# e!COCKPIT Application Note e!Cockpit



# WAGO-I/O-SYSTEM 750 Installing MySQL Server v5.1.72

Version 1.0.3



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### **Number Notation**

Number code	Example	Note
Decimal	100	Normal notation
Hexadecimal	0x64	C notation
Binary	'100' '0110.0100'	In quotation marks, nibble separated with dots (.)

Table 1: Number Notation

### **Font Conventions**

Font type	Indicates
italic	Names of paths and data files are marked in italic-type. e.g.: <i>C:\Programme\WAGO-I/O-CHECK</i>
Menu	Menu items are marked in bold letters. e.g.: Save
>	A greater-than sign between two names means the selection of a menu item from a menu. e.g.: <b>File</b> > <b>New</b>
Input	Designation of input or optional fields are marked in bold letters, e.g.: <b>Start of measurement range</b>
"Value"	Input or selective values are marked in inverted commas. e.g.: Enter the value "4 mA" under <b>Start of measurement range</b> .
[Button]	Pushbuttons in dialog boxes are marked with bold letters in square brackets. e.g.: [Input]
[Key]	Keys are marked with bold letters in square brackets. e.g.: [F5]



## Symbols

## ▲ DANGER

### **Personal Injury!**

Indicates a high-risk, imminently hazardous situation which, if not avoided, will result in death or serious injury.



# 

#### Personal Injury Caused by Electric Current!

Indicates a high-risk, imminently hazardous situation which, if not avoided, will result in death or serious injury.

## **WARNING**

#### **Personal Injury!**

Indicates a moderate-risk, potentially hazardous situation which, if not avoided, could result in death or serious injury.

# 

#### **Personal Injury!**

Indicates a low-risk, potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

# NOTICE

#### **Damage to Property!**

Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.



## NOTICE

#### Damage to Property Caused by Electrostatic Discharge (ESD)!

Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.



# Note

#### **Important Note!**

Indicates a potential malfunction which, if not avoided, however, will not result in damage to property.





# Information

Additional Information:

Refers to additional information which is not an integral part of this documentation (e.g., the Internet).

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Moreover, the persons cited here must also be familiar with all of the products cited in this document, along with the operating instructions. They must also be capable of correctly predicting any hazards which may not arise until the products are combined.

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The sample applications described in this documentation represent concepts, that is, technically feasible application. Whether these concepts can actually be implemented depends on various boundary conditions. For example, different versions of the hardware or software components can require different handling than that described here. Therefore, the descriptions contained in this documentation do not form the basis for assertion of a certain product characteristic.

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### 1 Description

This Application Note explains how to install a MySQL Sever v5.1.72 on a PFC200 (750-820x). An exchange of Data with the different MySQL-databases, which are stored on the SD Card, can be realized with one of the following librarys:

- WagoLibMySQL\_03.lib for CODESYS V2.3
- WagoAppSQL MySQL for e!COCKPIT

This Application note also contains an IEC-61131-3 example program for *e*!COCKPIT, which functions as a MySQL Client. In this example project, the WAGO 3-Phase Power Measurement Module (750-494) is used in recording measurement values and writing them in the previously created MySQL database.



# Note

Firmware Version!

The application note is only supported for PFC200 with firmware up to and including version 11. A function is not available with firmware 12 or higher devices.



## Note

### **Important General Information!**

Once the MySQL Server has been installed on the PFC200, it can be accessed via the network by using a remote client. The settings necessary for this are described in Section 4.2.

It is also possible to access the database via a running IEC application, which runs on the identical controller (see Section 5.3).





# Note

#### Handling the SD Card!

- The server is automatically installed on the SD card. This requires an <u>empty</u> PFC card that is correctly inserted in the PFC before the installation process is started.
- In the following, the expression "created SD card" is used as a synonym for a successfully set up SD card with a MySQL database.
- All databases created on the server are saved on the created SD card.
- Removing the SD card when an operation is running stops the operation or causes unpredictable MySQL Server functioning.
- Removing the SD card can lead to data loss and/or a corrupt database.
- The server can be restarted by rebooting the controller with an inserted, previously created SD card.
- If the created SD card is first inserted after the controller restart, the server will not be started. Thus, the controller should always be restarted after the created SD card has been inserted.
- Additional information about exchanging the SD card is presented in Section 6.



### **Note** SD Card Type!

Please only use a WAGO SD card (Item No. 758-879/000-001). This card has been specially designed for industrial applications in extreme environments. Compatibility with other storage media cannot be guaranteed.



