

Driver Manual
(Supplement to the FieldServer Instruction Manual)

FS-8705-33

**Hunter Industries ACC99 Irrigation Controller
Ethernet Driver**

APPLICABILITY & EFFECTIVITY

Effective for all systems manufactured after Sep 20, 2010

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1. Hunter Industries ACC99 Driver Description

The Hunter ACC protocol can be used to connect to suitably enabled Hunter Industries controllers such as the ACC99 Irrigation Controller. The Driver can read and write data, change settings and issue commands to the irrigation system. A single gateway can connect to multiple controller's using this driver.

The Gateway will be an active client in communications with the Hunter controller. This means that the gateway will issue messages to read/write data. The Hunter Controller ACC99D will be a passive server, waiting silently for messages from the gateway to which it will respond. The data read will be cached for serving via a 2nd protocol such as DNP3 to Cimplicity or Modbus / BACnet for a building management system. Any of the over 140 protocols in the gateway library may be connected to the Hunter Driver.

The gateway requires minimal configuration and can be considered a plug and play component of a system, in that it is ready to operate out of the box with the default configuration.

Max Nodes Supported

FieldServer Mode	Nodes	Comments
Client	Many	One Gateway can connect to many irrigation controllers provided each has a unique IP.
Server	0	This driver cannot be used to simulate a Hunter ACC Controller.

2. Driver Scope of Supply

2.1. Supplied by FieldServer Technologies for this driver

FieldServer Technologies PART #	Description
-	No specific cables are shipped with this driver. A generic RJ45 Ethernet cable must be shipped with this driver.
-	A generic male and Female connector kit must be shipped with this driver.
FS-8705-33	Driver Manual.

2.2. Provided by the Supplier of 3rd Party Equipment

2.2.1. Required 3rd Party Hardware

Part #	Description

2.2.2. Required 3rd Party Software

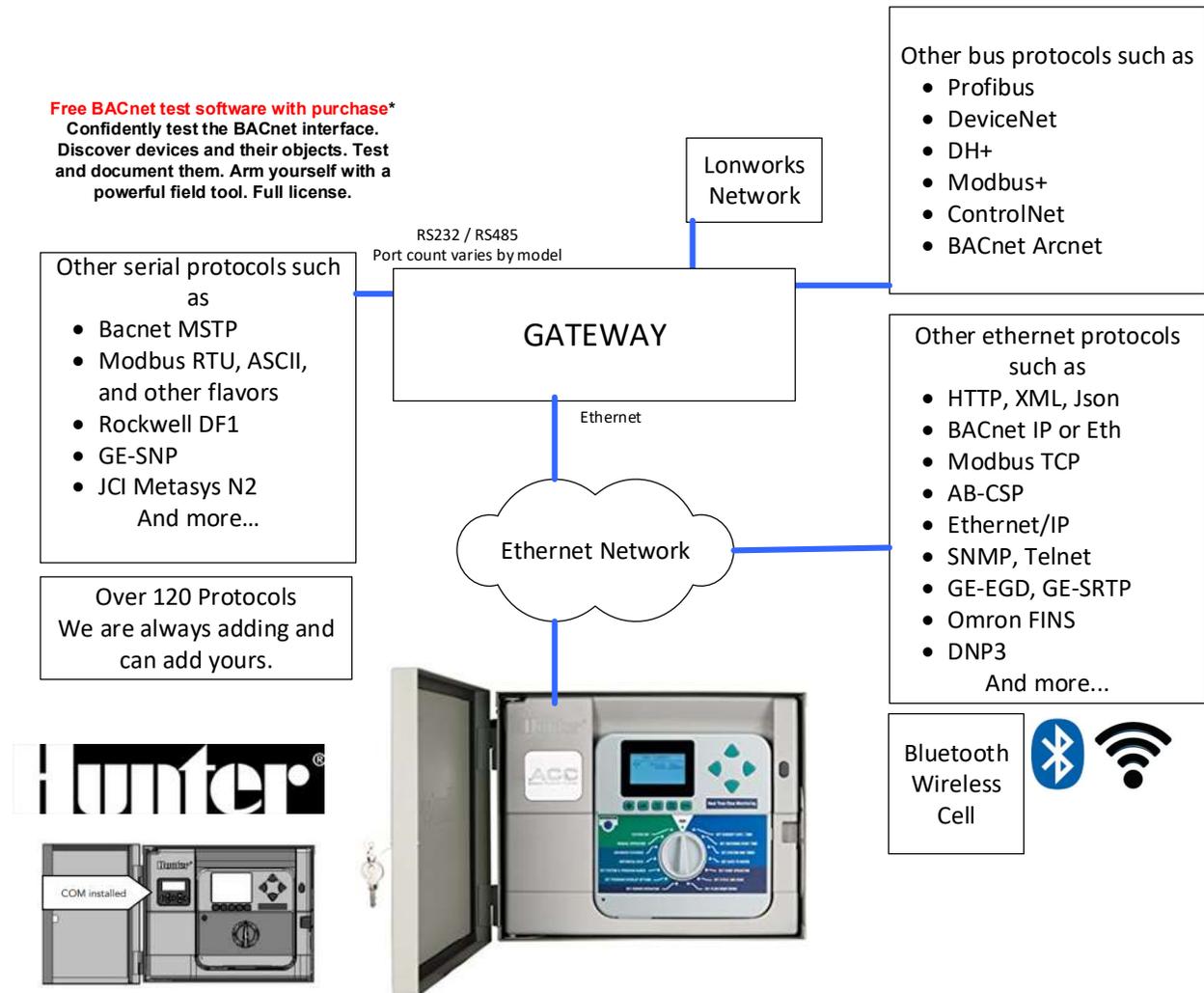
2.2.3. Required 3rd Party Configuration

None Known.

