Modbus Protocol Guide for ModuLaser Aspirating Systems

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Manufacturer

KGS Manufacturing Poland Sp. z.o.o.,
Ul. Kolejowa 24, 39-100 Ropczyce, Poland.

Authorized EU manufacturing representative:
KGS Fire & Security B.V., Kelvinstraat 7, NL-6003 DH, Weert,
The Netherlands.

Version

For ModuLaser command display modules with firmware version 1.4 or later.

Conformity

CE UK CA

Contact information and product documentation

For contact information or to download the latest product documentation, visit firesecurityproducts.com.

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Important information

Scope

The purpose of this guide is to describe the Modbus holding registers used with ModuLaser command display modules to monitor ModuLaser aspirating smoke detection systems.

This guide is a technical reference for experienced engineers and contains terms that do not have accompanying explanation and understanding may require an in-depth appreciation of the technical issues involved.

Caution: Read this guide, all related product documentation, and all related Modbus protocol standards and specifications entirely before creating Modbus applications.

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Advisory messages

Advisory messages alert you to conditions or practices that can cause unwanted results. The advisory messages used in this document are shown and described below.

WARNING: Warning messages advise you of hazards that could result in injury or loss of life. They tell you which actions to take or to avoid in order to prevent the injury or loss of life.

Caution: Caution messages advise you of possible equipment damage. They tell you which actions to take or to avoid in order to prevent the damage.

Note: Note messages advise you of the possible loss of time or effort. They describe how to avoid the loss. Notes are also used to point out important information that you should read.

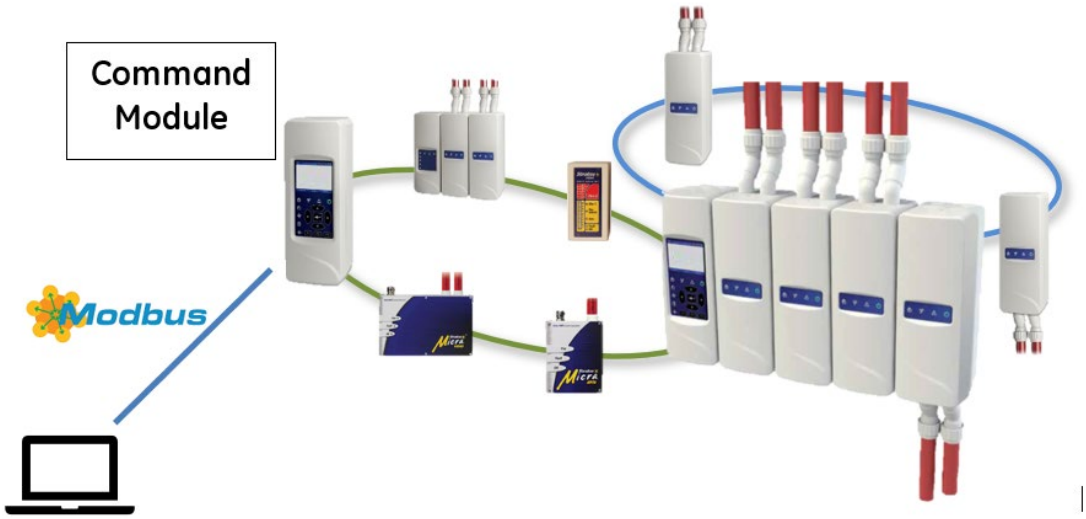
Modbus connections

Connections

Communications are maintained via Modbus TCP (port 502) using a ModuLaser command display module.

Note: RTU connections are not supported.

Figure 1: Connection overview



Command display module configuration

Modbus is available for ModuLaser command display modules with firmware version 1.4 or later.

To ensure full compatibility, we recommend that all modules in a network are updated to firmware version 1.4 if any module in the network has firmware version 1.4 (or later).

By default Modbus functionality is disabled. Enable Modbus from the command display module TFT display menu or by using the Remote configuration application (version 5.2 or later).

Modbus connections may be configured from a single point by specifying the destination IP address. Indicating 0.0.0.0 allows Modbus connection to the network from any accessible point.

