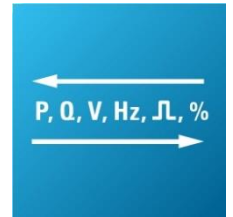


# MODBUS POWER CONTROL BLUE'LOG XC

Item no.: 557.008



*Modbus interface for real-time process data exchange with the grid operator*

## LICENSE DESCRIPTION

The Modbus Power Control interface is an open Modbus TCP interface. It facilitates the real-time process data exchange with the grid operator. If telecontrol protocols (IEC 60870-5-101 /-104, IEC 61850 or DNP3) are used, the interface is the ideal connection between a protocol converter (e.g. Programmable logic controller (PLC)) and the telecontrol system of the grid operator. The License Modbus Power Control activates this function on the controller blue'Log XC.

## FEATURES

- + Modbus TCP interface
- + Setpoint commands given by the grid operator (active power curtailment, power factor ( $\cos \varphi$ ) control, reactive power control)
- + Interface for protocol converter of telecontrol protocols (IEC 60870-5-101 /-104, IEC 61850 or DNP3)
- + Switching between different methods for active / reactive power management
- + Setting of reference voltage for parallel shift of the characteristic curve Q (V)
- + Feedback (acknowledgement) of setpoint commands for signal monitoring
- + Feedback of electrical parameters measured at Point of Common Coupling (e.g. P, Q,  $\cos \varphi$ , f, V, I)

## REQUIREMENTS

- + blue'Log XC with firmware  $\geq 10.0.8$
- + Licence Modbus Power Control<sup>1)</sup>
- + Configuration is done in the menu „Power Control“
  - + For active power the setting must be done via web frontend that setpoint command will be transmitted via Modbus
    - Setting in the menu „Power Control“ – „Active power“
    - Setpoint command method: Variable fixed value  $P_{var}$ , Modbus
  - + For reactive power it's necessary to configure via web frontend if  $\cos \varphi$  or Q will be used for control
    - Setting in the menu „Power Control“ – „Reactive power“
    - Setpoint command method: Variable fixed value  $Q_{var}$ , Modbus or Variable fixed value  $\cos \varphi_{var}$ , Modbus
  - + For setting a reference voltage for parallel shift of the characteristic curve Q (V)
    - Setting in the menu „Power Control“ – „Reactive power“
    - Setpoint command method: Characteristic curve Q (V)
    - Menu "Option" for "Characteristic curve Q(V)": Activate "Parallel shift" and "Transmissino type" Modbus
  - + For setting an absolute voltage setpoint  $V_{setpoint}$  and the reference reactive power  $Q_{\Delta V0}$  it's necessary to configure via the web frontend in the menu "Power Control" - "Reactive power" the
    - Method Voltage control Q (V droop)

<sup>1)</sup> The licence is linked to a specific device. When ordering, please provide the 14-digit hardware serial number of the controller.

## MODBUS SPECIFICATION

### Communication parameter

- + Slave-Adresse (Client ID): 1
- + Port: 502
- + Delay: 1.000 ms

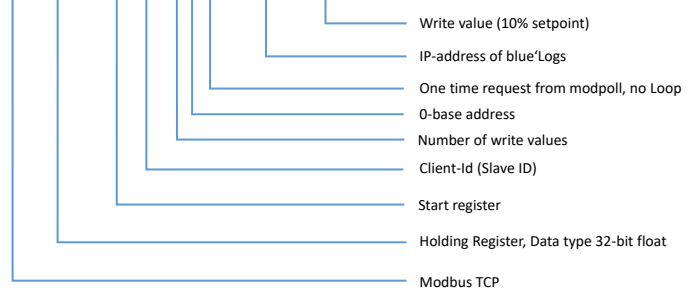
### General register definition

- + Data type: float 32
- + Missing value: 0x7FC00000
- + Function Code 03 - Read Holding Registers must be used to read the values.
- + Function Code 16 - Preset Multiple Registers must be used to write the values
- + Register- and Byteorder
  - The word order is low register before high register (Little Endian)
  - The byte order is high byte before low byte (Big Endian)  
→ 0xCCDDAABB

