

**Modbus® RTU Serial Communications  
User Manual  
Configuration Interface for DR4300**

Supplement to 51-52-25-66

**51-52-25-71A**

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Reference: Modicon Modbus Protocol Reference Guide - PI-MBUS-300 Rev. G

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# About This Document

## Abstract

This document provides configuration information specific to Honeywell's DR4300 recorders and should be used in tandem with document number 51-52-25-66, Modbus® RTU Serial Communications User Manual.

## References

The following list identifies all documents that may be sources of reference for material discussed in this publication.

Document Title	Doc ID
Modbus® RTU Serial Communications User Manual	51-52-25-66
DR4300 Circular Chart Recorder Product Manual	44-01-25-14

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# 1. Overview of Modbus RTU Configuration Interface

This User Manual is intended to accompany the Modbus RTU Serial Communications User Manual (51-52-25-66). It describes the function codes needed to upload and download the configuration from a host computer into the DR4300 recorder.

Refer to document 51-52-25-66 (Modbus RTU Serial Communications User Manual) for general Modbus RTU message formatting and other information.

## Two-pen Models

If you have a 2-pen model recorder, each pen channel has its own unique Slave Address. This address is set, via the recorder's operator interface, at the **ADDRES** function prompt in the Communications set up group. Be sure that the Slave Address in the Query message for function codes 20 and 21 is the correct address for the desired pen.



## 2. Modbus RTU Configuration Function Codes

The Modbus Read/Write general reference function codes (20 and 21) are used to access configuration information in the DR4300. Each message can be divided into a series of sub-messages, each of which provides access for one configuration item. Information other than the actual configuration value is available for each item by accessing register numbers 0 through D. Refer to Sections 2.2 and 2.3 for more details concerning the structure of the query messages. The tables in Section 2.1 define the registers.

### 2.1 Register Definitions

#### 2.1.1 Register Definitions - Integer Parameter (Type 1)

REG Num (hex)	Name	Access	Notes
0	Type = 1	RD	16 Bit Unsigned Integer
1	Attribute	RD	1 = Read Only, 2 = Read/Write
2	<b>Configuration Value (Int16)</b>	<b>RW</b>	
3	0000	RW	
4	Low Range (Int16)	RD	
5	0000	RD	
6	High Range (Int16)	RD	
7	0000	RD	
8 to D	Description Text (ASCII string)	RD	6 characters

#### 2.1.2 Register Definitions - Floating Point Parameter (Type 2)

REG Num (hex)	Name	Access	Notes
0	Type = 2	RD	IEEE Floating Point
1	Attribute	RD	1 = Read Only, 2 = Read/Write
2	<b>Configuration Value (float high word)</b>	<b>RW</b>	
3	<b>Configuration Value (float low word)</b>	<b>RW</b>	
4	Low Range (float high word)	RD	
5	Low Range (float low word)	RD	
6	High Range (float high word)	RD	
7	High Range (float low word)	RD	
8 to D	Description Text (ASCII string)	RD	6 characters

### 2.1.3 Register Definitions - Enumerated Parameters (Type 5)

REG Num (Dec)	Name	Access	Notes
0	Type = 5	RD	Enumerated value list type
1	Attribute	RD	1 = Read Only, 2 = Read/Write
<b>2</b>	<b>Configuration Value (Int16)</b>	<b>RW</b>	<b>Current enumeration value</b>
3	0000	RW	
4	Enumeration Low Limit	RD	Low limit of enumerated value
5	0000	RD	
6	Enumeration High Limit	RD	High limit of enumerated value
7	0000	RD	
8 to D	Description Text (ASCII string)	RD	6 characters



## 2.2 Function Code 20 (14h) - Read Multiple Configuration Values

### Description

Reads multiple configuration records. Each record provides access to parameter type, access, value, high and low range limits, and the ASCII prompt for that configuration item as it appears on the DR4300 display.