## Note

#### **PFC200 Restrictions!**

The performance of the MySQL Server on the PFC200 cannot be compared with the performance of a conventional server. The user of this application should be aware of the limited computing capacity of the PFC200.



## Note

### **Power failure!**

If a power failure occurs during ongoing operation, this can lead to data loss and/or to a corrupt database. To avoid this failure, an uninterruptible power supply (UPS) should be used.



## 2 Material Used

### 2.1 Required Libraries

Library	Description
Standard.lib	Standard library
WagoLibMySQL_03.lib	MySQL library
PowerMeasurement_494_02.lib	Library for the 3-phase power measurement module

### 2.2 Devices

Supplier	Quantity	Designation	Item No.
WAGO	1	Controller PFC200*	750-820x
WAGO	1	SD memory card	758-879/000-001
WAGO	1	3-phase power measurement module	750-494
WAGO	1	End module	750-600

\*Support up to firmware 11

### 2.3 Tools

Designation	Item No.
e!COCKPIT - Workstation License	2759-101/1110-2002
MySQL Client "HeidiSQL"	-



## 3 Structure





Figure 1: Connection diagram



### 4 Set-up

The process for installing a MySQL Server is described in the following:

- 1. After the ZIP file has been downloaded and unzipped, open the folder *"Setup* MySQL *Server/."* This folder contains three IPK files:
  - "install-mysql-server-part1.ipk"
  - "install-mysql-server-part2.ipk"
  - "install-mysql-server-part3.ipk"
- 2. Insert an <u>empty</u> SD card in the PFC200. Because it is used as saving location for the database, make sure the card is actually empty before startup.
- 3. Use a Web browser to open the Web-Based Management (WBM): "Controller-IP/wbm"
- 4. Log on with the user name **admin** and the corresponding password (default password: **wago**).
- 5. Navigate to the tab "Software Uploads" (see Fig.2 1)).
- Click the [Browse] button and select the first IPK file "install-mysql-server-part1.ipk." Then click the [Open] button to select the file (see Fig.2 2), 3) & 4)).
- 7. Click the [Start Upload] button to start the upload (see Fig.2 5)).
- 8. After the upload has completed, activate the IPK file by ticking "Activate" and clicking the **[Submit]** button (see Fig.2 6)).
- 9. Repeat steps 6 through 8 for the other two IPK files.



### Note

### Sequence of the Upload!

It is imperative to follow the IPK file upload sequence as described under Point 1.

