

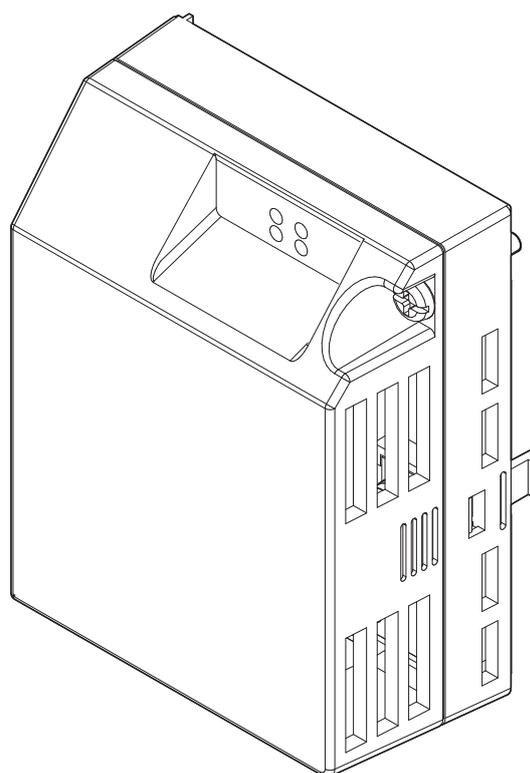
Bus Interfaces

Profibus, ProfiNet, Ethernet IP, EtherCAT for
DRYVAC DV 200, 300, 450, 650, 1200,
RUVAC WH 700, 2500, 4400, 7000

Operating Instructions 300802431_002_C0

Part Numbers

Profibus	155212V
ProfiNet	112005A35
Ethernet	112005A02
EtherCAT	112005A36



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Original operating instructions.

Obligation to Provide Information

Before installing and commissioning the pump, carefully read these Operating Instructions and follow the information so as to ensure optimum and safe working right from the start.

The Leybold **DRYVAC** and **RUVAC** have been designed for safe and efficient operation when used properly and in accordance with these Operating Instructions. It is the responsibility of the user to carefully read and strictly observe all safety precautions described in this section and throughout the Operating Instructions. The pump must only be operated in the proper condition and under the conditions described in the Operating Instructions. It must be operated and maintained by trained personnel only. Consult local, state, and national agencies regarding specific requirements and regulations. Address any further safety, operation and/or maintenance questions to our nearest office.

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

We reserve the right to change the design and the specified data. The illustrations are not binding.

Keep the instructions for future use.

0 Important Safety Information

- 1 Electrical shock caused by direct or indirect contact with live parts. Electrical shock due to faulty electrical connection and possible residual voltage up to 5 minutes after disconnection from the mains. The electrical connection may only be carried out by a trained person. Observe the national regulations in the user country, e.g. for Europe EN 50110 - 1. Prior to servicing, disconnect the vacuum pump from the power supply.
- 2 Burns caused by touching hot surfaces. Burning of fingers, hands or arms on hot surfaces. Handle the pump only when ventilated and cooled down. Wear suitable protective equipment.
- 3 Danger of escaping or emitting pumped hazardous gases, vapours or substances. If the pump has pumped hazardous materials before installing the interfaces, take appropriate safety measures.

NOTICE



DANGER



CAUTION



DANGER



CAUTION



DANGER



Description

1 Description

The DRYVAC DV and RUVAC WH are equipped as standard with a remote interface (digital inputs and outputs) and an RS 485 interface (MEMOBUS). These two interfaces are described in the instruction manual for the pump.

The DRYVAC DV 1200 are equipped as standard with a Profibus interface.

In addition, further bus interfaces can be retrofitted, which are described in this manual.

For installation and operation of the bus interface, please refer to the instructions of YASKAWA enclosed with the module. This manual describes the settings required for the DRYVAC and RUVAC of the respective interface.

