



**OEM SAFphire**  
**Model OEM-DDCS-E2**

*Programmable Linear Controller*  
*With Dual Ethernet and DDCS*

**Hardware Guide**  
Manual Version 1.0

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## **FOR YOUR SAFETY**

**Only qualified personnel should install this equipment, after first reading and understanding all the information in this manual. All instructions should be strictly adhered to. The user should consult SAF or a SAF supplier for clarification of the contents of this manual should any doubt or questions arise.**

**The installation of this equipment must be conducted in accordance with all national, regional and local electrical codes.**

**All drawings and technical representations included in this manual are for typical installations and should not in any way be considered for specific applications or modifications. Consult SAF Drives for supplemental instructions.**

**SAF Drives accepts no liability for any consequences resulting from inappropriate, negligent or incorrect installation, application or adjustment of this equipment.**

**The contents of this manual are believed to be correct at the time of printing. In following with our commitment to the ongoing development and improvement of our products SAF reserves the right to change the specification of this product and/or the content of this instruction manual without notice.**



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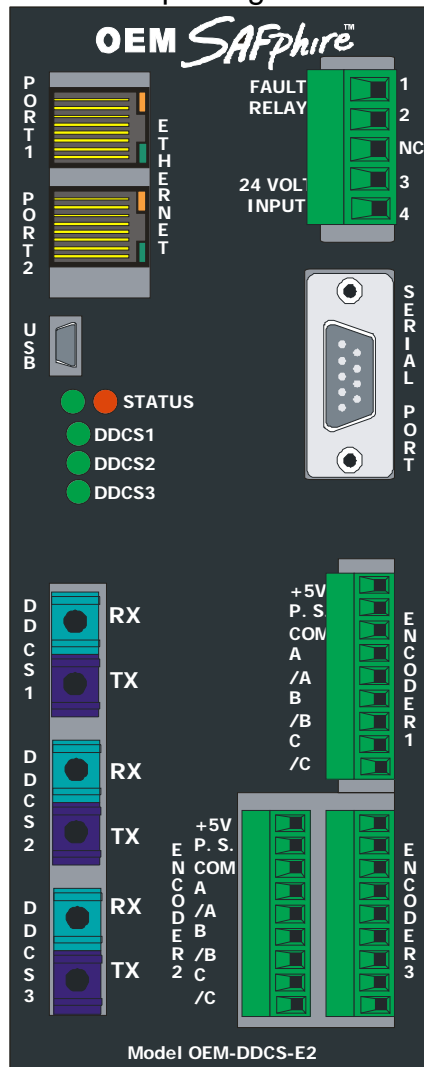
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## OEM SAFphire Overview

OEM SAFphire provides a leading edge drive control solution at an off-the-shelf price. It is a full featured, multiple drive, digital controller in a fixed I/O configuration, based on SAF's SAFphire technology.

Each version of OEM SAFphire combines the identical processing core of SAFphire with inputs, outputs and communication capabilities designed for specific applications. The same programming software and function blocks are available for OEM SAFphire that exist for SAFphire. The model OEM-DDCS-E2 version includes 2 100 Mbd Ethernet ports, 3 encoder input channels, a serial port for communicating to either Allen-Bradley or Modicon PLC's or MMI's and 3 DDCS fiber optic channels for communications to ABB ACS600 or DCS500 or DD312 drives. All of the hardware inputs and outputs found on the drives can be accessed over the fiber optic DDCS link, eliminating the need and cost of local inputs and outputs on the controller itself.

OEM SAFphire combines exceptional performance and flexibility into a small form factor, DIN rail mount package.

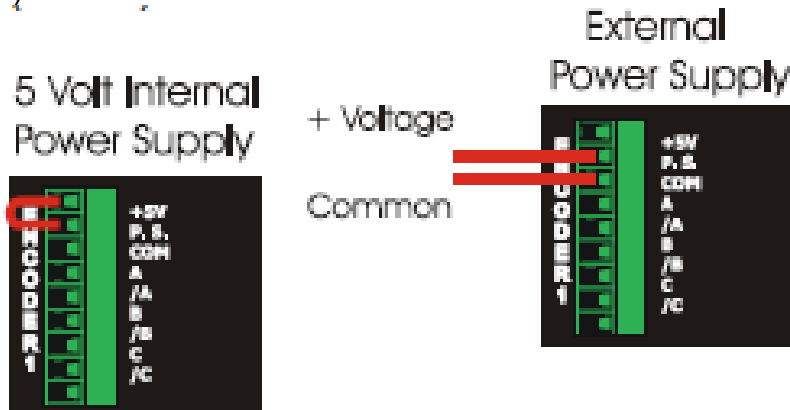


## Model OEM-DDCS-E2 Hardware

The hardware of the model OEM-DDCS OEM SAFphire is designed to control small to medium sized drive systems using ABB ACS600 AC Drives or DCS500 DC Drives.

