DAE Instrument Corp.

CC500

Smart Lighting Control System
Modbus Gateway

Modbus Reference

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General Information

The CC500 is a Modbus gateway for the Smart Lighting Control System D-Bus protocol. It can interface with a PC host using either Ethernet or RS485 and communicates using the Modbus/RTU protocol.

The baud rate is fixed at 9600 bauds. The data format is 8 bits, no parity, 1 stop bit.

All numerical data is in integer form and must be scaled by multiplying/dividing with its associated unit to get the final data value.

Reading is executed through function code 3. Writing is executed using function code 16. Most control is executed using function code 5, but some may use function code 16 as well.

Function code 3 can support reading a single register or multiple registers at a time. When reading multiple registers, a maximum of 125 registers (250 bytes) can be requested per command query. Requesting to read more than 125 registers at a time is considered an invalid command and will engender no response.

Function code 16 can write to a single register or multiple registers at a time. When writing to multiple registers, a maximum of 4 registers (8 data bytes) can be written to at a time. Requesting to write more than 4 registers at a time is considered an invalid command and will engender no response.

The CC500 will not respond to an invalid command, this is to force the host PC doing the reading to time out. The CC500 has a typical response latency of 100 milliseconds, but as a safety margin, a latency of 300 milliseconds should be allowed for, if this time is exceeded, the host PC should issue a time out.

An invalid command may be any one of the following:

1. The function code is not supported.
2. No register at the given register address for a given function code.
3. The data is malformed or out of range.
4. The CRC is incorrect.

The CC500 can operate in two modes. The first mode is normal Modbus. The second mode is a variation of the Modbus wherein any valid command will be executed but will not be responded to. The no response behavior for the second mode is not an error but rather a normal behavior as required for certain types of applications.

Object Types and Commands

Object Types

Object Type	Read		Write	
	Command	Func & Reg	Command	Func & Reg
Group	-----	-----	Set Group On/Off	F5: 1 to 63
Pattern	-----	-----	Activate Pattern	F5: 64 to 127
DO	Read DO Status	F3: 0 to 7	Set DO On/Off	F5: 256 to 383
DI	Read DI Status	F3: 32 to 47		-----
Latched DI	Read Latched DI	F3: 96 to 111	Clear Latched DI	F16: 96 to 111
Single DO Pulse	-----	-----	Single DO Pulse Out	F5: 768 to 895
Dual DO Pulse	-----	-----	Dual DO Pulse Out	F5: 1280 to 1343
Group Status Map	Read Group Status Map	F3: 160 to 163	-----	-----
Pattern Activation Map	Read Pattern Activation Map	F3: 164 to 167	Clear Pattern Activation Map	F16: 164 to 167
LT Alive Map	Read LT Alive Status Map	F3: 168	-----	-----
AI Value	Read AI Value	F3: 256 to 319	-----	-----
AO Value	Read AO Value	F3: 512 to 575	Set AO Value	F16: 512 to 575
Authorization Mode	Read Authorization Mode	F3: 768 to 895	Set Authorization Mode	F16: 768 to 895
AO Upper Limit	Read AO Upper Limit	F3: 2816 to 2879	Set AO Upper Limit	F16: 2816 to 2879
AO Lower Limit	Read AO Lower Limit	F3: 3072 to 3135	Set AO Lower Limit	F16: 3072 to 3135

Commands

Command	Description
Read DO Status	• Reads the status of a discrete output
Read DI Status	• Reads the real time status of a discrete input
Read Latched DI [寫入保全 DI]	• Reads the status of the latched discrete input. The latched DI is a flag that is set when the DI channel to which it refers to goes from LOW to HIGH. The event is remembered (latched), the flag is not cleared when the DI channel goes back to LOW. It can only be cleared by explicitly issuing the Clear Latched DI command.
Read Group Status Map [讀取群狀態表]	• Reads the bit map representing the on/off status of each group.
Read Pattern Activation Map [讀取被觸發場景表]	• Reads the bit map representing the activation status of each pattern. • The bit representing a pattern is sticky, once activated (set to 1), the bit will always remain in that state since a pattern cannot be turned off. To clear the bit, the map must be cleared manually using the **Clear Pattern Activation Map** command.
Read LT Alive Status Map [LT 是否存在表]	• Reads the bit map representing the alive status of each LT. • An LT is alive when it can be communicated to, an LT is not alive when it does not exist on the bus or when it is not responding to commands from the CC500.
Read AI Value [讀取 AI 數值]	• Reads the value of the analog input. • The value is a percentage from 0 to 100, with no decimal place.
Read AO Value [讀取 AO 數值]	• Reads the value of the analog output. • The value is a percentage from 0 to 100, with no decimal place.

Command	Description
Read Authorization Mode [讀取強制模式]	• Reads the IR operating mode • Each DO can have its own mode. • There are four possible modes for each DO: Local On, Local Off, Forced On, Forced Off. • Note that reading has 4 possibilities, but setting only has 3 possibilities. • There is a corresponding command to set the authorization mode, see the **Set Authorization Mode** command for more details. • This command is available for the LT3384 with firmware version 23 or higher only.
Read AO Upper Limit [讀取 AO 高階設定]	• Reads the value of the upper limit for an AO channel. • See also the **Set AO Upper Limit** command to set this value.
Read AO Lower Limit [讀取 AO 低階設定]	• Reads the value of the lower limit for an AO channel. • See also the **Set AO Upper Limit** command to set this value.
Set Group On/Off [控制群控]	• Commands all the DO belonging to a given group to turn On or Off at the same time.
Activate Pattern [觸發情境]	• Commands all the DO belonging to a given pattern to arrange themselves into a formation consisting of On and Off elements. • Note that a pattern can only be activated, a pattern cannot be turned Off.
Set DO On/Off [控制單點]	• Commands a single DO to turn either On or Off.
Single DO Pulse Out [控制單 DO Pulse]	• Commands a single DO to output a pulse. The pulse is low->high->low.
Dual DO Pulse Out [控制雙 DO Pulse]	• Commands a pair of DO to each output a pulse simultaneously. The pulse is low->high->low.
Clear Latched DI [清除保全 DI]	• Clears the latched DI flag. • The latched DI flag is sticky, it is set when the DI goes high, the flag will remain set even when the DI goes back low.
Clear Pattern Activation Map [清除場景]	• Clears the bit map representing the activation status of each pattern. • The bit representing a pattern is sticky, once activated (set to 1), the bit will always remain in that state since a pattern cannot be turned off. This command is needed in order to clear this sticky bit. • See also the command **Read Pattern Activation Map**.
Set AO Value [寫入AO數值]	• Writes a value to the analog output. • The value can be any percent from 0 to 100. There is no decimal place.
Set Authorization Mode [寫入強制模式]	• Sets the IR operating mode. • Each DO can have its own mode. • There are three possible modes that can be set for each DO: Local, Forced On, Forced Off. • Note that reading has 4 possibilities, but setting only has 3 possibilities. • There is a corresponding command to read the authorization mode, see the **Read Authorization Mode** command for more details. • This command is available for LT3384 with firmware version 23 or higher only.
Set AO Upper Limit [寫入 AO 高階設定]	• Sets the value of the upper limit for an AO channel. • See also the **Read AO Upper Limit** command to read the value that is set from this command.
Set AO Lower Limit [寫入 AO 低階設定]	• Sets the value of the lower limit for an AO channel. • See also the **Read AO Lower Limit** command to read the value that is set from this command.

LT Commands

Command	TU104	LT2504	LT2508	LT2544	LT3050	LT3504	LT3506	LT3000	LT3100	LT3384
Read DO Status [讀取 DO 狀態]	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Read DI Status [讀取 DI 狀態]	✘	✘	✘	✘	✘	✘	✘	✘	✔	✔
Read Latched DI [讀取保全 DI]	✘	✘	✘	✘	✘	✘	✘	✘	✔	✔
Read AI Value [讀取 AI 數值]	✘	✘	✘	✘	✘	✘	✘	✘	✘	✘
Read AO Value [讀取 AO 數值]	✘	✘	✘	✘	✘	✘	✘	✘	✘	✘
Read Authorization Mode [讀取強制模式]	✘	✘	✘	✘	✘	✘	✘	✘	✘	✔(1)
Read AO Upper Limit [讀取 AO 高階設定]	✘	✘	✘	✘	✘	✘	✘	✘	✘	✘
Read AO Lower Limit [讀取 AO 低階設定]	✘	✘	✘	✘	✘	✘	✘	✘	✘	✘
Command	**TU104**	**LT2504**	**LT2508**	**LT2544**	**LT3050**	**LT3504**	**LT3506**	**LT3000**	**LT3100**	**LT3384**
Set Group On/Off [控制群控]	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Activate Pattern [觸發情境]	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Set DO On/Off [控制單點]	✔	✔	✔	✔	✔	✔	✔	✔	✔	✘
Single DO Pulse Out [控制單 DO Pulse]	✘	✘	✘	✘	✘	✘	✔	✘	✘	✘
Dual DO Pulse Out [控制雙 DO Pulse]	✘	✘	✘	✘	✘	✘	✔	✘	✘	✘
Command	**TU104**	**LT2504**	**LT2508**	**LT2544**	**LT3050**	**LT3504**	**LT3506**	**LT3000**	**LT3100**	**LT3384**
Clear Latched DI [清除保全 DI]	✘	✘	✘	✘	✘	✘	✘	✘	✔	✔
Set AO Value [寫入AO數值]	✘	✘	✘	✘	✘	✘	✘	✘	✘	✘
Set Authorization Mode [寫入強制模式]	✘	✘	✘	✘	✘	✘	✘	✘	✘	✔(2)
Set AO Upper Limit [寫入 AO 高階設定]	✘	✘	✘	✘	✘	✘	✘	✘	✘	✘
Set AO Lower Limit [寫入 AO 低階設定]	✘	✘	✘	✘	✘	✘	✘	✘	✘	✘

Notes:

(1) For the LT3384, the function "Read Authorization Mode" only applies to version 23 or higher. Older versions do not support this function.

(2) For the LT3384, the function "Set Authorization Mode" only applies to version 23 or higher. Older versions do not support this function.

Command	LT3036	LT3070	LT4500	LT4500-2	LT4514	LT4602	KT454	KT462	iRCU	iHCU
Read DO Status [讀取 DO 狀態]	✔	✔	✔	✔	✔	✘	✔	✔	✔	✔
Read DI Status [讀取 DI 狀態]	✘	✘	✘	✘	✔	✘	✘	✘	✘	✘
Read Latched DI [讀取保全 DI]	✘	✘	✘	✘	✔	✘	✘	✘	✘	✘
Read AI Value [讀取 AI 數值]	✘	✘	✔	✔	✘	✔	✘	✘	✘	✔
Read AO Value [讀取 AO 數值]	✘	✘	✔	✔	✔	✔	✔	✔	✘	✔
Read Authorization Mode [讀取強制模式]	✘	✘	✘	✘	✔	✘	✘	✘	✘	✘
Read AO Upper Limit [讀取 AO 高階設定]	✘	✘	✘	✘	✔	✘	✘	✘	✘	✘
Read AO Lower Limit [讀取 AO 低階設定]	✘	✘	✘	✘	✔	✘	✘	✘	✘	✘
Command	**LT3036**	**LT3070**	**LT4500**	**LT4500-2**	**LT4514**	**LT4602**	**KT454**	**KT462**	**iRCU**	**iHCU**
Set Group On/Off [控制群控]	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Activate Pattern [觸發情境]	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Set DO On/Off [控制單點]	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Single DO Pulse Out [控制單 DO Pulse]	✘	✔	✘	✘	✘	✘	✘	✘	✘	✘
Dual DO Pulse Out [控制雙 DO Pulse]	✘	✔	✘	✘	✘	✘	✘	✘	✘	✘
Command	**LT3036**	**LT3070**	**LT4500**	**LT4500-2**	**LT4514**	**LT4602**	**KT454**	**KT462**	**iRCU**	**iHCU**
Clear Latched DI [清除保全 DI]	✘	✘	✘	✘	✘	✘	✘	✘	✘	✘
Set AO Value [寫入AO數值]	✘	✘	✔	✔	✔	✔	✔	✔	✘	✔
Set Authorization Mode [寫入強制模式]	✘	✘	✘	✘	✔	✘	✘	✘	✘	✘
Set AO Upper Limit [寫入 AO 高階設定]	✘	✘	✘	✘	✔	✘	✘	✘	✘	✘
Set AO Lower Limit [寫入 AO 低階設定]	✘	✘	✘	✘	✔	✘	✘	✘	✘	✘

Register Tables Summary

Function Code	Register	Modscan	Command	# of Registers	LT Address	Channel
3	0	03:0001	Read DO Status [讀取 DO 狀態]	8	1 to 2	All DO
	n	03:n+1			2n+1 to 2n+2	All DO
	7	03:0008			15 to 16	All DO
3	32	03:0033	Read DI Status [讀取 DI 狀態]	16	1	All DI
	n	03:n+1			n-31	All DI
	47	03:0048			16	All DI
3	96	03:0097	Read Latched DI [讀取保全 DI]	16	1	All DI
	n	03:n+1			n-95	All DI
	111	03:0112			16	All DI
3	160	03:0161	Read Group Status Map [讀取群狀態表]	4	All	Groups 1 to 16
	161	03:0162			All	Groups 17 to 32
	162	03:0163			All	Groups 33 to 48
	163	03:0164			All	Groups 49 to 63
3	164	03:0165	Read Pattern Activation Map [讀取被觸發場景表]	4	All	Patterns 1 to 16
	165	03:0166			All	Patterns 17 to 32
	166	03:0167			All	Patterns 33 to 48
	167	03:0168			All	Patterns 49 to 64
3	168	03:0169	Read LT Alive Status Map [LT 是否存在表]	1	1 to 16	---

Function Code	Register	Modscan	Command	# of Registers	LT Address	Channel
3	256	03:0257	Read AI Value [讀取 AI 數值]	64	1	AI 1
	257	03:0258				AI 2
	258	03:0259				AI 3
	259	03:0260				AI 4
	n	03:n+1			n/4-63	AI 1
	n+1	03:n+2				AI 2
	n+2	03:n+3				AI 3
	n+3	03:n+4				AI 4
	316	03:0317			16	AI 1
	317	03:0318				AI 2
	318	03:0319				AI 3
	319	03:0320				AI 4
3	512	03:0513	Read AO Value [讀取 AO 數值]	64	1	AO 1
	513	03:0514				AO 2
	514	03:0515				AO 3
	515	03:0516				AO 4
	n	03:n+1			n/4-127	AO 1
	n+1	03:n+2				AO 2
	n+2	03:n+3				AO 3
	n+3	03:n+4				AO 4
	572	03:0573			16	AO 1
	573	03:0574				AO 2
	574	03:0575				AO 3
	575	03:0576				AO 4

Function Code	Register	Modscan	Command	# of Registers	LT Address	Channel
3	768	03:0769	Read Authorization Mode [讀取強制模式]	128	1	DO 1
	769	03:0770				DO 2
	770	03:0771				DO 3
	771	03:0772				DO 4
	772	03:0773				DO 5
	773	03:0774				DO 6
	774	03:0775				DO 7
	775	03:0776				DO 8
	n	03:n+1			n/8-95	DO 1
	n+1	03:n+2				DO 2
	n+2	03:n+3				DO 3
	n+3	03:n+4				DO 4
	n+4	03:n+5				DO 5
	n+5	03:n+6				DO 6
	n+6	03:n+7				DO 7
	n+7	03:n+8				DO 8
	888	03:0889			16	DO 1
	889	03:0890				DO 2
	890	03:0891				DO 3
	891	03:0892				DO 4
	892	03:0893				DO 5
	893	03:0894				DO 6
	894	03:0895				DO 7
	895	03:0896				DO 8

Function Code	Register	Modscan	Command	# of Registers	LT Address	Channel
3	2816	03:2817	Read AO Upper Limit [讀取 AO 高階設定]	64	1	AO 1
	2817	03:2818				AO 2
	2818	03:2819				AO 3
	2819	03:2820				AO 4
	n	03:n+1			n/4-703	AO 1
	n+1	03:n+2				AO 2
	n+2	03:n+3				AO 3
	n+3	03:n+4				AO 4
	2876	03:2877			16	AO 1
	2877	03:2878				AO 2
	2878	03:2879				AO 3
	2879	03:2880				AO 4
3	3072	03:3073	Read AO Lower Limit [讀取 AO 低階設定]	64	1	AO 1
	3073	03:3074				AO 2
	3074	03:3075				AO 3
	3075	03:3076				AO 4
	n	03:n+1			n/4-767	AO 1
	n+1	03:n+2				AO 2
	n+2	03:n+3				AO 3
	n+3	03:n+4				AO 4
	3132	03:3133			16	AO 1
	3133	03:3134				AO 2
	3134	03:3135				AO 3
	3135	03:3136				AO 4
	1	---	Set Group On/Off		All	Group 1