### Query

The query message is structured using sub-messages which define each configuration record along with the associated parameters desired to be read. The Reference type, included to be consistent with the General Modbus specification, is not used. Each sub-message begins with the reference type and is defined by a starting register and the number of registers to be read. Refer to tables in Sections 2.1.1, 2.1.2, and 2.1.3 for a definition of the registers.

### ATTENTION

For reading values only, the starting address is 2 (0002h) and the number of registers to read is 2 (0002h).

#### Query message format for function code 20

Slave Address	Function Code (14h)	Byte Count	Ref Type (06)	Item # Hi	Item # Lo	Starting Address High	Start Address Low	Number Addresses High	Number Addresses Low
Ref Type (06)	Item # Hi	Item # Lo	Starting Address High	Start Address Low	Number Addresses High	Number Addresses Low	(etc)	crc	crc

Example: Read one configuration value starting at 1000 and 1 value starting at 1020:

```
02 15 0E 06 10 00 00 02 00 02 06 10 20 00 02 00 02 crc crc
```

### Response

The response is a series of sub-messages, each corresponding the sub-request. There is a total overall byte count as well as a byte count for each sub-response.

#### Response message format for function code 20

Slave Address	Function Code	Overall byte count	Sub byte count	Ref type (06)	Reg Data Hi	Reg Data Lo	etc. Hi	etc. Lo	Sub byte count	Ref type (06)	Reg data Hi	Reg data Lo	etc	crc	crc

Example: Reads 1.00 at 1000 and 3.00 at 1020.

```
02 15 0C 05 06 3F 80 00 00 08 06 40 40 00 00 crc crc
```

### ATTENTION

Chart title, Pen range tags, and Engineering Unit strings are not supported configuration values.

## 2.3 Function Code 21 (15h) - Write Multiple Configuration Values

### Description

Writes multiple configuration values.

### Query

The query message is structured using sub-messages which define each configuration record along with the associated value to be written. The Reference type, included to be consistent with the General Modbus specification, is not used. Each sub-message begins with the reference type and is defined by a starting register and the number of registers to be written followed by the data.

**Query message format for function code 21**

Slave Address	Function Code (14h)	Byte Count	Ref Type (06)	Item # Hi	Item # Lo	00	02	00	02
Data Hi	Data Lo	Data Hi	Data Lo	Another sub message				crc	crc

Example: Write 4 registers starting at 1000 (values 1 and 2) and 2 registers starting at 1020 (value 100):  
 02 15 1A 06 00 00 10 00 00 04 3F 80 00 00 40 00 00 00 06 00 00 10 20 00 02 42 C8 00 00 crc crc

### Response

The response is an echo of the query.

**Response message format for function code 10h**

Slave Address	Function Code	Overall byte count	Sub byte count	Reg Data Hi	Reg Data Lo	Reg Data Hi	Reg Data Lo	etc.	etc.	Sub byte count	Reg data Hi	Reg data Lo	etc	crc	crc
---------------	---------------	--------------------	----------------	-------------	-------------	-------------	-------------	------	------	----------------	-------------	-------------	-----	-----	-----

## 3. Configuration Values

### 3.1 Floating Point (Analog) Configuration Values

#### 3.1.1 Input Floating Point Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Input High Range	1000	4097	-999 to 9999	
Input Low Range	1002	4099	-999 to 9999	
Input Bias	1004	4101	-999 to 9999	
Filter Value	1006	4103	0 to 120	

#### 3.1.2 Pen Floating Point Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Pen High Limit	100C	4109	-999 to 9999	
Pen Low Limit	100E	4111	-999 to 9999	

#### 3.1.3 Chart Floating Point Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Chart Speed (Hr/Rev)	1018	4121	6 to 744	

#### 3.1.4 Totalizer Floating Point Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Totalizer Lo Flo Cutoff	100A	4107	0 to 100	