3. Hardware Connections

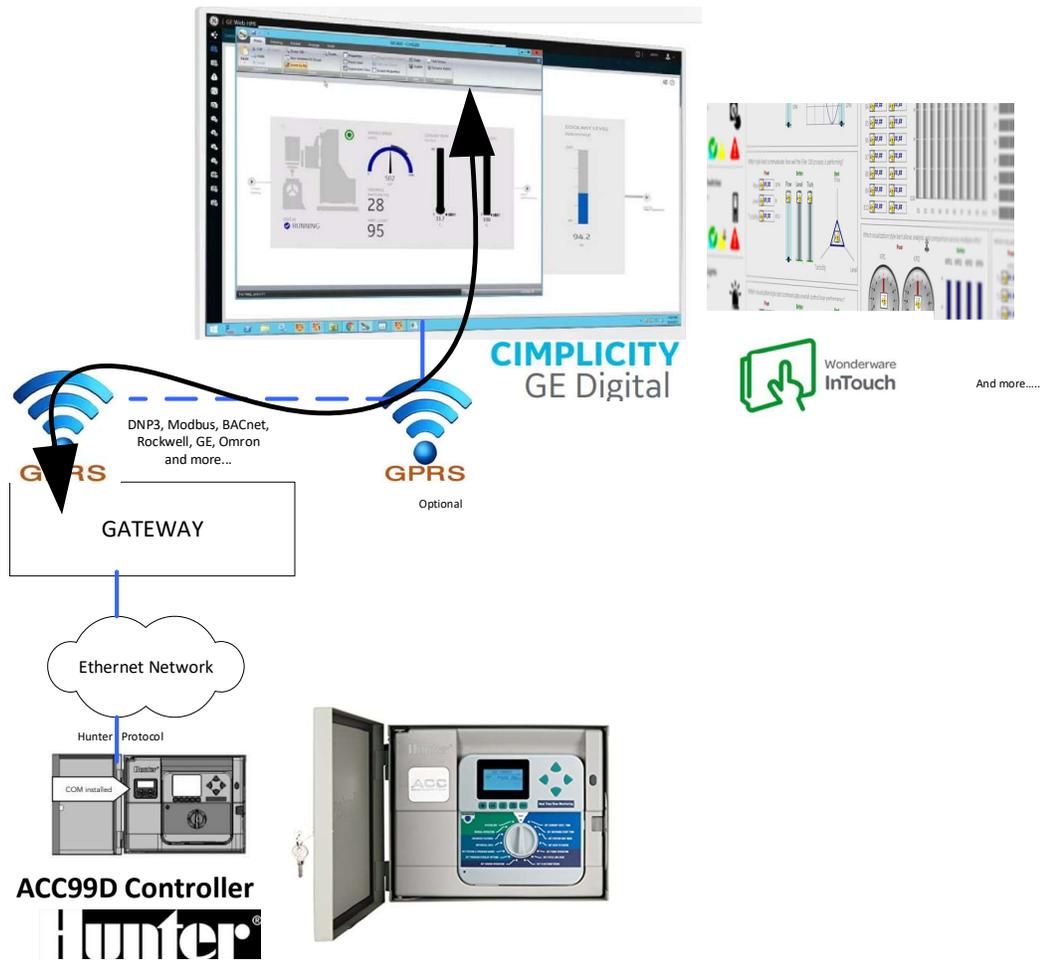
3.1. Typical Block Diagram

Multiple upstream protocols and connection supported. See list of FieldServer Drivers.



3.1. HMI Typical Block Diagram

Driver can be linked with any of the 140+ other protocols that the gateway supports. Thus, support for all HMI's is enabled.