Function Code	Register	Modscan	Command	# of Registers	LT Address	Channel
5	n	---	Set Group On/Off [控制群控]	63	All	Group n
	63	---			All	Group 63
5	64	---	Activate Pattern [觸發情境]	64	All	Pattern 1
	n	---			All	Pattern n-63
	127	---			All	Pattern 64
5	256	---	Set DO On/Off [控制單點]	128	1	DO 1
	257	---				DO 2
	258	---				DO 3
	259	---				DO 4
	260	---				DO 5
	261	---				DO 6
	262	---				DO 7
	263	---				DO 8
	n	---			n/8-31	DO 1
	n+1	---				DO 2
	n+2	---				DO 3
	n+3	---				DO 4
	n+4	---				DO 5
	n+5	---				DO 6
	n+6	---				DO 7
	n+7	---				DO 8
	376	---			16	DO 1
	377	---				DO 2
	378	---				DO 3
	379	---				DO 4
	380	---				DO 5
	381	---				DO 6
	382	---				DO 7
	383	---				DO 8

Function Code	Register	Modscan	Command	# of Registers	LT Address	Channel
5	768	---	Single DO Pulse Out [控制單 DO Pulse]	128	1	DO 1
	769	---				DO 2
	770	---				DO 3
	771	---				DO 4
	772	---				DO 5
	773	---				DO 6
	774	---				DO 7
	775	---				DO 8
	n	---			n/8-95	DO 1
	n+1	---				DO 2
	n+2	---				DO 3
	n+3	---				DO 4
	n+4	---				DO 5
	n+5	---				DO 6
	n+6	---				DO 7
	n+7	---				DO 8
	888	---			16	DO 1
	889	---				DO 2
	890	---				DO 3
	891	---				DO 4

Function Code	Register	Modscan	Command	# of Registers	LT Address	Channel
	892	---			16	DO 5
	893	---				DO 6
	894	---				DO 7
	895	---				DO 8
5	1280	---	Dual DO Pulse Out [控制雙 DO Pulse]	64	1	DO 1 to 2
	1281	---				DO 3 to 4
	1282	---				DO 5 to 6
	1283	---				DO 7 to 8
	n	---			n/4-319	DO 1 to 2
	n+1	---				DO 3 to 4
	n+2	---				DO 5 to 6
	n+3	---				DO 7 to 8
	1340	---			16	DO 1 to 2
	1341	---				DO 3 to 4
	1342	---				DO 5 to 6
	1343	---				DO 7 to 8

Function Code	Register	Modscan	Command	# of Registers	LT Address	Channel
16	96	---	Clear Latched DI [清除保全 DI]	16	1	All DI
	n	---			n-95	All DI
	111	---			16	All DI
16	164	---	Clear Pattern Activation Map [清除場景]	4	All	Patterns 1 to 16
	165	---			All	Patterns 17 to 32
	166	---			All	Patterns 33 to 48
	167	---			All	Patterns 49 to 64
16	512	---	Set AO Value [寫入AO數值]	64	1	AO 1
	513	---				AO 2
	514	---				AO 3
	515	---				AO 4
	n	---			n/4-127	AO 1
	n+1	---				AO 2
	n+2	---				AO 3
	n+3	---				AO 4
	572	---			16	AO 1
	573	---				AO 2
	574	---				AO 3
	575	---				AO 4
16	768	---	Set Authorization Mode [寫入強制控制模式]	128	1	DO 1
	769	---				DO 2
	770	---				DO 3
	771	---				DO 4
	772	---				DO 5
	773	---				DO 6
	774	---				DO 7
	775	---				DO 8
	n	---			n/8-95	DO 1
	n+1	---				DO 2
	n+2	---				DO 3
	n+3	---				DO 4
	n+4	---				DO 5
	n+5	---				DO 6

Function Code	Register	Modscan	Command	# of Registers	LT Address	Channel
	n+6	---				DO 7
	n+7	---				DO 8
	888	---			16	DO 1
	889	---				DO 2
	890	---				DO 3
	891	---				DO 4
	892	---				DO 5
	893	---				DO 6
	894	---				DO 7
	895	---				DO 8
Function Code	**Register**	**Modscan**	**Command**	**# of Registers**	**LT Address**	**Channel**
16	2816	---	Set AO Upper Limit [寫入 AO 高階設定]	64	1	AO 1
	2817	---				AO 2
	2818	---				AO 3
	2819	---				AO 4
	n	---			n/4-703	AO 1
	n+1	---				AO 2
	n+2	---				AO 3
	n+3	---				AO 4
	2876	---			16	AO 1
	2877	---				AO 2
	2878	---				AO 3
	2879	---				AO 4
16	3072	---	Set AO Lower Limit [寫入 AO 低階設定]	64	1	AO 1
	3073	---				AO 2
	3074	---				AO 3
	3075	---				AO 4
	n	---			n/4-767	AO 1
	n+1	---				AO 2
	n+2	---				AO 3
	n+3	---				AO 4
	3132	---			16	AO 1
	3133	---				AO 2
	3134	---				AO 3
	3135	---				AO 4

Command & Data Formats

Read DO Status

Command Format

✦ N = 1 to 8

Query

CC500 Address	3	Reg-H	Reg-L	0	N	CRC-L	CRC-H

Reply

CC500 Address	3	Nx2	Data1-H	Data1-L	. . .	DataN-H	DataN-L	CRC-L	CRC-H

Data Format

Byte	Data-H (high byte)								Data-L (low byte)							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Bit State	0 = Off, 1 = On															
DO	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
LT	LT n+1 (even)								LT n (odd)							

LT to Register Address Conversion

❖ Reg = (LT-1) div 2

Read DI Status

Command Format

✦ N = 1 to 16

Query

CC500 Address	3	Reg-H	Reg-L	0	N	CRC-L	CRC-H

Reply

CC500 Address	3	Nx2	Data1-H	Data1-L	. . .	DataN-H	DataN-L	CRC-L	CRC-H

Data Format

Byte	High Byte								Low Byte							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Bit State	0 = Off, 1 = On															
DI	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

LT to Register Address Conversion

❖ Reg = LT+31

Read Latched DI Status

Command Format

✦ N = 1 to 16

Query

CC500 Address	3	Reg-H	Reg-L	0	N	CRC-L	CRC-H

Reply

CC500 Address	3	Nx2	Data1-H	Data1-L	. . .	DataN-H	DataN-L	CRC-L	CRC-H

Data Format

Byte	High Byte								Low Byte							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Bit State	0 = Off, 1 = On															
DI	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

LT to Register Address Conversion

❖ Reg = LT+95

Read Group Status Map

Command Format

- N = 1 to 4

Query

CC500 Address	3	Reg-H	Reg-L	0	N	CRC-L	CRC-H

Reply

CC500 Address	3	Nx2	Data1-H	Data1-L	. . .	DataN-H	DataN-L	CRC-L	CRC-H

Data Format

Byte	Data-H (high byte)								Data-L (low byte)							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Bit State	0 = Off, 1 = On															
Groups 1 to 16	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Groups 17 to 32	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
Groups 33 to 48	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
Groups 49 to 63	---	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49

Group to Register Address Conversion

Groups	Register Address	Note
1 to 16	160	Each register has the status of 16 groups
17 to 32	161	
33 to 48	162	
49 to 63	163	This last register has the status of 15 groups only

Read Pattern Activation Map

Command Format

✦ N = 1 to 4

Query

CC500 Address	3	Reg-H	Reg-L	0	N	CRC-L	CRC-H

Reply

CC500 Address	3	Nx2	Data1-H	Data1-L	. . .	DataN-H	DataN-L	CRC-L	CRC-H

Data Format

Byte	Data-H (high byte)								Data-L (low byte)							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Bit State	0 = Not activated, 1 = Activated															
Patterns 1 to 16	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Patterns 17 to 32	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
Patterns 33 to 48	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
Patterns 49 to 64	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49

Patterns to Register Address Conversion

Patterns	Register Address
1 to 16	164
17 to 32	165
33 to 48	166
49 to 64	167

✶ Note that there are 64 patterns but only 63 groups.

Read LT Alive Status Map

Command Format

✦ N = 1

Query

CC500 Address	3	Reg-H	Reg-L	0	N	CRC-L	CRC-H

Reply

CC500 Address	3	Nx2	Data1-H	Data1-L	. . .	DataN-H	DataN-L	CRC-L	CRC-H

Data Format

Byte	Data-H (high byte)								Data-L (low byte)							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Bit State	0 = Not alive or not present, 1 = Alive															
LT 1 to 16	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
LT 17 to 32	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
LT 33 to 48	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
LT 49 to 64	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49

LT to Register Address Conversion

LT	Register Address
1 to 16	168
17 to 32	169
33 to 48	170
49 to 64	171

✶ Note that there are 64 patterns but only 63 groups.

Read AI Value

Command Format

- N = 1 to 64

Query

CC500 Address	3	Reg-H	Reg-L	0	N	CRC-L	CRC-H

Reply

CC500 Address	3	Nx2	0	Data1-L	. . .	0	DataN-L	CRC-L	CRC-H

Data Format

- AI Value = Data-L x 1%

LT to Register Address Conversion

- Reg = (LT+63) x 4 + (AI-1)

Read AO Value

Command Format

- N = 1 to 64

Query

CC500 Address	3	Reg-H	Reg-L	0	N	CRC-L	CRC-H

Reply

CC500 Address	3	Nx2	0	Data1-L	. . .	0	DataN-L	CRC-L	CRC-H

Data Format

- AO Value = Data-L x 1%

LT to Register Address Conversion

- Reg = (LT+127) x 4 + (AO-1)

Read Authorization Mode

Command Format

✦ N = 1 to 125

Query

CC500 Address	3	Reg-H	Reg-L	0	N	CRC-L	CRC-H

Reply

CC500 Address	3	Nx2	0	Data1-L	. . .	0	DataN-L	CRC-L	CRC-H

Data Format

Data-L	Mode
0	**No LT present**
1	**Local Off [本地 Off]**
2	**Local On [本地 On]**
3	**Forced Off [強制 Off]**
4	**Forced On [強制 On]**

LT to Register Address Conversion

❖ Reg = (LT+95) x 8 + (DO-1)

Read AO Upper Limit

Command Format

✦ N = 1 to 64

Query

CC500 Address	3	Reg-H	Reg-L	0	N	CRC-L	CRC-H

Reply

CC500 Address	3	Nx2	0	Data1-L	. . .	0	DataN-L	CRC-L	CRC-H

Data Format

✦ AO Upper Limit = Data-L x 1%

LT to Register Address Conversion

❖ Reg = (LT+703) x 4 + (AO-1)

Read AO Lower Limit

Command Format

✦ N = 1 to 64

Query

CC500 Address	3	Reg-H	Reg-L	0	N	CRC-L	CRC-H

Reply

CC500 Address	3	Nx2	0	Data1-L	. . .	0	DataN-L	CRC-L	CRC-H

Data Format

✦ AO Lower Limit = Data-L x 1%

LT to Register Address Conversion

❖ Reg = (LT+767) x 4 + (AO-1)

Set Group On/Off

Data Format

Set Group To	Value
On	255
Off	0

Command Format

Query and Reply

CC500 Address	5	Reg-H	Reg-L	Group On/Off	0	CRC-L	CRC-H

Group to Register Address Conversion

- Reg = Group

Activate Pattern

Data Format

- Patterns can only be activated, the activation code is 255, there is no off for a pattern.

Command Format

Query and Reply

CC500 Address	5	Reg-H	Reg-L	255	0	CRC-L	CRC-H

Pattern to Register Address Conversion

- Reg = Pattern + 63

Set DO On/Off

Data Format

Set DO To	Value
On	255
Off	0

Command Format

Query and Reply

CC500 Address	5	Reg-H	Reg-L	DO On/Off	0	CRC-L	CRC-H

LT to Register Address Conversion

- Reg = (LT + 31) x 8 + (DO - 1)

Single DO Pulse Out

Command Format

Query and Reply

CC500 Address	5	Reg-H	Reg-L	255	0	CRC-L	CRC-H

LT to Register Address Conversion

- Reg = (LT + 95) x 8 + (DO - 1)

Dual DO Pulse Out

Command Format

Query and Reply

CC500 Address	5	Reg-H	Reg-L	255	0	CRC-L	CRC-H

LT to Register Address Conversion

- Reg = (LT + 319) x 4 + (DO - 1) div 2

Clear Latched DI

Data Format

- N = 1 to 4
- The data written is a mask and each DI can be cleared independently.

DI	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Bit State	0 = Clear, 1 = Don't Clear															
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Byte	Data-H (high byte)								Data-L (low byte)							

Command Format

Query

CC500 Address	16	Reg-H	Reg-L	0	N	Nx2	Data1-H DI 9~16 Mask	Data1-L DI 1~8 Mask	...	DataN-H DI 9~16 Mask	DataN-L DI 1~8 Mask	CRC-L	CRC-H

Reply

CC500 Address	16	Reg-H	Reg-L	0	N	CRC-L	CRC-H

LT to Register Address Conversion

- Reg = LT + 95

Clear Pattern Activation Map

Data Format

- There are 64 patterns, which are grouped into 4 registers of 16 patterns each.
- Each pattern is represented by a bit. Each pattern can be cleared independently.
- N = 1 to 4

Patterns 1 to 16	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Patterns 17 to 32	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
Patterns 33 to 48	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
Patterns 49 to 64	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
Bit State	0 = clear, 1 = don't clear															
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Byte	Data-H								Data-L (low byte)							

Command Format

Query

CC500 Address	16	Reg-H	Reg-L	0	N	Nx2	Data1-H Mask	Data1-L Mask	. . .	DataN-H Mask	DataN-L Mask	CRC-L	CRC-H

Reply

CC500 Address	16	Reg-H	Reg-L	0	N	CRC-L	CRC-H

Patterns to Register Address Conversion

Patterns	Register Address
1 to 16	164
17 to 32	165
33 to 48	166
49 to 64	167

Set AO Value

Data Format

- N = 1 to 4
- Allowed AO Values: 0 to 100%
- Data-L = AO Value / 1%

Command Format

Query

CC500 Address	16	Reg-H	Reg-L	0	N	Nx2	0	Data1-L	...	0	DataN-L	CRC-L	CRC-H

Reply

CC500 Address	16	Reg-H	Reg-L	0	N	CRC-L	CRC-H

LT to Register Address Conversion

- Reg = (LT + 127) x 4 + (AO - 1)

Set Authorization Mode

Data Format

- N = 1 to 4

Mode	Data-L
Local Mode [本地模式]	**1**
	2
Forced Off [強制 Off 模式]	**3**
Forced On [強制 On 模式]	**4**

Command Format

Query

CC500 Address	16	Reg-H	Reg-L	0	N	Nx2	0	Data1-L	...	0	DataN-L	CRC-L	CRC-H

Reply

CC500 Address	16	Reg-H	Reg-L	0	N	CRC-L	CRC-H

LT to Register Address Conversion

- Reg = (LT + 95) x 8 + (DO - 1)

Set AO Upper Limit

Data Format

- N = 1 to 4
- Allowed AO Upper Limit Values: 0 to 100%
- Data-L = AO Upper Limit / 1%

Command Format

Query

CC500 Address	16	Reg-H	Reg-L	0	N	Nx2	0	Data1-L	...	0	DataN-L	CRC-L	CRC-H

Reply

CC500 Address	16	Reg-H	Reg-L	0	N	CRC-L	CRC-H

LT to Register Address Conversion

- Reg = (LT + 703) x 4 + (AO - 1)

Set AO Lower Limit

Data Format

- N = 1 to 4
- Allowed AO Lower Limit Values: 0 to 100%
- Data-L = AO Lower Limit / 1%

Command Format

Query

CC500 Address	16	Reg-H	Reg-L	0	N	Nx2	0	Data1-L	...	0	DataN-L	CRC-L	CRC-H

Reply

CC500 Address	16	Reg-H	Reg-L	0	N	CRC-L	CRC-H

LT to Register Address Conversion

- Reg = (LT + 767) x 4 + (AO - 1)

