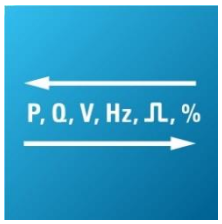
MODBUS POWER CONTROL BLUE'LOG XC

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 φ) 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 φ, f, V, I)

REQUIREMENTS

- blue'Log XC with firmware ≥ 10.0.8
- Licence Modbus Power Control[1)]
- 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 φ 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 φ_{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 defintion

+ 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 soure tool modpoll

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

- Write value (10% setpoint)
- IP-address of blue'Logs
- One time request from modpoll, no Loop
- 0-base address
- Number of write values
- Client-Id (Slave ID)
- Start register
- Holding Register, Data type 32-bit float
- Modbus TCP

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]
5006[5]	PPC_P_SET_GRIDOP_ABS	Absolute active power setpoint (grid operator)	W	Write	unlimited
5008[5]	PPC_Q_SET_ABS	Absolute reactive power setpoint	var	Write	unlimited

[2] Write values between 100.000 … 125.000 % from firmware 15.1.8 on.
[3] Negative values = underexcited, positive values = overexcited (e.g. cos φ = -0.95 = 0.95 underexcited, cos φ = 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] From Firmware 24.3.12

Register 5006 to 5009 are reserved but it is possible to write / read them from firmware 16.0.4 to 24.2.3[6]					
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 φ_{var} fix 2: Variable fixed value cos φ_{var} DI 3: Variable fixed value cos φ_{var} AI 4: Variable fixed value cos φ_{var} Modbus 5: Characteristic curve cos φ_{var} (P) 6: Characteristic curve cos φ_{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 φ) 14: Voltage control Q (V droop)[7]
Register 5014 to 5015 are reserved but it is possible to write / read them since firmware 16.0.4[6]					

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[6]					
5020[7]	PPC_V_SET_ABS	Absolute voltage setpoint $V_{setpoint}$	V	Read / Write	93,500.000 ... 126,500.000 V
5022[7]	PPC_Q_REF_V_DROOP_SHIFT	Setpoint reference reactive power $Q_{\Delta V0}$ for parallel shift of the voltage droop sV	var	Read / Write	-1,000,000,000.000 ... 1,000,000,000.000 var[8]
Register 5024 to 5099 are reserved and it's not possible to write / read them					
5100[7]	PPC_V_SIM_TEST	Simulated test voltage	V	Read / Write	0.000 ... 132,000.000 V
5102[9]	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
42	PPC_Q_SET_GRIDOP_REL	Relative reactive power setpoint (grid operator)	%	Read	
44[10]	PPC_PF_SET_CTRL	Power factor correction value	-	Read	-0,999 … 1,000[3]
46[10]	PPC_Q_SET_CTRL_REL	Relative reactive power correction value	%	Read	-100,000 … 100,000 %[4]
48[11]	PPC_P_SET_CTRL_REL	Relative active power correction value	%	Read	0.000 … 125.000 %[12]
50	PPC_P_SET_GRIDOP_REL	Relative active power setpoint (grid operator)	%	Read	0.000 … 125.000 %[12]
52	PPC_P_SET_ABS	Absolute active power setpoint (grid operator)	W	Read	-1,000,000,000.000 … 1,000,000,000.000 W[13]
54	PPC_P_SET_RPC_REL	Relative active power setpoint (3rd party)	%	Read	0.000 … 125.000 %[12]
56	PPC_P_SET_REL	Actual valid active power setpoint	%	Read	0.000 … 125.000 %[12]

[6] The blue'Log ignores the written values. This allows to write several registers in one block.
[7] From firmware 12.0.2 on.
[8] Negative values = underexcited, positive values = overexcited (e.g. Q = -1.000.000,000 var = 1,0 Mvar underexcited).
[9] From firmware 17.1.7 on.
[10] From firmware 19.2.10 on.
[11] From firmware 18.3.5 on.
[12] Read values between 100.000 … 125.000 % from firmware 15.1.8 on.
[13] Negative values = import (demand), positive values = export (generation).

58	PPC_P_SET_MODUS	Actual active power mode for setpoint setting	-	Read	0: No configuration found 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 5: Remote Power Control (RPC)[7)] 100: LFSM-O[10)] 101: LFSM-U[10)] 200: Fail-safe operation (hold last setpoint) [7)] 201: Fail-safe operation (default setpoint) [7)] 202: Fail-safe operation (System fallback value) [7)] 203: Fail-safe operation (Automatic grid disconnection) [7)]
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)]

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[8)]
66	PPC_Q_SET_MODUS	Actual reactive power mode for setpoint setting	-	Read	0: No configuration found 1: Variable fixed value cos φ_{var} fix 2: Variable fixed value cos φ_{var} DI 3: Variable fixed value cos φ_{var} AI 4: Variable fixed value cos φ_{var} Modbus 5: Characteristic curve cos φ (P) 6: Characteristic curve cos φ (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 φ) 14: Voltage control Q (V droop) [7)] 100: Reactive power compensation[7)] 200: Fail-safe operation (hold last setpoint) [7)] 201: Fail-safe operation (default setpoint) [7)] 202: Fail-safe operation (System fallback value) [7)]

Register 68 is reserved, but it's allowed to read it					
70[9)]	PPC_V_SET_ABS	Absolute voltage setpoint	V	Read	
72[10)]	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[10)]	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[10)]	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[10)]	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[13)]
92	PPC_PF	Actual power factor cos φ	-	Read	Value from power analyzer[3)]
94	PPC_Q_AC	Actual reactive power	var	Read	Value from power analyzer[8)]
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[9)]	PPC_V_PHASE_AN	Line-to-neutral voltage VPhA-N	V	Read	Value from power analyzer
114[9)]	PPC_V_PHASE_BN	Line-to-neutral voltage VPhB-N	V	Read	Value from power analyzer
116[9)]	PPC_V_PHASE_CN	Line-to-neutral voltage VPhC-N	V	Read	Value from power analyzer
Register 118 to 198 are reserved but it is possible to read them					
200	PPC_GHI	Actual global irradiation [14)]	W/m²	Read	Value of a connected sensor
202	PPC_T_AMBIENT	Actual ambient temperature [14)]	°C	Read	Value of a connected sensor
Register 204 to 252 are reserved but it is possible to read them					
254[9)]	PPC_P_AC_INV	Sum of inverter actual active power	W	Read	Value calculated by blue'Log
256[10)]	PPC_Q_AC_INV	Sum of inverter actual reactive power	VAr	Read	Value calculated by blue'Log
258	PPC_P_AC_AVAIL	Available active power [15)]	W	Read	Value configurable via blue'Log

[14)] From firmware 23.0.8 on.

[15)] Not yet implemented.

260	PPC_Q_AC_AVAIL	Available reactive power [15)]	Var	Read	Value configurable via blue'Log
262	PPC_INV_INST	Number of installed inverters [16)]	-	Read	Sum of all inverters connected to the blue'Log (Master+Slave)
264	PPC_INV_AVAIL	Number of active inverters [16)]	-	Read	Sum of all active inverters connected to the blue'Log (Master+Slave)
Register 266 to 267 are reserved but it is possible to read them					
268[11)]	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

[16)] Not yet implemented.