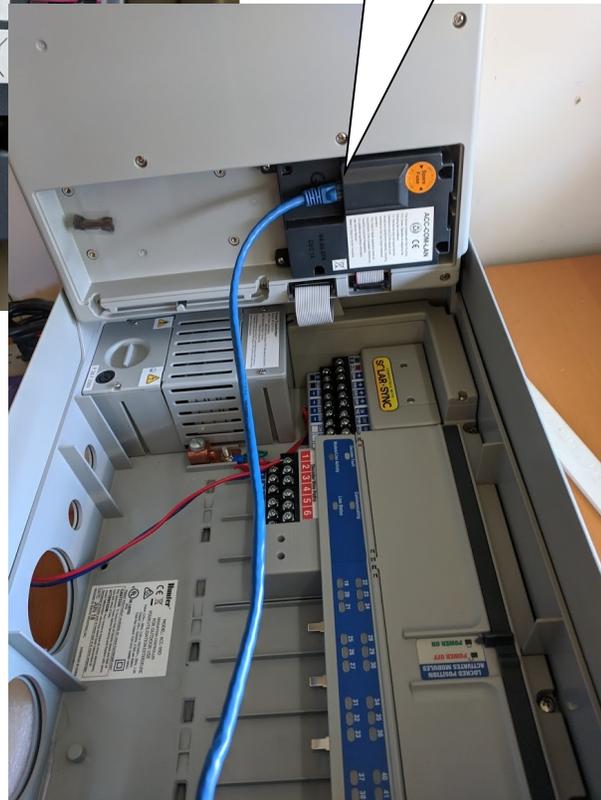


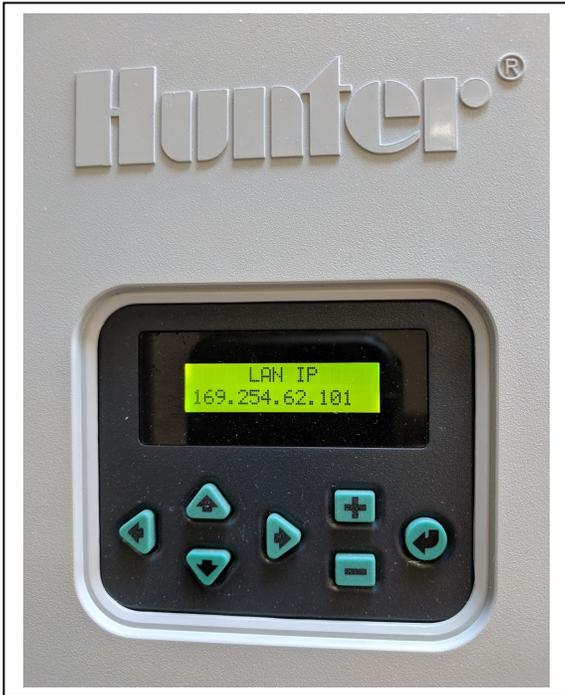
3.2. Hardware Connection Tips / Hints

The Hunter manual “LIT-568_OM_ACC-COM-LANSoftware_web.pdf” provides instructions on installing and configuring the Hunter Lan Module.



Connect ACC-COM-LAN module to Ethernet network using standard networking equipment – patch cables, switches etc.





Refer to the Hunter manual on how to change these settings.

Note these settings – you will need them in the configuration.

4. Configuring the FieldServer as a Hunter ACC Client

For a detailed discussion on FieldServer configuration, please refer to the FieldServer Configuration Manual. The information that follows describes how to expand upon the factory defaults provided in the configuration files included with the FieldServer (See “.csv” sample files provided with the FS).

This section documents and describes the parameters necessary for configuring the FieldServer to communicate with a Comput25 controller.

4.1. Data Arrays/Descriptors

The configuration file tells the FieldServer about its interfaces, and the routing of data required. In order to enable the gateway for Hunter ACC Driver communications, the driver independent FieldServer buffers need to be declared in the “Data Arrays” section, the destination device addresses need to be declared in the “Client Side Nodes” section, and the data required from the servers needs to be mapped in the “Client Side Map Descriptors” section. Details on how to do this can be found below.

Note that in the tables, * indicates an optional parameter, with the bold legal value being the default.

Section Title		
Data_Arrays		
Column Title	Function	Legal Values
Data_Array_Name	Provide name for Data Array	Up to 15 alphanumeric characters
Data_Array_Format	Provide data format. Each Data Array can only take on one format.	Float, Bit, UInt16, UInt32, SInt16, Packed_Bit, Byte, Packed_Byte, Swapped_Byte
Data_Array_Length	Number of Data Objects. Must be larger than the data storage area required by the Map Descriptors for the data being placed in this array.	1-10,000

Example

```
// Data Arrays
Data_Arrays
Data_Array_Name,           Data_Format,           Data_Array_Length,
Hunter-stats,              UNT16,                 200
```

4.2. Client Side Connection Descriptions

Create one adapter for each Ethernet port. Each connection can only be used to connect to a single PRO2000 interface/port.

Section Title		
Adapters		
Column Title	Function	Legal Values
Adapter	Specify which network port the device is connected to the gateway	N1.N1
Protocol	Specify protocol used	hunterACC
Hunter_LanPort	This is the TCP/IP Socket Port. Setting in config must match setting on Lan module.	Default is 10001. Whole Numbers
Hunter_SystemID		
Hunter_FCB	This setting controls an aspect of the protocol. Always use the value specified unless directed by tech Support.	169
Hunter_SystemID	This setting controls an aspect of the protocol. Always use the value specified unless directed by tech Support.	130

Example

```
// Client Side Connections

Adapter

Adapter,      Hunter_SystemID,  Hunter_FCB,      Protocol,
N1,          2400,                None,            HunterACC,
```

4.3. Client Side Node Descriptors

Create one Node per Hunter ACC Controller.