Examples

Read DO Status

- CC500 Address 1
- LT address 15 and 16
  - Register Address = (15 - 1) div 2 = 7
    - RH = 7 div 256 = 0
    - RL = 7 mod 256 = 7

Query

CC500 Address	Function Code	Register Address		Number of Points		CRC	
		high (RH)	low (RL)	high	low	low	high
1	3	0	7	0	1	53	203

Reply

CC500 Address	Function Code	Byte Count	Read Data		CRC	
			high (DH)	low (DL)	low	high
1	3	2	0xAB	0xCD	6	225

Byte	High Byte (DH)								Low Byte (DL)							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Data	0xA				0xB				0xC				0xD			
	1	0	1	0	1	0	1	1	1	1	0	0	1	1	0	1
Status	On	Off	On	Off	On	Off	On	On	On	On	Off	Off	On	On	Off	On
DO	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
LT	LT 16								LT 15							

Read DI Status

- CC500 Address 1
- LT address 6
  - Register Address = 6 + 31 = 37
    - RH = 37 div 256 = 0
    - RL = 37 mod 256 = 37

Query

CC500 Address	Function Code	Register Address		Number of Points		CRC	
		high (RH)	low (RL)	high	low	low	high
1	3	0	37	0	1	149	193

Reply

CC500 Address	Function Code	Byte Count	Read Data		CRC	
			high (DH)	low (DL)	low	high
1	3	2	0xCD	0xEF	173	88

Byte	High Byte (DH)								Low Byte (DL)							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Data	0xC				0xD				0xE				0xF			
	1	1	0	0	1	1	0	1	1	1	1	0	1	1	1	1
Status	On	On	Off	Off	On	On	Off	On	On	On	On	Off	On	On	On	On
DI	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Read Latched DI Status

- CC500 Address 1
- LT address 14
  - Register Address = 14 + 95 = 109
    - RH = 109 div 256 = 0
    - RL = 109 mod 256 = 109

Query

CC500 Address	Function Code	Register Address		Number of Points		CRC	
		high (RH)	low (RL)	high	low	low	high
1	3	0	109	0	1	21	215

Reply

CC500 Address	Function Code	Byte Count	Read Data		CRC	
			high (DH)	low (DL)	low	high
1	3	2	0x78	0x9A	26	47

Byte	high byte (DH)								low byte (DL)							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Data	0x7				0x8				0x9				0xA			
	0	1	1	1	1	0	0	0	1	0	0	1	1	0	1	0
Status	Off	On	On	On	On	Off	Off	Off	On	Off	Off	On	On	Off	On	Off
DI	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Read Group Status Map

- CC500 Address 1
- Read Groups 1 to 63
  - Starting Register Address = 160
    - RH = 160 div 256 = 0
    - RL = 160 mod 256 = 160

Query

CC500 Address	Function Code	Register Address		Number of Points		CRC	
		high (RH)	low (RL)	high	low	low	high
1	3	0	160	0	4	68	43

Reply

CC500 Address	Function Code	Byte Count	Read Data				
			D1	D2	D3	D4	...
1	3	2	0x12	0x34	0x56	0x78	

...	Read Data				CRC	
	D5	D6	D7	D8	low	high
	0x9A	0xBC	0xDE	0xF0	4	133

Byte	D1								D2							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Data	0x1				0x2				0x3				0x4			
	0	0	0	1	0	0	1	0	0	0	1	1	0	1	0	0
Status	Off	Off	Off	On	Off	Off	On	Off	Off	Off	On	On	Off	On	Off	Off
Group	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Byte	D3								D4							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Data	0x5				0x6				0x7				0x8			
	0	1	0	1	0	1	1	0	0	1	1	1	1	0	0	0
Status	Off	On	Off	On	Off	On	On	Off	Off	On	On	On	On	Off	Off	Off
Group	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

Byte	D5								D6							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Data	0x9				0xA				0xB				0xC			
	1	0	0	1	1	0	1	0	1	0	1	1	1	1	0	0
Status	On	Off	Off	On	On	Off	On	Off	On	Off	On	On	On	On	Off	Off
Group	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33

Byte	D7								D8							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Data	0xD				0xE				0xF				0x0			
	1	1	0	1	1	1	1	0	1	1	1	1	0	0	0	0
Status	On	On	Off	On	On	On	On	Off	On	On	On	On	Off	Off	Off	Off

Byte	D7								D8							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Group	---	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49

Read Pattern Activation Map

- CC500 Address 1
- Read Patterns 1 to 64
  - Starting Register Address = 164
    - RH = 164 div 256 = 0
    - RL = 164 mod 256 = 164

Query

CC500 Address	Function Code	Register Address		Number of Points		CRC	
		high (RH)	low (RL)	high	low	low	high
1	3	0	164	0	4	5	234

Reply

CC500 Address	Function Code	Byte Count	Read Data				
			D1	D2	D3	D4	...
1	3	2	0x12	0x34	0x56	0x78	

...	Read Data				CRC	
	D5	D6	D7	D8	low	high
	0x9A	0xBC	0xDE	0xF0	4	133

Byte	D1								D2							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Data	0x1				0x2				0x3				0x4			
	0	0	0	1	0	0	1	0	0	0	1	1	0	1	0	0
Status	---	---	---	Act	---	---	Act	---	---	---	Act	Act	---	Act	---	---
Pattern	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Byte	D3								D4							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Data	0x5				0x6				0x7				0x8			
	0	1	0	1	0	1	1	0	0	1	1	1	1	0	0	0
Status	---	Act	---	Act	---	Act	Act	---	---	Act	Act	Act	Act	---	---	---
Pattern	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

Byte	D5								D6							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Data	0x9				0xA				0xB				0xC			
	1	0	0	1	1	0	1	0	1	0	1	1	1	1	0	0
Status	Act	---	---	Act	Act	---	Act	---	Act	---	Act	Act	Act	Act	---	---
Pattern	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33

Byte	D7								D8							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Data	0xD				0xE				0xF				0x0			
	1	1	0	1	1	1	1	0	1	1	1	1	0	0	0	0
Status	Act	Act	---	Act	Act	Act	Act	---	Act	Act	Act	Act	---	---	---	---
Pattern	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49

Read LT Alive Status Map

- CC500 Address 1
- Read Alive Status for LT 1 to 16
  - Starting Register Address = 168
    - RH = 168 div 256 = 0
    - RL = 168 mod 256 = 168

Query

CC500 Address	Function Code	Register Address		Number of Points		CRC	
		high (RH)	low (RL)	high	low	low	high
1	3	0	168	0	1	5	234

Reply

CC500 Address	Function Code	Byte Count	Read Data		CRC	
			DH	DL	low	high
1	3	2	0x12	0x34	181	51

Byte	DH								DL							
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Data	0x1				0x2				0x3				0x4			
	0	0	0	1	0	0	1	0	0	0	1	1	0	1	0	0
Status	---	---	---	Alive	---	---	Alive	---	---	---	Alive	Alive	---	Alive	---	---
LT	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Read AI Value

- CC500 Address 1
- LT address 16, AI 3
  - Register Address = (16 + 63) x 4 + (3 - 1) = 318
    - RH = 318 div 256 = 1
    - RL = 318 mod 256 = 62

Query

CC500 Address	Function Code	Register Address		Number of Points		CRC	
		high (RH)	low (RL)	high	low	low	high
1	3	1	62	0	1	228	58

Reply

CC500 Address	Function Code	Byte Count	Read Data		CRC	
			high (DH)	low (DL)	low	high
1	3	2	0	76	185	177

- DL = 76
  - AI Value = 76 x 1% = 76%

Read AO Value

- CC500 Address 1
- LT address 5, AI 4
  - Register Address = (5 + 127) x 4 + (4 - 1) = 135
    - RH = 135 div 256 = 0
    - RL = 135 mod 256 = 135

Query

CC500 Address	Function Code	Register Address		Number of Points		CRC	
		high (RH)	low (RL)	high	low	low	high
1	3	0	135	0	1	52	35

Reply

CC500 Address	Function Code	Byte Count	Read Data		CRC	
			high (DH)	low (DL)	low	high
1	3	2	0	46	56	88

- DL = 46
  - AO Value = 46 * 1% = 46%

Example 1 - Read Authorization Mode for One DO

- CC500 Address 1
- LT address 2, read mode for DO 8
  - Register Address = (2 + 95) x 8 + (8 - 1) = 783
    - RH = 783 div 256 = 3
    - RL = 783 mod 256 = 15

Query

CC500 Address	Function Code	Register Address		Number of Points		CRC	
		high (RH)	low (RL)	high	low	low	high
1	3	3	15	0	1	180	77

Reply

CC500 Address	Function Code	Byte Count	Read Data		CRC	
			high	low (DL)	low	high
1	3	2	0	3	248	69

- DL = 3
  - DO 8 Mode = Forced Off

Example 2 - Read Authorization Mode for Four DOs

- Note that a maximum of 4 authorization modes can be read at a time.
- CC500 Address 1
- LT address 14, read modes for DO 5 to 8
  - Register Address = (14 + 95) x 8 + (5 - 1) = 876
    - RH = div 256 = 3
    - RL = mod 256 = 108

Query

CC500 Address	Function Code	Register Address		Number of Points		CRC	
		high (RH)	low (RL)	high	low	low	high
1	3	3	108	0	4	132	80

Reply

CC500 Address	Function Code	Byte Count	Read Data 1		Read Data 2		...
			high	low (D1)	high	low (D2)	
1	3	8	0	1	0	2	

...	Read Data 3		Read Data 4		CRC	
	high	low (D3)	high	low (D4)	low	high
	0	3	0	4	13	20

- D1 = 1
  - DO 5 Mode = Local Off
- D2 = 2
  - DO 6 Mode = Local On

- D3 = 3
  - DO 7 Mode = Forced Off
- D4 = 4
  - DO 8 Mode = Forced On

Read AO Upper Limit

- CC500 Address 1
- LT address 1, AO 3
  - Register Address = (1 + 703) x 4 + (3 - 1) = 2818
    - RH = 2818 div 256 = 11
    - RL = 2818 mod 256 = 2

Query

CC500 Address	Function Code	Register Address		Number of Points		CRC	
		high (RH)	low (RL)	high	low	low	high
1	3	11	2	0	1	39	238

Reply

CC500 Address	Function Code	Byte Count	Read Data		CRC	
			high (DH)	low (DL)	low	high
1	3	2	0	80	184	120

- DL = 80
  - AO Upper Limit = 80 x 1% = 80%

Read AO Lower Limit

- CC500 Address 1
- LT address 9, AO 1
  - Register Address = (9 + 767) x 4 + (1 - 1) = 3104
    - RH = 3104 div 256 = 12
    - RL = 3104 mod 256 = 32

Query

CC500 Address	Function Code	Register Address		Number of Points		CRC	
		high (RH)	low (RL)	high	low	low	high
1	3	12	32	0	1	134	144

Reply

CC500 Address	Function Code	Byte Count	Read Data		CRC	
			high (DH)	low (DL)	low	high
1	3	2	0	25	121	142

- DL = 25
  - AO Lower Limit = 25 x 1% = 25%

Set Group On/Off

Example 1 - Set Group to On

- CC500 Address 1
- Set Group 27 To On
  - Register Address = 27
    - RH = 27 div 256 = 0
    - RL = 27 mod 256 = 27
  - Group On
    - DH = 255

Query and Reply

CC500 Address	Function Code	Starting Register		Force Data		CRC	
		high (RH)	low (RL)	high (DH)	low	low	high
1	5	0	27	255	0	252	61

Example 2 - Set Group to Off

- CC500 Address 1
- Set Group 63 To Off
  - Register Address = 63
    - RH = 63 div 256 = 0
    - RL = 63 mod 256 = 63
  - Group Off
    - DH = 0

Query and Reply

CC500 Address	Function Code	Starting Register		Force Data		CRC	
		high (RH)	low (RL)	high (DH)	low	low	high
1	5	0	63	0	0	253	198

Activate Pattern

- CC500 Address 1
- Activate Pattern 7
  - Register Address = 7 + 63 = 70
    - RH = 70 div 256 = 0
    - RL = 70 mod 256 = 70
  - Activate Pattern
    - DH = 255

Query and Reply

CC500 Address	Function Code	Starting Register		Force Data		CRC	
		high (RH)	low (RL)	high (DH)	low	low	high
1	5	0	70	255	0	109	239

Example 1 - Set DO to On

- CC500 Address 1
- LT address 7, DO 6 to ON
  - Register Address = (7 + 31) x 8 + (6 - 1) = 309
    - RH = 309 div 256 = 1
    - RL = 309 mod 256 = 53
  - DO On = 255

Query and Reply

CC500 Address	Function Code	Starting Register		Force Data		CRC	
		high (RH)	low (RL)	high (DO)	low	low	high
1	5	1	53	255	0	157	200

Example 2 - Set DO to Off

- CC500 Address 1
- LT address 5, DO 3 to ON
  - Register Address = (5 + 31) x 8 + (3 - 1) = 290
    - RH = 290 div 256 = 1
    - RL = 290 mod 256 = 34
  - DO Off = 0

Query and Reply

CC500 Address	Function Code	Starting Register		Force Data		CRC	
		high (RH)	low (RL)	high (DO)	low	low	high
1	5	1	34	0	0	108	60

Single DO Pulse Out

- CC500 Address 1
- Send out pulse from LT 15, DO 6
  - Register Address = (15 + 95) x 8 + (6 - 1) = 885
    - RH = 885 div 256 = 3
    - RL = 885 mod 256 = 117
  - Pulse Out
    - DH = 255

Query and Reply

CC500 Address	Function Code	Starting Register		Force Data		CRC	
		high (RH)	low (RL)	high (DH)	low	low	high
1	5	3	117	255	0	157	164

Dual DO Pulse Out

- CC500 Address 1
- Send out a pulse from both DO 7 and 8 simultaneously on LT 4
  - Register Address = (4 + 319) x 4 + (7 - 1) div 2 = 1295
    - RH = 1295 div 256 = 5
    - RL = 1295 mod 256 = 15
  - Pulse Out
    - DH = 255

Query and Reply

CC500 Address	Function Code	Starting Register		Force Data		CRC	
		high (RH)	low (RL)	high (DH)	low	low	high
1	5	5	15	255	0	188	245

Example 1 - Clear Some Latched DIs For One LT

- CC500 Address 1
- LT address 7
  - Register Address = 7 + 95 = 102
    - RH = 102 div 256 = 0
    - RL = 102 mod 256 = 102
- Data mask for the Latched DIs to be cleared:

DI	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
State	---	Clr	---	Clr	---	Clr	---	---	---	---	Clr	Clr	---	---	Clr	---
Data	1	0	1	0	1	0	1	1	1	1	0	0	1	1	0	1
	0xA				0xB				0xC				0xD			
Bit #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Byte	high byte (DH)								low byte (DL)							

Query

CC500 Address	Function Code	Register Address		Number of Registers		Byte Count	Write Data		CRC	
		high (RH)	low (RL)	high	low		high (DH)	low (DL)	low	high
1	16	0	102	0	1	2	0xAB	0xCD	17	51

Reply

CC500 Address	Function Code	Register Address		Number of Registers		CRC	
		high (RH)	low (RL)	high	low	low	high
1	16	0	102	0	1	225	214

Example 2 - Clear All Latched DIs For 4 LTs

- ✳ Note that 4 is the maximum number of Latched DIs that can be cleared at a time.
- CC500 Address 1
- LT 11 to 14
  - Starting Register Address = 11 + 95 = 106
    - RH = 106 div 256 = 0
    - RL = 106 mod 256 = 106
  - Number of Registers = 4
  - Byte Count = 8
- Clearing a latched DI sets its bit to zero, so clearing all DIs would set the entire data mask to zero.
  - D1, D2, D3, D4, D5, D6, D7, D8 = 0

Query

CC500 Address	Function Code	Register Address		Number of Registers		Byte Count	Write Data		...
		high (RH)	low (RL)	high	low		D1	D2	
1	16	0	106	0	4	8	0	0	...

