Programmable logic valve control type PLVC 8

See also other electronic valve controller/accessory:

Type PLVC 41	D 7845-41
Type PLVC 2	D 7845-2
Type PLVC-CAN	D 7845 Z
Type CAN-HMI	D 7845 HMI

1. General information

The programmable logic valve control of type PLVC consists of a complex PLC-enabled micro-control unit with integrated amplifiers for mobile and stationary hydraulic applications. There is a wide range of possible application due to the CAN-Bus interface and the IP67-approved housing, e.g.:

- Cranes
- Construction machinery
- Complex lifting devices
- Logging machinery

The various control tasks are realized through:

- Modular system with extension and supplementary module
  - There are two versions of the basic module, either with more emphasis on the input side (PLVC 8x1) or more on the output side (PLVC 8x2)
  - Extension module (additional inputs/outputs)
  - Small display for diagnosis and parameterization (via CAN-Bus)
  - real time-clock und data-logging, optional
- Flexible programmability according to IEC 61131-3 standard (PLC-programming via structured text (ST))
- Interfaces: CAN-Bus, RS232
- Free parameterization of all outputs as well as complete diagnosis capability and short-circuit protection
- Remote diagnosis via modem or mobile phone
- Plug and play combination of multiple PLVC's via CAN-Bus within one integrated unit for the control of large systems

The main performance parameters include furthermore:

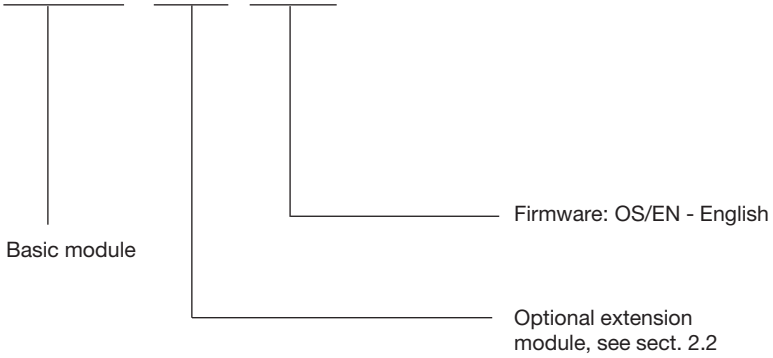
- Basic module PLVC 8x2 (output emphasized)
  - 16 outputs for prop. or ON/OFF valves (current-controlled) 2 A
  - 11 analog inputs (for joysticks, potentiometers, sensors such as analog pressure sensors)
  - 6 digital inputs (for limit switches, pressure switches, push buttons etc.) which can be also used as frequency input for rotary sensors, speed sensors, incremental encoder etc.
  - Emergency-Stop
  - Interface for RS232 and CAN-Bus
  - Power supply 10 ... 30 V DC, max. 16 A
- Basic module PLVC 8x1 (input emphasized)
  - 8 outputs for prop. or ON/OFF valves (current-controlled) 2 A
  - 15 analog inputs (for joysticks, potentiometers, sensors such as analog pressure sensors)
  - 14 digital inputs (for limit switches, pressure switches, push buttons etc.) which can be also used as frequency input for rotary sensors, speed sensors, incremental encoder etc.
  - Emergency-Stop
  - Interface for RS232 and CAN-Bus
  - Power supply 10 ... 30 V DC, max. 16 A
- Extension module PLVC 8x. - EW
  - 11 digital inputs (for limit switches, pressure switches, push buttons etc.) which can be also used as frequency input for rotary sensors, speed sensors, incremental encoder etc.
  - 13 digital outputs for resistant or inductive loads
  - 12 analog inputs (for joysticks, potentiometers, sensors such as analog pressure sensors)
  - CAN-Bus
  - Power supply 10 ... 30 V DC, max. 16 A
- Functional software features
  - SPS-programming via ST
  - Parameterization during operation
  - CAN-Bus is integrated in the firmware

2. Available Versions

2.1 Basic module

Order examples:

PLVC 8x1 - G - OS/EN Basic module
PLVC 8x2 - X-EW - OS/DE Basic module with extension module



General data

Casing, protection class	IP 67 (IEC 60529)
Temperature range	-40°C to +80°C
Power supply	10 V DC to 30 V DC
Max. total current Required external fusing	2x8 A, 1 A 2x8 A, 1 A (for controller) 2x10 A (slow blow), 1x1 A (slow blow)
Protection	Reverse voltage protection
Admission (only PLVC 8x2-G and PLVC 8x2-X-EW)	E13-Admission (ECE-R10 Rev. 3, CISPR 25 ISO 7637-2: 2004 ISO 11452-2: 2004 ISO 11452-5: 2002)
Monitoring	Short-circuit, low-voltage, and over-voltage Cable break
Connection	The connectors for connection are not scope of delivery and have to be ordered individually

Nomenclatura	Order No.	Note
Plug-set	6217 2066-00	(complete; Demand: 1x = basic module / 2x = basic module + extension)
Plug-contacts	6217 2067-00	(Spare part; Content: 30x contacts + 15x seals)
Crimp tool	6217 2068-00	(recommended)
Contact removal tool	6217 2069-00	(recommended)
Connector tweeser tool	6217 2074-00	(recommended for dismantling the plug)

Micro-controller 1 (basic module)	ST10F276 Basic parameter memory: EEPROM 1000 words Memory Flash: 768 kByte RAM: 420 kByte
Micro-controller 2 (basic module)	32 bit Memory Flash: 32 kByte RAM: 8 kByte
Micro-controller 3 (extension module)	32 bit Memory Flash: 32 kByte RAM: 8 kByte
Mounting	4 x M6
Casing material	Aluminium galvanized
Mass (weight)	approx. 2.4 kg (basic module) approx. 2.6 kg (extension module)