This manual does **not apply to DRYVAC-i** models.

1.1 Ordering Information

	Part No.
Profibus module	155212V
ProfiNet module	112005A35
Ethernet module	112005A02
EtherCAT module	112005A36

2 Profibus

GSD file

The GSD file and the manual can be downloaded from www.leybold.com -> Downloads -> Download Software -> PC software for DRYVAC and RUVAC WH pumps.

The GSD file for the versions in this manual is different from the GSD file for the DRYVAC-i versions. Do not mix them up.

2.1 Parameter Settings

No.	Name	Description	Leybold Setting
b1-01	Frequency Reference Selection *1 *2	Selects the frequency reference input source 0: Operator - Digital preset speed d1-01 to d1-17 1: Terminals - Analog input terminal A1 or A2 2: MEMOBUS/Modbus communications 3: Option PCB 4: Pulse Input (Terminal RP)	3
b1-02	Run Command Selection *1 *2	Selects the run command input source 0: Digital Operator - RUN and STOP keys 1: Digital input terminals S1 to S7 2: MEMOBUS/Modbus communications 3: Option PCB	3
F6-30	Node Address *3	0 to 125	6
F6-31	Clear Mode Selection	Selects the action to take when a „Clear Mode“ command is received 0: Resets back to 0 1: Maintains the previous value	0
F6-32	PROFIBUS Map Selection	0: PPO Type 1: Conventional	1

* 1. To start and stop the drive through the PROFIBUS-DP network, set b1-02 to “3”. To control the frequency reference of the drive via the PROFIBUS-DP network, set b1-01 to “3”.

* 2. When b1-01 = 3 and/or b1-02 = 3 are selected and the communication option is not installed, V1000 detects oPE07 instead of oPE05 with software version 1010.

* 3. All node addresses must be unique. Node addresses 0, 1, and 2 are typically reserved for control, maintenance, and diagnostic equipment. The ERR light will illuminate when 0 or greater than 125 is entered.

MEMOBUS/Modbus Message

MEMOBUS/Modbus Message is **not** active.

Profibus

2.2 Data Register

Basic Data Register Map Detail

Input		Output	
Byte	Description	Byte	Description
0	Operation Command High Byte	0	Drive Status High Byte
1	Operation Command Low Byte	1	Drive Status Low Byte
} Table 13		} Table 14	
2	Frequency setpoint High Byte*1	2	Motor Speed High Byte*1
3	Frequency setpoint Low Byte*1	3	Motor Speed Low Byte*1
4	Reserved	4	Output Current High Byte*2
5	Reserved	5	Output Current Low Byte*2

* 1. The unit is 0.01 Hz

* 2. The unit is 0.01 A for drives set up to 11 kW in Heavy Duty or Normal Duty and 0.1 A for drives set up for 15 kW and above.

Extended Data 1 Register Map

Input		Output	
Byte	Description	Byte	Description
0	Operation Command High Byte	0	Drive Status High Byte
1	Operation Command Low Byte	1	Drive Status Low Byte
} Table 13		} Table 14	
2	Frequency setpoint High Byte*3	2	Motor Speed High Byte*3
3	Frequency setpoint Low Byte*3	3	Motor Speed Low Byte *3
4	Reserved	4	Torque Reference Monitor High Byte *4
5	Reserved	5	Torque Reference Monitor Low Byte *4
6, 7	Reserved	6, 7	Reserved
8	Reserved	8	Frequency setpoint High Byte
9	Reserved	9	Frequency setpoint Low Byte
10	Analog Output Channel 1 High Byte *1	10	Output Frequency High Byte
11	Analog Output Channel 1 Low Byte *1	11	Output Frequency Low Byte
12	Reserved	12	Output Current High Byte *5
13	Reserved	13	Output Current Low Byte *5
14	Digital Output High Byte *2	14	Reserved
15	Digital Output Low Byte *2	15	Reserved
16 to 31	Reserved	16 to 31	Reserved

* 1. To select drive analog output channel for communications, set H4-01 (Multi-Function Analog Output Terminal AM) to 31 (Not used)

* 2. Drive digital output ON/OFF during communications, set H2-01 (Terminal MA, MB and MC Function Selection (relay)), H2-02 (Terminal P1 Function Selection (open-collector)), and H2-03 (Terminal P2 Function Selection (open-collector)) to F.