...	Write Data						CRC	
	D3	D4	D5	D6	D7	D8	low	high
...	0	0	0	0	0	0	46	226

Reply

CC500 Address	Function Code	Register Address		Number of Registers		CRC	
		high (RH)	low (RL)	high	low	low	high
1	16	0	106	0	4	225	214

Clear Pattern Activation Map

- CC500 Address 1
- Patterns 1 to 16
  - Register Address = 164
    - RH = 164 div 256 = 0
    - RL = 164 mod 256 = 164
- Clear Activation Status for all Patterns
  - D1, D2 = 0

Query

CC500 Address	Function Code	Register Address		Number of Registers		Byte Count	Write Data		CRC	
		high (RH)	low (RL)	high	low		D1	D2	low	high
1	16	0	164	0	1	2	0	0	191	116

Reply

CC500 Address	Function Code	Register Address		Number of Registers		CRC	
		high (RH)	low (RL)	high	low	low	high
1	16	0	164	0	4	128	41

Set AO Value

- CC500 Address 1
- LT address 13, AO 1
  - Register Address = (13 + 127) x 4 + (1 - 1) = 560
    - RH = 560 div 256 = 2
    - RL = 560 mod 256 = 48
- AO Value = 50%
  - DL = 50% / 1% = 50

✶ Note that the allowed values for AO is from 0 to 100%.

Query

CC500 Address	Function Code	Register Address		Number of Registers		Byte Count	Write Data		CRC	
		high (RH)	low (RL)	high	low		high (DH)	low (DL)	low	high
1	16	2	48	0	1	2	0	50	1	181

Reply

CC500 Address	Function Code	Register Address		Number of Registers		CRC	
		high (RH)	low (RL)	high	low	low	high
1	16	2	48	0	1	0	126

Set Authorization Mode

- CC500 Address 1
- LT address 1, DO 1
  - Register Address = (1 + 95) x 8 + (1 - 1) = 768
    - RH = 768 div 256 = 3
    - RL = 768 mod 256 = 0
- Set Authorization Mode to Forced On
  - DL = 4

Query

CC500 Address	Function Code	Register Address		Number of Registers		Byte Count	Write Data		CRC	
		high (RH)	low (RL)	high	low		high (DH)	low (DL)	low	high
1	16	3	0	0	1	2	0	4	148	147

Reply

CC500 Address	Function Code	Register Address		Number of Registers		CRC	
		high (RH)	low (RL)	high	low	low	high
1	16	3	0	0	1	1	141

Set AO Upper Limit

- CC500 Address 1
- LT address 1, AO 1
  - Register Address = (1 + 703) x 4 + (1 - 1) = 2816
    - RH = 2816 div 256 = 11
    - RL = 2816 mod 256 = 0
- Set AO Upper Limit to 85%
  - DL = 85% / 1% = 85

Query

CC500 Address	Function Code	Register Address		Number of Registers		Byte Count	Write Data		CRC	
		high (RH)	low (RL)	high	low		high (DH)	low (DL)	low	high
1	16	11	0	0	1	2	0	85	220	175

Reply

CC500 Address	Function Code	Register Address		Number of Registers		CRC	
		high (RH)	low (RL)	high	low	low	high
1	16	11	0	0	1	3	237

Set AO Lower Limit

- CC500 Address 1
- LT address 4, AO 4
  - Register Address = (4 + 767) x 4 + (4 - 1) = 3087
    - RH = 3087 div 256 = 12
    - RL = 3087 mod 256 = 15
- Set AO Upper Limit to 10%
  - DL = 10% / 1% = 10

Query

CC500 Address	Function Code	Register Address		Number of Registers		Byte Count	Write Data		CRC	
		high (RH)	low (RL)	high	low		high (DH)	low (DL)	low	high
1	16	12	15	0	1	2	0	10	234	168

Reply

CC500 Address	Function Code	Register Address		Number of Registers		CRC	
		high (RH)	low (RL)	high	low	low	high
1	16	12	15	0	1	50	154

CRC Computation

The CC500 conforms to the Modbus/RTU protocol and thus uses CRC16 for its error checking. The computed CRC is appended to the end of the message with the LSB first and then the MSB. Below is the pseudo code for computing the CRC as used by the standard Modbus/RTU. The pseudo code is written in the Ruby language and can be directly used as such.

Definition

```
def get_crc (*byte_array)
    sum = 0xFFFF
    byte_array.each do |byte|
      sum ^= byte
      8.times do
        carry = (1 == sum & 1)
        sum = 0x7FFF & (sum >> 1)
        sum ^= 0xA001 if carry
    end
  end
  return [sum & 0xFF, sum >> 8]
end
```

Usage

```
>> crc = get_crc(1,3,0,141,0,5)
=> [21, 226]        <---- [CRC low byte, CRC high byte]
```

Terms and Abbreviations

div

Operator that gives the quotient after an integer division. Example: 773 div 256 = 3

mod

Operator that gives the remainder after an integer division. Example: 773 mod 256 = 5

Reg-H

Short for Register Address High byte.

Reg-L

Short for Register Address Low byte.

CRC

Short for Cyclic Redundancy Code.

CRC-H

Short for CRC High byte.

CRC-L

Short for CRC Low byte.

-H

Suffix to indicate the high byte of a word-sized data.

-L

Suffix to indicate the lower byte of a word-sized data.

DO

Short for Discrete Output (also known as Digital Output).

DI

Short for Discrete Input (also known as Digital Input).

AO

Short for Analog Output.

AI

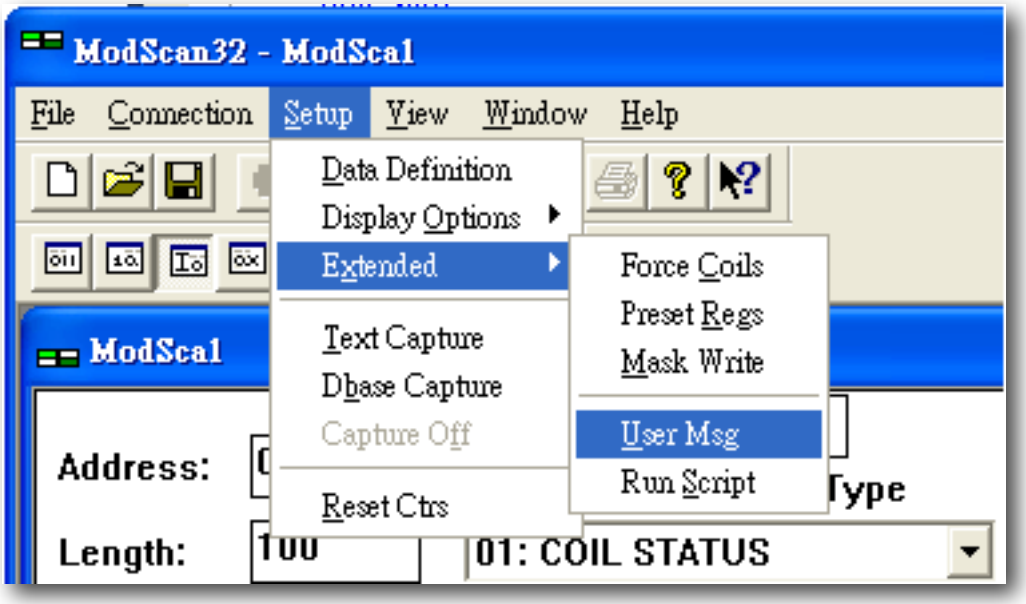
Short for Analog Input.

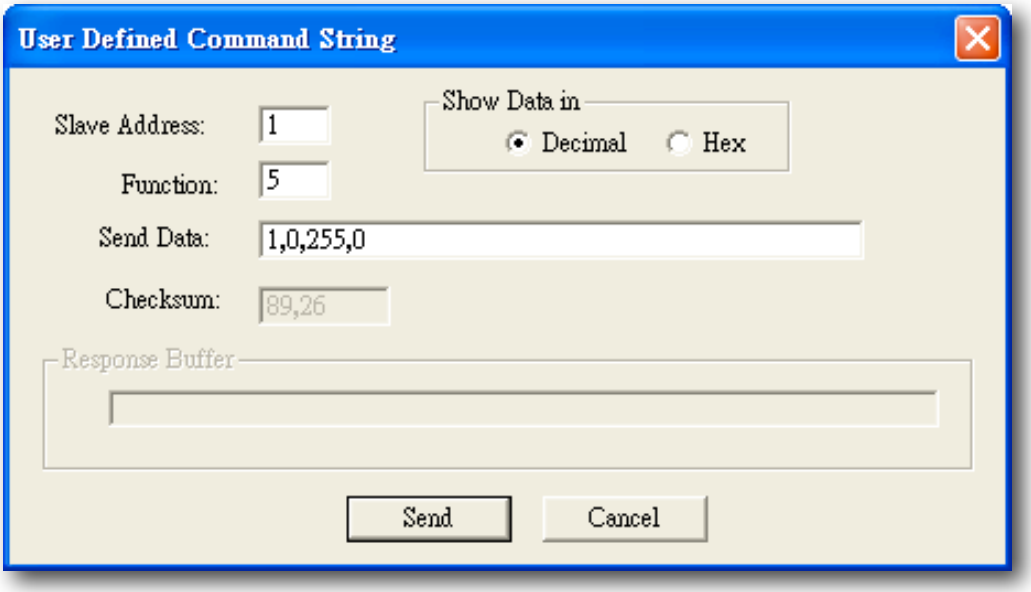
Notes on Using Modscan

This is not a manual of Modscan, but only a short note describing its manual commands capability.

Most users are familiar with Modscan's ability to read and continuously poll a designated device using Modbus commands 1 to 4. But in addition, Modscan also has the ability to issue other commands as well.

For the CC500, function code 5 and 16 needs to be issued as well. To issue them, first make sure that the connection has already been established and running then go to the menu and run the dialog box "User Defined Command String" from [Setup->Extended->User Msg] as shown in the screen captures below:





Additional Resources

Although every effort has been taken to ensure that this document is free from errors, some may still remain. If found please send an email to: info@daeinstrument.com, in the subject line write “Errata” and please indicate the name of this document “CC500 Modbus Reference”, revision number, page number and indicate the error with its correction.

We have made sure that this document is as clear and useful to you as possible, but any suggestions on improving this document to serve you even better would be welcome. Send comments and suggestions to: info@daeinstrument.com, in the subject line, write “Comments” and please indicate the name of this document “CC500 Modbus Reference”. Questions are also welcome.

This document only covers the Modbus protocol registers as used by the CC500 gateway, for hardware interfacing and other information please refer to the other documentation for the CC500.

Precomputed Tables

These precomputed tables are for control commands function code 5 only. The CC500 device address is assumed to be set to 1. The CRC is the last two bytes of the command query and is included in the command query.

Set Group Off/On

Group	Group Off Command Query	Group On Command Query	Group	Group Off Command Query	Group On Command Query
1	1,5,0,1,0,0,156,10	1,5,0,1,255,0,221,250	2	1,5,0,2,0,0,108,10	1,5,0,2,255,0,45,250
3	1,5,0,3,0,0,61,202	1,5,0,3,255,0,124,58	4	1,5,0,4,0,0,140,11	1,5,0,4,255,0,205,251
5	1,5,0,5,0,0,221,203	1,5,0,5,255,0,156,59	6	1,5,0,6,0,0,45,203	1,5,0,6,255,0,108,59
7	1,5,0,7,0,0,124,11	1,5,0,7,255,0,61,251	8	1,5,0,8,0,0,76,8	1,5,0,8,255,0,13,248
9	1,5,0,9,0,0,29,200	1,5,0,9,255,0,92,56	10	1,5,0,10,0,0,237,200	1,5,0,10,255,0,172,56
11	1,5,0,11,0,0,188,8	1,5,0,11,255,0,253,248	12	1,5,0,12,0,0,13,201	1,5,0,12,255,0,76,57
13	1,5,0,13,0,0,92,9	1,5,0,13,255,0,29,249	14	1,5,0,14,0,0,172,9	1,5,0,14,255,0,237,249
15	1,5,0,15,0,0,253,201	1,5,0,15,255,0,188,57	16	1,5,0,16,0,0,204,15	1,5,0,16,255,0,141,255
17	1,5,0,17,0,0,157,207	1,5,0,17,255,0,220,63	18	1,5,0,18,0,0,109,207	1,5,0,18,255,0,44,63
19	1,5,0,19,0,0,60,15	1,5,0,19,255,0,125,255	20	1,5,0,20,0,0,141,206	1,5,0,20,255,0,204,62
21	1,5,0,21,0,0,220,14	1,5,0,21,255,0,157,254	22	1,5,0,22,0,0,44,14	1,5,0,22,255,0,109,254
23	1,5,0,23,0,0,125,206	1,5,0,23,255,0,60,62	24	1,5,0,24,0,0,77,205	1,5,0,24,255,0,12,61
25	1,5,0,25,0,0,28,13	1,5,0,25,255,0,93,253	26	1,5,0,26,0,0,236,13	1,5,0,26,255,0,173,253
27	1,5,0,27,0,0,189,205	1,5,0,27,255,0,252,61	28	1,5,0,28,0,0,12,12	1,5,0,28,255,0,77,252
29	1,5,0,29,0,0,93,204	1,5,0,29,255,0,28,60	30	1,5,0,30,0,0,173,204	1,5,0,30,255,0,236,60
31	1,5,0,31,0,0,252,12	1,5,0,31,255,0,189,252	32	1,5,0,32,0,0,204,0	1,5,0,32,255,0,141,240
33	1,5,0,33,0,0,157,192	1,5,0,33,255,0,220,48	34	1,5,0,34,0,0,109,192	1,5,0,34,255,0,44,48
35	1,5,0,35,0,0,60,0	1,5,0,35,255,0,125,240	36	1,5,0,36,0,0,141,193	1,5,0,36,255,0,204,49
37	1,5,0,37,0,0,220,1	1,5,0,37,255,0,157,241	38	1,5,0,38,0,0,44,1	1,5,0,38,255,0,109,241
39	1,5,0,39,0,0,125,193	1,5,0,39,255,0,60,49	40	1,5,0,40,0,0,77,194	1,5,0,40,255,0,12,50
41	1,5,0,41,0,0,28,2	1,5,0,41,255,0,93,242	42	1,5,0,42,0,0,236,2	1,5,0,42,255,0,173,242
43	1,5,0,43,0,0,189,194	1,5,0,43,255,0,252,50	44	1,5,0,44,0,0,12,3	1,5,0,44,255,0,77,243
45	1,5,0,45,0,0,93,195	1,5,0,45,255,0,28,51	46	1,5,0,46,0,0,173,195	1,5,0,46,255,0,236,51
47	1,5,0,47,0,0,252,3	1,5,0,47,255,0,189,243	48	1,5,0,48,0,0,205,197	1,5,0,48,255,0,140,53
49	1,5,0,49,0,0,156,5	1,5,0,49,255,0,221,245	50	1,5,0,50,0,0,108,5	1,5,0,50,255,0,45,245
51	1,5,0,51,0,0,61,197	1,5,0,51,255,0,124,53	52	1,5,0,52,0,0,140,4	1,5,0,52,255,0,205,244
53	1,5,0,53,0,0,221,196	1,5,0,53,255,0,156,52	54	1,5,0,54,0,0,45,196	1,5,0,54,255,0,108,52
55	1,5,0,55,0,0,124,4	1,5,0,55,255,0,61,244	56	1,5,0,56,0,0,76,7	1,5,0,56,255,0,13,247
57	1,5,0,57,0,0,29,199	1,5,0,57,255,0,92,55	58	1,5,0,58,0,0,237,199	1,5,0,58,255,0,172,55
59	1,5,0,59,0,0,188,7	1,5,0,59,255,0,253,247	60	1,5,0,60,0,0,13,198	1,5,0,60,255,0,76,54
61	1,5,0,61,0,0,92,6	1,5,0,61,255,0,29,246	62	1,5,0,62,0,0,172,6	1,5,0,62,255,0,237,246
63	1,5,0,63,0,0,253,198	1,5,0,63,255,0,188,54	---	---	---