Timing considerations

Reading and writing holding registers is a synchronous operation.

The table below gives the minimum times that must be maintained between consecutive operations. For optimum reliability, third-party software should conform to these specifications.

Caution: Do not send multiple operations without first receiving a response from the device.

Function	Minimum time between operations
Read Holding Register	As soon as device responds.
Bus Reset	2 seconds
Isolate	3 seconds

Register mapping

Global register map

Start Address	End Address	Name	Access	Use
0x0001	0x0001	STATUS_MN	Read (R)	ModuLaser network status.
0x0002	0x0080	STATUS_DEV1 - STATUS_DEV127	Read (R)	Device N status – ModuLaser command display module, display module, detector, or legacy AirSense device.
0x0081	0x0081	FAULTS_MN	Read (R)	ModuLaser network faults and warnings.
0x0082	0x0100	FAULTS_DEV1 - FAULTS_DEV127	Read (R)	Device N faults and warnings - ModuLaser command display module, display module, detector, or legacy AirSense device.
0x0258	0x0258	CONTROL_RESET	Write (W)	Execute reset.
0x025A	0x025A	NETWORK_REVISION_NUMBER	Read (R)	Read returns network revision number.
0x02BD	0x033B	LEVEL_DET1 - LEVEL_DET127	Read (R)	Detector output level – only valid for detector device addresses and when the detector is not signalling a fault.
0x0384	0x0402	CONTROL_DISABLE_DET1 – CONTROL_DISABLE_DET127	Read (R)	Read returns non-zero when isolated.
			Write (W)	Toggles the enable/disable status for a device.

ModuLaser network status

Consists of 1 holding register.

Start address	End address	Name	Access	Use
0x0001	0x0001	STATUS_ MN	Read (R)	ModuLaser network status.

The register is divided into two bytes.

The lower byte represents the ModuLaser network status, as shown in the table below.

High byte								Low byte							
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Not used								ModuLaser network status							

Bit	High byte	Bit	Low byte
8	Not used	0	General fault flag
9	Not used	1	Aux flag
10	Not used	2	Prealarm flag
11	Not used	3	Fire 1 flag
12	Not used	4	Fire 2 flag
13	Not used	5	Not used.
14	Not used	6	Not used.
15	Not used	7	General warning flag

Device status

Consists of 127 holding registers.

Start address	End address	Name	Access	Use
0x0002	0x0080	STATUS_DEV1 - STATUS_DEV127	Read (R)	DEVICE 1 – DEVICE 127 status.

Address	Status	Address	Status	Address	Status	Address	Status	Address	Status
0x0002	Device 1	0x001C	Device 27	0x0036	Device 53	0x0050	Device 79	0x006A	Device 105
0x0003	Device 2	0x001D	Device 28	0x0037	Device 54	0x0051	Device 80	0x006B	Device 106
0x0004	Device 3	0x001E	Device 29	0x0038	Device 55	0x0052	Device 81	0x006C	Device 107
0x0005	Device 4	0x001F	Device 30	0x0039	Device 56	0x0053	Device 82	0x006D	Device 108
0x0006	Device 5	0x0020	Device 31	0x003A	Device 57	0x0054	Device 83	0x006E	Device 109
0x0007	Device 6	0x0021	Device 32	0x003B	Device 58	0x0055	Device 84	0x006F	Device 110
0x0008	Device 7	0x0022	Device 33	0x003C	Device 59	0x0056	Device 85	0x0070	Device 111
0x0009	Device 8	0x0023	Device 34	0x003D	Device 60	0x0057	Device 86	0x0071	Device 112
0x000A	Device 9	0x0024	Device 35	0x003E	Device 61	0x0058	Device 87	0x0072	Device 113
0x000B	Device 10	0x0025	Device 36	0x003F	Device 62	0x0059	Device 88	0x0073	Device 114
0x000C	Device 11	0x0026	Device 37	0x0040	Device 63	0x005A	Device 89	0x0074	Device 115
0x000D	Device 12	0x0027	Device 38	0x0041	Device 64	0x005B	Device 90	0x0075	Device 116
0x000E	Device 13	0x0028	Device 39	0x0042	Device 65	0x005C	Device 91	0x0076	Device 117
0x000F	Device 14	0x0029	Device 40	0x0043	Device 66	0x005D	Device 92	0x0077	Device 118
0x0010	Device 15	0x002A	Device 41	0x0044	Device 67	0x005E	Device 93	0x0078	Device 119
0x0011	Device 16	0x002B	Device 42	0x0045	Device 68	0x005F	Device 94	0x0079	Device 120
0x0012	Device 17	0x002C	Device 43	0x0046	Device 69	0x0060	Device 95	0x007A	Device 121
0x0013	Device 18	0x002D	Device 44	0x0047	Device 70	0x0061	Device 96	0x007B	Device 122
0x0014	Device 19	0x002E	Device 45	0x0048	Device 71	0x0062	Device 97	0x007C	Device 123
0x0015	Device 20	0x002F	Device 46	0x0049	Device 72	0x0063	Device 98	0x007D	Device 124
0x0016	Device 21	0x0030	Device 47	0x004A	Device 73	0x0064	Device 99	0x007E	Device 125
0x0017	Device 22	0x0031	Device 48	0x004B	Device 74	0x0065	Device 100	0x007F	Device 126
0x0018	Device 23	0x0032	Device 49	0x004C	Device 75	0x0066	Device 101	0x0080	Device 127
0x0019	Device 24	0x0033	Device 50	0x004D	Device 76	0x0067	Device 102		
0x001A	Device 25	0x0034	Device 51	0x004E	Device 77	0x0068	Device 103		
0x001B	Device 26	0x0035	Device 52	0x004F	Device 78	0x0069	Device 104		