10. The installation process is now finished and the MySQL Server is active.

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Clock       Activate new software       US       US       Software File:       install-mysql-server-part1.ipk         Adation:       Activate       Activate       US       It         Mass Storage       Force (Manual reboot afterwards needed)       US       It         Ports and Services       Discard (delete upload)       Submit       UI       UI         Diagnostic       Completing function       Completing function       Completing function       Completing function	Navigation PLC Runtime Networking	Softw Softw Softw Softw	o-based 750-8202 PF vare Upload tep is to upload ed file will aut an new softwa are file:	Dateiname: install-mysql-server Management C200 CS 2ETH RS TELECONTRO s d the new software. Second is to omatically be deleted. Rebooting are	-part1.ipk L D activate it. Af will delete the	terwards, 1 file autor	the natically.	Alle Dateien 4 Offnen  4 Username: adm Username: adm 5t WBM Local Time Local Date	Abbrechen iin Lo atus 11 13.12.2
Administration       Activate new software       US       Rd         Package Server       Software File: install-mysql-server-part1.ipk       U4       IC         Mass Storage       Force (Manual reboot afterwards needed)       U2       Nt         Software Uploads       Discard (delete upload)       Submit       U1       U1         SNMP       Diagnostic       Completing for the formation of the second	Navigation Networking Firewall	Softw Softw Softw Softw	o-based 750-8202 PF vare Upload tep is to upload ed file will aut an ew softwa are file:	Dateiname: install-mysql-server Management C200 CS 2ETH RS TELECONTRO s d the new software. Second is to omatically be deleted. Rebooting are	-part1.ipk L D activate it. Af will delete the	terwards, t file autom	the natically.	Alle Dateien 4 Offnen  4 Username: adm Username: adm Local Time Local Time Local Date PLC Switch	Abbrechen iin Lo atus 11 13.12.2
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Mass Storage     Action: <ul> <li>Activate</li> <li>Force (Manual reboot afterwards needed)</li> <li>Discard (delete upload)</li> </ul> U30 0 M U20 N U10 U            Ports and Services          Discard (delete upload)          Submit 6            Diagnostic          Oacas(MM) ( Upon)           Oacas(MM) ( Upon)	Navigation Networking Firewall Clock Administration	Softw Softw Softw Softw Softw Activity	o-based 750-8202 PF vare Upload ee file will aut ad new softwa are file: ate new softw	Dateiname: install-mysql-server Management C200 CS 2ETH RS TELECONTRO s d the new software. Second is to omatically be deleted. Rebooting are vare	-part1.ipk	terwards, file autom	the natically. owse	Alle Dateien 4 Offnen  4 Username: adm Username: adm 5t WBM Local Time Local Date PLC Switch LEDs	Abbrechen  in  tus  U6 S U5 R
Software Uploads     Porce (Manual reboot afterwards needed)     Discard (delete upload)     Submit 6     U10 U	Navigation          Navigation         Information         PLC Runtime         Networking         Firewall         Clock         Administration         Package Server	Web     WAGO     Softw     Softw     Softw     Softw     Softw	D-based 750-8202 PF Vare Upload ee file will aut ad new softwa are file: ate new softwa are File:	Dateiname: install-mysql-server Management C200 CS 2ETH RS TELECONTRO s d the new software. Second is to omatically be deleted. Rebooting are install-mysql-server-part1.ipk	-part1.ipk	terwards, file autom Br Start	the natically. owse	Alle Dateien Cffnen  Cusername: adm Username: adm Username: adm Local Time Local Time Local Date PLC Switch LEDs	Abbrechen Abbrechen in in i U i U i U i U i U i U i U i U
Software Uploads     Software Uploads       Ports and Services     Software Uploads       SNMP     Software Uploads       Diagnostic     Software Uploads	Navigation Navigation Information PLC Runtime Networking Firewall Clock Administration Package Server	Softw Active Softw	D-based 750-8202 PF vare Upload ed file will aut ad new softwa are file: ate new softwa are File:	Dateiname: install-mysql-server  Management C200 CS 2ETH RS TELECONTRO  s d the new software. Second is to omatically be deleted. Rebooting are install-mysql-server-part1.ipk Activate	-part1.ipk	terwards, i file autorr Br Start	the natically.	Alle Dateien Corfinen  Username: adm Username: adm Local Time Local Date PLC Switch LEDs	Abbrechen  Abbrechen  in  L0  in  U6  S  U  U  U  U  U  U  U  U  U  U  U  U
Ports and Services     >       SNMP     >       Diagnostic     >	Navigation Navigation Information PLC Runtime Networking Firewall Clock Administration Package Server Mass Storage	Wet     WAGO     Softw     Soft	D-based 750-8202 PF vare Upload ed file will aut ad new softwa are file: ate new softwa are File: :	Dateiname: install-mysql-server  Management C200 CS 2ETH RS TELECONTRO  s d the new software. Second is to omatically be deleted. Rebooting are install-mysql-server-part1.ipk Activate Force (Manual reboot afterwa Discard (delete uplact)	-part1.ipk	terwards, i file auton Br Start	the natically. Upload	Alle Dateien Control of the second s	Abbrechen  Abbrechen  in  L0  in  L0 i
SNMP     Diagnostic     Occurrent ( Trace	Navigation Networking Firewall Clock Administration Package Server Mass Storage Software Uploads	Wet     WAGO     Softw     Soft	D-based 750-8202 PF vare Upload ed file will aut ad new softwa are file: ate new softwa are File:	Dateiname install-mysql-server  Management C200 CS 2ETH RS TELECONTRO  s d the new software, Second is to omatically be deleted. Rebooting are install-mysql-server-part1.ipk Activate Force (Manual reboot afterwa Discard (delete upload)	-part1.ipk	terwards, 1 file autor Start	the hatically.	Alle Dateien 4 Offnen V Username: adm Username: adm Local Time Local Date PLC Switch LEDs	Abbrechen Abbrechen atus U6 0 S U5 0 R U4 0 IC U3 0 M U2 0 N U1 0 U
Diagnostic	Navigation Navigation Information PLC Runtime Networking Firewall Clock Administration Package Server Mass Storage Software Uploads Ports and Services	Vet WAGO      Softw      Sof	D-based 750-8202 PF Aare Upload ee file will aut ad new softwa are file: ate new softwa are File: :	Dateiname install-mysql-server Management C200 CS 2ETH RS TELECONTRO s d the new software. Second is to omatically be deleted. Rebooting are install-mysql-server-part1.ipk Activate Force (Manual reboot afterwa Discard (delete upload)	-part1.ipk	terwards, 1 file autor Start	the natically. Upload	Alle Dateien 4 Offnen Username: adm Username: adm Local Time Local Date PLC Switch LEDs	Abbrechen in atus U6 0 S U5 R U4 0 I U3 0 M U2 0 N U1 0 U
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	Navigation Navigation Information PLC Runtime Networking Firewall Clock Administration Package Server Mass Storage Software Uploads Ports and Services SNMP Diagnostic	<ul> <li>Well WAGO</li> <li>Softw</li> <li>First st upload</li> <li>Upload</li> <li>Softw</li> <li>Softw</li> <li>Softw</li> <li>Action</li> </ul>	o-based 750-8202 PF vare Upload rep is to uploar ed file will aut al new softwa are file: ate new softwa are File: ::	Dateiname install-mysql-server Management C200 CS 2ETH RS TELECONTRO s d the new software. Second is to omatically be deleted. Rebooting are install-mysql-server-part1.ipk Activate Force (Manual reboot afterwa Discard (delete upload)	-part1.ipk	terwards, 1 file auton Start	the natically.	Alle Dateien	Abbrechen  in  atus  U6 0 S  U5 0 S  U5 0 R  U3 0 M  U2 0 N  U1 0 U