Activate Pattern

Pat	Activate Pattern Command Query	Pat	Activate Pattern Command Query	Pat	Activate Pattern Command Query	Pat	Activate Pattern Command Query
1	1,5,0,64,255,0,141,238	2	1,5,0,65,255,0,220,46	3	1,5,0,66,255,0,44,46	4	1,5,0,67,255,0,125,238
5	1,5,0,68,255,0,204,47	6	1,5,0,69,255,0,157,239	7	1,5,0,70,255,0,109,239	8	1,5,0,71,255,0,60,47
9	1,5,0,72,255,0,12,44	10	1,5,0,73,255,0,93,236	11	1,5,0,74,255,0,173,236	12	1,5,0,75,255,0,252,44
13	1,5,0,76,255,0,77,237	14	1,5,0,77,255,0,28,45	15	1,5,0,78,255,0,236,45	16	1,5,0,79,255,0,189,237
17	1,5,0,80,255,0,140,43	18	1,5,0,81,255,0,221,235	19	1,5,0,82,255,0,45,235	20	1,5,0,83,255,0,124,43
21	1,5,0,84,255,0,205,234	22	1,5,0,85,255,0,156,42	23	1,5,0,86,255,0,108,42	24	1,5,0,87,255,0,61,234
25	1,5,0,88,255,0,13,233	26	1,5,0,89,255,0,92,41	27	1,5,0,90,255,0,172,41	28	1,5,0,91,255,0,253,233
29	1,5,0,92,255,0,76,40	30	1,5,0,93,255,0,29,232	31	1,5,0,94,255,0,237,232	32	1,5,0,95,255,0,188,40
33	1,5,0,96,255,0,140,36	34	1,5,0,97,255,0,221,228	35	1,5,0,98,255,0,45,228	36	1,5,0,99,255,0,124,36
37	1,5,0,100,255,0,205,229	38	1,5,0,101,255,0,156,37	39	1,5,0,102,255,0,108,37	40	1,5,0,103,255,0,61,229
41	1,5,0,104,255,0,13,230	42	1,5,0,105,255,0,92,38	43	1,5,0,106,255,0,172,38	44	1,5,0,107,255,0,253,230
45	1,5,0,108,255,0,76,39	46	1,5,0,109,255,0,29,231	47	1,5,0,110,255,0,237,231	48	1,5,0,111,255,0,188,39
49	1,5,0,112,255,0,141,225	50	1,5,0,113,255,0,220,33	51	1,5,0,114,255,0,44,33	52	1,5,0,115,255,0,125,225
53	1,5,0,116,255,0,204,32	54	1,5,0,117,255,0,157,224	55	1,5,0,118,255,0,109,224	56	1,5,0,119,255,0,60,32
57	1,5,0,120,255,0,12,35	58	1,5,0,121,255,0,93,227	59	1,5,0,122,255,0,173,227	60	1,5,0,123,255,0,252,35
61	1,5,0,124,255,0,77,226	62	1,5,0,125,255,0,28,34	63	1,5,0,126,255,0,236,34	64	1,5,0,127,255,0,189,226

Set DO Off/On

LT	DO	Set DO Off Command Query	Set DO On Command Query
1	1	1,5,1,0,0,0,204,54	1,5,1,0,255,0,141,198
	2	1,5,1,1,0,0,157,246	1,5,1,1,255,0,220,6
	3	1,5,1,2,0,0,109,246	1,5,1,2,255,0,44,6
	4	1,5,1,3,0,0,60,54	1,5,1,3,255,0,125,198
	5	1,5,1,4,0,0,141,247	1,5,1,4,255,0,204,7
	6	1,5,1,5,0,0,220,55	1,5,1,5,255,0,157,199
	7	1,5,1,6,0,0,44,55	1,5,1,6,255,0,109,199
	8	1,5,1,7,0,0,125,247	1,5,1,7,255,0,60,7
3	1	1,5,1,16,0,0,205,243	1,5,1,16,255,0,140,3
	2	1,5,1,17,0,0,156,51	1,5,1,17,255,0,221,195
	3	1,5,1,18,0,0,108,51	1,5,1,18,255,0,45,195
	4	1,5,1,19,0,0,61,243	1,5,1,19,255,0,124,3
	5	1,5,1,20,0,0,140,50	1,5,1,20,255,0,205,194
	6	1,5,1,21,0,0,221,242	1,5,1,21,255,0,156,2
	7	1,5,1,22,0,0,45,242	1,5,1,22,255,0,108,2
	8	1,5,1,23,0,0,124,50	1,5,1,23,255,0,61,194
5	1	1,5,1,32,0,0,205,252	1,5,1,32,255,0,140,12
	2	1,5,1,33,0,0,156,60	1,5,1,33,255,0,221,204
	3	1,5,1,34,0,0,108,60	1,5,1,34,255,0,45,204
	4	1,5,1,35,0,0,61,252	1,5,1,35,255,0,124,12
	5	1,5,1,36,0,0,140,61	1,5,1,36,255,0,205,205
	6	1,5,1,37,0,0,221,253	1,5,1,37,255,0,156,13
	7	1,5,1,38,0,0,45,253	1,5,1,38,255,0,108,13
	8	1,5,1,39,0,0,124,61	1,5,1,39,255,0,61,205
7	1	1,5,1,48,0,0,204,57	1,5,1,48,255,0,141,201
	2	1,5,1,49,0,0,157,249	1,5,1,49,255,0,220,9
	3	1,5,1,50,0,0,109,249	1,5,1,50,255,0,44,9
	4	1,5,1,51,0,0,60,57	1,5,1,51,255,0,125,201
	5	1,5,1,52,0,0,141,248	1,5,1,52,255,0,204,8
	6	1,5,1,53,0,0,220,56	1,5,1,53,255,0,157,200
	7	1,5,1,54,0,0,44,56	1,5,1,54,255,0,109,200
	8	1,5,1,55,0,0,125,248	1,5,1,55,255,0,60,8
9	1	1,5,1,64,0,0,205,226	1,5,1,64,255,0,140,18
	2	1,5,1,65,0,0,156,34	1,5,1,65,255,0,221,210
	3	1,5,1,66,0,0,108,34	1,5,1,66,255,0,45,210
	4	1,5,1,67,0,0,61,226	1,5,1,67,255,0,124,18
	5	1,5,1,68,0,0,140,35	1,5,1,68,255,0,205,211
	6	1,5,1,69,0,0,221,227	1,5,1,69,255,0,156,19
	7	1,5,1,70,0,0,45,227	1,5,1,70,255,0,108,19
	8	1,5,1,71,0,0,124,35	1,5,1,71,255,0,61,211
11	1	1,5,1,80,0,0,204,39	1,5,1,80,255,0,141,215
	2	1,5,1,81,0,0,157,231	1,5,1,81,255,0,220,23
	3	1,5,1,82,0,0,109,231	1,5,1,82,255,0,44,23
	4	1,5,1,83,0,0,60,39	1,5,1,83,255,0,125,215
	5	1,5,1,84,0,0,141,230	1,5,1,84,255,0,204,22
	6	1,5,1,85,0,0,220,38	1,5,1,85,255,0,157,214
	7	1,5,1,86,0,0,44,38	1,5,1,86,255,0,109,214
	8	1,5,1,87,0,0,125,230	1,5,1,87,255,0,60,22
13	1	1,5,1,96,0,0,204,40	1,5,1,96,255,0,141,216
	2	1,5,1,97,0,0,157,232	1,5,1,97,255,0,220,24
	3	1,5,1,98,0,0,109,232	1,5,1,98,255,0,44,24
	4	1,5,1,99,0,0,60,40	1,5,1,99,255,0,125,216
	5	1,5,1,100,0,0,141,233	1,5,1,100,255,0,204,25
	6	1,5,1,101,0,0,220,41	1,5,1,101,255,0,157,217
	7	1,5,1,102,0,0,44,41	1,5,1,102,255,0,109,217
	8	1,5,1,103,0,0,125,233	1,5,1,103,255,0,60,25
	1	1,5,1,112,0,0,205,237	1,5,1,112,255,0,140,29
	2	1,5,1,113,0,0,156,45	1,5,1,113,255,0,221,221
	3	1,5,1,114,0,0,108,45	1,5,1,114,255,0,45,221

LT	DO	Set DO Off Command Query	Set DO On Command Query
2	1	1,5,1,8,0,0,77,244	1,5,1,8,255,0,12,4
	2	1,5,1,9,0,0,28,52	1,5,1,9,255,0,93,196
	3	1,5,1,10,0,0,236,52	1,5,1,10,255,0,173,196
	4	1,5,1,11,0,0,189,244	1,5,1,11,255,0,252,4
	5	1,5,1,12,0,0,12,53	1,5,1,12,255,0,77,197
	6	1,5,1,13,0,0,93,245	1,5,1,13,255,0,28,5
	7	1,5,1,14,0,0,173,245	1,5,1,14,255,0,236,5
	8	1,5,1,15,0,0,252,53	1,5,1,15,255,0,189,197
4	1	1,5,1,24,0,0,76,49	1,5,1,24,255,0,13,193
	2	1,5,1,25,0,0,29,241	1,5,1,25,255,0,92,1
	3	1,5,1,26,0,0,237,241	1,5,1,26,255,0,172,1
	4	1,5,1,27,0,0,188,49	1,5,1,27,255,0,253,193
	5	1,5,1,28,0,0,13,240	1,5,1,28,255,0,76,0
	6	1,5,1,29,0,0,92,48	1,5,1,29,255,0,29,192
	7	1,5,1,30,0,0,172,48	1,5,1,30,255,0,237,192
	8	1,5,1,31,0,0,253,240	1,5,1,31,255,0,188,0
6	1	1,5,1,40,0,0,76,62	1,5,1,40,255,0,13,206
	2	1,5,1,41,0,0,29,254	1,5,1,41,255,0,92,14
	3	1,5,1,42,0,0,237,254	1,5,1,42,255,0,172,14
	4	1,5,1,43,0,0,188,62	1,5,1,43,255,0,253,206
	5	1,5,1,44,0,0,13,255	1,5,1,44,255,0,76,15
	6	1,5,1,45,0,0,92,63	1,5,1,45,255,0,29,207
	7	1,5,1,46,0,0,172,63	1,5,1,46,255,0,237,207
	8	1,5,1,47,0,0,253,255	1,5,1,47,255,0,188,15
8	1	1,5,1,56,0,0,77,251	1,5,1,56,255,0,12,11
	2	1,5,1,57,0,0,28,59	1,5,1,57,255,0,93,203
	3	1,5,1,58,0,0,236,59	1,5,1,58,255,0,173,203
	4	1,5,1,59,0,0,189,251	1,5,1,59,255,0,252,11
	5	1,5,1,60,0,0,12,58	1,5,1,60,255,0,77,202
	6	1,5,1,61,0,0,93,250	1,5,1,61,255,0,28,10
	7	1,5,1,62,0,0,173,250	1,5,1,62,255,0,236,10
	8	1,5,1,63,0,0,252,58	1,5,1,63,255,0,189,202
10	1	1,5,1,72,0,0,76,32	1,5,1,72,255,0,13,208
	2	1,5,1,73,0,0,29,224	1,5,1,73,255,0,92,16
	3	1,5,1,74,0,0,237,224	1,5,1,74,255,0,172,16
	4	1,5,1,75,0,0,188,32	1,5,1,75,255,0,253,208
	5	1,5,1,76,0,0,13,225	1,5,1,76,255,0,76,17
	6	1,5,1,77,0,0,92,33	1,5,1,77,255,0,29,209
	7	1,5,1,78,0,0,172,33	1,5,1,78,255,0,237,209
	8	1,5,1,79,0,0,253,225	1,5,1,79,255,0,188,17
12	1	1,5,1,88,0,0,77,229	1,5,1,88,255,0,12,21
	2	1,5,1,89,0,0,28,37	1,5,1,89,255,0,93,213
	3	1,5,1,90,0,0,236,37	1,5,1,90,255,0,173,213
	4	1,5,1,91,0,0,189,229	1,5,1,91,255,0,252,21
	5	1,5,1,92,0,0,12,36	1,5,1,92,255,0,77,212
	6	1,5,1,93,0,0,93,228	1,5,1,93,255,0,28,20
	7	1,5,1,94,0,0,173,228	1,5,1,94,255,0,236,20
	8	1,5,1,95,0,0,252,36	1,5,1,95,255,0,189,212
14	1	1,5,1,104,0,0,77,234	1,5,1,104,255,0,12,26
	2	1,5,1,105,0,0,28,42	1,5,1,105,255,0,93,218
	3	1,5,1,106,0,0,236,42	1,5,1,106,255,0,173,218
	4	1,5,1,107,0,0,189,234	1,5,1,107,255,0,252,26
	5	1,5,1,108,0,0,12,43	1,5,1,108,255,0,77,219
	6	1,5,1,109,0,0,93,235	1,5,1,109,255,0,28,27
	7	1,5,1,110,0,0,173,235	1,5,1,110,255,0,236,27
	8	1,5,1,111,0,0,252,43	1,5,1,111,255,0,189,219
	1	1,5,1,120,0,0,76,47	1,5,1,120,255,0,13,223
	2	1,5,1,121,0,0,29,239	1,5,1,121,255,0,92,31
	3	1,5,1,122,0,0,237,239	1,5,1,122,255,0,172,31

LT	DO	Set DO Off Command Query	Set DO On Command Query
15	4	1,5,1,115,0,0,61,237	1,5,1,115,255,0,124,29
	5	1,5,1,116,0,0,140,44	1,5,1,116,255,0,205,220
	6	1,5,1,117,0,0,221,236	1,5,1,117,255,0,156,28
	7	1,5,1,118,0,0,45,236	1,5,1,118,255,0,108,28
	8	1,5,1,119,0,0,124,44	1,5,1,119,255,0,61,220

LT	DO	Set DO Off Command Query	Set DO On Command Query
16	4	1,5,1,123,0,0,188,47	1,5,1,123,255,0,253,223
	5	1,5,1,124,0,0,13,238	1,5,1,124,255,0,76,30
	6	1,5,1,125,0,0,92,46	1,5,1,125,255,0,29,222
	7	1,5,1,126,0,0,172,46	1,5,1,126,255,0,237,222
	8	1,5,1,127,0,0,253,238	1,5,1,127,255,0,188,30

Single DO Pulse Out

LT	DO	Single DO Pulse Out Command Query	LT	DO	Single DO Pulse Out Command Query	LT	DO	Single DO Pulse Out Command Query	LT	DO	Single DO Pulse Out Command Query
1	1	1,5,3,0,255,0,140,126	2	1	1,5,3,8,255,0,13,188	3	1	1,5,3,16,255,0,141,187	4	1	1,5,3,24,255,0,12,121
	2	1,5,3,1,255,0,221,190		2	1,5,3,9,255,0,92,124		2	1,5,3,17,255,0,220,123		2	1,5,3,25,255,0,93,185
	3	1,5,3,2,255,0,45,190		3	1,5,3,10,255,0,172,124		3	1,5,3,18,255,0,44,123		3	1,5,3,26,255,0,173,185
	4	1,5,3,3,255,0,124,126		4	1,5,3,11,255,0,253,188		4	1,5,3,19,255,0,125,187		4	1,5,3,27,255,0,252,121
	5	1,5,3,4,255,0,205,191		5	1,5,3,12,255,0,76,125		5	1,5,3,20,255,0,204,122		5	1,5,3,28,255,0,77,184
	6	1,5,3,5,255,0,156,127		6	1,5,3,13,255,0,29,189		6	1,5,3,21,255,0,157,186		6	1,5,3,29,255,0,28,120
	7	1,5,3,6,255,0,108,127		7	1,5,3,14,255,0,237,189		7	1,5,3,22,255,0,109,186		7	1,5,3,30,255,0,236,120
	8	1,5,3,7,255,0,61,191		8	1,5,3,15,255,0,188,125		8	1,5,3,23,255,0,60,122		8	1,5,3,31,255,0,189,184
5	1	1,5,3,32,255,0,141,180	6	1	1,5,3,40,255,0,12,118	7	1	1,5,3,48,255,0,140,113	8	1	1,5,3,56,255,0,13,179
	2	1,5,3,33,255,0,220,116		2	1,5,3,41,255,0,93,182		2	1,5,3,49,255,0,221,177		2	1,5,3,57,255,0,92,115
	3	1,5,3,34,255,0,44,116		3	1,5,3,42,255,0,173,182		3	1,5,3,50,255,0,45,177		3	1,5,3,58,255,0,172,115
	4	1,5,3,35,255,0,125,180		4	1,5,3,43,255,0,252,118		4	1,5,3,51,255,0,124,113		4	1,5,3,59,255,0,253,179
	5	1,5,3,36,255,0,204,117		5	1,5,3,44,255,0,77,183		5	1,5,3,52,255,0,205,176		5	1,5,3,60,255,0,76,114
	6	1,5,3,37,255,0,157,181		6	1,5,3,45,255,0,28,119		6	1,5,3,53,255,0,156,112		6	1,5,3,61,255,0,29,178
	7	1,5,3,38,255,0,109,181		7	1,5,3,46,255,0,236,119		7	1,5,3,54,255,0,108,112		7	1,5,3,62,255,0,237,178
	8	1,5,3,39,255,0,60,117		8	1,5,3,47,255,0,189,183		8	1,5,3,55,255,0,61,176		8	1,5,3,63,255,0,188,114
9	1	1,5,3,64,255,0,141,170	10	1	1,5,3,72,255,0,12,104	11	1	1,5,3,80,255,0,140,111	12	1	1,5,3,88,255,0,13,173
	2	1,5,3,65,255,0,220,106		2	1,5,3,73,255,0,93,168		2	1,5,3,81,255,0,221,175		2	1,5,3,89,255,0,92,109
	3	1,5,3,66,255,0,44,106		3	1,5,3,74,255,0,173,168		3	1,5,3,82,255,0,45,175		3	1,5,3,90,255,0,172,109
	4	1,5,3,67,255,0,125,170		4	1,5,3,75,255,0,252,104		4	1,5,3,83,255,0,124,111		4	1,5,3,91,255,0,253,173
	5	1,5,3,68,255,0,204,107		5	1,5,3,76,255,0,77,169		5	1,5,3,84,255,0,205,174		5	1,5,3,92,255,0,76,108
	6	1,5,3,69,255,0,157,171		6	1,5,3,77,255,0,28,105		6	1,5,3,85,255,0,156,110		6	1,5,3,93,255,0,29,172
	7	1,5,3,70,255,0,109,171		7	1,5,3,78,255,0,236,105		7	1,5,3,86,255,0,108,110		7	1,5,3,94,255,0,237,172
	8	1,5,3,71,255,0,60,107		8	1,5,3,79,255,0,189,169		8	1,5,3,87,255,0,61,174		8	1,5,3,95,255,0,188,108
13	1	1,5,3,96,255,0,140,96	14	1	1,5,3,104,255,0,13,162	15	1	1,5,3,112,255,0,141,165	16	1	1,5,3,120,255,0,12,103
	2	1,5,3,97,255,0,221,160		2	1,5,3,105,255,0,92,98		2	1,5,3,113,255,0,220,101		2	1,5,3,121,255,0,93,167
	3	1,5,3,98,255,0,45,160		3	1,5,3,106,255,0,172,98		3	1,5,3,114,255,0,44,101		3	1,5,3,122,255,0,173,167
	4	1,5,3,99,255,0,124,96		4	1,5,3,107,255,0,253,162		4	1,5,3,115,255,0,125,165		4	1,5,3,123,255,0,252,103
	5	1,5,3,100,255,0,205,161		5	1,5,3,108,255,0,76,99		5	1,5,3,116,255,0,204,100		5	1,5,3,124,255,0,77,166
	6	1,5,3,101,255,0,156,97		6	1,5,3,109,255,0,29,163		6	1,5,3,117,255,0,157,164		6	1,5,3,125,255,0,28,102
	7	1,5,3,102,255,0,108,97		7	1,5,3,110,255,0,237,163		7	1,5,3,118,255,0,109,164		7	1,5,3,126,255,0,236,102
	8	1,5,3,103,255,0,61,161		8	1,5,3,111,255,0,188,99		8	1,5,3,119,255,0,60,100		8	1,5,3,127,255,0,189,166