Power specifications of connections (block diagram basic module, see page 4)

Function	Description	Parameter
- Power supply	Rated voltage U_N Max. total current (power)	10 ... 30 V DC 2x 8 A
- Prop. and/or ON/OFF outputs (with high-side measuring) PLVC 8x2: 0-15 PLVC 8x1: 0-7	I_{min} I_{max} Dither frequency Dither amplitude (in relation to PWM) Cold resistance	100 ... 1200 mA 100 ... 2000 mA 33 ... 200 Hz 0 ... 48% 6 ... 35 Ohm
- Digital inputs PLVC 8x2: IB3.0 to IB3.5 also as frequency inputs and IB1.7 PLVC 8x1: like PLVC 8x2 and IB0.0 to IB0.7	Voltage range Voltage range / input resistance Limit frequency Voltage range Voltage range	10 ... 30 V DC 7 kOhm f_{lim} = 5 kHz 10 ... 30 V DC / 3-7 kOhm 10 ... 30 V DC / 9.4 kOhm
- Analog inputs PLVC 8x2: 8-11 and 40-43 PLVC 8x1: like PLVC 8x2 and 20-23	10 bit A DC ≙ 1024 steps Configurable via software Configurable via software	 0 ... 5 V DC / 470 kOhm 0 ... 10 V DC / 100 kOhm 4 ... 20 mA / 220 Ohm 0 ... 5 V DC / 470 kOhm 0 ... 10 V DC / 100 kOhm 4 ... 20 mA / 150 Ohm 0 ... 10 V DC / 24 kOhm
- Analog/digital inputs PLVC 8 (x2 and x1) 12-14	10 bit A DC ≙ 1024 steps Configurable via software	 0 ... 10 V DC / 100 kOhm 10 ... 30 V DC / 7 kOhm
- CAN-Bus interface	Interface parameters	CAN Interface 2.0, ISO 11898 50 ... 1000 kBit/sec Protocol: CANOpen/J1939