#### Write of 10% setpoint command for active power

Following write command is built with the open source tool modpoll

```
modpoll -m tcp -t4:float -r 5000 -a 1 -c 1 -0 -1 192.168.30.162 10
```



## WRITE VALUES

Address	Designation	Description	Unit	Read / Write	Value range
5000	PPC_P_SET_GRIDOP_REL	Relative active power setpoint (grid operator)	%	Read / Write	0.000 ... 125.000 % <sup>2)</sup>
5002	PPC_PF_SET	Power factor setpoint	-	Read / Write	-0.999 ... 1.000 <sup>3)</sup>
5004	PPC_Q_SET_REL	Actual valid reactive power setpoint	%	Read / Write	-100.000 ... 100.000 % <sup>4)</sup>
Register 5006 to 5009 are reserved but it is possible to write / read them since firmware 16.0.4 <sup>5)</sup>					
5010	PPC_P_SET_METHOD	Active power setpoint command method	-	Read / Write	1: Variable fixed value $P_{var}$ fix 2: Variable fixed value $P_{var}$ DI 3: Variable fixed value $P_{var}$ AI 4: Variable fixed value $P_{var}$ Modbus
5012	PPC_Q_SET_METHOD	Reactive power setpoint command method	-	Read / Write	1: Variable fixed value $\cos \varphi_{var}$ fix 2: Variable fixed value $\cos \varphi_{var}$ DI 3: Variable fixed value $\cos \varphi_{var}$ AI 4: Variable fixed value $\cos \varphi_{var}$ Modbus 5: Characteristic curve $\cos \varphi_{var}$ (P) 6: Characteristic curve $\cos \varphi_{var}$ (V) 7: Variable fixed value $Q_{var}$ fix 8: Variable fixed value $Q_{var}$ DI 9: Variable fixed value $Q_{var}$ AI 10: Variable fixed value $Q_{var}$ Modbus 11: Characteristic curve Q (P) 12: Characteristic curve Q (V) 13: Characteristic curve Q ( $\tan \varphi$ ) 14: Voltage control Q (V droop) <sup>6)</sup>
Register 5014 to 5015 are reserved but it is possible to write / read them since firmware 16.0.4 <sup>5)</sup>					

<sup>2)</sup> Write values between 100.000 ... 125.000 % from firmware 15.1.8 on.

<sup>3)</sup> Negative values = underexcited, positive values = overexcited (e.g.  $\cos \varphi = -0.95 = 0.95$  underexcited,  $\cos \varphi = 0.95 = 0.95$  overexcited).

<sup>4)</sup> Negative values = underexcited, positive values = overexcited (e.g.  $Q = -32.868 = 32.868$  underexcited,  $Q = 32.868 = 32.868$  overexcited).

<sup>5)</sup> The blue'Log ignores the written values. This allows to write several registers in one block.

<sup>6)</sup> From firmware 12.0.2 on.

Address	Designation	Description	Unit	Read / Write	Value range
5016	PPC_V_REF_Q_V_SHIFT	Setting of reference voltage for parallel shift of the characteristic curve Q (V)	V	Read / Write	-16,800.00 ... 24,200.00 V
Register 5018 to 5019 are reserved but it is possible to write / read them since Firmware 16.0.4 <sup>5)</sup>					
5020 <sup>6)</sup>	PPC_V_SET_ABS	Absolute voltage setpoint $V_{\text{setpoint}}$	V	Read / Write	93,500.000 ... 126,500.000 V
5022 <sup>6)</sup>	PPC_Q_REF_V_DROOP_S HIFT	Setpoint reference reactive power $Q_{\Delta V_0}$ for parallel shift of the voltage droop sV	var	Read / Write	-1,000,000,000.000 ... 1,000,000,000.000 var <sup>7)</sup>
Register 5024 to 5099 are reserved and it's not possible to write / read them					
5100 <sup>6)</sup>	PPC_V_SIM_TEST	Simulated test voltage	V	Read / Write	0.000 ... 132,000.000 V
5102 <sup>8)</sup>	PPC_F_SIM_TEST	Simulated test frequency	Hz	Read / Write	0.000 ... 70.000 Hz