Dual DO Pulse Out

LT	DO		Dual DO Pulse Out Command Query
1	1	2	1,5,5,0,255,0,140,246
	3	4	1,5,5,1,255,0,221,54
	5	6	1,5,5,2,255,0,45,54
	7	8	1,5,5,3,255,0,124,246
2	1	2	1,5,5,4,255,0,205,55
	3	4	1,5,5,5,255,0,156,247
	5	6	1,5,5,6,255,0,108,247
	7	8	1,5,5,7,255,0,61,55
3	1	2	1,5,5,8,255,0,13,52
	3	4	1,5,5,9,255,0,92,244
	5	6	1,5,5,10,255,0,172,244
	7	8	1,5,5,11,255,0,253,52
4	1	2	1,5,5,12,255,0,76,245
	3	4	1,5,5,13,255,0,29,53
	5	6	1,5,5,14,255,0,237,53
	7	8	1,5,5,15,255,0,188,245
5	1	2	1,5,5,16,255,0,141,51
	3	4	1,5,5,17,255,0,220,243
	5	6	1,5,5,18,255,0,44,243
	7	8	1,5,5,19,255,0,125,51
6	1	2	1,5,5,20,255,0,204,242
	3	4	1,5,5,21,255,0,157,50
	5	6	1,5,5,22,255,0,109,50
	7	8	1,5,5,23,255,0,60,242
7	1	2	1,5,5,24,255,0,12,241
	3	4	1,5,5,25,255,0,93,49
	5	6	1,5,5,26,255,0,173,49
	7	8	1,5,5,27,255,0,252,241
8	1	2	1,5,5,28,255,0,77,48
	3	4	1,5,5,29,255,0,28,240
	5	6	1,5,5,30,255,0,236,240
	7	8	1,5,5,31,255,0,189,48
9	1	2	1,5,5,32,255,0,141,60
	3	4	1,5,5,33,255,0,220,252
	5	6	1,5,5,34,255,0,44,252
	7	8	1,5,5,35,255,0,125,60
10	1	2	1,5,5,36,255,0,204,253
	3	4	1,5,5,37,255,0,157,61
	5	6	1,5,5,38,255,0,109,61
	7	8	1,5,5,39,255,0,60,253
11	1	2	1,5,5,40,255,0,12,254
	3	4	1,5,5,41,255,0,93,62
	5	6	1,5,5,42,255,0,173,62
	7	8	1,5,5,43,255,0,252,254
12	1	2	1,5,5,44,255,0,77,63
	3	4	1,5,5,45,255,0,28,255
	5	6	1,5,5,46,255,0,236,255
	7	8	1,5,5,47,255,0,189,63
13	1	2	1,5,5,48,255,0,140,249
	3	4	1,5,5,49,255,0,221,57
	5	6	1,5,5,50,255,0,45,57
	7	8	1,5,5,51,255,0,124,249
14	1	2	1,5,5,52,255,0,205,56
	3	4	1,5,5,53,255,0,156,248
	5	6	1,5,5,54,255,0,108,248
	7	8	1,5,5,55,255,0,61,56
15	1	2	1,5,5,56,255,0,13,59
	3	4	1,5,5,57,255,0,92,251
	5	6	1,5,5,58,255,0,172,251
	7	8	1,5,5,59,255,0,253,59
16	1	2	1,5,5,60,255,0,76,250
	3	4	1,5,5,61,255,0,29,58
	5	6	1,5,5,62,255,0,237,58
	7	8	1,5,5,63,255,0,188,250

Complete Register Table For R/W Address

Use function code 3 to read, use function code 16 to write.

Register	Modscan Read	Size	LT & Channel	Parameter	R/W
0	30000	1	LT 1: DO 1~8 LT 2: DO 1~8	DO Status	R
1	30001	1	LT 3: DO 1~8 LT 4: DO 1~8	DO Status	R
2	30002	1	LT 5: DO 1~8 LT 6: DO 1~8	DO Status	R
3	30003	1	LT 7: DO 1~8 LT 8: DO 1~8	DO Status	R
4	30004	1	LT 9: DO 1~8 LT 10: DO 1~8	DO Status	R
5	30005	1	LT 11: DO 1~8 LT 12: DO 1~8	DO Status	R
6	30006	1	LT 13: DO 1~8 LT 14: DO 1~8	DO Status	R
7	30007	1	LT 15: DO 1~8 LT 16: DO 1~8	DO Status	R
32	30032	1	LT 1: DO 1~16	DI Status	R
33	30033	1	LT 2: DO 1~16	DI Status	R
34	30034	1	LT 3: DO 1~16	DI Status	R
35	30035	1	LT 4: DO 1~16	DI Status	R
36	30036	1	LT 5: DO 1~16	DI Status	R
37	30037	1	LT 6: DO 1~16	DI Status	R
38	30038	1	LT 7: DO 1~16	DI Status	R
39	30039	1	LT 8: DO 1~16	DI Status	R
40	30040	1	LT 9: DO 1~16	DI Status	R
41	30041	1	LT 10: DO 1~16	DI Status	R
42	30042	1	LT 11: DO 1~16	DI Status	R
43	30043	1	LT 12: DO 1~16	DI Status	R
44	30044	1	LT 13: DO 1~16	DI Status	R
45	30045	1	LT 14: DO 1~16	DI Status	R
46	30046	1	LT 15: DO 1~16	DI Status	R
47	30047	1	LT 16: DO 1~16	DI Status	R
96	30096	1	LT 1: DI 1~16	Latched DI Status	R/W
97	30097	1	LT 2: DI 1~16	Latched DI Status	R/W
98	30098	1	LT 3: DI 1~16	Latched DI Status	R/W
99	30099	1	LT 4: DI 1~16	Latched DI Status	R/W
100	30100	1	LT 5: DI 1~16	Latched DI Status	R/W
101	30101	1	LT 6: DI 1~16	Latched DI Status	R/W
102	30102	1	LT 7: DI 1~16	Latched DI Status	R/W
103	30103	1	LT 8: DI 1~16	Latched DI Status	R/W
104	30104	1	LT 9: DI 1~16	Latched DI Status	R/W
105	30105	1	LT 10: DI 1~16	Latched DI Status	R/W
106	30106	1	LT 11: DI 1~16	Latched DI Status	R/W
107	30107	1	LT 12: DI 1~16	Latched DI Status	R/W
108	30108	1	LT 13: DI 1~16	Latched DI Status	R/W
109	30109	1	LT 14: DI 1~16	Latched DI Status	R/W
110	30110	1	LT 15: DI 1~16	Latched DI Status	R/W
111	30111	1	LT 16: DI 1~16	Latched DI Status	R/W
160	30160	1	Groups 1 to 16	Group Status Map	R

Register	Modscan Read	Size	LT & Channel	Parameter	R/W
161	30161	1	Groups 17 to 32	Group Status Map	R
162	30162	1	Groups 33 to 48	Group Status Map	R
163	30163	1	Groups 49 to 63	Group Status Map	R
164	30164	1	Patterns 1 to 16	Pattern Activation Map	R/W
165	30165	1	Patterns 17 to 32	Pattern Activation Map	R/W
166	30166	1	Patterns 33 to 48	Pattern Activation Map	R/W
167	30167	1	Patterns 49 to 64	Pattern Activation Map	R/W
168	30168	1	LT 1 to 16	LT Alive Status Map	R
169	30169	1	LT 17 to 32	LT Alive Status Map	R
170	30170	1	LT 33 to 48	LT Alive Status Map	R
171	30171	1	LT 49 to 64	LT Alive Status Map	R
256	30256	1	LT 1: AI 1	AI Value	R
257	30257	1	LT 1: AI 2		R
258	30258	1	LT 1: AI 3		R
259	30259	1	LT 1: AI 4		R
260	30260	1	LT 2: AI 1	AI Value	R
261	30261	1	LT 2: AI 2		R
262	30262	1	LT 2: AI 3		R
263	30263	1	LT 2: AI 4		R
264	30264	1	LT 3: AI 1	AI Value	R
265	30265	1	LT 3: AI 2		R
266	30266	1	LT 3: AI 3		R
267	30267	1	LT 3: AI 4		R
268	30268	1	LT 4: AI 1	AI Value	R
269	30269	1	LT 4: AI 2		R
270	30270	1	LT 4: AI 3		R
271	30271	1	LT 4: AI 4		R
272	30272	1	LT 5: AI 1	AI Value	R
273	30273	1	LT 5: AI 2		R
274	30274	1	LT 5: AI 3		R
275	30275	1	LT 5: AI 4		R
276	30276	1	LT 6: AI 1	AI Value	R
277	30277	1	LT 6: AI 2		R
278	30278	1	LT 6: AI 3		R
279	30279	1	LT 6: AI 4		R
280	30280	1	LT 7: AI 1	AI Value	R
281	30281	1	LT 7: AI 2		R
282	30282	1	LT 7: AI 3		R
283	30283	1	LT 7: AI 4		R
284	30284	1	LT 8: AI 1	AI Value	R
285	30285	1	LT 8: AI 2		R
286	30286	1	LT 8: AI 3		R
287	30287	1	LT 8: AI 4		R
288	30288	1	LT 9: AI 1	AI Value	R
289	30289	1	LT 9: AI 2		R
290	30290	1	LT 9: AI 3		R
291	30291	1	LT 9: AI 4		R
292	30292	1	LT 10: AI 1	AI Value	R
293	30293	1	LT 10: AI 2		R
294	30294	1	LT 10: AI 3		R

Register	Modscan Read	Size	LT & Channel	Parameter	R/W
295	30295	1	LT 10: AI 4		R
296	30296	1	LT 11: AI 1	AI Value	R
297	30297	1	LT 11: AI 2		R
298	30298	1	LT 11: AI 3		R
299	30299	1	LT 11: AI 4		R
300	30300	1	LT 12: AI 1	AI Value	R
301	30301	1	LT 12: AI 2		R
302	30302	1	LT 12: AI 3		R
303	30303	1	LT 12: AI 4		R
304	30304	1	LT 13: AI 1	AI Value	R
305	30305	1	LT 13: AI 2		R
306	30306	1	LT 13: AI 3		R
307	30307	1	LT 13: AI 4		R
308	30308	1	LT 14: AI 1	AI Value	R
309	30309	1	LT 14: AI 2		R
310	30310	1	LT 14: AI 3		R
311	30311	1	LT 14: AI 4		R
312	30312	1	LT 15: AI 1	AI Value	R
313	30313	1	LT 15: AI 2		R
314	30314	1	LT 15: AI 3		R
315	30315	1	LT 15: AI 4		R
316	30316	1	LT 16: AI 1	AI Value	R
317	30317	1	LT 16: AI 2		R
318	30318	1	LT 16: AI 3		R
319	30319	1	LT 16: AI 4		R
512	30512	1	LT 1: AO 1	AO Value	R/W
513	30513	1	LT 1: AO 2		R/W
514	30514	1	LT 1: AO 3		R/W
515	30515	1	LT 1: AO 4		R/W
516	30516	1	LT 2: AO 1	AO Value	R/W
517	30517	1	LT 2: AO 2		R/W
518	30518	1	LT 2: AO 3		R/W
519	30519	1	LT 2: AO 4		R/W
520	30520	1	LT 3: AO 1	AO Value	R/W
521	30521	1	LT 3: AO 2		R/W
522	30522	1	LT 3: AO 3		R/W
523	30523	1	LT 3: AO 4		R/W
524	30524	1	LT 4: AO 1	AO Value	R/W
525	30525	1	LT 4: AO 2		R/W
526	30526	1	LT 4: AO 3		R/W
527	30527	1	LT 4: AO 4		R/W
528	30528	1	LT 5: AO 1	AO Value	R/W
529	30529	1	LT 5: AO 2		R/W
530	30530	1	LT 5: AO 3		R/W
531	30531	1	LT 5: AO 4		R/W
532	30532	1	LT 6: AO 1	AO Value	R/W
533	30533	1	LT 6: AO 2		R/W
534	30534	1	LT 6: AO 3		R/W
535	30535	1	LT 6: AO 4		R/W
536	30536	1	LT 7: AO 1		R/W

Register	Modscan Read	Size	LT & Channel	Parameter	R/W
537	30537	1	LT 7: AO 2	AO Value	R/W
538	30538	1	LT 7: AO 3		R/W
539	30539	1	LT 7: AO 4		R/W
540	30540	1	LT 8: AO 1	AO Value	R/W
541	30541	1	LT 8: AO 2		R/W
542	30542	1	LT 8: AO 3		R/W
543	30543	1	LT 8: AO 4		R/W
544	30544	1	LT 9: AO 1	AO Value	R/W
545	30545	1	LT 9: AO 2		R/W
546	30546	1	LT 9: AO 3		R/W
547	30547	1	LT 9: AO 4		R/W
548	30548	1	LT 10: AO 1	AO Value	R/W
549	30549	1	LT 10: AO 2		R/W
550	30550	1	LT 10: AO 3		R/W
551	30551	1	LT 10: AO 4		R/W
552	30552	1	LT 11: AO 1	AO Value	R/W
553	30553	1	LT 11: AO 2		R/W
554	30554	1	LT 11: AO 3		R/W
555	30555	1	LT 11: AO 4		R/W
556	30556	1	LT 12: AO 1	AO Value	R/W
557	30557	1	LT 12: AO 2		R/W
558	30558	1	LT 12: AO 3		R/W
559	30559	1	LT 12: AO 4		R/W
560	30560	1	LT 13: AO 1	AO Value	R/W
561	30561	1	LT 13: AO 2		R/W
562	30562	1	LT 13: AO 3		R/W
563	30563	1	LT 13: AO 4		R/W
564	30564	1	LT 14: AO 1	AO Value	R/W
565	30565	1	LT 14: AO 2		R/W
566	30566	1	LT 14: AO 3		R/W
567	30567	1	LT 14: AO 4		R/W
568	30568	1	LT 15: AO 1	AO Value	R/W
569	30569	1	LT 15: AO 2		R/W
570	30570	1	LT 15: AO 3		R/W
571	30571	1	LT 15: AO 4		R/W
572	30572	1	LT 16: AO 1	AO Value	R/W
573	30573	1	LT 16: AO 2		R/W
574	30574	1	LT 16: AO 3		R/W
575	30575	1	LT 16: AO 4		R/W
768	30768	1	LT : DO	DO Authorization Mode	R/W
769	30769	1	LT : DO		R/W
770	30770	1	LT : DO		R/W
771	30771	1	LT : DO		R/W
772	30772	1	LT : DO		R/W
773	30773	1	LT : DO		R/W
774	30774	1	LT : DO		R/W
775	30775	1	LT : DO		R/W
776	30776	1	LT : DO		R/W
777	30777	1	LT : DO		R/W
778	30778	1	LT : DO		R/W