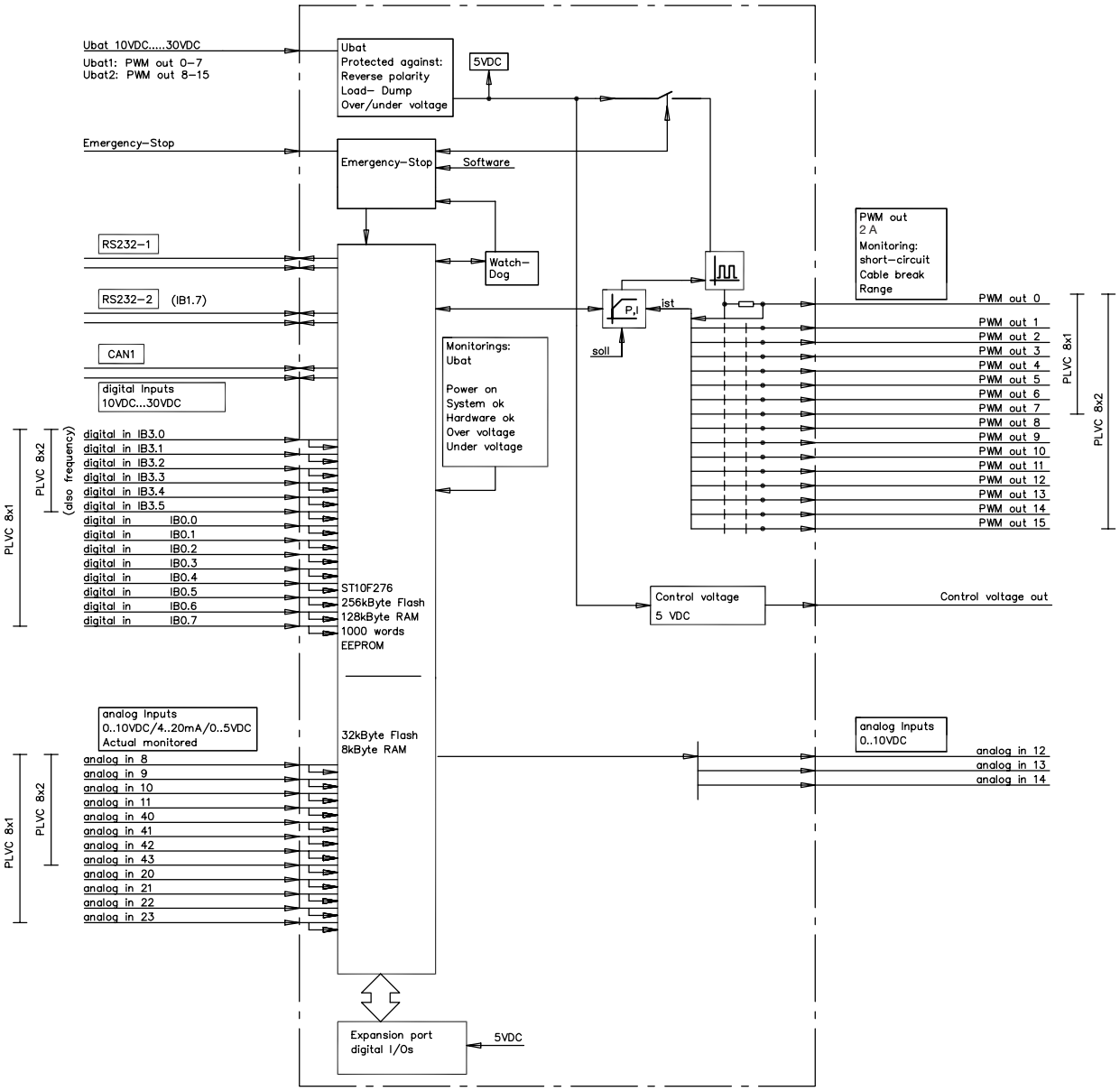
2.2 Extension module EW

General data

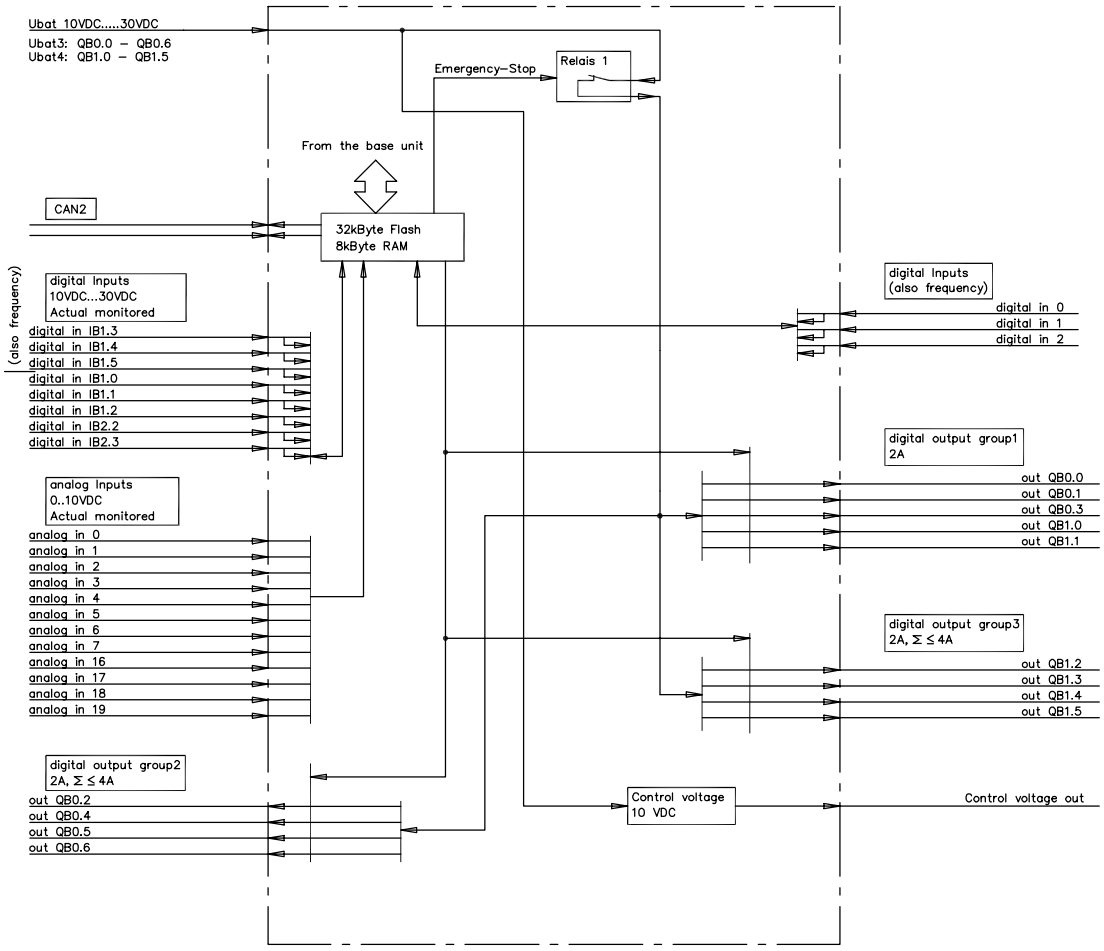
Power supply	10 to 30 V DC
Max. total current	2x 8 A
Required external fusing	2x 8 A
Mounting	Installed into the basic system

Function	Description	Parameter
- Power supply	Rated voltage U_N max. total current (power)	10 ... 30 V DC 16 A
- Digital outputs QB0.0 to QB0.6 and QB1.0 to QB1.5	for ON/OFF-valves and consumers with resistance characteristics	10 ... 30 V DC 2 A (max. 4 A per group)
- Digital inputs IB1.3 to IB1.5 also as frequency inputs and IB2.0 IB1.0 to IB1.2 IB2.2 to IB2.3 IB2.4 bis IB2.6	Voltage range Voltage range / input resistance Limit frequency Voltage range Voltage range Voltage range Voltage range	10 ... 30 V DC 7 kOhm f_{lim} = 5 kHz 10 ... 30 V DC / 3-7 kOhm 10 ... 30 V DC / 7 kOhm 10 ... 30 V DC / 7 kOhm 10 ... 30 V DC / 11 kOhm
- Analog inputs 0-7 also digitally utilizable 16-19 (suited for electronic switches and sensors)	Voltage range	0 ... 10 V DC / 26 kOhm 10 ... 30 V DC / 26 kOhm
- CAN-Bus interface	Interface parameters	CAN Interface 2.0, ISO 11898 50 ... 1000 kBit/sec Protocol: CANOpen/J1939

Block diagram (basic module)



Block diagram (extension module)



3. Software, Programming, Diagnosis

3.1 Software

Scope of delivery includes the following software package as standard:
- Firmware („C“-programmed real-time operation system) with integrated CAN-Bus functionality as well as PLC-capability
- Functionality of prop. amplifiers
- Initializing functions for all inputs and outputs
- Diagnosis software

Available as additional options:
- Diagnosis for CAN-Bus (incl. continuous chart logger)
- Function module, adapted for specified applications (on request)

Examples:
- Max. load control
- Synchronicity / Positioning
- Flow control (e.g. via prop. flow control valves type SE and SEH acc. to D 7557/1)
- Pressure control (e.g. via prop. pressure limiting valves type PMV acc. to D 7485/1 and electrical pressure transducer type DT 11 acc. to D 5440 T/2 and / or type DT 2 acc. to D 5440 T/1)