Figure 2: Uploading the IPK Files in WBM

Set-up



### 4.1 Default Server Settings

After the three IPK files have been activated, the PFC200 functions as a MySQL Server. The following default server settings are set:

- An individual with "root" privileges is set up:
  - Default user name: admin
  - Default password: **wago**



## Note

Security Information!

It is strongly recommended to change the default logon information. This procedure is described in Section 5.1.

### 4.2 Testing the MySQL Server

The simplest way to test the previously installed server is by installing a free MySQL Client on a Windows operating system. A sufficient number of free tools is available on the Internet.

The program "HeidiSQL" is used in this Application Note. HeidiSQL is a free tool which can be used to edit data, create and edit tables, etc.

1. After successful installation, open the program HeidiSQL. The following window is displayed:

🐵 Session manager	8 23
Session name A	Start New here? In order to connect to a server, you have to create a so called "session" at first. Just click the "New" button on the bottom left to create your first session.Give it a friendly name (e.g. "Local DB server") so you'll recall it the next time you start HeidiSQL. Import settings file
New Save Delete	Open Cancel More 🗸

#### Figure 3: HeidiSQL Start Window



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- 2. To establish a connection to the server, first a new link must be set up. Click the button **[New]** at the lower left edge of the window.
- 3. To maintain a clear overview, rename the new session, e.g.: "PFC200\_Server." Then enter the following setup parameters:
  - Network type: MySQL (TCP/IP)
  - **Hostname/IP:** Enter the PFC200 IP address here (in this example: 192.168.1.17).
  - User: admin
  - **Password:** wago
  - **Port:** 3306

Session name 🔺	de Settings de Set	Advanced 🚺 Statistics
N PFC200_Server	Network type:	MySQL (TCP/IP)
	Hostname / IP:	192.168.1.106
		Prompt for credentials
		Use Windows authentication
	User:	admin
	Password:	••••
	Port:	3306
		Compressed client/server protocol
	Databases:	Separated by semicolon 🔍
	Comment:	

Figure 4: Default Server Settings

- 4. Then click **[Open].** If the MySQL Server has been correctly installed, now the following two databases should be visible:
  - Information\_schema
  - mysql



BFC200_Server\ - HeidiSQL Portat	ole 9.4.0.5125											23
File Edit Search Tools Go to Help PSend a donation												
🍬 🕶 🖉   🗅 🦰 🥥 📥   4	ø • ø   [] [] [] [] [] [] [] [] [] [] [] [] []											
🗐 Database filter 🛛 🗐 Table filter	<u></u>	🗐 Host: 192.168.1.106 🕨	Query 🗔									
▲	649,6 KiB	🗐 Databases (2) 🧼 Vari	iables  😽 Stat	tus 🕨	Processes	💼 Co	mmand-S	Statistics				
information_schema	8,0 KiB	Database 🔺	Size	Items	Last	Tables	Views	Func	Proc	Trigg	Events	Def
⊳ iii mysqi	041,0 KID	information_schema	8,0 KiB	28	2017	28	0	0	0	0	0	utf
		间 mysql	641,6 KiB	23	2017	23	0	0	0	0	0	arn
		٩ [			111							•
36 SHOW TABLE STATUS FROM `mysql`; 37 SHOW FUNCTION STATUS WHERE `Db`='mysql'; 38 SHOW PROCEDURE STATUS WHERE `Db`='mysql'; 39 SHOW TRIGGERS FROM `mysql`; 40 SELECT *, EVENT_SCHEMA AS `Db`, EVENT_NAME AS `Name` FROM information_schema.`EVENTS` WHERE `EVENT_SCHEMA`='mysql';												
🕑 Connected: 00:00 h 🔍	MySQL 5.1.72	Uptime: 06:19	h	🕑 U	TC: 2017-0	5-30 13:4	7 .	Idle.				đ

