabinet.
- Mark the front panel aperture and the holes by means of the template (grey areas) and cut out and drill the marked areas.

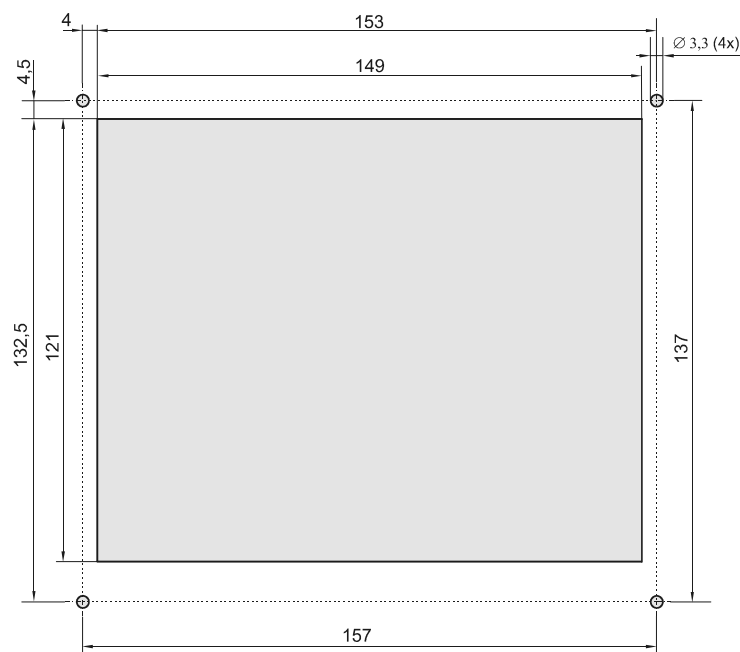


Fig. 2: Aperture and drilling template of LCD 19 for front panel

- Check the gasket for damages, see fig. 4, page 18.
- Replace the gasket if damaged (may happen when the LCD 19 is installed and uninstalled several times).
- Screw the LCD 19 user interface tightly with M3 hexagon nuts.
- Install the MMIEDIT program on your computer.
- Create an application mask for the LCD 19 user interface.
For detailed information on how to create a mask, please refer to the online help of MMIEDIT.
- Save the program for the mask on your computer.
- Save environment variables of MMIEDIT separately for your mask since **environment variables are not saved automatically**.
- Connect the LCD 19 user interface (X1) to your computer (COM port) with the programming cable EM-PK.
- Connect the LCD 19 user interface (X2) to your control system (LCD port) with the user interface cable DK-422.
- Activate the control system and load the program from your computer to the LCD 19 user interface.
- Remove the EM-PK programming cable from your LCD 19 and connect the cable to your control system, see fig. 3, page 13.
- Check the function of the application mask with your control system.