## READ VALUES

Address	Designation	Description	Unit	Read / Write	Value range
44 <sup>9)</sup>	PPC_PF_SET_CTRL	Power factor correction value	-	Read	-0,999 ... 1,000 <sup>3)</sup>
46 <sup>9)</sup>	PPC_Q_SET_CTRL_REL	Relative reactive power correction value	%	Read	-100,000 ... 100,000 % <sup>4)</sup>
48 <sup>10)</sup>	PPC_P_SET_CTRL_REL	Relative active power correction value	%	Read	0.000 ... 125.000 % <sup>11)</sup>
50	PPC_P_SET_GRIDOP_REL	Relative active power setpoint (grid operator)	%	Read	0.000 ... 125.000 % <sup>11)</sup>
52	PPC_P_SET_ABS	Absolute active power setpoint (grid operator)	W	Read	-1,000,000,000.000 ... 1,000,000,000.000 W <sup>12)</sup>
54	PPC_P_SET_RPC_REL	Relative active power setpoint (3rd party)	%	Read	0.000 ... 125.000 % <sup>11)</sup>
56	PPC_P_SET_REL	Actual valid active power setpoint	%	Read	0.000 ... 125.000 % <sup>11)</sup>
58	PPC_P_SET_MODUS	Actual active power mode for setpoint setting	-	Read	0: No configuration found 1: Variable fixed value $P_{\text{var fix}}$ 2: Variable fixed value $P_{\text{var DI}}$ 3: Variable fixed value $P_{\text{var AI}}$ 4: Variable fixed value $P_{\text{var Modbus}}$ 5: Remote Power Control (RPC) <sup>6)</sup> 100: LFSM-O <sup>9)</sup> 101: LFSM-U <sup>9)</sup> 200: Fail-safe operation (hold last setpoint) <sup>6)</sup> 201: Fail-safe operation (default setpoint) <sup>6)</sup> 202: Fail-safe operation (System fallback value) <sup>6)</sup> 203: Fail-safe operation (Automatic grid disconnection) <sup>6)</sup>
60	PPC_PF_SET	Power factor setpoint	-	Read	-0,999 ... 1,000 <sup>3)</sup>
62	PPC_Q_SET_REL	Actual valid reactive power setpoint	%	Read	-100.000 ... 100.000 % <sup>4)</sup>

<sup>7)</sup> Negative values = underexcited, positive values = overexcited (e.g. Q = -1.000.000,000 var = 1,0 Mvar underexcited).

<sup>8)</sup> From firmware 17.1.7 on.

<sup>9)</sup> From firmware 19.2.10 on.

<sup>10)</sup> From firmware 18.3.5 on.

<sup>11)</sup> Read values between 100.000 ... 125.000 % from firmware 15.1.8 on.

<sup>12)</sup> Negative values = import (demand), positive values = export (generation).