### 3.1.5 Tuning Floating Point Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Heat Gain/PB 1	101E	4127	.1 to 1000	
Heat Rate 1	1020	4129	0 to 10	
Heat Reset/RPM 1	1022	4131	.02 to 50	
Manual Reset	1024	4133	-100 to 100	
Cycle Time 1 (Heat)	1026	4135	1 to 120	
Cool Gain/PB 2	1028	4137	.1 to 1000	
Cool Rate 2	102A	4139	0 to 10	
Cool Reset/RPM 2	102C	4141	.02 to 50	
Cycle Time 2 (Cool)	102E	4143	1 to 120	

### 3.1.6 Control Floating Point Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Local SP 1	1030	4145	within SP HI/LO limits	
Local SP 2	1032	4147	within SP HI/LO limits	
SP High Limit	1034	4149	-999 to 9999	
SP Low Limit	1036	4151	-999 to 10000	
High Output Limit	1038	4153	-5 to 105	
Low Output Limit	103A	4155	-5 to 106	
Output Deadband	103C	4157	-5 to 25	
Output Hysteresis	103E	4159	0 to 5	
Failsafe Output	1040	4161	0 to 100	

### 3.1.7 Alarms Floating Point Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Alarm 1 SP 1	104C	4173	-999 to 9999	
Alarm 1 SP 2	104E	4175	-999 to 9999	
Alarm 2 SP 1	1050	4177	-999 to 9999	
Alarm 2 SP 2	1052	4179	-999 to 9999	
Alarm Hysteresis	1054	4181	0 to 100	

### 3.1.8 SP Ramp/Rate/Program Floating Point Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Ramp Time	1056	4183	0 to 255	
Ramp Final SP	1058	4185	within SP HI/LO limits	
SPP Recycles	1060	4193	0 to 99	
SPP Soak Deviation	1062	4195	0 to 100	
SPP Segment 1 Ramp Time	1064	4197	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 2 Soak SP	1066	4199	within SP HI/LO limits	
SPP Segment 2 Soak Time	1068	4201	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 3 Ramp Time	106A	4203	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10hrs, 87 minutes)
SPP Segment 4 Soak SP	106C	4205	within SP HI/LO limits	
SPP Segment 4 Soak Time	106E	4207	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 5 Ramp Time	1070	4209	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 6 Soak SP	1072	4211	within SP HI/LO limits	
SPP Segment 6 Soak Time	1074	4213	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 7 Ramp Time	1076	4215	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 8 Soak SP	1078	4217	within SP HI/LO limits	
SPP Segment 8 Soak Time	107A	4219	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 9 Ramp Time	107C	4221	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 10 Soak SP	107E	4223	within SP HI/LO limits	
SPP Segment 10 Soak Time	1080	4225	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 11 Ramp Time	1082	4227	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 12 Soak SP	1084	4229	within SP HI/LO limits	
SPP Segment 12 Soak Time	1086	4231	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 13 Ramp Time	10A0	4257	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)

## Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
SPP Segment 14 Soak SP	10A2	4259	within SP HI/LO limits	
SPP Segment 14 Soak Time	10A4	4261	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 15 Ramp Time	10A6	4263	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 16 Soak SP	10A8	4265	within SP HI/LO limits	
SPP Segment 16 Soak Time	10AA	4267	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 17 Ramp Time	10AC	4269	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 18 Soak SP	10AE	4271	within SP HI/LO limits	
SPP Segment 18 Soak Time	10B0	4273	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 19 Ramp Time	10B2	4275	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 20 Soak SP	10B4	4277	within SP HI/LO limits	
SPP Segment 20 Soak Time	10B6	4279	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 21 Ramp Time	10B8	4281	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 22 Soak SP	10BA	4283	within SP HI/LO limits	
SPP Segment 22 Soak Time	10BC	4285	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 23 Ramp Time	10BE	4287	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)
SPP Segment 24 Soak SP	10C0	4289	within SP HI/LO limits	
SPP Segment 24 Soak Time	10C2	4291	0.0 to 99.59	Any decimal number accepted (e.g., 10.87 = 10 hours, 87 minutes)