### Encoder Inputs

3 pulse encoder inputs are provided. All 3 inputs can accept differential, quadrature input signals. To power the encoders from the internal 5 volt supply, connect the +5V terminal to the terminal labelled P.S. To use an external power supply of a different voltage, connect it between common (COM) and P.S.



Encoder Input Specifications	
Max Input Frequency	300 kHz
Max External Power Supply	24 Volts
Max Encoder Current Draw (per channel)	150 mA

### DDCS Fiber Optic Channels

3 DDCS Fiber Optic Communication channels are provided for communications with ABB ACS600 or DCS500 Drives or with SAF DD312 drives. For more information see SAFphire to ABB Drives Communications Using DDCS. The DDCS channels can also be used for communications between OEM SAFphires or between OEM SAFphires and SAFphire with a CA419/CA454 card. For more information see SAFphire to SAFphire Communications Using DDCS.

DDCS Specifications		
Part Number	A820034	A820033
Baud Rate	10 Mbaud	4 Mbaud
Max Cable Length	100 meters using HCS Cable	10 meters using Plastic Cable
Max Nodes per	8	8

Channel		
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### Serial Port

The Serial Port is a RS232 port with two functions. It can be used for Downloading / Annunciating programs from a PC with SBL or it can be used for Modbus or DF1 communications to a PLC or other compatible device. This port does not require or use any handshaking signals (RTS, CTS)

DB9 Male Pin	Function
2	Receive Data
3	Transmit Data
9	+5V for HandHeld
5	Common

### Switch Settings

SW1 is located towards the front of the OEM and configures the serial port operation, SW2 is located towards the back of the OEM and determines the node number

SW1 – Config		SW2 – Node	
Position	Function	Position	Function
0	Software Config	0	Software Config
1	DF1 @19200	1-E	Node Address
2	Modbus Slave@19200	F	Node1 @
3	Modbus Master@19200		192.168.250.1
4	Modbus Master@9600		
7	HandTerm		
8	BootBlock – with trace		
9	BootBlock – serial 115K		
B	Download@19200		
C	Download@38400		
D	Download@57600		
E	Download@115200		
F	BootBlock@19200		

### Fault Relay

The Fault Relay provides a set of dry contacts that are normally wired into the ESTOP circuitry. These contacts will be closed whenever the OEM SAFphire is properly executing a Block Program. These contacts will open when downloading a new program, or if the Block Program is not executing (hardware failure, invalid program etc)

Fault Relay Specifications	
Current Rating	1 A resistive



Voltage Rating	120 VAC
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## 24 Volt Input

OEM SAFphire will accept 24 V AC or DC as input power. When using a DC power source, polarity does not matter.

24 Volt Input Specifications	
Input Voltage	24 Volts AC or DC +/- 25%
Input Power	20 VA

## LEDs

LEDs are provided to indicate the status of OEM SAFphire.

**STATUS:** The red LED will be on to indicate that the fault relay is closed and the the block program is executioing. The green LED will flash once per second for normal operation. Other patterns indicate the following:

STATUS LED Patterns	
OFF solid	Hardware Failure
ON solid	Executing out of BootBlock Memory, due to 386 Code Checksum Error or SWITCH SETTINGS
1 Flash then OFF	386 Memory Test Error
2 Flash then OFF	320 Memory Test Error
3 Flash then OFF	320 Code Checksum Error
4 Flash then OFF	Block Program Checksum Error
5 Flash then OFF	Invalid Hardware Code
6 Flash then OFF	Flash Write Error (see Jumper Settings)
7 Flash then OFF	Invalid Block Program