Section Title		
Nodes		
Column Title	Function	Legal Values
Node_Name	Provide name for node	Up to 32 alphanumeric characters
Node_ID	Station address of physical server node	Whole Numbers 0,1,2,...
Hunter_SideID		Whole Numbers 0,1,2,...
Protocol	Specify protocol used	HunterACC
Adapter	Specify which network port the device is connected to the gateway	N1.N1

Example:

```

Nodes

Node_name , Node_ID, Hunter_SiteID, Protocol , Adapter

ACC99-01 , 3 , 0 , HunterACC , N1
    
```

4.4. Client Side Map Descriptors

4.4.1. FieldServer Related Map Descriptor Parameters

Column Title	Function	Legal Values
Map_Descriptor_Name	Name of this Map Descriptor	Up to 32 alphanumeric characters
Data_Array_Name	Name of Data Array where data is to be stored in the FieldServer The temperature is stored here.	One of the Data Array names from "Data Array" section above We recommend that you use a 'FLOAT' Data Array since the temperatures are reported as floating point numbers.
Data_Array_Offset	Starting location in Data Array	0 to maximum specified in "Data Array" section above
Function	Function of Client Map Descriptor..	RDBC, ARB, WRBX, WRBC

4.4.2. Driver Related Map Descriptor Parameters

Column Title	Function	Legal Values
Node_Name	Name of Node to fetch data from	One of the node names specified in "Client Node Descriptor" above
Data_Type	This commonly used parameter is not used by this driver.	
Length	Length of Map Descriptor Reserves space in the Data Array. Set to 1.	1
Address	This commonly used FieldServer parameter is not used by this protocol.	
Hunter_CMD	The Hunter Command / Services to be executed. For a complete list see ??????	0xnn where nn is a 2 digit hex number. Eg,. "0x72" , "0x9A"
Hunter_Option1	Use and meaning is dependent on the Hunter_CMD. This parameter specifies a command option. Many	0,1,2... Whole Numbers

	<p>commands do not require these options – setting these to zero if fin.</p> <p>See the map Descriptor examples</p>	
Hunter_Option2	See Above.	<p>0,1,2...</p> <p>Whole Numbers</p>

4.4.3. Timing Parameters

Column Title	Function	Legal Values
Scan_Interval	Rate at which data is polled	$\geq 0.001s$

4.4.1. Hunter Services and Commands Supported

Hunter_CMD	Command / Service
0x01	Set Field Controller System Globals
0x02	Read Global
0x06	Mute
0x07	Reset Mute
0x0a	Report versions
0x13	Set Station Parameters
0x17	Set Controller Start Time Options
0x1e	Set Field Controller Program Header Data
0x23	Set Global Seasonal Adjust
0x24	Stop and Delete Stations
0x26	Stop a Program
0x28	Purge Log
0x3e	Report Field Ctrlr Header
0x51	Stop Irrigation Command
0x52	Programmable Off
0x53	Suspend Irrigation
0x54	Cancel Programmable Off
0x55	Cancel Suspend
0x56	Start Manual All Station
0x57	Set System Event Mode
0x58	SetFCP Mode
0x59	Clear Field Controller Display
0x5a	Set Pause Mode
0x5b	Cancel pause Mode
0x5c	Start Manual One Station
0x5d	Start Custom Manual Program
0x72	Report Stations On
0x73	Report Mode/Alarms
0x74	Read Contoller Log

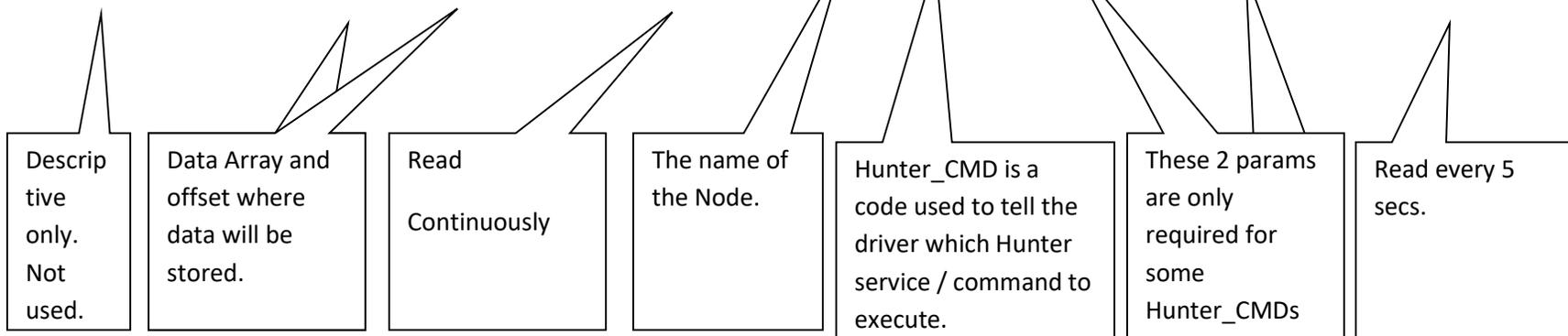
0x74	Read Station Log
0x74	Read Alarm Log
0x75	Report Current Flow Data
0x76	Report Sensor Data
0x77	Report ADM Status
0x78	Report Overloaded Pumps Status
0x7a	Report Flow Totals Ctrlr
0x7a	Report Flow Totals Program
0x7b	Report Flow Detail Data
0x92	Report Comm Module Globals
0x9a	Report Comm Module Firm Rev