3.2 Configuration software „PLVC Visual tool“

a) Standard version

The Windows based software „PLVC Visual tool“ (availably free of charge) for configuration and supervision of controller type PLVC. This software provides the following functionality:
- Supervision and configuration of all in- and outputs of the control
- Generation of projects for each control
- Freely selectable nomenclature of all in- and outputs
- Export of the layout in various formats (PDF, Excel)
- Loading and saving of program and parameters
- Transfer of a new firmware
- Update via Internet
- etc.

b) Extended version

In addition to the standard version of this software there is also an extended version available (not free of charge). This versions contains an integrated oscilloscope.
The oscilloscope has the following functionality:
- Monitoring of up to 20 signals (in- and outputs as well as internal variable values from the running control program)
- storage period up to 24 h
- Graphics/scope export of the stored files as Bitmap, JPEG, GIF, Postscript, PDF, PCX, SVG
- Export of the indiv. values as text, HTML, XML or Excel
- Import of saved data
- Automatic scaling
- Legend either displayed or masked
- Displayed statistics
- etc.

3.3 Programming environment OpenPCS

The controller type PLVC can be freely programmed conforming IEC 61131-3 (best with structured text (ST)). Basically, the customer can program his control himself. The software OpenPCS, available from HAWE Hydraulik, is required for programming. Additional to the user interface there are also manufacturer specific function blocs e.g. controls for prop. outputs, input of frequencies available from HAWE Hydraulik.

Additional HAWE Hydraulik offers customer oriented programming tutorials.

3.4 Diagnose

The following output equipment can be used for diagnosis:
- PC - connected via RS232, for parameterization, programming, error detection as well as remote diagnosis via modem.
- CAN-HMI display (see D 7845 HMI), connected via CAN-Bus, for error detection and adjustment parameterization
- VT-software, this software tool enables the diagnosis and parameterization of the PLVC (see sec. 3.2) .
- Terminalprogramm

3.5 Function blocks

General:
The manufacturer-specific function blocks serve to indicate to the PLC-programmer the interfaces to the actual system. They are structured into the following two groups.

Group 1: Initializing functions (INI-functions)

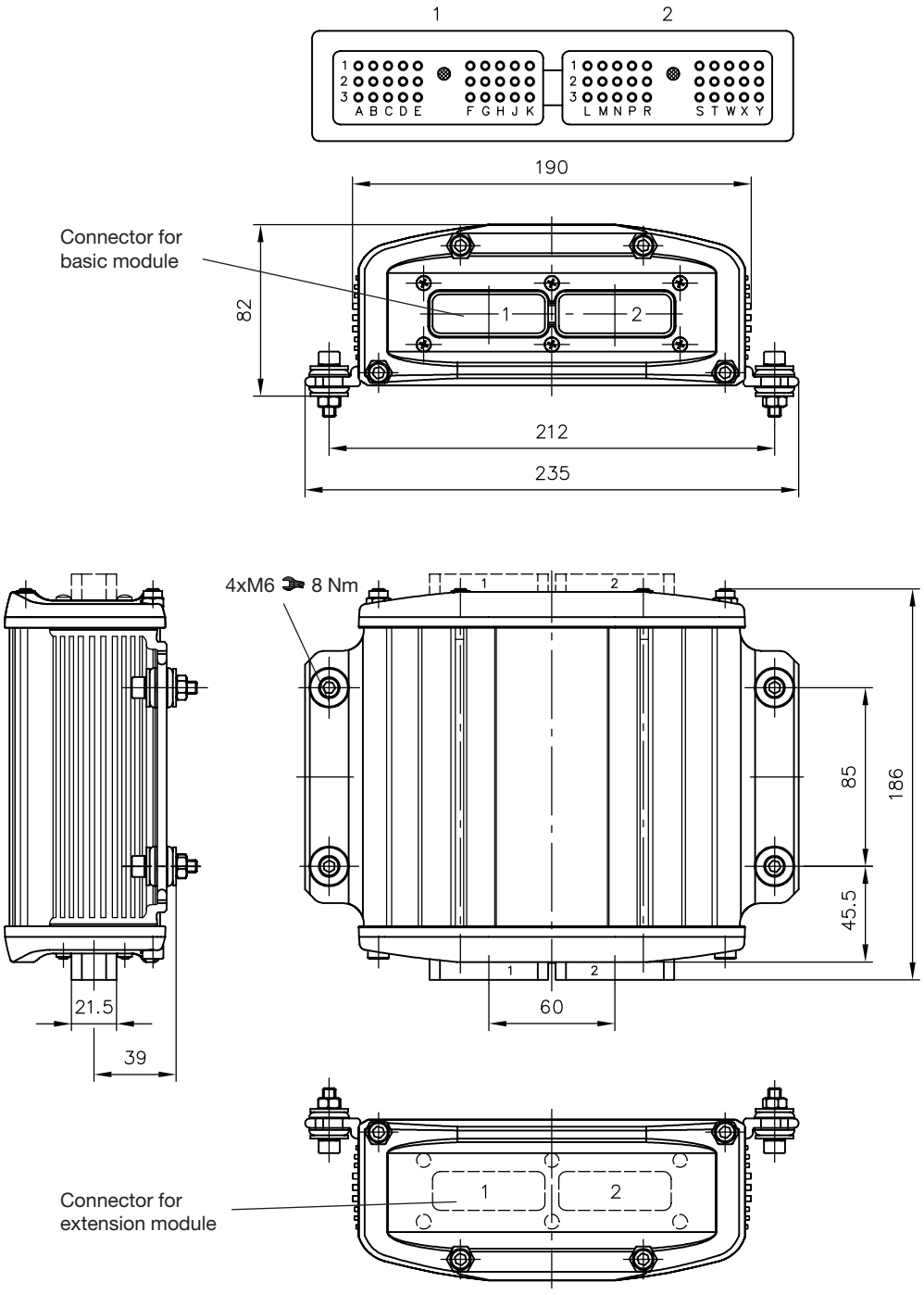
These functions are used for parameterization and/or configuration of the inputs and outputs - normally only once at start-up. It is also possible to apply this parameterization through the firmware. All these parameters and configurations are included in the system‘s EEPROM. Thus they are preset and can be overwritten by the PLC-system.
The terminal program (scope of delivery), allows to check , change and save (EPROM and/or file) all settings. Due to these configurations and parameterizations all data is available at runtime in an already converted and standardized form, which even can include a ramp or debouncing information. This makes it possible to write the data directly onto the outputs without conversion and supplemented with ramp information and/or other time-related information.