* 3. The unit is 0.01 Hz

* 4. Cannot be used when setting A1-02 (Control Method Selection) to 0 (V/f Control without PG).

* 5. The unit is 0.01 A for drives set up to 11 kW in Heavy Duty or Normal Duty and 0.1 A for drives set up for 15 kW and above.

Extended Data 2 Register Map

Output		Input	
Byte	Description	Byte	Description
0	Operation Command High Byte	0	Drive Status High Byte
1	Operation Command Low Byte	1	Drive Status Low Byte
2	Frequency setpoint High Byte*1	2	Motor Speed High Byte *1
3	Frequency setpoint Low Byte*1	3	Motor Speed Low Byte *1
4 to 11	Reserved	4 to 11	Reserved

* 1. The unit is 0.01 Hz

Table 13 Operation Command

Byte	Command Bits	Description
Byte 1	0	Start / Stop (1 = Start, 0 = Stop)
Byte 1	1 to 7	Reserved
Byte 0	8	Reserved
Byte 0	9	Reset
Byte 0	A to F	Reserved

Basically set reserved bits to 0!

Table 14 Drive Status

Byte	Command Bits	Description
Byte 1	0	Pump rotating
Byte 1	1	Pump stands still
Byte 1	2, 3	Reserved
Byte 1	4	Normal operation (frequency setpoint reached)
Byte 1	5	Drive ready (ready to start, no fault)
Byte 1	6	Alarm
Byte 1	7	Fault
Byte 0	8 to F	Reserved

MEMOBUS/Modbus Message Area

MEMOBUS/Modbus Message Area is **not** active.

Handshaking Register

Handshaking Register is **not** active.

3 Profinet

ProfiNet module SI-EP3/V (version with one connection)

Settings on the frequency converter

Activating the adapter card

B1-01 = 3

B1-02 = 3

Network parameter

F7-01 to F7-04 IP address

F7-05 to F7-08 Subnet mask

F7-09 to F7-12 Gateway

After setting the parameters, reboot the system.

Note the parameters for later use in the PLC or PC program.

The GSDML file is an xml file that can be downloaded at www.leybold.com
-> Downloads -> Download Software -> PC software for DRYVAC and RUVAC WH pumps.

Assignment of the PROFINET address

The PROFINET address can only be assigned via the hardware configuration tool of the PLC. To assign the PROFINET IP address via hardware configuration tool of the PLC, please refer to the documentation of the PLC.

Configuration I/O parameters

The decision to use either the PROFIdrive control and status words or the Yaskawa-specific control and status words is done in a hardware configuration tool (customer supplied). The default value is the Yaskawa-specific format.

SI-EP3/V uses slots 0 and 1. Slot 0 does not have any sub-slots and the attached DAP module represents the device. Other functional modules and sub-modules described in the GSD file can be assigned to slot 1 and its sub-slots.

- Slot 0 = Device access point (DAP)
- Slot 1, sub-slot 1 = Standard telegram 1, Standard telegram 1 + 5 configurable inputs, outputs, Forty byte IO with 5 configurable input, outputs

The services provided by the SI-EP3/V option can be defined using the F7-□□ parameters in the drive or by using a configuration tool. To define the service using the F7-□□ parameters, set the parameter to a value other than 0. If all F7-□□ parameters are set to 0, the value from the configuration tool will be used.