4.4.2. Map Descriptor Example 1 – Read Global Data

In this example the driver reads the Controller’s GLOBAL DATA. This task is executed at best every 5 seconds. The data read by the command is stored in the data array named “DA_Global_Data” starting at offset zero in the array. Exactly what data is stored is dependent on the Hunter_CMD. For command and services that write data, the Data Array/Offset as well the the 2x Hunter_options define the data that will be sent to the controller.

Map_Descriptors

```
Map_Descriptor_Name ,Data_Array_Name ,Data_Array_Offset ,Function ,Node_Name ,Hunter_CMD, Hunter_Option1, Hunter_option2, Scan_Interval
Read Globals ,DA_Global_Data ,0 ,RDBC ,ACC99-01 ,0x02 ,0 ,0 ,5.000s
```

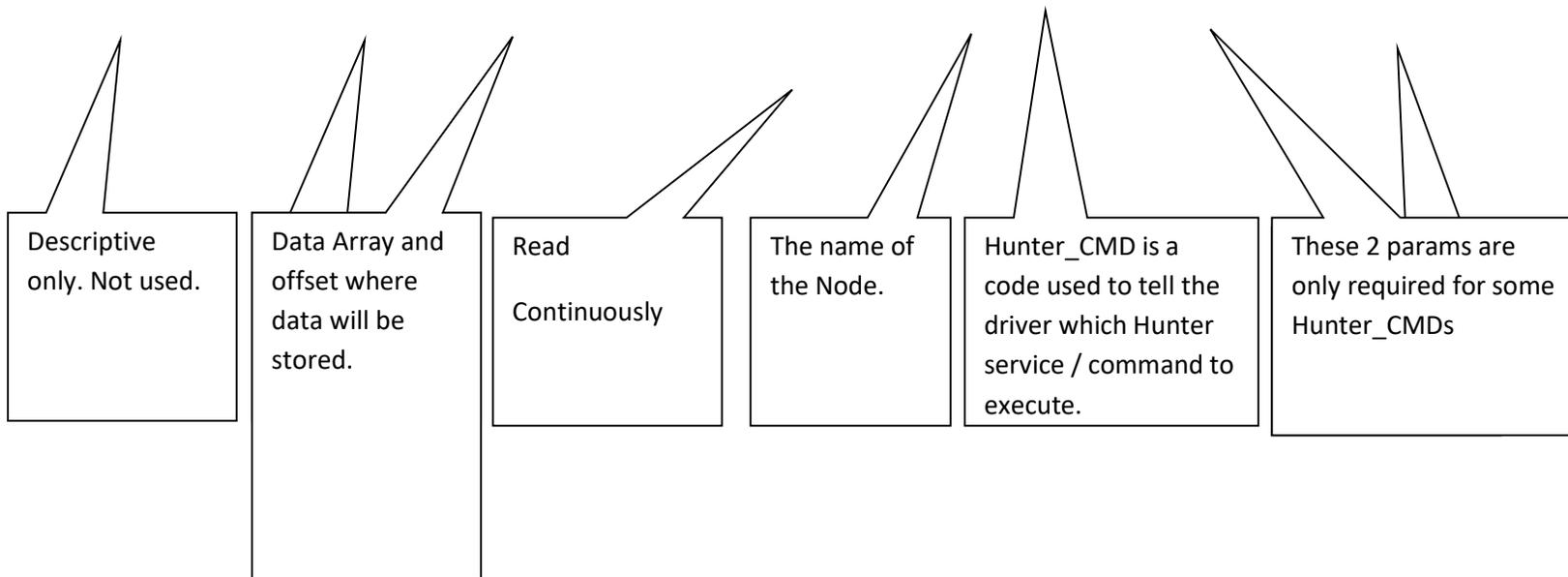


4.4.3. Map Descriptor Example 2 – Read Alarm Log

In this example the driver reads, every 5 seconds, the controller alarm log. The data is stored in the Data Array named “DA_ALARM_Log” starting at offset 0. Exactly what data is stored and how the data is arranged is described elsewhere. In this example on the Hunter_Option1 parameter is set to 3 (selecting the Alarm Log).