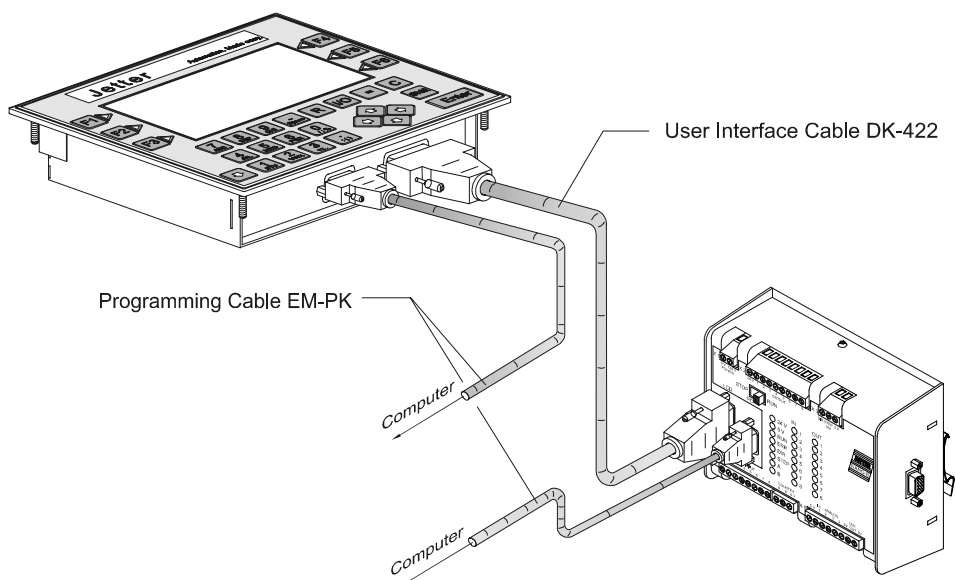


Fig. 3: Example: Connection of LCD 19 with PROCESS-PLC NANO-B

Mounting and Startup Accessories

(not included in the scope of delivery)

- Four M3 hexagon nuts
- Programming cable EM-PK, 0.5 m, 2.5 m or 5 m
- User interface cable DK-422, 2.5 or 5 m
- Computer

Troubleshooting

- Check whether the programming cable EM-PK and the user interface cables are connected properly according to the manual.
- Check the function of the mask with your control system. If errors occur, please refer to the online help of MMIEDIT.

Notes on Safety as regards the Installation

Danger resulting from electric shock!



If the LCD 19 user interface is not isolated from the mains, for example during installation, maintenance, and repair, you can get an electric shock. Please observe the following precautions in order to avoid injuries such as muscle cramps, burns, unconsciousness, respiratory standstill, and possibly death:

- Have works on the electric and electronic system performed by qualified personnel only.
- Isolate the LCD 19 from the mains (pull out the user interface cable DK-422) when working on the control system.
- **Prior to commissioning, do the following:**
 - Reattach dismantled safety equipment and check it for proper functioning.
 - Secure the LCD 19 against accidental contact with conductive parts and components.
 - Only connect units or electric components with the signal lines of the LCD 19 user interface when they are insulated properly against the connected electric circuit.
 - Establish a permanent connection from the LCD 19 to the PROCESS-PLC with the user interface cable DK-422, see fig. 3, page 13.

3 Operating Conditions

Environmental Operating Parameters		
Parameter	Value	Reference
Operating Temperature Range	0 °C up to + 55 °C (max. 168 h at 60 °C) with max. 3 K/min	
Storage Temperature Range	-20 °C (max. 48 h) up to +70 °C (max. 168 h)	DIN EN 60068-2-1 DIN EN 60068-2-2
Air Humidity / Humidity Rating	5 % to 85 %, no condensation	
Pollution Degree	II	DIN EN 61131-2
Corrosion Immunity/ Chemical Resistance	No special protection against corrosion. Ambient air must be free from higher concentrations of acids, alkaline solutions, corrosive agents, salts, metal vapours, or other corrosive or electroconductive contaminants.	
Operating Altitude	max. 2000 m above sea level	DIN EN 61131-2

Mechanical Operating Parameters		
Parameter	Value	Reference
Free Falls Withstanding Test	Height of fall (units within packing): 1 m	DIN EN 60068-2-32
Vibration Resistance	10 Hz - 57 Hz: with an amplitude of 0.0375 mm for continuous operation (peak amplitude of 0.075 mm) 57 Hz -150 Hz: 0.5 constant acceleration for continuous operation (1 g constant acceleration occasionally) 1 octave/minute, 10 frequency sweeps (sinusoidal), all 3 spatial axes	DIN EN 60068-2-6
Shock Resistance	15 g occasionally, 11 ms half sine wave, 2 shocks, all 3 spatial axes	DIN EN 60068-2-27
Degree of Protection	IP 65 front end, with gasket and integrated IP 40 rear end	EN 60529
Mounting Position	any position, integrated into stationary housing	

Electrical Safety Operating Parameters		
Parameter	Value	Reference
Class of Protection	III	DIN EN 61131-2
Overvoltage Category	II	DIN EN 50178