The SI-EP3/V option provides the following services:

- Cyclic messaging in PROFIdrive or Yaskawa-specific mode
- Acyclic parameter access mechanism
- Identification & Maintenance functions (I&M0)
- PROFIdrive parameters
- Diagnostic and alarm mechanism
- Fault buffer mechanism

Standard telegram 1

Minimal information

- Frequency specification
- Commands to frequency converter
- Output frequency feedback
- Status frequency converter feedback

Standard telegram 1 + 5 configurable inputs, outputs

Standard plus, maximum information, a little slower

- Write 5 self-defined parameters
- 5 self-defined parameters return
- Input and output independently

I/O 40 profiles

- 40 bytes of inputs and outputs including general operating parameters

Ethernet IP

3 Ethernet IP

3.1 LED Status indicators

Name	Indication		Operating Status	Remarks
	Color	Status		
MS	–	OFF	Power supply OFF	Power is not being supplied to the drive
	Green	ON	Option operating	The option is operating normally
	Green	Flashing	Option initializing	The option is configuring an IP address
	Red	ON	Fatal error occurred	The option has detected a fatal (unrecoverable) error
	Red	Flashing	Non-fatal error occurred	The option has detected a non-fatal (recoverable) error
	Green/Red	Flashing	Option self-test	The option is in self-test mode
NS	–	OFF	Offline or Power supply OFF	–
	Green	ON	Online communications established	The option is online and has established connections
	Green	Flashing	Online communications not established	The option is online without an established connection
	Red	ON	Communications error (fatal)	The option detected a duplicate IP address
	Red	Flashing	Communications time-out (non-fatal)	A communications time-out occurred
10/100	Green/Red	Flashing	Option self-test	The option is in self-test mode
	Green	OFF	10 Mbps is established	–
	Green	ON	100 Mbps is established	–
LINK/ACT	Green	OFF	Link is not established	–
	Green	ON	Link is established	–
	Green	Flashing	Link is established and there is network activity	–

Power-Up Diagnostics

An LED test is performed each time the drive is powered up. The initial boot sequence may take several seconds. After the LEDs have completed the diagnostic LED sequence, the option is successfully initialized. The LEDs then assume operational conditions as shown in the Table above.

Power-Up Diagnostic LED Sequence

Sequence	Module Status (MS)	Network Status (NS)	Time (ms)
1	Green	OFF	250
2	Red	OFF	250
3	Green	OFF	-
4	Green	Green	250
5	Green	Red	250
6	Green	OFF	-

EDS File

For easy network implantation, download the EDS file at www.leybold.com -> Downloads -> Download Software -> PC Software for DRYVAC and RUVAC WH pumps.

Refer to the option package labeling in the field designated "PRG" (four digit number)" to identify the option software version

Version 1.05. (0224, 4100)

Version 1.06. (4101)

Version 1.07. (4102)

Version 1.08. (4103)

Activating the adapter card

B1-01 = 3

B1-02 = 3

3.2 Control and Monitor Parameters

F7-13 1 BootP

2 DHCP

0 User defined

If 0 is selected, set the following values:

F7-01 to F7-04 IP address

F7-05 to F7-08 Subnet mask

F7-09 to F7-12 Gateway

Ethernet IP

Current IP addresses and errors are in:

U6-80 to U6-83	Online IP Address	IP Address currently available; U6-80 is the most significant octet	0 to 255
U6-84 to U6-87	Online Subnet	Subnet currently available; U6-84 is the most significant octet	0 to 255
U6-88 to U6-91	Online Gateway	Gateway currently available; U6-88 is the most significant octet	0 to 255
U6-92	Online Speed	Link Speed	10: 10 Mbps, 100: 100 Mbps
U6-93	Online Duplex	Duplex Setting	0: Half, 1: Full
U6-98	First Fault	First Option Fault	–
U6-99	Current Fault	Current Option Fault	–

Enter IP address in browser to access website.

3.3 Configuration of Messages / Input and Output Assemblies

The following is a summary of the necessary functions, the complete description can be found in the Yaskawa manual.