Each register is divided into two bytes.

The lower byte represents the status of a single device, as shown in the table below.

High byte								Low byte							
15	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Not used								Device N status							

Bit	High byte	Bit	Low byte
8	Not used	0	General fault flag
9	Not used	1	Aux flag
10	Not used	2	Prealarm flag
11	Not used	3	Fire 1 flag
12	Not used	4	Fire 2 flag
13	Not used	5	Not used
14	Not used	6	Not used
15	Not used	7	General warning flag

Modulaser network faults and warnings

Consists of 1 holding register.

Start address	End address	Name	Access	Use
0x0081	0x0081	FAULTS_MN	Read (R)	ModuLaser network faults and warnings.

The register is divided into two bytes.

The lower byte represents ModuLaser network faults and the upper byte network warnings, as shown in the table below.

High byte								Low byte							
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
ModuLaser network warnings								ModuLaser network faults							

Bit	High byte	Bit	Low byte
8	Detection aborted.	0	Flow fault (low or high)
9	FastLearn.	1	Offline
10	Demo mode.	2	Head fault
11	Flow Low range.	3	Mains/Battery fault
12	Flow High range.	4	Front cover removed
13	Not used.	5	Isolated
14	Not used.	6	Separator fault
15	Other warning.	7	Other, including Bus Loop Break

Device faults and warnings

Consists of 127 holding registers.

Start address	End address	Name	Access	Use
0x0082	0x0100	FAULTS_DEV1 - FAULTS_DEV127	Read (R)	DEVICE 1 – DEVICE 127 faults.