Figure 5: Successful Connection to the PFC200\_MySQL-Server



**Example Application** 5

Installation of Sample Projects for *e*!COCKPIT

Neu	Updates & Add-ons
Öffnen	
Speichern	Alle Updates Neu Installiert
Speichern unter	Name
	e!COCKPIT
Drucken	elcockpit 😓
Import/Export	Add-ons für e!COCKPIT V 1.6.0.1
	elCOCKPIT Profiler 🤶
Skripting	e!COCKPIT Static Analysis 9
	e!COCKPIT UML 👷
Projekteinstellungen	Beispielprojekte für e!COCKPIT V 1.6.0.1
	✓ Sample Projects for e!COCKPIT
Updates & Add-ons	Firmware für e!COCKPIT V 1.6.0.1
······	Firmware 12, Patch 1 - Controller PFC
	Firmware 12, Patch 1 - TouchPanel
Produktkatalog	Firmware 14 - Controller PFC
	Firmware 14 - Touch Panel

Figure 6: e!COCKPIT Sample Projects

Sample programs can be called up from the *e*!COCKPIT Backstage view by clicking the Updates & Add-ons button in the navigation bar.

#### 5.1 **Changing Default Logon Information**

The following steps demonstrate how the default user logon information "admin" can be changed. This step is optional, but is emphatically recommended for security reasons.

Clicking the menu option Tools > User manager (see Fig. 6) opens the User manager (see Fig. 7).



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Figure 7: Menu option User manager

Click the account "admin" and enter a new user name and password in the field next to it.

Click **[Save]** to apply the settings.



😬 User manager - ad	min		
Select user account:	_	Credentials Limitations SSL	options
🕒 Add 👘 Clone	e 🥥 Delete Host	User <u>n</u> ame:	admin
admin	%%	From <u>h</u> ost:	%%
🛎 root	localhost	<u>P</u> assword:	*5239FBCDF33B7C022281640666A7F70A86961CCD
a root	127.0.0.1	Repeat password:	
		Allow access to:	Add obju
		👂 🔳 🛴 Global privileges	
			Save Discard X Close

Figure 8: Changing the Logon Information for the User "admin"



### 5.2 Preparing the Database

The example IEC-61131-3 in this Application Note requires a previously prepared database structure to function properly. Follow these steps to create this structure:

1. Open HeidiSQL and establish a connection to the PFC200\_Server (see Section 4.2).



2. Right-click on "PFC200\_Server" > Create new > Database

Figure 9: Creating a new Database

3. Enter the name "PowerMeasurement" and confirm with [Ok].

Create databas	;e						
<u>N</u> ame:	PowerMeasurement						
Collation:	armscii8_general_ci 🔹						
	Servers default: armscii8_general_ci						
	OK Cancel						
CREATE code:							
CREATE DAT	TABASE `PowerMeasurement` /*!4010						

Figure 10: Naming the Newly Created Database

4. A new database is created under the name "PowerMeasurement." The next step is to set up a table in this database.



Figure 11: Created Database "PowerMeasurement"

5. To create a new file, click **File > Load SQL file**. Then, select the file "CreatePowerMeasurementTable01.sql" located in the folder .../Create Table/ and confirm the selection with the [**Open**] button.



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Figure 12: Loading the SQL File

6. Next, click the [▶] button to execute the previously loaded SQL instructions. The code then automatically creates a new table with the name "Data" in the "PowerMeasurement" database.



