

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 Control¹⁾
- + 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)

¹⁾ 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

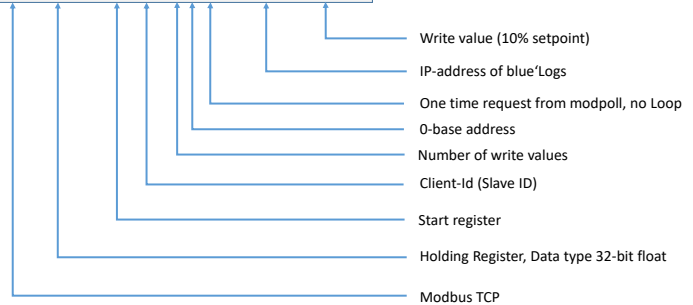
General register definition

- + 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 % ²⁾
5002	PPC_PF_SET	Power factor setpoint	-	Read / Write	-0.999 ... 1.000 ³⁾
5004	PPC_Q_SET_REL	Actual valid reactive power setpoint	%	Read / Write	-100.000 ... 100.000 % ⁴⁾
Register 5006 to 5009 are reserved but it is possible to write / read them since firmware 16.0.4 ⁵⁾					
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) ⁶⁾
Register 5014 to 5015 are reserved but it is possible to write / read them since firmware 16.0.4 ⁵⁾					

²⁾ Write values between 100.000 ... 125.000 % from firmware 15.1.8 on.

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

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

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

⁶⁾ 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 ⁵⁾					
5020	PPC_V_SET_ABS	Absolute voltage setpoint V_{setpoint}	V	Read / Write	93,500.000 ... 126,500.000 V ⁶⁾
5022	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 ⁶⁾
Register 5024 to 5099 are reserved and it's not possible to write / read them					
5100	PPC_V_SIM_TEST	Simulated test voltage	V	Read / Write	0.000 ... 132,000.000 V ^{6) 7)}

READ VALUES

Address	Designation	Description	Unit	Read / Write	Value range
50	PPC_P_SET_GRIDOP_REL	Relative active power setpoint (grid operator)	%	Read	0.000 ... 125.000 % ⁸⁾
52	PPC_P_SET_ABS	Absolute active power setpoint (grid operator)	W	Read	-1,000,000,000.000 ... 1,000,000,000.000 W ⁹⁾
54	PPC_P_SET_RPC_REL	Relative active power setpoint (3rd party)	%	Read	0.000 ... 125.000 % ⁸⁾
56	PPC_P_SET_REL	Actual valid active power setpoint	%	Read	0.000 ... 125.000 % ⁸⁾
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) ⁶⁾ 200: Fail-safe operation (hold last setpoint) ⁶⁾ 201: Fail-safe operation (default setpoint) ⁶⁾ 202: Fail-safe operation (System fallback value) ⁶⁾ 203: Fail-safe operation (Automatic grid disconnection) ⁶⁾
60	PPC_PF_SET	Power factor setpoint	-	Read	-0.999 ... 1.000 ³⁾
62	PPC_Q_SET_REL	Actual valid reactive power setpoint	%	Read	-100.000 ... 100.000 % ⁴⁾
64	PPC_Q_SET_ABS	Absolute reactive power setpoint	var	Read	-1,000,000,000.000 ... 1,000,000,000.000 var ¹⁰⁾

⁷⁾ For commissioning purposes, a test voltage can be temporarily specified for voltage-dependent methods. Currently only available for voltage control Q (V droop).

⁸⁾ Read values between 100.000 ... 125.000 % from firmware 15.1.8 on.

⁹⁾ Negative values = import (demand), positive values = export (generation).

¹⁰⁾ Negative values = underexcited, positive values = overexcited (e.g. $Q = -1,000,000.000 \text{ var} = 1.0 \text{ Mvar underexcited}$).

Address	Designation	Description	Unit	Read / Write	Value range
66	PPC_Q_SET_MODUS	Actual reactive power mode for setpoint setting	-	Read	0: No configuration found 1: Variable fixed value $\cos \varphi_{\text{var}} \text{ fix}$ 2: Variable fixed value $\cos \varphi_{\text{var}} \text{ DI}$ 3: Variable fixed value $\cos \varphi_{\text{var}} \text{ AI}$ 4: Variable fixed value $\cos \varphi_{\text{var}} \text{ Modbus}$ 5: Characteristic curve $\cos \varphi (P)$ 6: Characteristic curve $\cos \varphi (V)$ 7: Variable fixed value $Q_{\text{var}} \text{ fix}$ 8: Variable fixed value $Q_{\text{var}} \text{ DI}$ 9: Variable fixed value $Q_{\text{var}} \text{ AI}$ 10: Variable fixed value $Q_{\text{var}} \text{ Modbus}$ 11: Characteristic curve $Q (P)$ 12: Characteristic curve $Q (V)$ 13: Characteristic curve $Q (\tan \varphi)$ 14: Voltage control $Q (V \text{ droop})^{(6)}$ 100: Reactive power compensation ⁽⁶⁾ 200: Fail-safe operation (hold last setpoint) ⁽⁶⁾ 201: Fail-safe operation (default setpoint) ⁽⁶⁾ 202: Fail-safe operation (System fallback value) ⁽⁶⁾
Register 68 to 89 are reserved, but it's allowed to read them					
90	PPC_P_AC	Actual active power	W	Read	Value from power analyzer ⁽⁹⁾
92	PPC_PF	Actual power factor $\cos \varphi$	-	Read	Value from power analyzer ⁽³⁾
94	PPC_Q_AC	Actual reactive power	var	Read	Value from power analyzer ⁽¹⁰⁾
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 $V_{\text{PhA-PhB}}$	V	Read	Value from power analyzer
102	PPC_V_PHASE_BC	Actual phase voltage $V_{\text{PhB-PhC}}$	V	Read	Value from power analyzer
104	PPC_V_PHASE_CA	Actual phase voltage $V_{\text{PhC-PhA}}$	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

Further information: www.meteocontrol.com