Output Assemblies (Drive Consumes)

The convention in this manual is from the PLC perspective. As such, an assembly is called an “Output Assembly” when outputted from the PLC and received by this node. This section details “Output Assemblies” that are “Consumed” by this drive.

Basic Speed Control Output - 20 (0x14)

Output Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
20	0	–	–	–	–	–	Fault Reset	–	Run Fwd	
	1							–		
	2	Speed Reference (Low Byte)								
	3	Speed Reference (High Byte)								

Extended Speed Control Output - 21 (0x15)

Output Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
21	0	–	NetRef	NetCtrl	–	–	Fault Reset	Run Rev	Run Fwd	
	1							–		
	2	Speed Reference (Low Byte)								
	3	Speed Reference (High Byte)								

Output assembly data info

Name	Description
Run Fwd	Forward Run Command 0: Stop 1: Forward Run
Run Rev	Reverse Run Command 0: Stop 1: Reverse Run
Fault Reset	Fault Reset (0 to 1 transition: Fault Reset)
NetCtrl	Run command from Network 0: Depends on b1-02 1: Enables the run command from network
NetRef	Speed reference from Network 0: Depends on b1-01 1: Enables the speed reference from network
Speed Reference	Speed Command Sets drive speed reference. Speed reference data: Frequency reference/2SS (SS: Speed scale) Setting range: 0 to 0xFFFF For example, when setting a reference of 4096 with a speed scale of 2: Speed reference data = $4096/22 = 1024 = 0x0400$ Unit depends on o1-03.

Input Assemblies (Drive Produces)

The convention in this manual is from the PLC perspective. An “Input Assembly” is outputted from this node and read by the PLC. This section details “Input Assemblies” that are “Produced” by this drive.

Basic Speed Control Input - 70 (0x46)

Input Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
70	0	-	-	-	-	-	Running 1 (FWD)	-	Faulted
	1					-			
	2				Speed Actual (Low Byte)				
	3				Speed Actual (High Byte)				

Extended Speed Control Input - 71 (0x47)

Input Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
71	0	At Speed	Ref from Net	Ctrl from Net	Ready	Running 2 (REV)	Running 1 (FWD)	Warning	Faulted
	1				Drive State				
	2				Speed Actual (Low Byte)				
	3				Speed Actual (High Byte)				

Input assembly data info

Name	Description
Faulted	Faulted 0: No Faults Occurred 1: Fault Occurred
Warning	Warning 0: No Warning Occurred 1: Warning Occurred
Running 1 (FWD)	Forward Running 0: Stop or Reverse Running 1: Forward Running
Running 2 (REV)	Reverse Running 0: Stop or Forward Running 1: Reverse Running
Ready	Drive Ready 0: Not Ready 1: Ready
Ctrl from Net	Status of Run command from Network 0: Run command is not from network 1: Run command is from network
Ref from Net	Status of Speed reference from Network 0: Speed reference is not from network 1: Speed reference is from network
At Speed	Speed Agree 0: No Speed Agree 1: Speed actual at speed reference

3.4 Error codes

Display	Description
	Option Communication Error
bUS	After establishing initial communication, the connection was lost Only detected when the run command or frequency reference is assigned to the option (b1-01 = 3 or b1-02 = 3)
EFO	Option Card External Fault The alarm function for an external device has been triggered.
oFA00	Option Card Fault Option is not properly connected.
oFA01	Option Card Fault Option is not properly connected.
oFA03	Option Card Fault Option self-diagnostics error.
oFA04	Option Card Fault Option flash write mode.
oFA30 to oFA43	Communication Option Card Connection Error Communication ID error
CALL	Serial communication transmission error Communication is not established.

4 EtherCAT

ESI file

For easy network implementation of drives equipped with a Communication Option card, the ESI file can be obtained from www.leybold.com -> Downloads -> Download Software -> PC software for DRYVAC and RUVAC WH pumps.