### 3.1.9 Auxiliary Output Floating Point Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Aux. OUT Scale Low	1088	4233	depends on Auxiliary Source limits	
Aux. OUT Scale High	108A	4235	depends on Auxiliary Source limits	

### 3.1.10 Timer Floating Point Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Timer Period	108C	4237	0.0 to 99.59	

### 3.2 Enumerated (Digital) Configuration Values

#### 3.2.1 Input Enumerated Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Input Decimal Point	1801	6146	0 - None 1 - One 2 - Two	
Input Engineering Units	1802	6147	0 - Degrees F 1 - Degrees C 2 - None	
Input Actuation	1803	6148	0 - B Thermocouple 1 - E Thermocouple 2 - E Thermocouple low 3 - J Thermocouple 4 - J Thermocouple low 5 - K Thermocouple 6 - K Thermocouple low 7 - NNM Thermocouple 8 - NIC Thermocouple 9 - R Thermocouple 10 - S Thermocouple 11 - T Thermocouple 12 - T Thermocouple low 13 - W Thermocouple 14 - 100 ohm RTD 15 - 100 ohm RTD low 16 - 100 ohm RTD $\alpha = .00391$ 17 - 4-20 mA 18 - 0-20 mA 19 - 0-10 mV 20 - 0-100 mV 21 - 0-200 mV 22 - 0-1 Volt 23 - 0-2 Volt 24 - 1-5 Volt 25 - 0-5 Volt 26 - 0-10 Volt 27 - 2-10 Volt	
Input Transmitter Type	1804	6149	0 - Linear 1 - Square Root	
Input Burnout	1805	6150	0 - None 1 - Up 2 - Down	
Input Calibration Value	1806	6151	0 - Factory 1 - Field	



### 3.2.2 Pen Enumerated Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Pen Source	1809	6154	0 - Input 1 - Output 2 - Setpoint 3 - Remote Switch 1 4 - Remote Switch 2	

### 3.2.3 Chart Enumerated Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Chart Speed Selection	180A	6155	0 - 8hr 1 - 12hr 2 - 24hr 3 - 7day 4 - Xhr	
Chart Type	180F	6160	0 - Linear 1 - Non-Linear	

### 3.2.4 Control Enumerated Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Control Enable	1810	6161	0 - Disable 1 - Enable	
Control Algorithm Selection	1811	6162	0 - On-Off 1 - PID A 3 - PD + MR	
Output Algorithm	1812	6163	0 - Time 1 - Time Duplex 2 - Current 3 - Current/Time 4 - Time/Current	
SP Source	1813	6164	0 - 1 Local 1 - 2 Local	
Power Up Mode	1816	6167	0 - Manual 1 - Auto LSP	
Control Output Direction	1817	6168	0 - Direct 1 - Reverse	
Gain/PB Selection	1819	6170	0 - Gain 1 - PB	
Min/RPM Selection	181A	6171	0 - Min 1 - RPM	
Current Duplex 4-20 Range Algorithm	181D	6174	0 - 100% (Full) 1 - 50% (Half)	
Power Up Display	181F	6176	0 - Input 1 - Setpoint	

### 3.2.5 Alarms Enumerated Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Alarm 1 SP 1 Type	1820	6177	0 - None 1 - Input 2 - Deviation	
Alarm 1 SP 1 Event	1821	6178	0 - Low/Begin 1 - High/End	
Alarm 1 SP 2 Type	1822	6179	0 - None 1 - Input 2 - Deviation	
Alarm 1 SP 2 Event	1823	6180	0 - Low/Begin 1 - High/End	
Alarm 2 SP 1 Type	1824	6181	0 - None 1 - Input 2 - Deviation	
Alarm 2 SP 1 Event	1825	6182	0 - Low/Begin 1 - High/End	
Alarm 2 SP 2 Type	1826	6183	0 - None 1 - Input 2 - Deviation	
Alarm 2 SP 2 Event	1827	6184	0 - Low/Begin 1 - High/End	