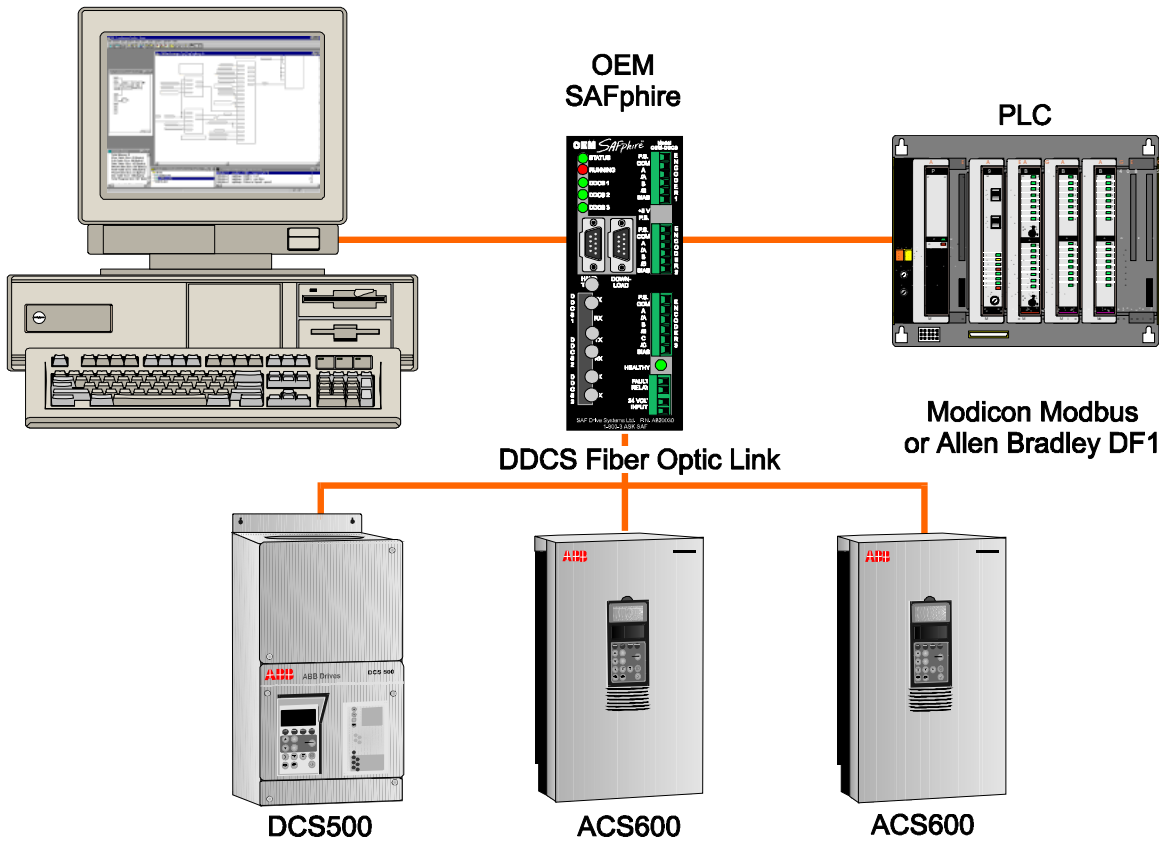
**DDCS1:** The green LED will be on whenever DDCS channel 1 is transmitting.

**DDCS2:** The green LED will be on whenever DDCS channel 2 is transmitting.

**DDCS3:** The green LED will be on whenever DDCS channel 3 is transmitting.

## Typical Configurations

The following shows a typical usage of OEM SAFphire in a small to mid-size ABB Drive System.



## SBL Blocks

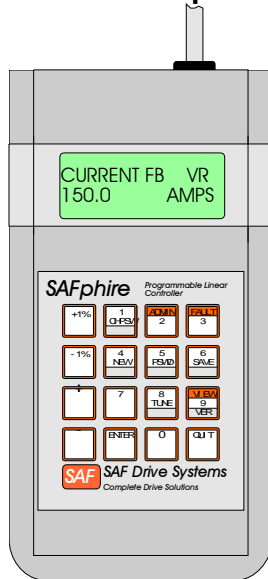
OEM SAFphire uses different input / output SBL blocks than SAFphire. The following blocks are the hardware dependant blocks for OEM SAFphire. Documentation for their usage can be found in the SBL Block Descriptions Manual

- DDCS INPUT
- DDCS OUTPUT
- COMM READ REG
- COMM WRITE REG
- COMM STATUS
- ENCODER INPUT

## Dimension and Mounting

OEM SAFphire is DIN Rail Mount. Requiring panel space of 2.75 inches (73 mm) wide, 7 inches high (185 mm), and a panel depth of 8 inches (212 mm) (including RS232 connectors).