Group 2: Functions that are normally invoked cyclically during runtime (runtime module)

These functions are used to read input data, logically link them and to write them onto the outputs.

The documentation of the existing function blocks is included in the software package of the PLVC.

4. Dimensions of basic and extension module



5. Safety and installation notes

General information

The scope of delivery for the programmable logic valve control type PLVC includes an firmware and - on special agreement - a customized software. It is the duty of the customer to test the requested functionality of the PLVC as he is responsible for the faultless operation and final application of the PLVC.

Attention: Whenever a PLVC is replaced it is additionally necessary to order the current version of the software including the operation parameter by the manufacturer of the machine.

The customer is responsible to take care that the requested functionality and safety of the application program is fulfilled. When local laws make an approval by a notified body (testing or approval organization) necessary the customer has to apply for it.

Liability

This description is integral part of the device. It contains information regarding the correct use of the PLVC and must be read prior to installation or prior to use. Make sure to follow the instructions of this description. Failure to comply with the notes or any operation that falls outside the intended usage, wrong installation or faulty handling can cause serious impairment of the safety of people and machinery and as such will prejudice any liability and warranty claims. This instruction is written for personnel, who can be considered to be „technically knowledgeable" in the understanding of the EMC-guideline 89/336 EEC and the low-voltage guideline 73/23 EEC. The controls must be installed and made operational by a professional electrician (programmer and/or service technician).

5.1 Installation

Electrical connection, grounding, arrangement of the wiring:

- Wiring in accordance with safe protective low voltage and/or electrically separated from other electric circuits
- Faulty switching can trigger unintended signals at the outputs of the control device.
  Attention: The parallel switching of external voltage sources (e.g. emergency activation via push button) and the outputs of the PLVC is not permitted!
- Pay attention to application-relevant documents (circuit diagrams, software descriptions, etc.).
- Only use shielded signal lines
- Do not install any wiring for electronic systems close to other power-fed lines in the machine.
- Make sure to use only additional accessory approved by HAWE Hydraulik SE
- A safety switch must be installed to interrupt the power supply of the electronic system to deactivate system in case of emergencies. This safety switch must be installed within easy reach for the operator. If the safety switch is activated the machine must be brought into standstill in a "safe status". The system's design must guarantee this feature.

Installation conditions

- It must not be mounted nearby heat generating components or sub-assemblies (exhaust etc.).
- It must not be placed near-by to radio facilities.
- An emergency cut-off has to be provided. This emergency cut-off has to be positioned at the machinery in such a manner that it is easily accessible by the operator. It has to be made sure by the manufacturer of the machinery that it can achieve a save position after the emergency cut-off is activated.
- The control lines must nor be routed nearby power supply lines.
- Line disruption and short-cut detection for the control lines have to be provided.

5.2 Installation, operation and maintenance

- Make sure to stay within the temperature range for operations between -40°C to +80°C
- Surfaces may encounter higher temperatures
- Do not install in the vicinity of machine parts and modules that develop great heat (e.g. exhaust)
- Prior to any welding work to be done on the machine (the vehicle), all PLVC devices must be disconnected from the power supply (positive and negative terminal) and/or a potential separation must be guaranteed
- Make sure to keep sufficient distance to radio-engineering installations.

Notes on proportional and switching solenoids and other switched inductive consumers:

- Make sure to test the PLVC's correct function only with connected proportional solenoids
- Make sure to connect all other switched inductive consumers, which are not connected to the PLVC, close to inductivity with spark arrester diodes.

Contact tech_support@hawe.de in case of doubt or in case of malfunctioning.

5.3 Loading of the firmware

Each controller type PLVC comes with the current version of the firmware. It can be updated via Windows ® based computer (PC/Laptop) according to customer specifications or with additional functionality.

5.3.1 Firmware is working

A new firmware can be installed over the operative one. All functionality needed for such an upload is integrated in the current firmware. Connect the controller type PLVC and PC via the serial interface and start the respective upload program of the firmware.

5.3.2 Firmware is not working

A new firmware can be installed, even when the apparent firmware won‘t start-up (e.g. after discontinued upload of an firmware).

Therefore a special mode has to be activated.

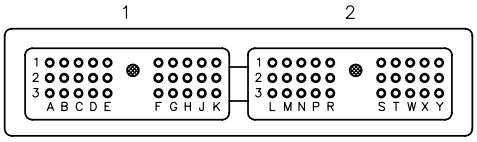
Connect the controls via the serial interface (RS232) with a PC.