Map_Descriptors

```
Map_Descriptor_Name ,Data_Array_Name ,Data_Array_Offset ,Function ,Node_Name ,Hunter_CMD ,Hunter_Option1 ,Hunter_option2 ,Scan_Interval
Read Alm Log ,DA_Alarm_Log ,0 ,RDBC ,ACC99-01 ,0x74 ,3 ,0 ,5.000s
```

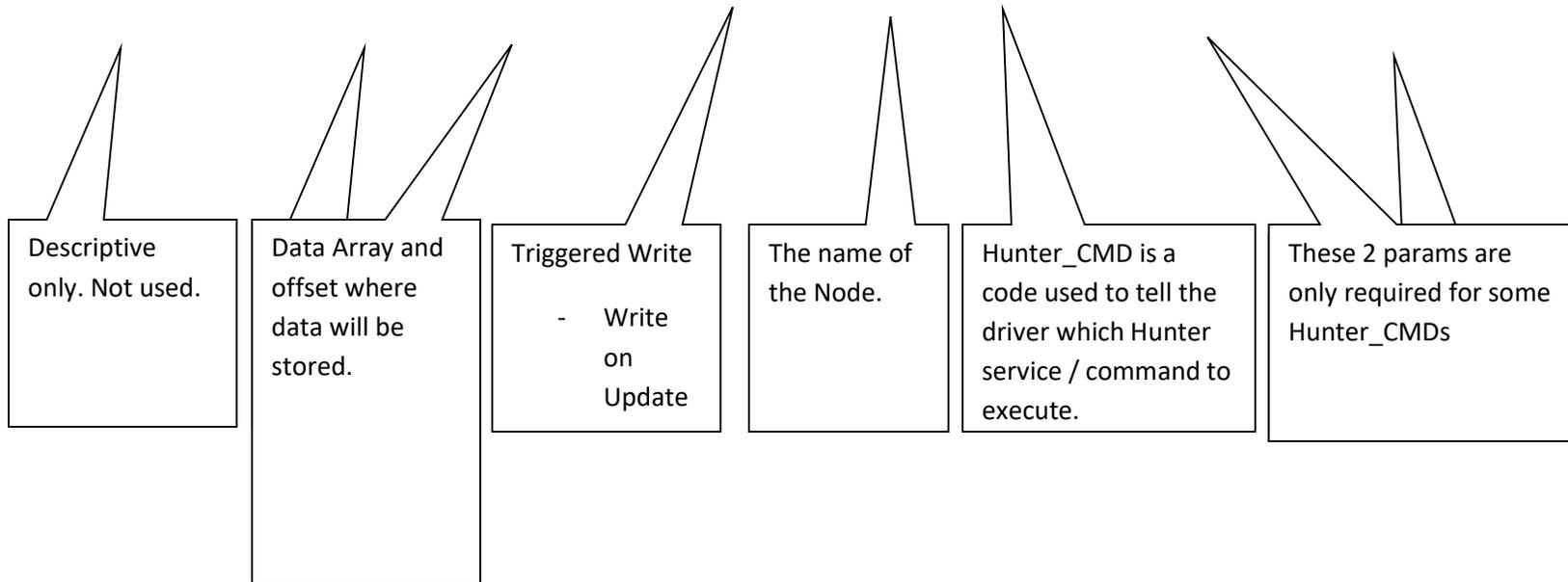


4.4.4. Map Descriptor Example 3 – Stop Irrigation Command

The function=wrbx means this is a triggered task. It is triggered by an update to the Data Array/Offset's data. When the data in the Data Array named "DA_commands" at offset=0 is updated then the command is triggered. An update simply means the data is updated – it does not have to change. In some services, data is extracted from the Data Array specified to make the payload of parameters the services require. Details for each command / service are provided elsewhere.

Map_Descriptors

```
Map_Descriptor_Name ,Data_Array_Name ,Data_Array_Offset ,Function ,Node_Name ,Hunter_CMD ,Hunter_Option1 ,Hunter_option2 ,
Stop Irrigation ,DA_Commands ,0 ,wrbx ,ACC99-01 ,0x51 ,0 ,0 ,
```



4.4.5. Hunter Command / Services Payloads

In this section we provide details of how data is stored in the gateway when a 'Read' command is completed as well as information on the how data is extracted from the Data Arrays to form a command or send settings to the Irrigation Controller.

To Form A Command / Set Payload – 2 data sources

1. Configuration file via the parameters Hunter_option1, Huner_option2. Not used with most commands.
2. Data Array. In forming the message the driver extracts data from consecutive offsets in the Data Array specified.

Legend

Command / Set
Report / Read

Want to know the meaning of each data variable / parameter ? There is not enough space in this manual. Google "Chipkin Hunter ACC Data Objects.xlsx"

0x01 – SET FIELD CONTROLLER SYSTEM GLOBALS

Transmits to field controller(s), system global system event operation. The Time-of-Day and format. The new values become effective immediately. Addressing field controller address of 1940H. Addressing

ation from a Central to all Field Controllers for eight components will be expressed in 24-hour format. This command would normally use the global controller would be an alternate method

The payload of data is extracted from the Data Array as show below to form the message sent to the Controller

Array as show below to form the message sent to the Controller

Payload			Data Type
Offset	item	Variable/ Data	
3	1	Hours	Byte
4	2	Minutes	Byte
5	3	Seconds	Byte

6	4	Month	Byte
7	5	Day	Byte
8	6	Year	UInt16
9	7	SysDChour	Byte
10	8	FcpDChour	Byte
11	9	options	Byte
12	10	curEtap	Byte
13	11	maxEtap	Byte
14	12	Response	Byte
15	13	ResponseInterval	Byte
16	14	OptStatus	Byte
17	15	OffStatus	Byte
18	16	GlblSeasAdj	UInt16
19	17	StackMode	Byte
20	18	SsPrgThold	Byte
21	19	SsgSsPrgThold	Byte

0x02 – REPORT FIELD CONTROLLER GLOBALS

Transmits to the central current global values contained in the specific field controller. TOD (Time of Day) reports time (hr/min/sec) in 24-hour format. DC (Day Change) reports time (hr) in 24 hour format. Day of Schedule is a value pointer referring to an FCP. Length is a value specifying the schedule length referring to an FCP.