Address	Designation	Description	Unit	Read / Write	Value range
64	PPC_Q_SET_ABS	Absolute reactive power setpoint	Var	Read	-1.000.000.000,000 ... 1.000.000.000,000 var <sup>7)</sup>
66	PPC_Q_SET_MODUS	Actual reactive power mode for setpoint setting	-	Read	0: No configuration found 1: Variable fixed value $\cos \varphi_{var}$ fix 2: Variable fixed value $\cos \varphi_{var}$ DI 3: Variable fixed value $\cos \varphi_{var}$ AI 4: Variable fixed value $\cos \varphi_{var}$ Modbus 5: Characteristic curve $\cos \varphi$ (P) 6: Characteristic curve $\cos \varphi$ (V) 7: Variable fixed value $Q_{var}$ fix 8: Variable fixed value $Q_{var}$ DI 9: Variable fixed value $Q_{var}$ AI 10: Variable fixed value $Q_{var}$ Modbus 11: Characteristic curve Q (P) 12: Characteristic curve Q (V) 13: Characteristic curve Q ( $\tan \varphi$ ) 14: Voltage control Q (V droop) <sup>6)</sup> 100: Reactive power compensation <sup>6)</sup> 200: Fail-safe operation (hold last setpoint) <sup>6)</sup> 201: Fail-safe operation (default setpoint) <sup>6)</sup> 202: Fail-safe operation (System fallback value) <sup>6)</sup>
Register 68 is reserved, but it's allowed to read it					
70 <sup>9)</sup>	PPC_V_SET_ABS	Absolute voltage setpoint	V	Read	
72 <sup>9)</sup>	PPC_P_SET_LFSMO_REL	Relative active power setpoint (LFSM-O)	%	Read	If the LFSM-O is active, this register contains the current active power setpoint  If the LFSM-O is not active, the register contains the value NaN
74 <sup>9)</sup>	PPC_P_REF	Reference active power $P_{ref}$	W	Read	If the LFSM-O/LFSM-U is active, this register contains the currently used reference active power ( $P_{AV}/P_{inst}$ or $P_{mom}$ )  If the LFSM-O/LFSM-U is not active, this register contains the value NaN
76 <sup>9)</sup>	PPC_P_MOM	Momentary active power $P_{mom}$	W	Read	If the LFSM-O/LFSM-U is active, this register contains the momentary active power at the time the frequency threshold is exceeded.  If the LFSM-O/LFSM-U is not active, this register contains the value NaN.
78 <sup>9)</sup>	PPC_P_SET_LFSMU_REL	Relative active power setpoint (LFSM-U)	%	Read	If the LFSM-U is active, this register contains the current active power setpoint.  If the LFSM-U is not active, the register contains the value NaN

Address	Designation	Description	Unit	Read / Write	Value range
Register 80 to 89 are reserved, but it's allowed to read them					
90	PPC_P_AC	Actual active power	W	Read	Value from power analyzer <sup>12)</sup>
92	PPC_PF	Actual power factor $\cos \varphi$	-	Read	Value from power analyzer <sup>3)</sup>
94	PPC_Q_AC	Actual reactive power	var	Read	Value from power analyzer <sup>7)</sup>
96	PPC_S_AC	Actual apparent power	VA	Read	Value from power analyzer
98	PPC_F_AC	Actual grid frequency	Hz	Read	Value from power analyzer
100	PPC_V_PHASE_AB	Actual phase voltage $V_{PhA-PhB}$	V	Read	Value from power analyzer
102	PPC_V_PHASE_BC	Actual phase voltage $V_{PhB-PhC}$	V	Read	Value from power analyzer
104	PPC_V_PHASE_CA	Actual phase voltage $V_{PhC-PhA}$	V	Read	Value from power analyzer
106	PPC_I_PHASE_A	Actual current $I_{PhA}$	A	Read	Value from power analyzer
108	PPC_I_PHASE_B	Actual current $I_{PhB}$	A	Read	Value from power analyzer
110	PPC_I_PHASE_C	Actual current $I_{PhC}$	A	Read	Value from power analyzer
112 <sup>8)</sup>	PPC_V_PHASE_AN	Line-to-neutral voltage $V_{PhA-N}$	V	Read	Value from power analyzer
114 <sup>8)</sup>	PPC_V_PHASE_BN	Line-to-neutral voltage $V_{PhB-N}$	V	Read	Value from power analyzer
116 <sup>8)</sup>	PPC_V_PHASE_CN	Line-to-neutral voltage $V_{PhC-N}$	V	Read	Value from power analyzer
Register 118 to 253 are reserved but it is possible to read them					
254 <sup>9)</sup>	PPC_P_AC_INV	Sum of inverter actual active power	W	Read	Value calculated by blue'Log
256 <sup>9)</sup>	PPC_Q_AC_INV	Sum of inverter actual reactive power	VAr	Read	Value calculated by blue'Log
Register 258 to 267 are reserved but it is possible to read them					
268 <sup>10)</sup>	PPC_Q_V_LIMIT	Q (V) Lower-/Upper limit reached	-	Read	0: Q (V) limit not reached 1: Q (V) lower limit reached 2: Q (V) upper limit reached

Further information: [www.meteocontrol.com](http://www.meteocontrol.com)