SUPPLEMENTARY PRODUCT INFORMATION

Subject	ModBus Command Set
Product(s)	P9680/C*
Document Date	9th June 2020
Version	1.0

This is information is provided in addition to any existing literature that exists for the above product(s) and should be read in conjunction with the original product data sheet.

* Product variants P9660/C, P9670/C and P9690/C are also referred to in this document. Please consult sales as to their availability.

Contents

1 Introduction

P9660C/70C/80C/90C have modbus capability as of firmware version V1D106.

Please note that RegVal is short for Modbus Register Value, where seen in the tables below.

R/W = Read & Write

R = Read only

W = Write only

Implemented function codes:

- ⓿ Read holding registers (0x03)

- ⓿ Write single register (0x06)

- ⓿ Write multiple registers (0x10)

2 Setup & configuration

Dec address	Hex address	Words count	Description		Models	Data type
512	200	1	Toroid Ratio.		P9660C P9670C P9680C P9690C	uint16 (R/W)
			0=5/5	17=700/5		
			1=20/5	18=750/5		
			2=30/5	19=800/5		
			3=40/5	20=1000/5		
			4=50/5	21=1200/5		
			5=60/5	22=1250/5		
			6=75/5	23=1400/5		
			7=100/5	24=1500/5		
			8=120/5	25=1600/5		
			9=125/5	26=2000/5		
			10=150/5	27=2500/5		
			11=200/5	28=3000/5		
			12=250/5	29=3200/5		
			13=300/5	30=3500/5		
			14=400/5	31=4000/5		
			15=500/5	32=5000/5		
			16=600/5	33=6000/5		
513	201	1	Network frequency – 50Hz or 60Hz. 50 for 50Hz, or 60 for 60Hz.		P9660C P9670C P9680C P9690C	uint16 (R/W)

514	202	1	Relay 1 configuration: P9680C/90C only Bits (1:0) 0=O/C, 1=E/F, 2=O/C & E/F. All variants Relay 1 mode: Bit(2): 0=Auto, 1=Manual	See command for details	uint16 (R/W)
515	203	1	Relay 2 configuration: P9680C/90C only Bits(1:0): 0=O/C, 1=E/F, 2=O/C & E/F. All variants Relay 2 mode: Bits(3:2): 0=Auto(E), 1=Man(E), 2=Auto(S), 3=Man(S).	See command for details	uint16 (R/W)
516	204	1	O/C low set I: 0.5A to 10A in 0.05A steps. Setpoint = RegVal * 0.05 + 0.5 Min: 0, Max: 190	P9670C P9680C P9690C	uint16 (R/W)
517	205	1	**O/C curve selection.** **0=None 1=NI 3/10 2=NI 1.3/10 3=LTI 4=VI 5=EI 6=EI 0.65**	P9670C P9680C P9690C	uint16 (R/W)
518	206	1	O/C low set k (for when curve selected): 0.05s to 1.00s in 0.01s steps. Time = RegVal * 0.01. Min: 5, Max: 100 O/C low set t (for when no curve selected): 0.05s or 0.1s to 100.0s in 0.1s steps. 0=0.05s or >0 t=RegVal * 0.1 Min: 0, Max: 1000	P9670C P9680C P9690C	uint16 (R/W)
519	207	1	O/C high set Io: Disabled, or 0.5A to 100.0A in 0.01A steps. 0=disabled or >0 Io=RegVal * 0.01 Min: 0, Max: 10000. I.E 50 = 50 x 0.010 = 0.5A.	P9670C P9680C P9690C	uint16 (R/W)
520	208	1	O/C high set t: 0.05s to 2.50s in 0.01s steps. t=RegVal * 0.01. Min: 5, Max: 250.	P9670C P9680C P9690C	uint16 (R/W)
521	209	1	E/F low set I: 0.1A to 5A in 0.05A steps. I=RegVal * 0.05 + 0.1. Min: 0, Max: 98.	P9660C P9680C P9690C	uint16 (R/W)

522	20A	1	**E/F curve selection:** **0=None** **1=NI 3/10** **2=NI 1.3/10** **3=LTI** **4=VI** **5=EI** **6=EI 0.65**	P9660C P9680C P9690C	uint16 (R/W)
523	20B	1	E/F low set k. 0.05s to 1.00s in 0.01s increments. k = RegVal * 0.01 Min: 5, Max: 1000 E/F low set t (for when no curve selected): 0.05s, or 0.1s to 100.00s in 0.1s increments. **0=0.05s >0 t=RegVal * 0.1** Min: 0, Max: **1000**	P9660C P9680C P9690C	uint16 (R/W)
524	20C	1	E/F high set Io: Disabled or 0.1A to 50.00A in 0.01A steps. 0=disabled >0 Io=RegVal * 0.01 Min: 0, Max: 5000 I.E 50 = 50 x 0.01 = 0.5A.	P9660C P9680C P9690C	uint16 (R/W)
525	20D	1	E/F high set t: 0.05s to 2.50s in 0.01s steps. t=RegVal * 0.01. Min: 5, Max: 250.	P9660C P9680C P9690C	uint16 (R/W)
526	20E	1	Modbus device address, 1-247. Default is 1.	P9660C P9670C P9680C P9690C	uint16 (R/W)
527	20F	2	Modbus baud rate. 0=1200, 1=2400, 2=4800, 3=9600, 4=14400, 5=19200, 6=38400, 7=57600, 8=115200. Default is 7 (57600).	P9660C P9670C P9680C P9690C	uint8 (R/W)
528	210	1	Modbus parity: Bits (0-1): 0=Even, 1=Odd, 2=None. Default is Even.	P9660C P9670C P9680C P9690C	uint8 (R/W)
529	211	1	Write/commit settings to E2 memory. 43690 (0xAAAA) must be written to this register for write settings to work. Any value written to this register will trigger write command. Must be used if above settings need to be permanent. Please note, unit will go offline for a short time period (time TBD).	P9660C P9670C P9680C P9690C	uint16 (W)