Address	Faults	Address	Faults	Address	Faults	Address	Faults	Address	Faults
0x0082	Device 1	0x009C	Device 27	0x00B6	Device 53	0x00D0	Device 79	0x00EA	Device 105
0x0083	Device 2	0x009D	Device 28	0x00B7	Device 54	0x00D1	Device 80	0x00EB	Device 106
0x0084	Device 3	0x009E	Device 29	0x00B8	Device 55	0x00D2	Device 81	0x00EC	Device 107
0x0085	Device 4	0x009F	Device 30	0x00B9	Device 56	0x00D3	Device 82	0x00ED	Device 108
0x0086	Device 5	0x00A0	Device 31	0x00BA	Device 57	0x00D4	Device 83	0x00EE	Device 109
0x0087	Device 6	0x00A1	Device 32	0x00BB	Device 58	0x00D5	Device 84	0x00EF	Device 110
0x0088	Device 7	0x00A2	Device 33	0x00BC	Device 59	0x00D6	Device 85	0x00F0	Device 111
0x0089	Device 8	0x00A3	Device 34	0x00BD	Device 60	0x00D7	Device 86	0x00F1	Device 112
0x008A	Device 9	0x00A4	Device 35	0x00BE	Device 61	0x00D8	Device 87	0x00F2	Device 113
0x008B	Device 10	0x00A5	Device 36	0x00BF	Device 62	0x00D9	Device 88	0x00F3	Device 114
0x008C	Device 11	0x00A6	Device 37	0x00C0	Device 63	0x00DA	Device 89	0x00F4	Device 115
0x008D	Device 12	0x00A7	Device 38	0x00C1	Device 64	0x00DB	Device 90	0x00F5	Device 116
0x008E	Device 13	0x00A8	Device 39	0x00C2	Device 65	0x00DC	Device 91	0x00F6	Device 117
0x008F	Device 14	0x00A9	Device 40	0x00C3	Device 66	0x00DD	Device 92	0x00F7	Device 118
0x0090	Device 15	0x00AA	Device 41	0x00C4	Device 67	0x00DE	Device 93	0x00F8	Device 119
0x0091	Device 16	0x00AB	Device 42	0x00C5	Device 68	0x00DF	Device 94	0x00F9	Device 120
0x0092	Device 17	0x00AC	Device 43	0x00C6	Device 69	0x00E0	Device 95	0x00FA	Device 121
0x0093	Device 18	0x00AD	Device 44	0x00C7	Device 70	0x00E1	Device 96	0x00FB	Device 122
0x0094	Device 19	0x00AE	Device 45	0x00C8	Device 71	0x00E2	Device 97	0x00FC	Device 123
0x0095	Device 20	0x00AF	Device 46	0x00C9	Device 72	0x00E3	Device 98	0x00FD	Device 124
0x0096	Device 21	0x00B0	Device 47	0x00CA	Device 73	0x00E4	Device 99	0x00FE	Device 125
0x0097	Device 22	0x00B1	Device 48	0x00CB	Device 74	0x00E5	Device 100	0x00FF	Device 126
0x0098	Device 23	0x00B2	Device 49	0x00CC	Device 75	0x00E6	Device 101	0x0100	Device 127
0x0099	Device 24	0x00B3	Device 50	0x00CD	Device 76	0x00E7	Device 102		
0x009A	Device 25	0x00B4	Device 51	0x00CE	Device 77	0x00E8	Device 103		
0x009B	Device 26	0x00B5	Device 52	0x00CF	Device 78	0x00E9	Device 104		

Each register is divided into two bytes.

The lower byte represents a device fault, as shown in the table below.

High byte								Low byte							
15	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Device N warnings								Device N faults							

Bit	High byte	Bit	Low byte
8	Detection aborted.	0	Flow fault (low or high)
9	FastLearn.	1	Offline
10	Demo mode.	2	Head fault
11	Flow Low range.	3	Mains/Battery fault
12	Flow High range.	4	Front cover removed
13	Not used.	5	Isolated
14	Not used.	6	Separator fault
15	Other warning.	7	Other (for example, watchdog)

Detector output level

Caution: Only valid for detector device addresses and only when the detector is not signalling a fault.

Consists of 127 holding registers.

Start address	End address	Name	Access	Use
0x02BD	0x033B	LEVEL_DET1 - LEVEL_DET127	Read (R)	DETECTOR 1 – DETECTOR 127 output level.