When a response is received the payload of data is extracted and stored as shown below

Store	Offset	item	Variable/ Data	Data Type
	0	1	Fwvrs	Uint16
	1	2	EngRev	Byte
	2	3	Size	Uint16
	3	4	Hours	Byte
	4	5	Minutes	Byte
	5	6	Seconds	Byte
	6	7	Month	Byte
	7	8	Day	Byte
	8	9	Year	Uint16
	9	10	SysDChour	Byte
	10	11	FcpDChour	Byte
	11	12	options	Byte
	12	13	curEtap	Byte
	13	14	maxEtap	Byte
	14	15	Response	Byte

15	16	ResponseInterval	Byte
16	17	OptStatus	Byte
17	18	OffStatus	Byte
18	19	GlblSeasAdj	Uint16
19	20	StackMode	Byte
20	21	SsPrgThold	Byte
21	22	SsgSsPrgThold	Byte
22	23	RotaryKnob	Byte

0x06 – Mute

Transmits to a field controller, a command that used to prevent the field controller from initiating any random communication directed to the central when the controller is in a response mode other than NONE. This mode can be cancelled by sending the reciprocal command (07H) or will be cancelled by the controller at day change

This command and the response do not carry a payload of data

Offset	item	Variable/ Data	Data Type
N/A Command does not carry data			

0x07 - Reset Mute

Transmits to a field controller, a command that is the reciprocal command of Mute (06). It will reset the controller for random communications. This is the normal or default mode

This command and the response do not carry a payload of data

Payload		item	Variable/ Data	Data Type
Offset				
N/A Command does not carry data				

0x0A - Report Versions

This command will report the current firmware version of the Face Pack

This command and the response do not carry a payload of data

Payload		item	Variable/ Data	Data Type
Offset				
N/A Command does not carry data				

0x13 - Set Station Parameters

This command sends all station level parameters from the central to the controller. A maximum of 7 stations can be sent in a single transmission.

Uses the config file parameter Hunter_Option1 to control which station is being commanded. Command payload is xtracted from data array.

Payload		item	Variable/ Data	Data Type
Offset				
constant=1				
Hunter_option1		1	Count - Constant = 1	
0		2	StationID	Uint16
12		3	StationName	Byte

13	4	PumpUsage	Byte
14	5	CycleTime	Uint16
15	6	SoakTime	Uint16
16	7	LearnedFlow	Uint16
17	8	MaxPercentOverflow	Uint16
18	9	FlowDelay	Uint16
	10	maxCurrent	Uint16

0x17 – Set Controller Start Time Options

This command sets Start Time Options to one of the followings: STATCK OR OVERLAP, SMARTSTACK and SSG/SMARTSTACK. The program thresholds for SMARTSTACK and SSG/SMARTSTACK modes are also sent.

Extracts the mode and other parameters from the Data Array and then sends the cmd

Payload Offset	item	Variable/ Data	Data Type
0			
1	1	StackMode	Byte
2	2	SSPrgThold	Byte

3 SSGSSPrgThold

Byte

0x1E – SET FIELD CONTROLLER PROGRAM HEADER DATA

Transmits to a field controller, header data of a specific Field Controller Program. A FCP header is information global to the specified program. It consists of a program #, mode, start time(s), schedule, seasonal adjust, no water window times, and station advance delays.

Uses the config file parameter Hunter_Option1 to control which program is being commanded. Command payload is xtracted from data array.

Payload Offset	item	Variable/ Data	Data Type
Hunter_option1 0	1	Prog	Byte
1	2	Mode	Byte
2	3	StartTime	Uint16
3	4	StartTime	Uint16
4	5	StartTime	Uint16
5	6	StartTime	Uint16
6	7	StartTime	Uint16
7	8	StartTime	Uint16
8	9	StartTime	Uint16
9	10	StartTime	Uint16
10	11	StartTime	Uint16
11	12	StartTime	Uint16
12	13	SchedType	Byte

13	14	Sched	Uint16
14	15	IntLength	Byte
15	16	IntNextWater	Byte
16	17	NoWaterDays	Byte
17	18	SeasAdj	Uint16
18	19	NwwStart	Uint16
19	20	NwwEnd	Uint16
	21	StaDly	Uint16

0x23 - Set Global Seasonal Adjust.