🔍 🗕 🔚 🖓 🆕 🖉 🗛 🗟 🕫 🕴 🔇 🔄 😣 N N O 🔵 🗸 🗙 CreatePowerMeasurementTable01.sql Host: 192.168.1.106 2 3 ---4 -- Datenbank: `PowerMeasurement` 5 ---6 7 -8 9 --10 -- Tabellenstruktur für Tabelle `Data` 11 --12 USE `PowerMeasurement`: 13 CREATE TABLE IF NOT EXISTS `Data` ( `timestamp` timestamp NOT NULL default CURRENT\_TIMESTAMP on update CURRENT\_TIMESTAMP, `Current\_1` float(11) NOT NULL, `Current\_2` float(11) NOT NULL, 14 15 16 `Current\_3` float(11) NOT NULL, 17 Voltage\_1 float(11) NOT NULL, 18 `Voltage\_2` float(11) NOT NULL, `Voltage\_3` float(11) NOT NULL, 19 20 `ActivePower\_1` float(11) NOT NULL, 21 `ActivePower\_2` float(11) NOT NULL, 22 `ActivePower\_3` float(11) NOT NULL, 23 24 `TotalActivePower` float(11) NOT NULL `TotalReactivePower` float(11) NOT NULL, 25 `TotalActiveEnergyPowerMeasurement float(11) NOT NULL 26 27 ) ENGINE=MyISAM DEFAULT CHARSET=latin1;

Figure 13: Executing the Loaded SQL Code

The created table "Data" contains the following columns:

	- - - -	Current_1 (_2,_3) Voltage_1 (_2,_3) ActivePower_1 (_2,_3) TotalActivePower TotalReactivePower TotalActiveEnergy	(currents of the three phase (voltages of the three phase (active power of the three (total active power) (total reactive power) (total active energy)	ses) ses) phases)
间 Datenbankfilter	Tabellenfilter	🔶 💷 Host: 192.168.1.106 📄 Datenb	ank: PowerMeasurement 🔲 Tabelle: Data	📱 Daten ╞ CreatePowerM
▲ 🔍 PFC200_Server		PowerMeasurement.Data: 0 Zeilen ge	samt 🕪 Nächste Zeile 🕅 Alle Zeilen	▼ Sortierung ▼ Spa
information	schema			

Figure 14: Created "Data" Table - Section

1,0 KiB 1,0 KiB

a 🔊 PowerMeasurement

Data

Version 1.0.3

At this point, the table is empty. In the following section, the attached IEC-61131-3 application is used under e!COCKPIT to write the measurement values of the 3phase power measurement module in the database.

timestamp Current\_1 Current\_2 Current\_3 Voltage\_1 Voltage\_2 Voltage\_3 ActivePow



**Example Application** 

## 5.3 IEC-61131-3 Application as MySQLClient



## Note

### PLC Runtime!

Before the *e*!COCKPIT application can be operated on the PFC200, the PFC's "PLC Runtime" must be set on *e*!RUNTIME via WBM.

Please note, the MySQL Server runs on the identical PFC200 as the controller application. Therefore, the following information applies:



## Note

#### FbMySql\_Login Module Switching!

If the controller application and the MySQL Server are operating on the same PFC200, "localhost" or "127.0.0.1" must be entered as IP address in the function block **FbMySql\_Login**.

In addition to the WagoAppPowerMeasurement library in order to use the 3phase power measurement module, the attached *e*/COCKPIT example project *WagoApp\_x.x.x.MySQLServer\_PowerMeasurement\_Example\_01* . *ecp* also needs the WagoAppSQL\_MySQL. This library is needed for the communication with the MySQL Server. The following function blocks from the library are used thereby:

- **FbMySql\_Login** is needed to establish a connection with the database.

- **FbMySql\_Execute** is needed to add data to the "Data" table and for updating.

- **FbMySql\_Query** is needed to read out entries from the "Data" table.

- FbMySql\_GetStringValue is needed to convert query data in IEC files.
- **FbMySql\_Logout** is needed to terminate the connection to the database.

The example program source code is divided into two sections. The first connection contains module call-ups for parameterizing the 3-phase power measurement module and for the subsequent measurement value recording. However, this Installation note is focused on the MySQL functions, so the parameterization and wiring of these modules are not explained further. If you have any questions or uncertainty, refer to the documentation of the WagoAppPowerMeasurement.



The following description deals with the second section of the example program and the MySQL functions it contains.