EMC - Emitted Interference Operating Parameters		
Parameter	Value	Reference
Enclosure	<ul style="list-style-type: none"> Frequency band 30 to 230 MHz, limit 30 dB ($\mu\text{V/m}$) at 10 m distance Frequency band 230 to 1000 MHz, limit 37 dB ($\mu\text{V/m}$) at 10 m distance (class B) 	DIN EN 50081-1 DIN EN 50081-2 DIN EN 55011

EMC - Immunity to Interference Operating Parameters		
Interference Immunity: Enclosure		
Parameter	Value	Reference
Electromagnetic RF Field amplitude-modulated	Frequency band 27 -1000 MHz; Test signal strength 10 V/m AM 80 % with 1 kHz Criterion A	DIN EN 61000-6-2 DIN EN 61131-2 DIN EN 61000-4-3
Magnetic Field with Mains Frequency	50 Hz 30 A/m	DIN EN 61000-6-2 DIN EN 61000-4-8
ESD	Discharge through air: Test peak voltage 15 kV (Humidity Rating RH-2 / ESD-4) Contact discharge: Test peak voltage 4 kV (severity level 2) Criterion A	DIN EN 61000-6-2 DIN EN 61131-2 DIN EN 61000-4-2
Immunity to Interference of Signal Ports		
Parameter	Value	Reference
Asymmetric RF, amplitude-modulated	Frequency 0.15 - 80 MHz Test voltage 10 V AM 80 % with 1 kHz Source impedance 150 Ω Criterion A	DIN EN 61000-6-2 DIN EN 61000-4-6

EMC - Immunity to Interference Operating Parameters

Fast transients	Test voltage 1 kV tr/tn 5/50 ns Repetition rate 5 Hz Criterion A	DIN EN 61000-6-2 DIN EN 61131-2 DIN EN 61000-4-4
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4 Physical Dimensions