Procedure:

- Cut-off the controller
- Put pin G2 (BSL) on High (10...30 V)
- Switch-on controls
- Start download of the firmware
- Denergize pin Pin G2

6. Pin description

6.1 Pin description lists PLVC8x2-G (basic modul)



Pin	PLC	PLC2	Connection data	Name	Note	User
Y3			U_BAT1	Valve Supply (Coils 0…7)	ESTOP Transistor 1	U_BAT
Y1	0		Coil 0 / 24VDC, max. 2ADC	Coil A proportional Valve 0	Also on/off Valve	
Y2	1		Coil 1 / 24VDC, max. 2ADC	Coil B proportional Valve 1	Also on/off Valve	
X2			Measurement input for Y1, Y2		measurement input	
W2	2		Coil 2 / 24VDC, max. 2ADC	Coil A proportional Valve 2	Also on/off Valve	
X1	3		Coil 3 / 24VDC, max. 2ADC	Coil B proportional Valve 3	Also on/off Valve	
W1			Measurement input for W2, X1		measurement input	
T1	4		Coil 4 / 24VDC, max. 2ADC	Coil A proportional Valve 4	Also on/off Valve	
T2	5		Coil 5 / 24VDC, max. 2ADC	Coil B proportional Valve 5	Also on/off Valve	
T3			Measurement input for T1, T2		measurement input	
S2	6		Coil 6 / 24VDC, max. 2ADC	Coil A proportional Valve 6	Also on/off Valve	
S1	7		Coil 7 / 24VDC, max. 2ADC	Coil B proportional Valve 7	Also on/off Valve	
S3			Measurement input for S2, S1		measurement input	
A3			U_BAT2	Valve Supply (Coils 8…15)	ESTOP Transistor 2	U_BAT
A1	8		Coil 8 / 24VDC, max. 2ADC	Coil A proportional Valve 8	Also on/off Valve	
A2	9		Coil 9 / 24VDC, max. 2ADC	Coil B proportional Valve 9	Also on/off Valve	
B2			Measurement input for A1, A2			
C2	10		Coil 10 / 24VDC, max. 2ADC	Coil A proportional Valve 10	Also on/off Valve	
B1	11		Coil 11 / 24VDC, max. 2ADC	Coil B proportional Valve 11	Also on/off Valve	
C1			Measurement input for C2, B1			
D1	12		Coil 12 / 24VDC, max. 2ADC	Coil A proportional Valve 12	Also on/off Valve	
D2	13		Coil 13 / 24VDC, max. 2ADC	Coil B proportional Valve 13	Also on/off Valve	
D3			Measurement input for D1, D2			
E2	14		Coil 14 / 24VDC, max. 2ADC	Coil A proportional Valve 14	Also on/off Valve	
E1	15		Coil 15 / 24VDC, max. 2ADC	Coil B proportional Valve 15	Also on/off Valve	
E3			Measurement input for E2, E1			
M2			50, 100, 125, 250, 500, 1000kB	CAN1_H	CAN Bus	
M3			50, 100, 125, 250, 500, 1000kB	CAN1_L	CAN Bus	
K3			RXD_1	RS232 Data cable	ST10 RS-232 RX	
J3			TXD_1	RS232 Data cable	ST10 RS-232 TX	
H3	IB4.1		RXD_2	RS232 second Controller	also dig. Input *3	
J2			TXD_2	RS232 second Controller		
M1	IB3.1	Fq0	10..30VDC 7kOhm 5kHz	Digital Input IB3.1	also Frequency	
N1	IB3.2	Fq1	10..30VDC 7kOhm 5kHz	Digital Input IB3.2	also Frequency	
P1	IB3.0	Fq2	10..30VDC 7kOhm 5kHz	Digital Input IB3.0	also Frequency	
R1	IB3.3	Fq3	10..30VDC 7kOhm 5kHz	Digital Input IB3.3	also Frequency	
R2	IB3.4	Fq4	10..30VDC 7kOhm 5kHz	Digital Input IB3.4	also Frequency	
P3	IB3.5	Fq5	10..30VDC 7kOhm 5kHz	Digital Input IB3.5	also Frequency	
G3	IW40.0		0..5 / 0..10VDC / 4..20mA *1	Analog Input 8 C2	for Joystick/Pot	
F2	IW42.0		0..5 / 0..10VDC / 4..20mA *1	Analog Input 9 C2	for Joystick/Pot	
F1	IW44.0		0..5 / 0..10VDC / 4..20mA *1	Analog Input 10 C2	for Joystick/Pot	
G1	IW46.0		0..5 / 0..10VDC / 4..20mA *1	Analog Input 11 C2	for Joystick/Pot	
H1	IW104.0		0..5 / 0..10VDC / 4..20mA *1	Analog Input 40 C1	for Joystick/Pot	
J1	IW106.0		0..5 / 0..10VDC / 4..20mA *1	Analog Input 41 C1	for Joystick/Pot	
K1	IW108.0		0..5 / 0..10VDC / 4..20mA *1	Analog Input 42 C1	for Joystick/Pot	
K2	IW110.0		0..5 / 0..10VDC / 4..20mA *1	Analog Input 43 C1	for Joystick/Pot	
L3	IW48.0	IB48.0	0..10VDC / 10..30VDC *2	Analog Input 12 / dig. Input C2		
L2	IW50.0	IB50.0	0..10VDC / 10..30VDC *2	Analog Input 13 / dig. Input C1		
L1	IW52.0	IB52.0	0..10VDC / 10..30VDC *2	Analog Input 14 / dig. Input C1		
H2	IB3.7	IB4.0	ESTOP	Emergency Stop Input C1/C2		ESTOP
G2			BSL	Firmware Download *4	for both Controllers	
R3			U_BAT_Controller	Supply Input Controllers		U_BAT
F3		IW54.0	U_BAT_KL15	Backup Supply Voltage *5	also Analog Input 15	
N3			U_SENSOR	5V/200mA		
P2			reserved			
X3			PGND			GND
C3			PGND			GND
B3			PGND			GND
W3			Sensor GND			GND
N2			Termination	120 Ohm to CAN_Low int.		Connection to Pin M3

Description PLVC 8x2-G

*1 Analog input: the configuration can be changed via software parameters.
Input resistance: 0..5 V DC = 470 kOhm / 0..10 V DC = 100 kOhm / C1 4..20 mA = 220 Ohm / C2 4..20 mA = 150 Ohm

*2 Analog or digital input: the configuration can be changed via software parameters.
Input resistance: 0..10 V DC = 100 kOhm / digital = 7 kOhm

*3 Can be used alternatively as digital input. Input resistance: 3-7 kOhm

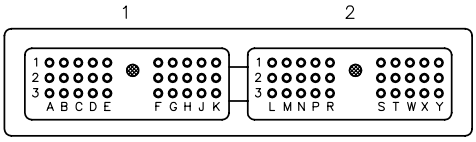
*4 Use after interrupted firmware-download

*5 Used for EE-Safe or can be used alternatively as analog input.

c1 These input works on the main processor.

c2 These input works on the second processor.