### 3.2.6 SP Ramp/Rate/Program Enumerated Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
SP Ramp Enable	182D	6190	0 - Disable 1 - Enable	Trying to enable more than one of these results in all being disabled!
SP Program Enable	182F	6192	0 - Disable 1 - Enable	Trying to enable more than one of these results in all being disabled!
SPP End State	1831	6194	0 - Disable 1 - Hold	
SPP Ramp Engineering Units	1834	6197	0 - Time 1 - EU/Min 2 - EU/Hr	

### 3.2.7 Totalizer Enumerated Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Totalizer Enable	1837	6200	0 - Disable 1 - Enable	
Totalizer Integration Rate	1838	6201	0 - Second 1 - Minute 2 - Hour 3 - Day 4 - Million/Day	
Totalizer Scale Factor	1839	6202	0 - 1 1 - 10 2 - 100 3 - 1000 4 - 1e4 5 - 1e5 6 - 1e6	
Totalizer Reset	183A	6203	0 - None 1 - Keyboard 2 - External SW1 3 - External SW2	
Totalizer Input Engineering Units	183B	6204	0 - None 1 - Cubic Feet 2 - Gallons 3 - Cubic Meters 4 - Liters 5 - Acre-Feet 6 - Hectare-Meters	
Totalizer Engineering Units	183C	6205	0 - None 1 - Cubic Feet 2 - Gallons 3 - Cubic Meters 4 - Liters 5 - Acre-Feet 6 - Hectare-Meters	
Totalizer Decimal Place	183D	6206	0 - None 1 - One Decimal Place 2 - Two Decimal Places	

### 3.2.8 External Switch Enumerated Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Digital Input 1	183E	6207	0 - None 1 - To SP2 2 - To Manual 3 - To Manual/Failsafe 4 - To Hold 5 - To Run 6 - Timer Start	
Digital Input 2	183F	6208	0 - None 1 - To SP2 2 - To Manual 3 - To Manual/Failsafe 4 - To Hold 5 - To Run 6 - Timer Start	

### 3.2.9 Miscellaneous Enumerated Configuration Values

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Auxiliary Output Selection	1840	6209	0 - None 1 - Input 2 - Output 3 - Setpoint 4 - Deviation	
Lockout	1841	6210	1 - Calibration 2 - Configuration 3 - Maximum	
Toggle	1842	6211	0 - None 1 - 2 seconds 2 - 4 seconds 3 - 6 seconds 4 - 8 seconds 5 - 10 seconds 6 - 12 seconds 7 - 14 seconds 8 - 16 seconds 9 - 18 seconds 10 - 20 seconds 11 - 22 seconds 12 - 24 seconds 13 - 26 seconds 14 - 28 seconds 15 - 30 seconds	

Parameter Description	Register Number		Range	Notes
	(hex)	(dec)		
Blank	184E	6223	0 - None 1 - 2 seconds 2 - 4 seconds 3 - 6 seconds 4 - 8 seconds 5 - 10 seconds 6 - 12 seconds 7 - 14 seconds 8 - 16 seconds 9 - 18 seconds 10 - 20 seconds 11 - 22 seconds 12 - 24 seconds 13 - 26 seconds 14 - 28 seconds 15 - 30 seconds	
SPP Program 1 Start	1843	6212	1-23 (Odd)	
SPP Program 1 End	1844	6213	2-24 (Even)	
SPP Program 2 Start	1845	6214	1-23 (Odd)	
SPP Program 2 End	1846	6215	2-24 (Even)	
SPP Program 3 Start	1847	6216	1-23 (Odd)	
SPP Program 3 End	1848	6217	2-24 (Even)	
SPP Program 4 Start	1849	6218	1-23 (Odd)	
SPP Program 4 End	184A	6219	2-24 (Even)	
Timer	184B	6220	0 - Disable 1 - Enable	
Timer Start	184C	6221	0 - Keyboard 1 - Alarm 1	
Timer Display	184D	6222	0 - Time Left 1 - Elapsed Time	





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