Refer to the option package labeling in the field designated "PRG" (four digit number) to identify the option software version.

The option contains support for the Velocity mode according the CANopen Device Profile and Motion Control (DSP402) profile.

It also contains YASKAWA vendor specific CANopen objects based on the present CANopen option board specification.

Communication profile DS 301 Ver. 4.02
 DSP 402 Ver. 1.1 Velocity Mode

4.1 Drive Parameters

No.	Name	Description	Default
E2-04	Motor 1 Motor Poles	= 2	
F6-06 <4>	Torque Reference/Torque Limit selection from Communications Option	0: Torque reference/torque limit via network communications are disabled. 1: Torque reference/torque limit via network communications are enabled. <5>	0
F6-07	NetRef/ComRef Selection Function	0: Multi-step speed reference disabled (F7 mode) 1: Multi-step speed reference allowed (V7 mode)	0
F6-08	Reset Communication Related Parameters	Determines if communication-related parameters are set back to their original default values when the drive is initialized. 0: Do not reset F6-□□ and F7-□□ parameters when the drive is initialized using parameter A1-03. 1: Rest F6-□□ and F7-□□ parameters when the drive is initialized using parameter A1-03. Note: Setting this parameter does not affect communication-related parameters. Setting this parameter only determines if communication-related parameters (F6-□□ and F7-□□) are also reset when A1-03 is used to initialize the drive.	0
o1-03 <7>	Digital Operator Display Selection	Sets the units to display the frequency reference and output frequency. 0: 0.01 Hz 1: 0.01% (100% = E1-04) 2: r/min (enter the number of motor poles to E2-04/E4-04/E5-04) 3: User defined by parameters o1-10 and o1-11	<6>

<4> This parameter might not appear in certain drives. Furthermore its availability is limited to depending on the control mode selection. For details refer to the technical manual for the drive the option card is used with.

<5> If the drive is set to receive the torque reference/limit from the network (F6-06 = 1) make sure the value is set appropriately by the controller. If no torque reference/limit value is entered the motor will not produce torque.

<6> The default value depends on the drive used and/or the drive software version. For details refer to the technical manual for the drive.

<7> Changing o1-03 changes the units for input object 2010 (Hex) (frequency reference), output object 2110 (Hex) (output frequency) and 2200 (Hex) (motor speed). Furthermore o1-03 must be set to 2 and E2-04 must be set to the correct value in order to use the Drive Profile DSP402.

4.2 Object Dictionary

The Object Dictionary consists of three sections:

- Communication Profile Objects
- Manufacturer Specific Profile Objects
- Drive and Motion Profile Objects

The tables below give an overview of the communication objects available in the SI-ES3 option.

Communication Profile Objects (DSP 301)

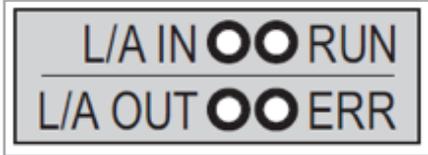
Index (Hex)	Name
1000	Device Type
1001	Error Register
1003	Pre-defined Error Field
1008	Manufacturer Device Name
1009	Manufacturer Hardware Version
100A	Manufacturer Software Version
1010	Store Parameters
1011	Restore Default Parameters
1018	Identity Object
1600 - 1628	Receive PDO Mapping
1A00 - 1A28	Transmit PDO mapping
1C00	Sync Manager Communication Type
1C12	Sync Manager RxPDO assign
1C13	Sync Manager TxPDO assign

Manufacturer Specific Profile Objects (DS 301)

