

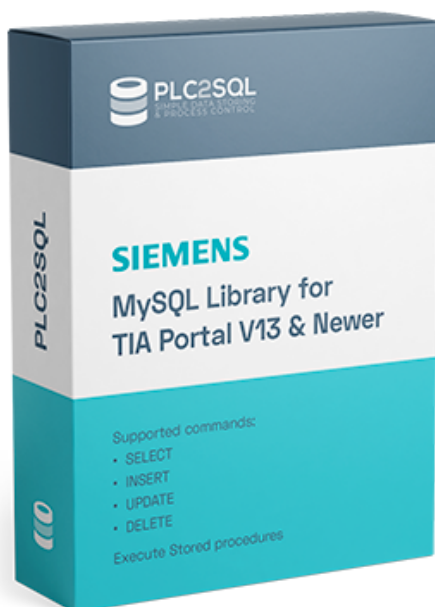
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# MySQL Library for TIA Portal V13 & Newer

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USER GUIDE

V1.0.0.0



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# Chapter 1

## Product description

This library allows you to connect your PLC Siemens S7-1200 or S7-1500 application to MySQL database or MariaDB. With this library you are able to store and read process data. Read recipes from ERP, save breakdown report and etc. No more OPC servers and other middleware.

Basic requirement for this library is TIA Portal V13 or higher and MySQL Server (V5 or higher).

MySQL server installation is there: <https://dev.mysql.com/downloads/installer/>

### 1.1 Range of function

This library allows to the user connect to MySQL Server V5 and higher.

**Supported commands:**

- SELECT
- INSERT
- UPDATE
- DELETE
- Execute stored procedures

### 1.2 Supported datatypes

Supported datatypes are mentioned in chapter 1.4.1. MySQL returns all data in text format. So basically everything can be converted from STRING to required datatype.

## 1.3 Function blocks

### 1.3.1 fbMySQL

FB for complete connecting and executing commands with Microsoft SQL from 2005 to 2017.

**Author:** krajcart

V1.0.0.0

Table 1.1: fbMySQL

Scope	Name	Type	Initial	Comment
Input	stConnectData	stConnectData		structure for login to MySQL
	stQuery	stQuery		structure for stQuery
	tTimeout	Time	T#10s	timeout
	sActivationNumber	String		activation number received after purchase
	interfaceID	HW_ANY	64	X1(64), X2(72)
Output	xConnectedSuccessfully	Bool		indication of successfull conection to SQL
	dwError	DWord		error identifier
	wRowDoneCnt	Word		no. of rows done
	sStatus	String		status message
	sErrorMessage	String		error message
	xLicenseValid	Bool		info about license
	DONE	Bool		signal that operation was finished OK
	BUSY	Bool		signal that operation is busy
	ERROR	Bool		signal that operation ended with Error
	sVersion	String[10]		info about current library version
InOut	xConnectSQL	Bool		trigger for login,to SQL
	xDisconnectSQL	Bool		trigger for logout from SQL
	xExecuteSQL	Bool		trigger to execute SQL command executing
	stSqlResponse	stSqlResponse		structure for SQL Response

### Structure stConnectData

Table 1.2: stConnectData

Name	Type	Initial	Comment
UserName	STRING		user name
Password	STRING		password
Database	STRING		name of database
ConnID	CONN_OUC	10	connection ID in Simatic
usiIP1	USINT		1st octet of IP Address
usiIP2	USINT		2nd octet of IP Address
usiIP3	USINT		3rd octet of IP Address
usiIP4	USINT		4th octet of IP Address
uiPort	UINT	3306	port for MySQL

## 1.4 Functions

### 1.4.1 fcGetValue

FC for converting raw SQL data to datatype STRING. Not supported type will be notified.

**Allowed data types:** TINY,DECIMAL, SHORT, LONG, INT24, LONGLONG, VAR\_STRING, STRING, VARCHAR, DECIMAL, NEWDECIMAL, FLOAT, DOUBLE, DATETIME, TIMESTAMP, DATE, TIME.

**Author:** krajcart

V1.0.0.0

Table 1.3: fcGetValue

Scope	Name	Type	Initial	Comment
Input	iCol	Int		index of selected column
	iRow	Int		index of selected row
InOut	stSqlResponse	stSqlResponse		response structure
	eError	Word		error variable look into tab.1.7.
	sValue	String		return value
	uiLength	Uint		length of string variable

```
"dbSQL_data".diValue := STRING_TO_DINT("dbSQL_data".sValue);  
"dbSQL_data".rValue := STRING_TO_REAL("dbSQL_data".sValue);  
"dbSQL_data".xValue := INT_TO_BOOL(STRING_TO_INT("dbSQL_data".sValue));
```

Figure 1.1: Example how to convert string value to other datatype

### 1.4.2 fcDtlToString

FC for converting datetime to string for inserting to SQL.

**Allowed data types:** DTL

**Author:** krajcart

V1.0.0.0

Table 1.4: fcDtlToString

Scope	Name	Type	Initial	Comment
Input	dtlIn	DTL		datetime insert
Output	fcDtlToString	STRING		with string value

### 1.4.3 fcStringToDtl

FC for converting string to DTL.