PLC	C_PRG	× StatusPowerMeasurement ×	
	25	(************************	**************************************
	26	oFbMvSOLLogin	: WagoAppSOL MySOL.FbMySgl Login:
	27	xConnect	: BOOL:
	28	xErrorLogin	: BOOL:
	29	sStatusLogin	: STRING(200):
	30	xConnected	: BOOL:
	31		
	32	oFbMvSQLExecute1	: WagoAppSOL MySOL FbMySgl Execute:
_	33	xExecute1	: BOOL:
	34	xErrorExecute1	: BOOL:
	35	aStatusExecute1	: STRING (200) :
	36	asSglStatement1	: ARRAY(0, WagoAppSOL MYSOL MYSOL SOL UPPER BOUNDI OF STRING (WagoAppSOL MYSOL MYSOL SOL LENGTH):
	37		
	38	oFbMvSQLQuerv	: WagoAppSQL MySQL FbMySgl Query:
	39	xOuerv1	: BOD::
	40	xErrorOuerv	: BODL:
	41	sStatusOuerv	: STRING (200) :
	42	typOuervResult	: WagaAppSOL MySOL typMySgl RegultSet:
	43	asSglOuerv1	: ARRAY[0, WagoAppSoL MySOL MYSOL SOL UPPER BOUND] OF STRING (WagoAppSoL MySOL MYSOL SOL LENGTH):
	44	appd1%ac111	
	45	oFbMySQLLogout.	: WagoAppSQL MySQL FbMySgl Logout:
	47	(********	**************************************
	48	//Preparing database connect:	ion 2
	49	oFbMySQLLogin(	
	50	sHost:='localhost',	
	51	uiPort:= 3306,	
	52	sUsername:='admin',	
	53	sPassword:='wago',	
	54	<pre>sDatabase:='PowerMeasurer</pre>	ment',
	55	<pre>xTrigger:=xConnect,</pre>	
	56	xBusy=> ,	
	57	xError=>xErrorLogin ,	
	58	oStatus=> ,	
	59	sStatus=>sStatusLogin ,	
	60	<pre>xConnected=&gt;xConnected);</pre>	
	61		
	62	//Preparing data to send	
	63	//Statement1	
	64		
	65	asSqlStatement1[0]:= 'INSERT	<pre>INTO Data (Current_1, Current_2, Current_3, Voltage_1, Voltage_2, Voltage_3,'; //Beginnir</pre>
	66	asSqlStatement1[1]:= 'Active!	<pre>Power_1, ActivePower_2, ActivePower_3,';</pre>
	67	asSqlStatement1[2]:= 'TotalAd	<pre>:tivePower, TotalReactivePower, TotalActiveEnergy )';</pre>
	68	asSqlStatement1[3]:= 'VALUES	C:
	69	asSqlStatement1[4] := CONCAT(H	<pre>WEAL_TO_STRING(arCurrent[0]),',');</pre>
	70	asSqlStatement1[5] := CONCAT(H	<pre>WEAL_TO_STRING(arCurrent[1]),',');</pre>
	71	asSqlStatement1[6]:= CONCAT(H	<pre>WEAL_TO_STRING(arCurrent[2]),',');</pre>
	72	asSqlStatement1[7]:= CONCAT(H	<pre>WEAL_TO_STRING(arVoltage_L_N[0]),',');</pre>
	73	asSqlStatement1[8]:= CONCAT(H	<pre>WEAL_TO_STRING(arVoltage_L_N[1]),',');</pre>
	74	asSqlStatement1[9]:= CONCAT(H	<pre>WEAL_TO_STRING(arVoltage_L_N[2]),',');</pre>
	75	asSqlStatement1[10] := CONCAT	<pre>(REAL_TO_STRING(arActivePower[0]),',');</pre>
	76	asSqlStatement1[11] := CONCAT	<pre>(REAL_TO_STRING(arActivePower[1]),',');</pre>
	77	asSqlStatement1[12] := CONCAT	<pre>(REAL_TO_STRING(arActivePower[2]),',');</pre>
	78	asSqlStatement1[13]:= CONCAT	<pre>(REAL_TO_STRING(rTotalActivePower),',');</pre>

Figure 15: Source Code of the Example Program "Example\_MySQL\_PowerMeasurement.pro" - Section

- After a connection to the sever has been successfully established and the application has been started, a connection to the database must be set up. To do so, set "TRUE" for parameter "*xConnect*" at the "*xTrigger*" input of the module \_oFbMySQLLogin (double-click, then [CTRL]+[F7]; see Fig. 15).
- Information about the current status of the logon function can be found under the variables "*sStatusLogin*" and "*xConnected*" (if connection is successful: "TRUE").