Register	Modscan Read	Size	LT & Channel	Parameter	R/W
779	30779	1	LT : DO	DO Authorization Mode	R/W
780	30780	1	LT : DO		R/W
781	30781	1	LT : DO		R/W
782	30782	1	LT : DO		R/W
783	30783	1	LT : DO		R/W
784	30784	1	LT : DO	DO Authorization Mode	R/W
785	30785	1	LT : DO		R/W
786	30786	1	LT : DO		R/W
787	30787	1	LT : DO		R/W
788	30788	1	LT : DO		R/W
789	30789	1	LT : DO		R/W
790	30790	1	LT : DO		R/W
791	30791	1	LT : DO		R/W
792	30792	1	LT : DO	DO Authorization Mode	R/W
793	30793	1	LT : DO		R/W
794	30794	1	LT : DO		R/W
795	30795	1	LT : DO		R/W
796	30796	1	LT : DO		R/W
797	30797	1	LT : DO		R/W
798	30798	1	LT : DO		R/W
799	30799	1	LT : DO		R/W
800	30800	1	LT : DO	DO Authorization Mode	R/W
801	30801	1	LT : DO		R/W
802	30802	1	LT : DO		R/W
803	30803	1	LT : DO		R/W
804	30804	1	LT : DO		R/W
805	30805	1	LT : DO		R/W
806	30806	1	LT : DO		R/W
807	30807	1	LT : DO		R/W
808	30808	1	LT : DO	DO Authorization Mode	R/W
809	30809	1	LT : DO		R/W
810	30810	1	LT : DO		R/W
811	30811	1	LT : DO		R/W
812	30812	1	LT : DO		R/W
813	30813	1	LT : DO		R/W
814	30814	1	LT : DO		R/W
815	30815	1	LT : DO		R/W
816	30816	1	LT : DO	DO Authorization Mode	R/W
817	30817	1	LT : DO		R/W
818	30818	1	LT : DO		R/W
819	30819	1	LT : DO		R/W
820	30820	1	LT : DO		R/W
821	30821	1	LT : DO		R/W
822	30822	1	LT : DO		R/W
823	30823	1	LT : DO		R/W
824	30824	1	LT : DO	DO Authorization Mode	R/W
825	30825	1	LT : DO		R/W
826	30826	1	LT : DO		R/W
827	30827	1	LT : DO		R/W
828	30828	1	LT : DO		R/W

Register	Modscan Read	Size	LT & Channel	Parameter	R/W
829	30829	1	LT : DO		R/W
830	30830	1	LT : DO		R/W
831	30831	1	LT : DO		R/W
832	30832	1	LT : DO	DO Authorization Mode	R/W
833	30833	1	LT : DO		R/W
834	30834	1	LT : DO		R/W
835	30835	1	LT : DO		R/W
836	30836	1	LT : DO		R/W
837	30837	1	LT : DO		R/W
838	30838	1	LT : DO		R/W
839	30839	1	LT : DO		R/W
840	30840	1	LT : DO	DO Authorization Mode	R/W
841	30841	1	LT : DO		R/W
842	30842	1	LT : DO		R/W
843	30843	1	LT : DO		R/W
844	30844	1	LT : DO		R/W
845	30845	1	LT : DO		R/W
846	30846	1	LT : DO		R/W
847	30847	1	LT : DO		R/W
848	30848	1	LT : DO	DO Authorization Mode	R/W
849	30849	1	LT : DO		R/W
850	30850	1	LT : DO		R/W
851	30851	1	LT : DO		R/W
852	30852	1	LT : DO		R/W
853	30853	1	LT : DO		R/W
854	30854	1	LT : DO		R/W
855	30855	1	LT : DO		R/W
856	30856	1	LT : DO	DO Authorization Mode	R/W
857	30857	1	LT : DO		R/W
858	30858	1	LT : DO		R/W
859	30859	1	LT : DO		R/W
860	30860	1	LT : DO		R/W
861	30861	1	LT : DO		R/W
862	30862	1	LT : DO		R/W
863	30863	1	LT : DO		R/W
864	30864	1	LT : DO	DO Authorization Mode	R/W
865	30865	1	LT : DO		R/W
866	30866	1	LT : DO		R/W
867	30867	1	LT : DO		R/W
868	30868	1	LT : DO		R/W
869	30869	1	LT : DO		R/W
870	30870	1	LT : DO		R/W
871	30871	1	LT : DO		R/W
872	30872	1	LT : DO	DO Authorization Mode	R/W
873	30873	1	LT : DO		R/W
874	30874	1	LT : DO		R/W
875	30875	1	LT : DO		R/W
876	30876	1	LT : DO		R/W
877	30877	1	LT : DO		R/W
878	30878	1	LT : DO		R/W

Register	Modscan Read	Size	LT & Channel	Parameter	R/W
879	30879	1	LT : DO		R/W
880	30880	1	LT : DO	DO Authorization Mode	R/W
881	30881	1	LT : DO		R/W
882	30882	1	LT : DO		R/W
883	30883	1	LT : DO		R/W
884	30884	1	LT : DO		R/W
885	30885	1	LT : DO		R/W
886	30886	1	LT : DO		R/W
887	30887	1	LT : DO		R/W
888	30888	1	LT : DO	DO Authorization Mode	R/W
889	30889	1	LT : DO		R/W
890	30890	1	LT : DO		R/W
891	30891	1	LT : DO		R/W
892	30892	1	LT : DO		R/W
893	30893	1	LT : DO		R/W
894	30894	1	LT : DO		R/W
895	30895	1	LT : DO		R/W
2816	32816	1	LT : AO	AO Upper Limit	R/W
2817	32817	1	LT : AO		R/W
2818	32818	1	LT : AO		R/W
2819	32819	1	LT : AO		R/W
2820	32820	1	LT : AO	AO Upper Limit	R/W
2821	32821	1	LT : AO		R/W
2822	32822	1	LT : AO		R/W
2823	32823	1	LT : AO		R/W
2824	32824	1	LT : AO	AO Upper Limit	R/W
2825	32825	1	LT : AO		R/W
2826	32826	1	LT : AO		R/W
2827	32827	1	LT : AO		R/W
2828	32828	1	LT : AO	AO Upper Limit	R/W
2829	32829	1	LT : AO		R/W
2830	32830	1	LT : AO		R/W
2831	32831	1	LT : AO		R/W
2832	32832	1	LT : AO	AO Upper Limit	R/W
2833	32833	1	LT : AO		R/W
2834	32834	1	LT : AO		R/W
2835	32835	1	LT : AO		R/W
2836	32836	1	LT : AO	AO Upper Limit	R/W
2837	32837	1	LT : AO		R/W
2838	32838	1	LT : AO		R/W
2839	32839	1	LT : AO		R/W
2840	32840	1	LT : AO	AO Upper Limit	R/W
2841	32841	1	LT : AO		R/W
2842	32842	1	LT : AO		R/W
2843	32843	1	LT : AO		R/W
2844	32844	1	LT : AO	AO Upper Limit	R/W
2845	32845	1	LT : AO		R/W
2846	32846	1	LT : AO		R/W
2847	32847	1	LT : AO		R/W
2848	32848	1	LT : AO		R/W

Register	Modscan Read	Size	LT & Channel	Parameter	R/W
2849	32849	1	LT : AO	AO Upper Limit	R/W
2850	32850	1	LT : AO		R/W
2851	32851	1	LT : AO		R/W
2852	32852	1	LT : AO	AO Upper Limit	R/W
2853	32853	1	LT : AO		R/W
2854	32854	1	LT : AO		R/W
2855	32855	1	LT : AO		R/W
2856	32856	1	LT : AO	AO Upper Limit	R/W
2857	32857	1	LT : AO		R/W
2858	32858	1	LT : AO		R/W
2859	32859	1	LT : AO		R/W
2860	32860	1	LT : AO	AO Upper Limit	R/W
2861	32861	1	LT : AO		R/W
2862	32862	1	LT : AO		R/W
2863	32863	1	LT : AO		R/W
2864	32864	1	LT : AO	AO Upper Limit	R/W
2865	32865	1	LT : AO		R/W
2866	32866	1	LT : AO		R/W
2867	32867	1	LT : AO		R/W
2868	32868	1	LT : AO	AO Upper Limit	R/W
2869	32869	1	LT : AO		R/W
2870	32870	1	LT : AO		R/W
2871	32871	1	LT : AO		R/W
2872	32872	1	LT : AO	AO Upper Limit	R/W
2873	32873	1	LT : AO		R/W
2874	32874	1	LT : AO		R/W
2875	32875	1	LT : AO		R/W
2876	32876	1	LT : AO	AO Upper Limit	R/W
2877	32877	1	LT : AO		R/W
2878	32878	1	LT : AO		R/W
2879	32879	1	LT : AO		R/W
3072	33072	1	LT : AO	AO Lower Limit	R/W
3073	33073	1	LT : AO		R/W
3074	33074	1	LT : AO		R/W
3075	33075	1	LT : AO		R/W
3076	33076	1	LT : AO	AO Lower Limit	R/W
3077	33077	1	LT : AO		R/W
3078	33078	1	LT : AO		R/W
3079	33079	1	LT : AO		R/W
3080	33080	1	LT : AO	AO Lower Limit	R/W
3081	33081	1	LT : AO		R/W
3082	33082	1	LT : AO		R/W
3083	33083	1	LT : AO		R/W
3084	33084	1	LT : AO	AO Lower Limit	R/W
3085	33085	1	LT : AO		R/W
3086	33086	1	LT : AO		R/W
3087	33087	1	LT : AO		R/W
3088	33088	1	LT : AO	AO Lower Limit	R/W
3089	33089	1	LT : AO		R/W
3090	33090	1	LT : AO		R/W

Register	Modscan Read	Size	LT & Channel	Parameter	R/W
3091	33091	1	LT : AO		R/W
3092	33092	1	LT : AO	AO Lower Limit	R/W
3093	33093	1	LT : AO		R/W
3094	33094	1	LT : AO		R/W
3095	33095	1	LT : AO		R/W
3096	33096	1	LT : AO	AO Lower Limit	R/W
3097	33097	1	LT : AO		R/W
3098	33098	1	LT : AO		R/W
3099	33099	1	LT : AO		R/W
3100	33100	1	LT : AO	AO Lower Limit	R/W
3101	33101	1	LT : AO		R/W
3102	33102	1	LT : AO		R/W
3103	33103	1	LT : AO		R/W
3104	33104	1	LT : AO	AO Lower Limit	R/W
3105	33105	1	LT : AO		R/W
3106	33106	1	LT : AO		R/W
3107	33107	1	LT : AO		R/W
3108	33108	1	LT : AO	AO Lower Limit	R/W
3109	33109	1	LT : AO		R/W
3110	33110	1	LT : AO		R/W
3111	33111	1	LT : AO		R/W
3112	33112	1	LT : AO	AO Lower Limit	R/W
3113	33113	1	LT : AO		R/W
3114	33114	1	LT : AO		R/W
3115	33115	1	LT : AO		R/W
3116	33116	1	LT : AO	AO Lower Limit	R/W
3117	33117	1	LT : AO		R/W
3118	33118	1	LT : AO		R/W
3119	33119	1	LT : AO		R/W
3120	33120	1	LT : AO	AO Lower Limit	R/W
3121	33121	1	LT : AO		R/W
3122	33122	1	LT : AO		R/W
3123	33123	1	LT : AO		R/W
3124	33124	1	LT : AO	AO Lower Limit	R/W
3125	33125	1	LT : AO		R/W
3126	33126	1	LT : AO		R/W
3127	33127	1	LT : AO		R/W
3128	33128	1	LT : AO	AO Lower Limit	R/W
3129	33129	1	LT : AO		R/W
3130	33130	1	LT : AO		R/W
3131	33131	1	LT : AO		R/W
3132	33132	1	LT : AO	AO Lower Limit	R/W
3133	33133	1	LT : AO		R/W
3134	33134	1	LT : AO		R/W
3135	33135	1	LT : AO		R/W

Complete Register Table For Control Address

Use function code 5 to issue the control command.

Register	Size	Command	LT & Channel
1	1	Set Group On/Off	All LT: Group 1
2	1	Set Group On/Off	All LT: Group 2
3	1	Set Group On/Off	All LT: Group 3
4	1	Set Group On/Off	All LT: Group 4
5	1	Set Group On/Off	All LT: Group 5
6	1	Set Group On/Off	All LT: Group 6
7	1	Set Group On/Off	All LT: Group 7
8	1	Set Group On/Off	All LT: Group 8
9	1	Set Group On/Off	All LT: Group 9
10	1	Set Group On/Off	All LT: Group 10
11	1	Set Group On/Off	All LT: Group 11
12	1	Set Group On/Off	All LT: Group 12
13	1	Set Group On/Off	All LT: Group 13
14	1	Set Group On/Off	All LT: Group 14
15	1	Set Group On/Off	All LT: Group 15
16	1	Set Group On/Off	All LT: Group 16
17	1	Set Group On/Off	All LT: Group 17
18	1	Set Group On/Off	All LT: Group 18
19	1	Set Group On/Off	All LT: Group 19
20	1	Set Group On/Off	All LT: Group 20
21	1	Set Group On/Off	All LT: Group 21
22	1	Set Group On/Off	All LT: Group 22
23	1	Set Group On/Off	All LT: Group 23
24	1	Set Group On/Off	All LT: Group 24
25	1	Set Group On/Off	All LT: Group 25
26	1	Set Group On/Off	All LT: Group 26
27	1	Set Group On/Off	All LT: Group 27
28	1	Set Group On/Off	All LT: Group 28
29	1	Set Group On/Off	All LT: Group 29
30	1	Set Group On/Off	All LT: Group 30
31	1	Set Group On/Off	All LT: Group 31
32	1	Set Group On/Off	All LT: Group 32
33	1	Set Group On/Off	All LT: Group 33
34	1	Set Group On/Off	All LT: Group 34
35	1	Set Group On/Off	All LT: Group 35
36	1	Set Group On/Off	All LT: Group 36
37	1	Set Group On/Off	All LT: Group 37
38	1	Set Group On/Off	All LT: Group 38
39	1	Set Group On/Off	All LT: Group 39
40	1	Set Group On/Off	All LT: Group 40
41	1	Set Group On/Off	All LT: Group 41
42	1	Set Group On/Off	All LT: Group 42
43	1	Set Group On/Off	All LT: Group 43
44	1	Set Group On/Off	All LT: Group 44
45	1	Set Group On/Off	All LT: Group 45
46	1	Set Group On/Off	All LT: Group 46