**Allowed data types:** STRING

**Author:** krajcart

V1.0.0.0

Table 1.5: fcDtlToString

Scope	Name	Type	Initial	Comment
Input	sValue	STRING		datetime insert
Output	fcStringToDtl	DTL		

## 1.5 Errors

List of errors stored in value **dwError** as output from **fbMySql**.

Table 1.6: Error table

Code	Error message	Advice
16#400000	No error.	
16#400001	Timeout destination server is unreachable.	Remote server unreachable, try fbPing and firewall.
16#400002	Login failed.	Wrong login or security settings on server side.
16#400003	Command failed.	Executed command failed.
16#400007	MYSQL-ERROR: Invalid or unexpected response from server.	My SQL error.
16#400009	No command to execute.	Write some SQL command.
16#400010	Result set has more columns then defined in "c_iNoOfColumns".	Increase c_iNoOfColumns constant in global parameters.
16#400011	MYSQL-WARNING: Number of received rows exceed maximum of "c_iNoOfRows" - Some rows are ignored".	Increase c_iNoOfRows constant in global parameters
16#400012	MYSQL-WARNING: Number of received rows exceed maximum of "c_iNoOfRows" - Some rows are ignored".	Increase gc_iLengthOfDataArray constant in global parameters.
16#400014	License is not valid! Demo expired.	Buy the license.
16#400016	stConnectData is not filled completely.	Fill all variables in sqlLogin.
16#400019	Request 4.0 authentication, old we will not implement, $s \geq 4.1$ only.	
16#400021	MYSQL-ERROR: Unsupported value for "column count", provided as 64-bit value(8 bytes) in "Result-Set-Header-Packet".	My SQL error.
16#400022	MYSQL-ERROR: Unsupported value for "column count", provided as 24-bit value(3 bytes) in "Result-Set-Header-Packet".	My SQL error.
16#400023	MYSQL-ERROR: Unsupported value for "column count", provided as 16-bit value(2 bytes) in "Result-Set-Header-Packet"	My SQL error.
16#400024	MYSQL-ERROR: Invalid or unexpected response packet from server.	My SQL error.
16#400025	State machine ended on timeout.	Look in which step it failed and try to increase timeout.
16#400027	MYSQL-ERROR: Received more data than declared in message header.	My SQL Error.
16#400029	MYSQL-ERROR: Greeting message contains wrong data.	My SQL Error.

Table 1.7: Error table convert functions

<b>eError</b>	<b>Error message</b>	<b>Advice</b>
16#00	No error.	
16#01	iRow is 0.	Set variable iRow bigger than 0.
16#02	iRow is out of range.	Set variable iRow between 1 and stSqlResponse.uiRowCount.
16#03	iColumn is 0.	Set variable iColumn bigger than 0.
16#04	iColumn is out of range.	Set variable iRow between 1 and stSqlResponse.uiColumnCount.
16#05	Unsupported datatype.	Please look into sValue for more info .

## 1.6 Licensing

MySQL library for TIA Portal V13, V14, V15, V15.1, V16 is licensed per runtime license. Each license is binded to SN of PLC. Price for one runtime license is **149€ without VAT**. Without valid license library works only 2 hours after startup. Link for purchase: <https://www.plc2sql.com/products/mysql-library-for-tia-portal-v13-newer/#license>

# Chapter 2

## Installation

### 2.1 Installation MySQL library to TIA Portal

Open example project for TIA Portal. Copy these block into your TIA Portal projects<sup>1</sup> :

#### Function Blocks

- fbMySQL (S7-1200 & S7-1500)

#### Functions

- fcGetValue (S7-1200 & S7-1500)

#### PLC data types

- astColData
- astRowDet
- stColumn
- stConnectData
- stQuery
- stSqlResponse

#### Recommended FW

- S7-1200 from FW4.2 and higher is recommended
- S7-1500 from FW2.0 and higher is recommended

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<sup>1</sup>Numbers of fb, fc and db can be arbitrary

**This library package contains:**

- Library for TIA Portal V14, V15, V16<sup>2</sup>
- Example project S7-1200 & S7-1500
- User guide

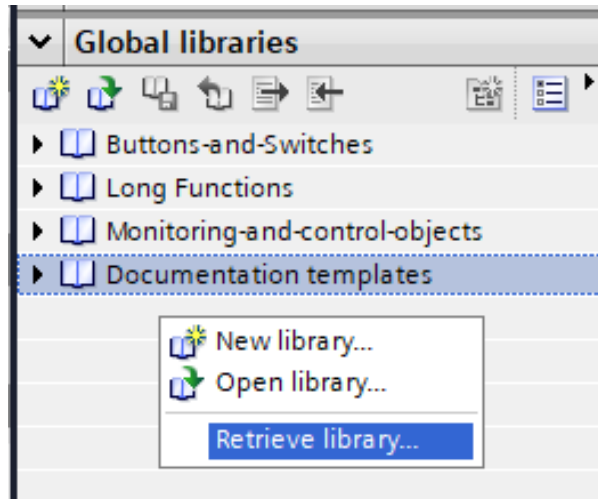


Figure 2.1: Loading Global Library

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<sup>2</sup>Library can be always converted to newer TIA enviroment

## Limits of data to read from SQL

fbMySQL has internally setup array bound for data able to read from MySQL. Because this is about definition of arrays and memory in PLC. In default you are able to read max 10 collumn, 10 rows and each row can contain max 300 bytes of data.