3 Measurement and status

Dec address	Hex address	Words count	Description	Models	Data type
1024	400	1	I1 current in 10's of amps. Please see section 3.1 for how to take CT ratio into account.	P9670C P9680C P9690C	uint16 (R)
1025	401	1	I2 current in 10's of amps. Please see section 3.1 for how to take CT ratio into account.	P9670C P9680C P9690C	uint16 (R)
1026	402	1	I3 current in 10's of amps. Please see section 3.1 for how to take CT ratio into account.	P9670C P9680C P9690C	uint16 (R)
1027	403	1	Io current in 10's of amps.	P9660C P9680C P9690C	uint16 (R)
1028	404	1	V1 current in 10's of volts.	P9690C	uint16 (R)
1029	405	1	V2 current in 10's of volts.	P9690C	uint16 (R)
1030	406	1	V3 current in 10's of volts.	P9690C	uint16 (R)
1031	407	1	P1 current in 10's of watts.	P9690C	uint16 (R)
1032	408	1	P2 current in 10's of watts.	P9690C	uint16 (R)
1033	409	1	P3 current in 10's of watts.	P9690C	uint16 (R)
1034	40A	1	Live trip and fault status. **P9670C, P9680C, P9690C** Bit0=1: Low Set IL1 has tripped Bit1=1: High Set IL1 has tripped Bit2=1: Low Set IL2 has tripped Bit3=1: High Set IL2 has tripped Bit4=1: Low Set IL3 has tripped Bit5=1: High Set IL3 has tripped **P9660C, P9680C, P9690C** Bit6=1: Low Set Io has tripped Bit7=1: High Set Io has tripped **P9670C, P9680C, P9690C** Bit8=1: Low Set IL1 is in fault Bit9=1: High Set IL1 is in fault Bit10=1: Low Set IL2 is in fault Bit11=1: High Set IL2 is in fault Bit12=1: Low Set IL3 is in fault Bit13=1: High Set IL3 is in fault **P9670C, P9680C, P9690C** Bit14=1: Low Set Io is in fault Bit15=1: High Set Io is in fault	See command info.	bitfield (R)
1035	40B	1	Num trip log entries, maximum of 10. RegVal=Number of trip log entries – 1. **Note: This moves the trip log**	P9660C P9670C P9680C P9690C	uint16 (R)
1036	40C	1	Trip 1 value of I1 when trip occurred (10's of amps).	P9660C P9670C P9680C P9690C	uint16 (R)
1037	40D	1	Trip 1 value of I2 when trip occurred (10's of amps).	P9660C P9670C P9680C P9690C	uint16 (R)

1038	40E	1	Trip 1 value of I3 when trip occurred (10's of amps).	P9660C P9670C P9680C P9690C	uint16 (R)
1039	40F	1	Trip 1 value of EF when trip occurred (10's of amps).	P9660C P9670C P9680C P9690C	uint16 (R)
1040	410	1	Trip 1 trip flag snapshot. See register 1034 (Live trip and fault status) for help on decoding trip flag information.	P9660C P9670C P9680C P9690C	uint16 (R)
1041	411	1	Trip 1 relative time since power up that this trip occurred, in 10's of seconds.	P9660C P9670C P9680C P9690C	uint16 (R)
1042	412	1	Trip 2 value of I1 when trip occurred (10's of amps).	P9660C P9670C P9680C P9690C	uint16 (R)
1043	413	1	Trip 2 value of I2 when trip occurred (10's of amps).	P9660C P9670C P9680C P9690C	uint16 (R)
1044	414	1	Trip 2 value of I3 when trip occurred (10's of amps).	P9660C P9670C P9680C P9690C	uint16 (R)
1045	415	1	Trip 2 value of EF when trip occurred (10's of amps).	P9660C P9670C P9680C P9690C	uint16 (R)
1046	416	1	Trip 2 trip flag snapshot.	P9660C P9670C P9680C P9690C	uint16 (R)
1047	417	1	Trip 2 relative time since power up that this trip occurred, in 10's of seconds.	P9660C P9670C P9680C P9690C	uint16 (R)
1048	418	1	Trip 3 value of I1 when trip occurred (10's of amps).	P9660C P9670C P9680C P9690C	uint16 (R)
1536	600	1	Product type: 0=P9660C 1=P9670C 2=P9680C 3=P9690C	P9660C P9670C P9680C P9690C	uint16 (R)
1537	601	1	S/W version Version major: 15:8 Version minor: 7:0	P9660C P9670C P9680C P9690C	uint16 (R)

3.1 Calculation of measured current

The P9660C/70C/80C/90C displays the measured on the LCD. However, if an external transformer is connected with a ratio other than 5/5 is used the displayed value is adjusted accordingly. For example:

CT ratio selected: 30/5. Sensed / measured CT current after external is 1.5A. Therefore primary of external CT is actually (30/5*1.5) = 9A.

The modbus current registers 1024-1027 do not take the external transformer into account. So a value of 1.5A would be seen by the unit, and an adjustment by the modbus host is needed by reading the currently selected transformer ratio.

4 System Command

These can be disabled by software build if required.

Dec address	Hex address	Words count	Description	Models	Data type
2048	800	1	Write system command: 0=Reset trip (simulate reset press). 1=Execute test (simulate test button). Note that test function can only be executed if not in fault mode. 43690 (0xAAAA)=Reset factory defaults.	P9660C P9670C P9680C P9690C	uint16 (W)