6.2 Pin description lists PLVC8x1-G (basic modul)



Pin	PLC	PLC2	Connection data	Name	Note	User
Y3			U_BAT1	Valve Supply (Coils 0…7)	ESTOP Transistor 1	U_BAT
Y1	0		Coil 0 / 24VDC, max. 2ADC	Coil A proportional Valve 0	Also on/off Valve	
Y2	1		Coil 1 / 24VDC, max. 2ADC	Coil B proportional Valve 1	Also on/off Valve	
X2			Measurement input for Y1, Y2		measurement input	
W2	2		Coil 2 / 24VDC, max. 2ADC	Coil A proportional Valve 2	Also on/off Valve	
X1	3		Coil 3 / 24VDC, max. 2ADC	Coil B proportional Valve 3	Also on/off Valve	
W1			Measurement input for W2, X1		measurement input	
T1	4		Coil 4 / 24VDC, max. 2ADC	Coil A proportional Valve 4	Also on/off Valve	
T2	5		Coil 5 / 24VDC, max. 2ADC	Coil B proportional Valve 5	Also on/off Valve	
T3			Measurement input for T1, T2		measurement input	
S2	6		Coil 6 / 24VDC, max. 2ADC	Coil A proportional Valve 6	Also on/off Valve	
S1	7		Coil 7 / 24VDC, max. 2ADC	Coil B proportional Valve 7	Also on/off Valve	
S3			Measurement input for S2, S1		measurement input	
A3			U_BAT2	Valve Supply (Coils 8…15)	ESTOP Transistor 2	
A1	IB0.0		10VDC…30VDC 9.4kOhm	Digital Input IB0.0		
A2	IB0.1		10VDC…30VDC 9.4kOhm	Digital Input IB0.1		
B2	IW64.0		0..10VDC 24kOhm	Analog Input 20		
C2	IB0.2		10VDC…30VDC 9.4kOhm	Digital Input IB0.2		
B1	IB0.3		10VDC…30VDC 9.4kOhm	Digital Input IB0.3		
C1	IW66.0		0..10VDC 24kOhm	Analog Input 21		
D1	IB0.4		10VDC…30VDC 9.4kOhm	Digital Input IB0.4		
D2	IB0.5		10VDC…30VDC 9.4kOhm	Digital Input IB0.5		
D3	IW68.0		0..10VDC 24kOhm	Analog Input 22		
E2	IB0.6		10VDC…30VDC 9.4kOhm	Digital Input IB0.6		
E1	IB0.7		10VDC…30VDC 9.4kOhm	Digital Input IB0.7		
E3	IW70.0		0..10VDC 24kOhm	Analog Input 23		
M2			50, 100, 125, 250, 500, 1000kB	CAN1_H	CAN Bus	
M3			50, 100, 125, 250, 500, 1000kB	CAN1_L	CAN Bus	
K3			RXD_1	RS232 Data cable	ST10 RS-232 RX	
J3			TXD_1	RS232 Data cable	ST10 RS-232 TX	
H3	IB1.7		RXD_2	RS232 second Controller	also dig. Input *3	
J2			TXD_2	RS232 second Controller		
M1	IB3.1	Fq0	10..30VDC 7kOhm 5kHz	Digital Input IB3.1	also Frequency	
N1	IB3.2	Fq1	10..30VDC 7kOhm 5kHz	Digital Input IB3.2	also Frequency	
P1	IB3.0	Fq2	10..30VDC 7kOhm 5kHz	Digital Input IB3.0	also Frequency	
R1	IB3.3	Fq3	10..30VDC 7kOhm 5kHz	Digital Input IB3.3	also Frequency	
R2	IB3.4	Fq4	10..30VDC 7kOhm 5kHz	Digital Input IB3.4	also Frequency	
P3	IB3.5	Fq5	10..30VDC 7kOhm 5kHz	Digital Input IB3.5	also Frequency	
G3	IW40.0		0..5 / 0..10VDC / 4..20mA *1	Analog Input 8 C2	for Joystick/Pot	
F2	IW42.0		0..5 / 0..10VDC / 4..20mA *1	Analog Input 9 C2	for Joystick/Pot	
F1	IW44.0		0..5 / 0..10VDC / 4..20mA *1	Analog Input 10 C2	for Joystick/Pot	
G1	IW46.0		0..5 / 0..10VDC / 4..20mA *1	Analog Input 11 C2	for Joystick/Pot	
H1	IW104.0		0..5 / 0..10VDC / 4..20mA *1	Analog Input 40 C1	for Joystick/Pot	
J1	IW106.0		0..5 / 0..10VDC / 4..20mA *1	Analog Input 41 C1	for Joystick/Pot	
K1	IW108.0		0..5 / 0..10VDC / 4..20mA *1	Analog Input 42 C1	for Joystick/Pot	
K2	IW110.0		0..5 / 0..10VDC / 4..20mA *1	Analog Input 43 C1	for Joystick/Pot	
L3	IW48.0	IB48.0	0..10VDC / 10..30VDC *2	Analog Input 12 / dig. Input C2		
L2	IW50.0	IB50.0	0..10VDC / 10..30VDC *2	Analog Input 13 / dig. Input C1		
L1	IW52.0	IB52.0	0..10VDC / 10..30VDC *2	Analog Input 14 / dig. Input C1		
H2	IB3.7	IB4.0	ESTOP	Emergency Stop Input C1/C2		ESTOP
G2			BSL	Firmware Download *4	for both Controllers	
R3			U_BAT_Controller	Supply Input Controllers		U_BAT
F3		IW54.0	U_BAT_KL15	Backup Supply Voltage *5	also Analog Input 15	
N3			U_SENSOR	5V/200mA		
P2			reserved			
X3			PGND			GND
C3			PGND			GND
B3			PGND			GND
W3			Sensor GND			GND
N2			Termination	120 Ohm to CAN_Low int.		Connection to Pin M3