Example Application	n	WAGO-I/O-SYS	S
47		(*************************************	
48		//Preparing database connection	
49		_oFbMySQLLogin(	
50		<pre>sHost 'localhost' ;</pre>	
51		uiPort 3306 := 3306,	
52		sUsername 'admin' :='admin' ,	
53		sPassword 'wago' :='wago',	
54		<pre>sDatabase 'PowerMeasu &gt; :='PowerMeasurement' ,</pre>	
55		<pre>xTrigger FALSE :=xConnect FALSE ,</pre>	
56		xBusy=> ,	
57		xError FALSE =>xErrorLogin FALSE ,	
58		oStatus=> ,	
59		<pre>sStatus 'CONNECTED &gt; =&gt;sStatusLogin 'CONNECTED &gt; ,</pre>	
60		xConnected TRUE =>xConnected TRUE );	

Figure 16: \_oFbMySQLLogin Module

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3. After a successful connection to the server has been established, the SQL instruction to transfer the measurement values is executed in a 5-second cycle. The **\_oFbMySqlExecute1** module delivers feedback about the data transfer status in the "*sStatusExecute1*" string.

87		/Writing PowerMeasurementValues into database
88	• _	oFbMySQLExecute1 (
89		aSqlCommand:=asSqlStatement1 ,
90		<pre>xTrigger FALSE :=xExecute1 FALSE ,</pre>
91		xBusy=> ,
92		<pre>xError FALSE =&gt;xErrorExecute1 FALSE ,</pre>
93		oStatus=> ,
94		<pre>sStatus 'Successful &gt; =&gt;sStatusExecute1 'Successful &gt; );</pre>

Figure 17: \_oFbMySQLExecute1 Module

The pause time between transfers (initially, five seconds) can be set to any value in the parameter *"tCycleTimeValue"*.

11	//Visualisation function	block - 750-494 Module
12	_oFbAC_Compact_494	: WagoAppPowerMeasurement.FbAC_Compact_494;
13	xEnableMeasurement	: BOOL := TRUE;
14	tCvcleTimeValue	: TIME := T#5S;

Figure 18: Setting the Transmission Interval (tCycleTimeValue)



## Note

#### **Transmission Interval!**

The time for the transmission interval should not be set too low. The resulting high transmission rate would lead to unnecessary loads on the controller and quickly exhaust the memory capacity on the SD card.



4. Next, the optional second SQL instruction (\_oFbMySQLQuery) can be executed to call up the measurement values saved in the database. To do so, set the signal "xQuery1" in the module to "TRUE." The status of the execution will then be present in the "sStatusQuery1" string. The results of the queries are filed in the "stTableData.astRow[]" array.



# Note

#### Maximum Rows of Data to be Called Up!

The <u>maximum</u> number of rows from the database table that can be called up can be set with the global variable *"MAX\_ROWS*." This parameter is set to thirty rows as default, but can be adjusted as required.

100		//Receiving values from database
101	•	_oFbMySQLQuery(
102		aSqlCommand:=asSqlQuery1,
103		xTriggerFALSE:=xQuery1FALSE
104		<pre>typResultSet:=typQueryResult ,</pre>
105		xBusy=> ,
106		xError FALSE =>xErrorQuery FALSE ,
107		oStatus=> ,
108		<pre>sStatus Successful &gt; =&gt;sStatusQuery Successful &gt; );</pre>

Figure 19: \_oFbMySQLQuery Module

5. Close the connection to the database by forcing the signal *"xDisconnect"* to the value "TRUE" in the \_oFbMySQLLogout module.

113		//Logout from Database
114	•	_oFbMySQLLogout(
115		xTrigger FALSE = xDisconnect FALSE
116		xBusy=> ,
117		xError FALSE =>xErrorLogout FALSE ,
118		oStatus=> ,
119	•	sStatus DISCONNECT > =>sStautsLogout DISCONNECT > ); RETURN

Figure 20: \_oFbMySQLLogout Module

6. As an option, the result can then be checked with HeidiSQL. To do so, reconnect to the server; the data that was just written in can be viewed in the "Data" table under the previously created "PowerMeasurement" database.

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Data	1,0 KiB	2017-05-02 16:11:40	0	0	0	0,09	0,09		
⊳ 📄 mysql		2017-05-02 16:11:45	0	0	0	0,09	0,09		

Figure 21: Overview of the Data in "HeidiSQL" - Section



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# 6 Exchanging the SD Card

Before new data is written in the database, check that sufficient capacity remains on the SD card used.

If the remaining memory capacity is insufficient, first check whether older data can be deleted to create enough capacity. If this is not possible, the SD card can be exchanged as described in the following steps.

- 1. Insert a new SD card in the PFC200.
- 2. Restart the controller.
- 3. Follow the instructions in Sections 4 and 5 again.



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