Address	Status	Address	Status	Address	Status	Address	Status	Address	Status
0x02BD	Detector 1	0x02D7	Detector 27	0x02F1	Detector 53	0x030B	Detector 79	0x0325	Detector 105
0x02BE	Detector 2	0x02D8	Detector 28	0x02F2	Detector 54	0x030C	Detector 80	0x0326	Detector 106
0x02BF	Detector 3	0x02D9	Detector 29	0x02F3	Detector 55	0x030D	Detector 81	0x0327	Detector 107
0x02C0	Detector 4	0x02DA	Detector 30	0x02F4	Detector 56	0x030E	Detector 82	0x0328	Detector 108
0x02C1	Detector 5	0x02DB	Detector 31	0x02F5	Detector 57	0x030F	Detector 83	0x0329	Detector 109
0x02C2	Detector 6	0x02DC	Detector 32	0x02F6	Detector 58	0x0310	Detector 84	0x032A	Detector 110
0x02C3	Detector 7	0X02DD	Detector 33	0x02F7	Detector 59	0x0310	Detector 85	0x032B	Detector 111
0x02C4	Detector 8	0x02DE	Detector 34	0x02F8	Detector 60	0x0312	Detector 86	0x032C	Detector 112
0x02C5	Detector 9	0x02DF	Detector 35	0x02F9	Detector 61	0x0313	Detector 87	0x032D	Detector 113
0x02C6	Detector 10	0x02E0	Detector 36	0x02FA	Detector 62	0x0314	Detector 88	0x032E	Detector 114
0x02C7	Detector 11	0x02E1	Detector 37	0x02FB	Detector 63	0x0315	Detector 89	0x032F	Detector 115
0x02C8	Detector 12	0x02E2	Detector 38	0x02FC	Detector 64	0x0316	Detector 90	0x0330	Detector 116
0x02C9	Detector 13	0x02E3	Detector 39	0x02FD	Detector 65	0x0317	Detector 91	0x0331	Detector 117
0x02CA	Detector 14	0x02E4	Detector 40	0x02FE	Detector 66	0x0318	Detector 92	0x0332	Detector 118
0x02CB	Detector 15	0x02E5	Detector 41	0x02FF	Detector 67	0x0319	Detector 93	0x0333	Detector 119
0x02CC	Detector 16	0x02E6	Detector 42	0x0300	Detector 68	0x031A	Detector 94	0x0334	Detector 120
0x02CD	Detector 17	0x02E7	Detector 43	0x0301	Detector 69	0x031B	Detector 95	0x0335	Detector 121
0x02CE	Detector 18	0x02E8	Detector 44	0x0302	Detector 70	0x031C	Detector 96	0x0336	Detector 122
0x02CF	Detector 19	0x02E9	Detector 45	0x0303	Detector 71	0x031D	Detector 97	0x0337	Detector 123
0x02D0	Detector 20	0x02EA	Detector 46	0x0304	Detector 72	0x031E	Detector 98	0x0338	Detector 124
0x02D1	Detector 21	0x02EB	Detector 47	0x0305	Detector 73	0x031F	Detector 99	0x0339	Detector 125
0x02D2	Detector 22	0x02EC	Detector 48	0x0306	Detector 74	0x0320	Detector 100	0x033A	Detector 126
0x02D3	Detector 23	0x02ED	Detector 49	0x0307	Detector 75	0x0321	Detector 101	0x033B	Detector 127
0x02D4	Detector 24	0x02EE	Detector 50	0x0308	Detector 76	0x0322	Detector 102		
0x02D5	Detector 25	0x02EF	Detector 51	0x0309	Detector 77	0x0323	Detector 103		
0x02D6	Detector 26	0x02F0	Detector 52	0x030A	Detector 78	0x0324	Detector 104		

Each register is divided into two bytes.

The lower byte contains the value of a single detector output level, as shown in the table below.

High byte								Low byte							
15	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Not used								Detector N output level							

Network revision number

Consists of 1 holding register.

Start address	End address	Name	Access	Use
0x025A	0x025A	NETWORK_REVISION_NUMBER	Read (R)	Read returns network revision number.

The register contains the revision number of the ModuLaser network, as shown in the table below.

High byte								Low byte							
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Network revision number															

Execute reset

Executes the Reset Display in the ModuLaser network (write any value to reset alarms or faults).

Start address	End address	Name	Access	Use
0x0258	0x0258	CONTROL_RESET	Write (W)	Execute Reset.

High byte								Low byte							
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Not used															

Execute device enable/disable

Toggles the enable/disable status for a device (write any value to toggle the enable/disable status).

Start address	End address	Name	Access	Use
0x0384	0x0402	CONTROL_DISABLE_DET1 – CONTROL_DISABLE_DET127	Write (W)	Enable or disable a device.