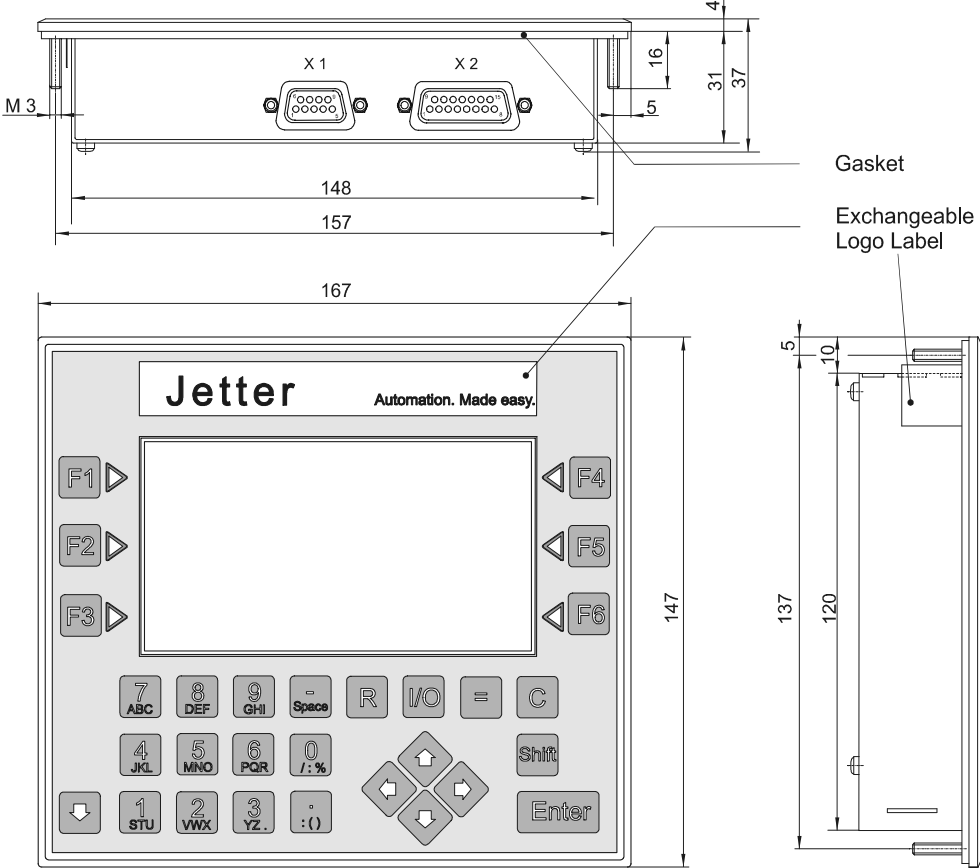


Fig. 4: Physical Dimensions LCD 19

5 Technical Data

General and Mechanical Specification	
Height	147 mm
Width	167 mm
Depth	37 mm
Fastening Thread	4 threads M3 x 16 mm
Screen Size	108 mm x 60 mm
Weight	about 520 g
Keys	<ul style="list-style-type: none"> • 6 function keys • 23 input keys (alphanumeric)
Front Panel	0.15 mm Polyester surface with exchangeable Jetter logo label on a 3.5 mm AlMg3 panel

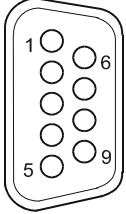
Electrical Specification	
Power Supply	DC 24 V (15V... 30 V) via 15-pin user interface cable DK-422 Please refer to "Note!"
Power consumption	max. 500 mA
Display	LCD FSTN smartfluid technology
Resolution of Display	240 x 120 pixels
Graphic Memory	4 Megabit flash memory
Lifetime of background lighting	MTBF 100.000 hours
Lifetime of LED	MTBF 100.000 hours
Interfaces	<ul style="list-style-type: none"> • 15-pin female SUB-D connector: RS232, RS422 and RS485 • 9-pin female SUB-D connector: RS232
Processor	16 Bit
Application Software	Windows Program MMIEDIT

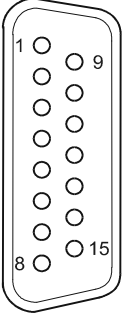
Note!

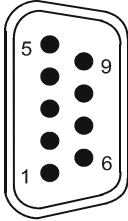
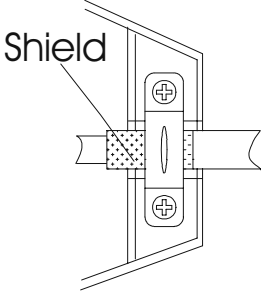


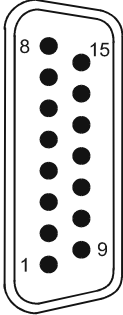
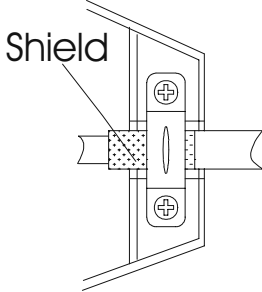
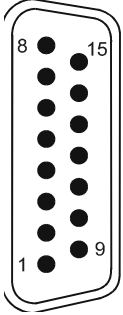
Disconnection from the power supply leads to a reset of the LCD 19.

6 Description of Connections

Assignment of the 9-pin female SUB-D-connector (X1)		
	PIN	Signal
	1	—
	2	TXD
	3	RXD
	4	—
	5	—
	6	—
	7	Gnd
	8	—
	9	—

Assignment of the 15-pin female SUB-D-connector (X2)		
	PIN	Signal
	1	—
	2	TXD
	3	RXD
	4	SDA
	5	SDB
	6	RDA
	7	RDB
	8	—
	9	Data + (connected with PIN 6), +5 V
	10	—
	11	Data - (connected with PIN 4), -5 V
	12	Gnd
	13	—
	14	—
	15	24 V