Description PLVC8x1-G

*1 Analog input: the configuration can be changed via software parameters.
Input resistance: 0..5 VDC = 470 kOhm / 0..10 VDC = 100 kOhm / C1 4..20 mA = 220 Ohm / C2 4..20 mA = 150 Ohm

*2 Analog or digital input: the configuration can be changed via software parameters.
Input resistance: 0..10 VDC = 100 kOhm / digital = 7 kOhm

*3 Can be used alternatively as digital input. Input resistance: 3-7 kOhm

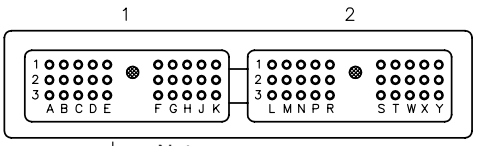
*4 Use after interrupted firmware-download

*5 Used for EE-Safe or can be used alternatively as analog input.

c1 These input works on the main processor.

c2 These input works on the second processor.

6.3 Pin description lists PLVC8x.-X-EW (extension module)



Pin	PLC	PLC2	Connection data	Name	Note
A1	QB0.0		10VDC ... 30VDC	Digital Output	2A
A2	QB0.1		10VDC ... 30VDC	Digital Output	2A
B1	QB0.2		10VDC ... 30VDC	Digital Output	2A *10
C2	QB0.3		10VDC ... 30VDC	Digital Output	2A
B3			PGND		
D1	QB0.4		10VDC ... 30VDC	Digital Output	2A *10
D2	QB0.5		10VDC ... 30VDC	Digital Output	2A *10
E1	QB0.6		10VDC ... 30VDC	Digital Output	2A *10
C3			PGND		
B2	IW24.0		0..10VDC 26kOhm	Analog Input 0	also digital Input
C1	IW26.0		0..10VDC 26kOhm	Analog Input 1	also digital Input
D3	IW28.0		0..10VDC 26kOhm	Analog Input 2	also digital Input
E2	IW30.0		0..10VDC 26kOhm	Analog Input 3	also digital Input
E3	IW32.0		0..10VDC 26kOhm	Analog Input 4	also digital Input
F1	IW34.0		0..10VDC 26kOhm	Analog Input 5	also digital Input
F2	IW36.0		0..10VDC 26kOhm	Analog Input 6	also digital Input
F3	IW38.0		0..10VDC 26kOhm	Analog Input 7	also digital Input
G1	IW56.0		0..10VDC 26kOhm	Analog Input 16	also digital Input
G3	IW58		0..10VDC 26kOhm	Analog Input 17	also digital Input
H1	IB1.0		10..30VDC 7kOhm	Digital Input	
H2	IB1.1		10..30VDC 7kOhm	Digital Input	
J1	IB1.2		10..30VDC 7kOhm	Digital Input	
J2	IB1.3	fq8	10..30VDC 7kOhm 5kHz	Digital Input	also Frequency
J3			TXD_1	RS-232 transmit	
K1			CAN2_H	CAN Bus 2	
K2			CAN2_L	CAN Bus 2	
K3	IB2.0		RXD_1	RS-232 receive	also dig. Input *13
H3			U_SENSOR from Basic	(10V/200mA)	
A3	IB2.1		U_BAT3	Supply (QB0.0 .. QB0.6)	
G2			BSL	Software Download Extension Controller *12	
Y1	QB1.0		10VDC ... 30VDC	Digital Output	2A
Y2	QB1.1		10VDC ... 30VDC	Digital Output	2A
W2	QB1.2		10VDC ... 30VDC	Digital Output	2A *11
X1	QB1.3		10VDC ... 30VDC	Digital Output	2A *11
T1	QB1.4		10VDC ... 30VDC	Digital Output	2A *11
T2	QB1.5		0..10VDC 26kOhm	Digital Output	2A *11
W3				Sensor GND	
Y3			U_BAT4	Supply (QB1.0 .. QB1.5)	
X3				GND	
X2	IW60.0		0..10VDC 26kOhm	Analog Input 18	also digital Input
W1	IW62.0		0..10VDC 26kOhm	Analog Input 19	also digital Input
L2	IB1.4	fq6	10..30VDC 7kOhm 5kHz	Digital Input	also Frequency
L1	IB1.5	fq7	10..30VDC 7kOhm 5kHz	Digital Input	also Frequency
M1	IB2.2		10..30VDC 7kOhm	Digital Input	
M2	IB2.3		10..30VDC 7kOhm	Digital Input	
N1	IB2.4		10..30VDC 11kOhm	Digital Input	
N2	IB2.5		10..30VDC 11kOhm	Digital Input	
P1	IB2.6		10..30VDC 11kOhm	Digital Input	
R3			reserved		
N3			U_Sensor 10		

Description PLVC8x.-X-EW

*10 Output-Group 1: Max.current of single output: 2 A, Max. current of group: 4 A
*11 Output-Group 2: Max.current of single output: 2 A, Max. current of group: 4 A
*12 Used for firmware download
*13 Can be used alternatively as digital input.
Input resistance: 3-7 kOhm