Address	Status	Address	Status	Address	Status	Address	Status	Address	Status
0x0384	Detector 1	0x039E	Detector 27	0x03B8	Detector 53	0x03D2	Detector 79	0x03EC	Detector 105
0x0385	Detector 2	0x039F	Detector 28	0x03B9	Detector 54	0x03D3	Detector 80	0x03ED	Detector 106
0x0386	Detector 3	0x03A0	Detector 29	0x03BA	Detector 55	0x03D4	Detector 81	0x03EE	Detector 107
0x0387	Detector 4	0x03A1	Detector 30	0x03BB	Detector 56	0x03D5	Detector 82	0x03EF	Detector 108
0x0388	Detector 5	0x03A2	Detector 31	0x03BC	Detector 57	0x03D6	Detector 83	0x03F0	Detector 109
0x0389	Detector 6	0x03A3	Detector 32	0x03BD	Detector 58	0x03D7	Detector 84	0x03F1	Detector 110
0x038A	Detector 7	0X03A4	Detector 33	0x03BE	Detector 59	0x03D8	Detector 85	0x03F2	Detector 111
0x038B	Detector 8	0x03A5	Detector 34	0x03BF	Detector 60	0x03D9	Detector 86	0x03F3	Detector 112
0x038C	Detector 9	0x03A6	Detector 35	0x03C0	Detector 61	0x03DA	Detector 87	0x03F4	Detector 113
0x038D	Detector 10	0x03A7	Detector 36	0x03C1	Detector 62	0x03DB	Detector 88	0x03F5	Detector 114
0x038E	Detector 11	0x03A8	Detector 37	0x03C2	Detector 63	0x03DC	Detector 89	0x03F6	Detector 115
0x038F	Detector 12	0x03A9	Detector 38	0x03C3	Detector 64	0x03DD	Detector 90	0x03F7	Detector 116
0x0390	Detector 13	0x03AA	Detector 39	0x03C4	Detector 65	0x03DE	Detector 91	0x03F8	Detector 117
0x0391	Detector 14	0x03AB	Detector 40	0x03C5	Detector 66	0x03DF	Detector 92	0x03F9	Detector 118
0x0392	Detector 15	0x03AC	Detector 41	0x03C6	Detector 67	0x03E0	Detector 93	0x03FA	Detector 119
0x0393	Detector 16	0x03AD	Detector 42	0x03C7	Detector 68	0x03E1	Detector 94	0x03FB	Detector 120
0x0394	Detector 17	0x03AE	Detector 43	0x03C8	Detector 69	0x03E2	Detector 95	0x03FC	Detector 121
0x0395	Detector 18	0x03AF	Detector 44	0x03C9	Detector 70	0x03E3	Detector 96	0x03FD	Detector 122
0x0396	Detector 19	0x03B0	Detector 45	0x03CA	Detector 71	0x03E4	Detector 97	0x03FE	Detector 123
0x0397	Detector 20	0x03B1	Detector 46	0x03CB	Detector 72	0x03E5	Detector 98	0x03FF	Detector 124
0x0398	Detector 21	0x03B2	Detector 47	0x03CC	Detector 73	0x03E6	Detector 99	0x0400	Detector 125
0x0399	Detector 22	0x03B3	Detector 48	0x03CD	Detector 74	0x03E7	Detector 100	0x0401	Detector 126
0x039A	Detector 23	0x03B4	Detector 49	0x03CE	Detector 75	0x03E8	Detector 101	0x0402	Detector 127
0x039B	Detector 24	0x03B5	Detector 50	0x03CF	Detector 76	0x03E9	Detector 102		
0x039C	Detector 25	0x03B6	Detector 51	0x03D0	Detector 77	0x03EA	Detector 103		
0x039D	Detector 26	0x03B7	Detector 52	0x03D1	Detector 78	0x03EB	Detector 104		

High byte								Low byte							
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Not used															

If the device is enabled, then the Write Single Register to the CONTROL_ISOLATE register disables the device.

If the device is disabled, then the Write Single Register to the CONTROL_ISOLATE register enables the device.