## HandTerm Operation Guide

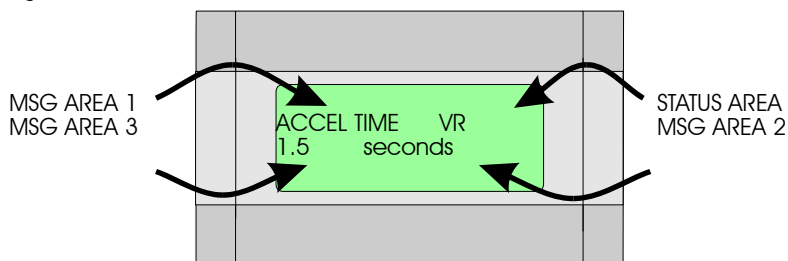


### Introduction

HandTerm is an optional tool for OEM SAFphire. It is an RS232 device that is primarily a maintenance or engineering tool and because of the lightness of construction should not be subjected to physical abuse. Variables of all types can be displayed on the LCD display of HandTerm. These variables may be viewable (to look at only), or tuneable (to look at and change, if desired) as controlled by the SBL program. The keypad is self explanatory and with a few minutes of practice, can be quickly mastered. A standard nine pin connector on the cable provides for easy connection or disconnection to OEM SAFphire. The user can plug into a number of OEM SAFphires this way.

All parameters are presented in alpha-numeric form in engineering units to avoid confusing computer codes. SAF Drives and Automation recommends however, that an Industrial Grade Operator Station be used for any permanent plant floor installations.

### Display Overview



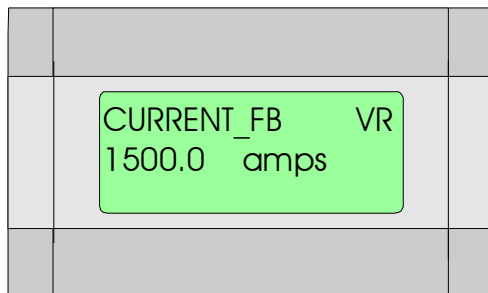
The display is divided into four areas. The top right hand area of the display is the status area. The status area consists of two characters. The first character indicates the mode. The possible modes are:

- C - command mode
- V - view mode (parameter can be viewed only)
- V - view mode (flashing V indicates parameter can be tuned)
- T - tune mode
- A - admin mode
- F - fault mode

The second character is the status character. It is set in the SYS\_CONFIG block. It can be used to indicate the status of machines controlled by OEM SAFphire. The possible status are:

- R - running
- J - jog
- S - stopped
- E - error
- F - faulted

The message areas are used to display alpha numeric information relating to the current mode or command. An example is in the view mode. A parameter such as current\_fb would be shown as follows:



## **Operating Modes**

### **Command Mode**

Command Mode is indicated by a C as the mode character in the status area.

This mode acts as a top level menu allowing the user to move between the other modes.

The user has the following options:

- FAULT (3) - view active faults
- ADMIN (2) - enter administration mode
- VIEW (9) - enter view mode

### **View Mode**

View Mode is indicated by a V (flashing or solid) as the mode character in the status area.

In this mode the user is able to scroll through the list of the parameters names and their current values. A parameter can be either viewable or tuneable. Parameters are stored alphabetically with all viewable parameters before tuneable parameters. Tuneable parameters are indicated by a flashing V as the mode character. Viewable parameters are indicated by a solid V as the mode character. In the View Mode, the user has the following options.

<+> - display next parameter name and value

<-> - display previous parameter name and value

TUNE (8) - tune the displayed parameter (i.e. enter tune mode) This option is only accessible if the parameter is tunable. This is indicated by a flashing V in the top right hand corner of the screen.

QUIT - quit (return to command mode)

### **Tune Mode**

Tune Mode is indicated by a T as the mode character in the status area. Tune mode allows the user to modify the value of the selected parameter. After the parameters have been tuned, they are still only stored in static memory. If the user wishes the changes to be kept they must be saved. (see Admin Mode)

The user has the following options:

NEW (4) - enter new value for parameter followed by the <ENTER> key

<+1%> - add 1% of the parameter's range to its value

<-1%> - subtract 1% of the parameter's range from its value

<+> - increment the parameter's value

<-> - decrement the parameter's value

<QUIT> - quit (return to view mode)

### **Admin Mode**

Admin Mode is indicated by an A as the mode character in the status area.

The administration menu is used to perform administration type functions.

The user has the following options.

<VER> - Display information relative to software version, program information, parameter status, Node Address etc.

<SAVE> - Save the tuned parameters to battery backed memory so that if power to the rack is interrupted, it will default to the tuned parameters.

<QUIT> - return to command mode

### **Fault Mode**

Fault Mode is indicated by an F as the mode character in the status area. This mode displays active faults. The active fault is determined by a SYS\_CONFIG block and the fault table. The message displayed can be edited using the SBL Development System. Pressing any key will return the user to the command mode.

## Technical Support

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