Register	Size	Command	LT & Channel
47	1	Set Group On/Off	All LT: Group 47
48	1	Set Group On/Off	All LT: Group 48
49	1	Set Group On/Off	All LT: Group 49
50	1	Set Group On/Off	All LT: Group 50
51	1	Set Group On/Off	All LT: Group 51
52	1	Set Group On/Off	All LT: Group 52
53	1	Set Group On/Off	All LT: Group 53
54	1	Set Group On/Off	All LT: Group 54
55	1	Set Group On/Off	All LT: Group 55
56	1	Set Group On/Off	All LT: Group 56
57	1	Set Group On/Off	All LT: Group 57
58	1	Set Group On/Off	All LT: Group 58
59	1	Set Group On/Off	All LT: Group 59
60	1	Set Group On/Off	All LT: Group 60
61	1	Set Group On/Off	All LT: Group 61
62	1	Set Group On/Off	All LT: Group 62
63	1	Set Group On/Off	All LT: Group 63
64	1	Activate Pattern	All LT: Pattern 1
65	1	Activate Pattern	All LT: Pattern 2
66	1	Activate Pattern	All LT: Pattern 3
67	1	Activate Pattern	All LT: Pattern 4
68	1	Activate Pattern	All LT: Pattern 5
69	1	Activate Pattern	All LT: Pattern 6
70	1	Activate Pattern	All LT: Pattern 7
71	1	Activate Pattern	All LT: Pattern 8
72	1	Activate Pattern	All LT: Pattern 9
73	1	Activate Pattern	All LT: Pattern 10
74	1	Activate Pattern	All LT: Pattern 11
75	1	Activate Pattern	All LT: Pattern 12
76	1	Activate Pattern	All LT: Pattern 13
77	1	Activate Pattern	All LT: Pattern 14
78	1	Activate Pattern	All LT: Pattern 15
79	1	Activate Pattern	All LT: Pattern 16
80	1	Activate Pattern	All LT: Pattern 17
81	1	Activate Pattern	All LT: Pattern 18
82	1	Activate Pattern	All LT: Pattern 19
83	1	Activate Pattern	All LT: Pattern 20
84	1	Activate Pattern	All LT: Pattern 21
85	1	Activate Pattern	All LT: Pattern 22
86	1	Activate Pattern	All LT: Pattern 23
87	1	Activate Pattern	All LT: Pattern 24
88	1	Activate Pattern	All LT: Pattern 25
89	1	Activate Pattern	All LT: Pattern 26
90	1	Activate Pattern	All LT: Pattern 27
91	1	Activate Pattern	All LT: Pattern 28
92	1	Activate Pattern	All LT: Pattern 29
93	1	Activate Pattern	All LT: Pattern 30
94	1	Activate Pattern	All LT: Pattern 31
95	1	Activate Pattern	All LT: Pattern 32
96	1	Activate Pattern	All LT: Pattern 33
97	1	Activate Pattern	All LT: Pattern 34

Register	Size	Command	LT & Channel
98	1	Activate Pattern	All LT: Pattern 35
99	1	Activate Pattern	All LT: Pattern 36
100	1	Activate Pattern	All LT: Pattern 37
101	1	Activate Pattern	All LT: Pattern 38
102	1	Activate Pattern	All LT: Pattern 39
103	1	Activate Pattern	All LT: Pattern 40
104	1	Activate Pattern	All LT: Pattern 41
105	1	Activate Pattern	All LT: Pattern 42
106	1	Activate Pattern	All LT: Pattern 43
107	1	Activate Pattern	All LT: Pattern 44
108	1	Activate Pattern	All LT: Pattern 45
109	1	Activate Pattern	All LT: Pattern 46
110	1	Activate Pattern	All LT: Pattern 47
111	1	Activate Pattern	All LT: Pattern 48
112	1	Activate Pattern	All LT: Pattern 49
113	1	Activate Pattern	All LT: Pattern 50
114	1	Activate Pattern	All LT: Pattern 51
115	1	Activate Pattern	All LT: Pattern 52
116	1	Activate Pattern	All LT: Pattern 53
117	1	Activate Pattern	All LT: Pattern 54
118	1	Activate Pattern	All LT: Pattern 55
119	1	Activate Pattern	All LT: Pattern 56
120	1	Activate Pattern	All LT: Pattern 57
121	1	Activate Pattern	All LT: Pattern 58
122	1	Activate Pattern	All LT: Pattern 59
123	1	Activate Pattern	All LT: Pattern 60
124	1	Activate Pattern	All LT: Pattern 61
125	1	Activate Pattern	All LT: Pattern 62
126	1	Activate Pattern	All LT: Pattern 63
127	1	Activate Pattern	All LT: Pattern 64
256	1	Set DO On/Off	LT 1: DO 1
257	1		LT 1: DO 2
258	1		LT 1: DO 3
259	1		LT 1: DO 4
260	1		LT 1: DO 5
261	1		LT 1: DO 6
262	1		LT 1: DO 7
263	1		LT 1: DO 8
264	1	Set DO On/Off	LT 2: DO 1
265	1		LT 2: DO 2
266	1		LT 2: DO 3
267	1		LT 2: DO 4
268	1		LT 2: DO 5
269	1		LT 2: DO 6
270	1		LT 2: DO 7
271	1		LT 2: DO 8
272	1	Set DO On/Off	LT 3: DO 1
273	1		LT 3: DO 2
274	1		LT 3: DO 3
275	1		LT 3: DO 4
276	1		LT 3: DO 5

Register	Size	Command	LT & Channel
277	1		LT 3: DO 6
278	1		LT 3: DO 7
279	1		LT 3: DO 8
280	1	Set DO On/Off	LT 4: DO 1
281	1		LT 4: DO 2
282	1		LT 4: DO 3
283	1		LT 4: DO 4
284	1		LT 4: DO 5
285	1		LT 4: DO 6
286	1		LT 4: DO 7
287	1		LT 4: DO 8
288	1	Set DO On/Off	LT 5: DO 1
289	1		LT 5: DO 2
290	1		LT 5: DO 3
291	1		LT 5: DO 4
292	1		LT 5: DO 5
293	1		LT 5: DO 6
294	1		LT 5: DO 7
295	1		LT 5: DO 8
296	1	Set DO On/Off	LT 6: DO 1
297	1		LT 6: DO 2
298	1		LT 6: DO 3
299	1		LT 6: DO 4
300	1		LT 6: DO 5
301	1		LT 6: DO 6
302	1		LT 6: DO 7
303	1		LT 6: DO 8
304	1	Set DO On/Off	LT 7: DO 1
305	1		LT 7: DO 2
306	1		LT 7: DO 3
307	1		LT 7: DO 4
308	1		LT 7: DO 5
309	1		LT 7: DO 6
310	1		LT 7: DO 7
311	1		LT 7: DO 8
312	1	Set DO On/Off	LT 8: DO 1
313	1		LT 8: DO 2
314	1		LT 8: DO 3
315	1		LT 8: DO 4
316	1		LT 8: DO 5
317	1		LT 8: DO 6
318	1		LT 8: DO 7
319	1		LT 8: DO 8
320	1	Set DO On/Off	LT 9: DO 1
321	1		LT 9: DO 2
322	1		LT 9: DO 3
323	1		LT 9: DO 4
324	1		LT 9: DO 5
325	1		LT 9: DO 6
326	1		LT 9: DO 7
327	1		LT 9: DO 8

Register	Size	Command	LT & Channel
328	1	Set DO On/Off	LT 10: DO 1
329	1		LT 10: DO 2
330	1		LT 10: DO 3
331	1		LT 10: DO 4
332	1		LT 10: DO 5
333	1		LT 10: DO 6
334	1		LT 10: DO 7
335	1		LT 10: DO 8
336	1	Set DO On/Off	LT 11: DO 1
337	1		LT 11: DO 2
338	1		LT 11: DO 3
339	1		LT 11: DO 4
340	1		LT 11: DO 5
341	1		LT 11: DO 6
342	1		LT 11: DO 7
343	1		LT 11: DO 8
344	1	Set DO On/Off	LT 12: DO 1
345	1		LT 12: DO 2
346	1		LT 12: DO 3
347	1		LT 12: DO 4
348	1		LT 12: DO 5
349	1		LT 12: DO 6
350	1		LT 12: DO 7
351	1		LT 12: DO 8
352	1	Set DO On/Off	LT 13: DO 1
353	1		LT 13: DO 2
354	1		LT 13: DO 3
355	1		LT 13: DO 4
356	1		LT 13: DO 5
357	1		LT 13: DO 6
358	1		LT 13: DO 7
359	1		LT 13: DO 8
360	1	Set DO On/Off	LT 14: DO 1
361	1		LT 14: DO 2
362	1		LT 14: DO 3
363	1		LT 14: DO 4
364	1		LT 14: DO 5
365	1		LT 14: DO 6
366	1		LT 14: DO 7
367	1		LT 14: DO 8
368	1	Set DO On/Off	LT 15: DO 1
369	1		LT 15: DO 2
370	1		LT 15: DO 3
371	1		LT 15: DO 4
372	1		LT 15: DO 5
373	1		LT 15: DO 6
374	1		LT 15: DO 7
375	1		LT 15: DO 8
376	1		LT 16: DO 1
377	1		LT 16: DO 2
378	1		LT 16: DO 3

Register	Size	Command	LT & Channel
379	1	Set DO On/Off	LT 16: DO 4
380	1		LT 16: DO 5
381	1		LT 16: DO 6
382	1		LT 16: DO 7
383	1		LT 16: DO 8
768	1	Single DO Pulse Out	LT 1: DO 1
769	1		LT 1: DO 2
770	1		LT 1: DO 3
771	1		LT 1: DO 4
772	1		LT 1: DO 5
773	1		LT 1: DO 6
774	1		LT 1: DO 7
775	1		LT 1: DO 8
776	1	Single DO Pulse Out	LT 2: DO 1
777	1		LT 2: DO 2
778	1		LT 2: DO 3
779	1		LT 2: DO 4
780	1		LT 2: DO 5
781	1		LT 2: DO 6
782	1		LT 2: DO 7
783	1		LT 2: DO 8
784	1	Single DO Pulse Out	LT 3: DO 1
785	1		LT 3: DO 2
786	1		LT 3: DO 3
787	1		LT 3: DO 4
788	1		LT 3: DO 5
789	1		LT 3: DO 6
790	1		LT 3: DO 7
791	1		LT 3: DO 8
792	1	Single DO Pulse Out	LT 4: DO 1
793	1		LT 4: DO 2
794	1		LT 4: DO 3
795	1		LT 4: DO 4
796	1		LT 4: DO 5
797	1		LT 4: DO 6
798	1		LT 4: DO 7
799	1		LT 4: DO 8
800	1	Single DO Pulse Out	LT 5: DO 1
801	1		LT 5: DO 2
802	1		LT 5: DO 3
803	1		LT 5: DO 4
804	1		LT 5: DO 5
805	1		LT 5: DO 6
806	1		LT 5: DO 7
807	1		LT 5: DO 8
808	1	Single DO Pulse Out	LT 6: DO 1
809	1		LT 6: DO 2
810	1		LT 6: DO 3
811	1		LT 6: DO 4
812	1		LT 6: DO 5
813	1		LT 6: DO 6

Register	Size	Command	LT & Channel
814	1		LT 6: DO 7
815	1		LT 6: DO 8
816	1	Single DO Pulse Out	LT 7: DO 1
817	1		LT 7: DO 2
818	1		LT 7: DO 3
819	1		LT 7: DO 4
820	1		LT 7: DO 5
821	1		LT 7: DO 6
822	1		LT 7: DO 7
823	1		LT 7: DO 8
824	1	Single DO Pulse Out	LT 8: DO 1
825	1		LT 8: DO 2
826	1		LT 8: DO 3
827	1		LT 8: DO 4
828	1		LT 8: DO 5
829	1		LT 8: DO 6
830	1		LT 8: DO 7
831	1		LT 8: DO 8
832	1	Single DO Pulse Out	LT 9: DO 1
833	1		LT 9: DO 2
834	1		LT 9: DO 3
835	1		LT 9: DO 4
836	1		LT 9: DO 5
837	1		LT 9: DO 6
838	1		LT 9: DO 7
839	1		LT 9: DO 8
840	1	Single DO Pulse Out	LT 10: DO 1
841	1		LT 10: DO 2
842	1		LT 10: DO 3
843	1		LT 10: DO 4
844	1		LT 10: DO 5
845	1		LT 10: DO 6
846	1		LT 10: DO 7
847	1		LT 10: DO 8
848	1	Single DO Pulse Out	LT 11: DO 1
849	1		LT 11: DO 2
850	1		LT 11: DO 3
851	1		LT 11: DO 4
852	1		LT 11: DO 5
853	1		LT 11: DO 6
854	1		LT 11: DO 7
855	1		LT 11: DO 8
856	1	Single DO Pulse Out	LT 12: DO 1
857	1		LT 12: DO 2
858	1		LT 12: DO 3
859	1		LT 12: DO 4
860	1		LT 12: DO 5
861	1		LT 12: DO 6
862	1		LT 12: DO 7
863	1		LT 12: DO 8
864	1		LT 13: DO 1

Register	Size	Command	LT & Channel
865	1	Single DO Pulse Out	LT 13: DO 2
866	1		LT 13: DO 3
867	1		LT 13: DO 4
868	1		LT 13: DO 5
869	1		LT 13: DO 6
870	1		LT 13: DO 7
871	1		LT 13: DO 8
872	1	Single DO Pulse Out	LT 14: DO 1
873	1		LT 14: DO 2
874	1		LT 14: DO 3
875	1		LT 14: DO 4
876	1		LT 14: DO 5
877	1		LT 14: DO 6
878	1		LT 14: DO 7
879	1		LT 14: DO 8
880	1	Single DO Pulse Out	LT 15: DO 1
881	1		LT 15: DO 2
882	1		LT 15: DO 3
883	1		LT 15: DO 4
884	1		LT 15: DO 5
885	1		LT 15: DO 6
886	1		LT 15: DO 7
887	1		LT 15: DO 8
888	1	Single DO Pulse Out	LT 16: DO 1
889	1		LT 16: DO 2
890	1		LT 16: DO 3
891	1		LT 16: DO 4
892	1		LT 16: DO 5
893	1		LT 16: DO 6
894	1		LT 16: DO 7
895	1		LT 16: DO 8
1280	1	Dual DO Pulse Out	LT 1: DO 1~2
1281	1		LT 1: DO 3~4
1282	1		LT 1: DO 5~6
1283	1		LT 1: DO 7~8
1284	1	Dual DO Pulse Out	LT 2: DO 1~2
1285	1		LT 2: DO 3~4
1286	1		LT 2: DO 5~6
1287	1		LT 2: DO 7~8
1288	1	Dual DO Pulse Out	LT 3: DO 1~2
1289	1		LT 3: DO 3~4
1290	1		LT 3: DO 5~6
1291	1		LT 3: DO 7~8
1292	1	Dual DO Pulse Out	LT 4: DO 1~2
1293	1		LT 4: DO 3~4
1294	1		LT 4: DO 5~6
1295	1		LT 4: DO 7~8
1296	1	Dual DO Pulse Out	LT 5: DO 1~2
1297	1		LT 5: DO 3~4
1298	1		LT 5: DO 5~6
1299	1		LT 5: DO 7~8

Register	Size	Command	LT & Channel
1300	1	Dual DO Pulse Out	LT 6: DO 1~2
1301	1		LT 6: DO 3~4
1302	1		LT 6: DO 5~6
1303	1		LT 6: DO 7~8
1304	1	Dual DO Pulse Out	LT 7: DO 1~2
1305	1		LT 7: DO 3~4
1306	1		LT 7: DO 5~6
1307	1		LT 7: DO 7~8
1308	1	Dual DO Pulse Out	LT 8: DO 1~2
1309	1		LT 8: DO 3~4
1310	1		LT 8: DO 5~6
1311	1		LT 8: DO 7~8
1312	1	Dual DO Pulse Out	LT 9: DO 1~2
1313	1		LT 9: DO 3~4
1314	1		LT 9: DO 5~6
1315	1		LT 9: DO 7~8
1316	1	Dual DO Pulse Out	LT 10: DO 1~2
1317	1		LT 10: DO 3~4
1318	1		LT 10: DO 5~6
1319	1		LT 10: DO 7~8
1320	1	Dual DO Pulse Out	LT 11: DO 1~2
1321	1		LT 11: DO 3~4
1322	1		LT 11: DO 5~6
1323	1		LT 11: DO 7~8
1324	1	Dual DO Pulse Out	LT 12: DO 1~2
1325	1		LT 12: DO 3~4
1326	1		LT 12: DO 5~6
1327	1		LT 12: DO 7~8
1328	1	Dual DO Pulse Out	LT 13: DO 1~2
1329	1		LT 13: DO 3~4
1330	1		LT 13: DO 5~6
1331	1		LT 13: DO 7~8
1332	1	Dual DO Pulse Out	LT 14: DO 1~2
1333	1		LT 14: DO 3~4
1334	1		LT 14: DO 5~6
1335	1		LT 14: DO 7~8
1336	1	Dual DO Pulse Out	LT 15: DO 1~2
1337	1		LT 15: DO 3~4
1338	1		LT 15: DO 5~6
1339	1		LT 15: DO 7~8
1340	1	Dual DO Pulse Out	LT 16: DO 1~2
1341	1		LT 16: DO 3~4
1342	1		LT 16: DO 5~6
1343	1		LT 16: DO 7~8