Programming Cable EM-PK			
PROCESS-PLC or LCD 19	Shield		PC
 <p>9-pin male SUB-D connector</p>	 <p>Connect shield with the greatest possible surface area! Use metallised housing only!</p>		<p>9-pin female SUB-D connector</p>
PIN	Signal		PIN
2	TXD	RXD	2
3	RXD	TXD	3
7	Gnd		5

User Interface Cable DK-422			
PROCESS PLC	Shield	User Interface	
 <p>15-pin male SUB-D connector</p>	 <p>Connect shield with the greatest possible surface area! Use metallised housing only!</p>	 <p>15-pin male SUB-D connector</p>	
PIN	Signal		PIN
4	DC 24 V		15
7	Gnd		12
10	SDB	RDB	6
11	SDA	RDA	7
12	RDB	SDB	4
13	RDA	SDA	5



Important!


- The user interface cable DK-422 can be obtained from JETTER AG.
- In case you prefer to fabricate the cable yourself, the following minimum requirements must be met (also for EMC):
 1. Number of cores: 3
 2. Core cross-sectional area: 0.25 mm²
 3. Connector (male): SUB-D, metallised
 4. Max. cable length: 400 m
 5. Shield: complete shielding, no paired shielding
- The shield must be connected to the metallised connector housings on both ends of the cable with the greatest possible surface area.
- When fabricating the cable according to the above specification, the cable will not influence EMC.
- If you prefer to manufacture the cable yourself, be sure to unambiguously mark the cable ends with "CPU" and "LCD" to prevent incorrect connection. If the cable is connected the other way round, the port of the user interface will possibly be destroyed.

7 Display and Key Functions

The LCD 19 communicates with the PROCESS-PLC by means of screen masks, registers and flags.



Note!

During startup, the setup menu can be invoked by pressing the  key

e.g. to set baud rate, interface parameters etc. For details, please refer to the online help of MMIEDIT.

7.1 Display LCD 19



The LCD 19 user interface has a graphic display. This graphic display allows process operation with

- unlimited scalable graphic and numeric variables.
- Display of graphic objects and functions.

The masks for the LCD 19 screen are generated by the MMIEDIT program and are loaded into the memory of the LCD 19 user interface:

- The masks are invoked by the program of the PROCESS-PLC.
- Messages are displayed in the status line on the LCD 19 screen.
The display is activated via the SYMPAS instructions `DISPLAY_TEXT` and `DISPLAY_REG`.

The function keys are user-programmable and are used to display masks and/or activate control functions.

- Double assignment of keys and function keys is achieved by pressing the  key.
- Text is entered by simultaneously holding the  key and pressing the key with the desired letter.
Since up to 3 letters are located on a key, the desired letter is selected by pressing the key repeatedly.

The selected letter is entered by relieving the  key.

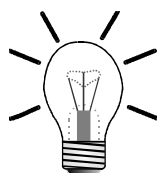
7.2 Register Assignment

Ten free registers must be available or reserved in the PROCESS-PLC to allow communication between the LCD 19 and the PROCESS-PLC. Data exchange between display and control system takes place by means of these 10 free registers, also referred to as register block.

The number of the first register of the register block is indicated in the project programming tool MMIEDIT where the parameters for the LCD settings are specified. Default is 1, i.e. the register block is assigned to the registers 1 to 10.















Register Block		
Register #	Function	Meaning
1	Mask register	The Process-PLC must load the number of the mask to be displayed into this register.
2	Acknowledgment register	When a new mask number is selected in the mask register, it is acknowledged in the acknowledgment register by writing the new mask number to this register.
3	Reserved	---
4	LCD 19 status	This register is bit-coded.
5	Reserved	---
6	PROCESS PLC status	This register is bit-coded.
7	Present register for user input	This register contains the number of the register to be edited by the user. Editing is only possible via MMIEDIT window.
8	LED status	With this register, the PROCESS-PLC toggles the LEDs of the function keys of the LCD 19 on and off by changing the bits.
9	DA file for text variable	If the contents of a text variable is not created by the control system but by a data file, the number of the data file where the text for the text variable is present must be entered in this register.
10	Reserved	---

Note!