Index (Hex)	Content
	2000 Operation Command
	2010. Speed Command
	2040 MEMOBUS/Modbus Read Command
Input	2050 MEMOBUS/Modbus Write Command
	2060 MEMOBUS/Modbus Unlimited Enter Command
	2070 MEMOBUS/Modbus Limited Enter Command
	20D0 FM analog output 1
	20F0 Multi-function DO output
	2100 Drive Status
	2110 Output Frequency
	2120 Output Current
	2140 MEMOBUS/Modbus Read Command Response
	2150 MEMOBUS/Modbus Write Command Response
	2155 PDO Parameter Write Response
	2160 MEMOBUS/Modbus Not Limited Enter Command Response
Output	2180 Selectable (default: Input terminal status)
	2190 Selectable (default: Analog input 1 monitor)
	2200 Motor Speed
	2210 DC Bus Voltage
	2220 Analog input monitor A1
	2240 Analog input monitor A2
	2270 Inverter DI Input
	4000 Option NVS FATAL Record
	4001 Option Info + Status Record

Drives and Motion Profile Objects (DSP 402)

Object Type	Index (Hex)	Name
Common Entries	60FD	Digital Inputs
	60FE	Digital Outputs
Device Control	6040	Controlword
	6041	Statusword
	6060	Modes of operation
	6061	Modes of operation display
	6042	vl target velocity
Velocity Mode	6043	vl velocity demand
	6044	vl control effort
	6046	vl velocity min max amount
	6048	vl velocity acceleration
	6049	vl velocity deceleration
	604A	vl velocity quick stop
	604C	vl dimension factor
604D	vl pole number	



LEDs

4.3 Status LEDs

The EtherCAT Option has four LEDs that indicate the communication status. The indications conform with DS303, Part 3: Indicator Specification.

LEDs L/A OUT and L/A IN: Ethernet Link/Activity 1 and 2

The Link/Activity indicators show the status of the physical link and show activity on the link period

RUN LED

A green lit RUN LED indicates the status of the EtherCAT® network state machine.

A red lit RUN LED is only used by the NOID firmware loader, refer to the table below.

ERROR indicator

The red error LED indicates the presence of any errors.

LED	Color	Display	Meaning
Link Activity 1/2	-	Continuously Off	No link. The communication cable is not physically connected. The EtherCAT controller is not started up.
	Green	Continuously On	The module is connected to Ethernet. A communication cable is physically connected, but no data are being exchanged.
		Flickering	There is traffic on Ethernet, data are being exchanged.
RUN	-	Continuously Off	The device is in Init state.
	Green	Blinking	The device is in Pre-Operational State (flashing rate about 2.5 Hz)
		Single flash	The device is in Safe-Operational State (one short flash (approximately 200 ms) followed by a long off condition (approximately 1000 ms))
		Continuously On	The device is in Operational State
	Red	Blinking (1 Hz or 6 Hz)	The Option BOOT or APP firmware is executing the NOID firmware loader. 1 Hz: Firmware loader protocol in IDLE state (waiting for commands from the drive) 6 Hz: Firmware loader protocol is processing commands.
ERR	Red	Continuously Off	No link. The EtherCAT communication is in working condition.
		Blinking	General configuration error
		Single flash	The slave device application has changed the EtherCAT state autonomously: The parameter Change in the AL status register is set to 0x01: change/error. Single flash is one short flash (approximately 200 ms) followed by a long off phase (approximately 1000 ms).
		Double flash	The sync manager watchdog time out has occurred. Double flash is two short flashes (approximately 200 ms each), separated by an off condition (approximately 200 ms), and then a long off phase (approximately 1000 ms)
		Continuously On	Possible causes: 1 An EtherCAT PDI (Process Data Interface) error has occurred, the NOID application interface has failed. 2 An option card FATAL event has occurred (system has stalled execution, see EtherCAT vendor object 0x4000 for the cause).
		Blinking (1 Hz or 6 Hz)	The option BOOT or APP firmware is executing the NOID firmware loader. 1 Hz: Firmware loader protocol in IDLE state (waiting for commands from drive) 6 Hz: Firmware loader protocol is processing commands.



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