■	c_iLengthOfByteArrays	Int	1024		<input type="text"/>
■	c_iNoOfColumns	Int	10		<input type="text"/>
■	c_iNoOfRows	Int	10		<input type="text"/>
■	c_iLengthOfDataArray	Int	300		<input type="text"/>
■	c_iMaxIdentifierLength	Int	80		<input type="text"/>

Figure 2.2: Constants in fbMySQL Library

## Chapter 3

# Example application

On the picture 3.1 is main program in OB1 with fbMySQL and function block. All example files are in Global Library. Master copies S7-1200 or S7-1500.

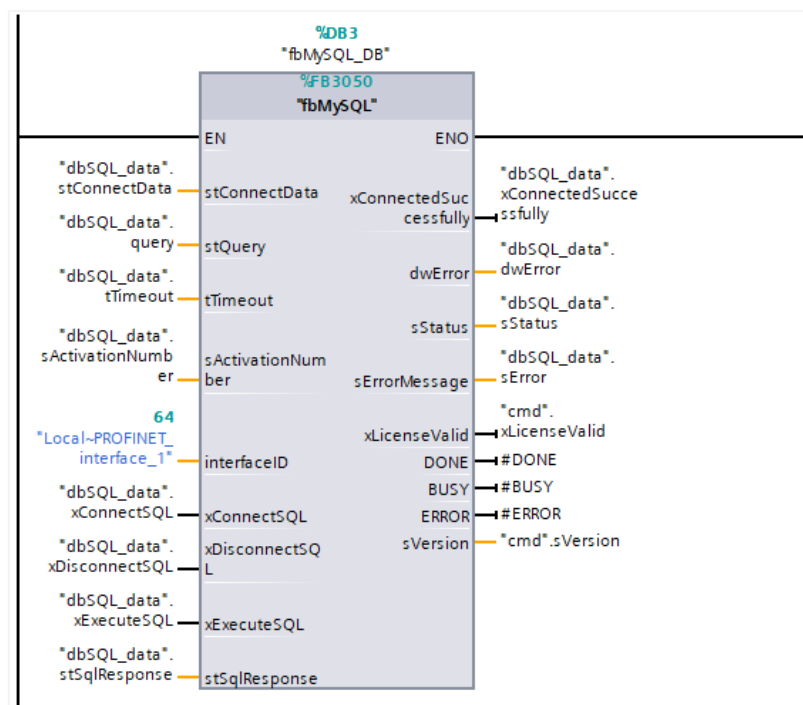


Figure 3.1: fbMySQL call in OB1(for S7-1512)

## 3.1 Example commands for SQL Server

```
CREATE DATABASE test /*!40100 COLLATE 'utf8_general_ci' */
```

Figure 3.2: Create database test

### 3.1.1 tblTestPLC

In this table we have 6 columns:

- **Bools** [bit]
- **String** [nvarchar(50)]
- **ID** [int]
- **Real** [float]
- **DoubleInt** [bigint]
- **dateTime** [datetime]

```
CREATE TABLE test.tblTestPLC ( Bools BOOLEAN NULL ,  
String VARCHAR(50) NULL ,  
ID SMALLINT NULL ,  
RealVal REAL NULL ,  
DoubleInt INT NULL,  
dateTime DATETIME NULL )  
ENGINE = InnoDB
```

Figure 3.3: Create tblTestPLC

```
SELECT Bools, String, ID, RealVal, DoubleInt, dateTime FROM tblTestPLC
```

Figure 3.4: SELECT from tblTestPLC

Table 3.1: Example of values, which you can add to your tblTestPLC table

[rows]	Bools	String	ID	Real	DoubleInt	dateTime
1	0	Test 12	456	13.2	445568	2020-03-29 11:46:36
2	1	Hello youtube	78964	0.4	44556	2020-03-29 11:46:36

```
INSERT INTO tblTestPLC (Bools, String, ID, RealVal, DoubleInt, dateTime)  
VALUES (0, '$'Test 12$', 456, 13.2, 445568, '$'2020-03-29 11:46:38$')
```

Figure 3.5: INSERT to tblTestPLC

**Note** If you insert STRING, DATETIME and other datatypes from PLC to SQL you have to put Dollar Sign(\$) before Apostrophe(').

## 3.2 Installation of MySQL Server

Here is video how to install MariaDB: <https://www.youtube.com/watch?v=Nvt7S9XVeXg>

Here is video how to install MySQL: <https://www.youtube.com/watch?v=WuBcTJnIuzo>

## Chapter 4

# Change Log

### V 1.0.0.0

- Released