For details on the configuration of registers of the register block, please refer to the online help of MMIEDIT.

7.3 Flag Assignment

Flag Assignment of Keys			
Flag	Key	Flag	Key
201		234	
202		235	
203		236	
204		237	
205		238	
206		239	
221		240	
222		241	
223		242	
224		243	
230		244	
231		245	
232		246	
233		248	
		249	

The flags are assigned to the keyboard of the LCD 19 user interface starting from base address 201, see the table on page 25.

The base address of the flag preset for each key can be changed via MMIEDIT program.

Each time a key is pressed, the respective flag is set in your PROCESS-PLC.

Example:

- F1 key pressed -> Flag 201 set to 1
- F1 key not pressed ->Flag 201 reset to 0

**Note!**

Please observe the following system characteristics when using a battery-backed flag range for the keyboard of your PROCESS-PLC:

- The flags assigned to the keys are not automatically reset when the LCD 19 is switched on.
- When the LCD 19 is switched off while pressing a function key, the respective flag is set in the PROCESS-PLC when the LCD 19 is switched on again. This applies whether the respective function key is pressed or not.
- In order to reset the flags assigned to the keys you can use e.g. the instruction at the beginning of a SYMPAS program
`CLEAR_FLAGS [201 to 249]`.
- Only use flags, e.g. in a SYMPAS program, that are not assigned to reserved flags of the LCD 19 keys.

Appendices

Appendix A: Glossary

Baud Rate	1 Baud = 1 signal change per second. The baud rate is the number of signal changes that occur in one second, not the number of bits per second transmitted.
Electromagnetic Compatibility (EMC)	Definition according to the EMC regulations: "EMC is the ability of a device to function in a satisfactory way in electromagnetic surroundings without causing electromagnetic disturbances itself, which would be unbearable for other devices in these surroundings."
Mean Time Between Failures	The average time interval that will probably elapse before a hardware component fails and requires service.
Process	A program or a part of it. A related sequence of steps carried out by a program.
PROCESS-PLC	Advanced control system of the JETTER AG in contrast to the conventional programmable logic controller.
Register	A high-speed memory for a group of bits placed in a microprocessor or in another electronic device where data can be buffered for a specific purpose. On JETTER controllers, usually, these are 24 bit wide storage positions in a remanent RAM.
Wintel	Designates a computer that uses the Microsoft Windows operating system and an Intel central processing unit.

Appendix B: List of Abbreviations

COM	Device name for a serial port in Wintel systems. The first serial port is identified as COM1, the second as COM2, etc.
DA	Data File
DC	Direct Current
DIN	Deutsches Institut für Normung = German Industry Standard
EMC	Electro Magnetic Compatibility
FSTN	Film Super Twisted Nematic
Gnd	Ground
Hz	Hertz
IEC	International Electrotechnical Commission
IP	International Protection
LC	Liquid Crystal
LCD	Liquid Crystal Display
LED	Light-Emitting Diode
MMIEDIT	Man Machine Interface Editor
MTBF	Mean Time Between Failures
PE	Protective Earth
PLC	Programmable Logic Controller
RDA	Receive Data A: The first differential channel of the RS 422 interface
RDB	Receive Data B: The second differential channel of the RS 422 interface
RS 232	An accepted industry standard for serial data transmission. RS: Recommended Standard For line lengths under 15 m. No differential evaluation. Transmitting and sending on different lines.
RS 422	For line lengths over 15 m. Two differential evaluations each. Transmitting and sending on different lines.
RS 485	For line lengths over 15 m. Two lines with difference evaluation. Transmitting and sending on the same line.
RXD	Receive (RX) Data: Receive Data A line used to carry received serial data from one device to another.
SDA	Send Data A: The first differential channel of the RS 422 interface
SDB	Send Data B: The second differential channel of the RS 422 interface

SUB-D Type designation of connectors

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