This command will set the global scale value for the controller. A single controller may be addressed for individual control or all controllers could be address for a blanket change

Extracts the Adjustment from the Data array and then sends cmd.

Payload

Offset	item	Variable/ Data	Data Type
0	1	GblSeasAdj	Uint16

0x24 – Stop and Delete Station

This command will allow one or more stations to be stopped and deleted from the active station and event queue.

Uses the config param Hunter_option1 to control which Station is being commanded. The mode the station is being set to is extracted from the data array

Payload Offset	item	Variable/ Data	Data Type
Const=1	1	StaInfoCnt	Byte
	2	mode	Byte
0 Hunter_option1	3	sta_id	Uint16

0x26 – Stop a Program

Transmits to a field controller a command to stop a the specified program based on the mode in which it is running. Additional parameter is passed indicating whether or not to clear any starts that have stacked for the specified program as well.

Extracts the Program number, mode and other params from the Data array and then sends cmd.

Payload Offset	item	Variable/ Data	Data Type
0	1	ProgNum	Byte
1	2	ProgMode	Byte

3 ClearStack Byte

0x28 – Purge Log

This command purges event logs that have already been successfully received by the central. It is used in conjunction with command 74H. The central shall issue this command after every successful reception of reply for command 74H.

Uses the config param Hunter_option1 to control which Log is being purged.

Payload Offset		item	Variable/ Data	Data Type
Hunter_Option1		1	LogType	Byte

0x3E – REPORT FIELD CONTROLLER PROGRAM HEADER DATA

Transmits from a field controller, header data of a specific Field Controller Program. A FCP header is information global to the specified program. It consists of a program #, mode, start time(s), schedule, seasonal adjust, no water window times, and station advance delays.

Uses the config param Hunter_option1 to control which program is being read. The response payload is stored as shown

Store Offset	item	Variable/ Data	Data Type
0			
1	1	Mode	Byte
2	2	StartTime	Uint16
3	3	StartTime	Uint16
4	4	StartTime	Uint16
5	5	StartTime	Uint16
6	6	StartTime	Uint16
7	7	StartTime	Uint16
8	8	StartTime	Uint16
9	9	StartTime	Uint16
10	10	StartTime	Uint16

11	11	StartTime	UInt16
12	12	SchedType	Byte
13	13	Sched	UInt16
14	14	IntLength	Byte
15	15	IntNextWater	Byte
16	16	NoWaterDays	Byte
17	17	SeasAdj	UInt16
18	18	NwwStart	UInt16
19	19	NwwEnd	UInt16
	20	StaDly	UInt16

0x51 – Stop Irrigation

Transmits to field controller(s), a command to immediately stop all active events. Irrigation resumes at the next event start or other operation.

This command and the response do not carry a payload of data

Payload Offset	item	Variable/ Data	Data Type
N/A Command does not carry data			

0x52 – Programmable Off

Transmits to field controller(s), a command to immediately stop all active events and cancels all programs currently running. Irrigation does not resume until mode is canceled by a Central or through the keypad at the controller, or the day counter reaches 0.

Extracts the Number of Days from the Data array and then sends cmd.

Payload Offset	item	Variable/ Data	Data Type
0	1	Days	Byte

0x53 – Suspend Irrigation

Immediately stops all irrigation, but scheduled events continue to time. Irrigation does not resume until mode is cancelled by a Central.

This command and the response do not carry a payload of data

Payload Offset	item	Variable/ Data	Data Type
N/A Command does not carry data			

0x54 – Cancel Programmable Off

Cancels Programmable Off and allows irrigation to resume. If Controller is not shutdown, no action is taken. This command is normally used with the 'All Call' address 1940, but controllers can be addressed individually.

This command and the response do not carry a payload of data

Payload

Offset	item	Variable/ Data	Data Type
N/A Command does not carry data			

0x55 – Cancel Suspend

Cancels Programmable Off and allows irrigation to resume. If Controller is not shutdown, no action is taken. This command is normally used with the ‘All Call’ address 1940, but controllers can be addressed individually

This command and the response do not carry a payload of data

Payload	Offset	item	Variable/ Data	Data Type
N/A Command does not carry data				

0x56 – Start Manual All Station Program

Starts the specified FCP from the specified station/SSG. All stations will run as programmed.

Uses the config param Hunter_option1 to control which program is being commanded. The StartPoint is extracted from the data array.

Payload	Offset	item	Variable/ Data	Data Type
Hunter_option1				
0		1	Prog	Byte
		2	StartPoint	Uint16

0x57 – Set System Event Mode

Sets a mode in the controller that will prevent all automatic programs (FCP’s) from running. This mode has an indefinite life span.

Payload
Offset

N/A Command does not carry data	item	Variable/ Data	Data Type
------------------------------------	------	----------------	--------------

0x58 – Set FCP Mode

Sets a mode in the controller that will prevent all System Automatic and Manual Events from running. This mode has an indefinite life span.

Payload			
Offset			
N/A Command does not carry data	item	Variable/ Data	Data Type

0x59 – Clear Field Controller Display Messages

This command emulates the action of pressing the “+” key on the Field Controller faceplate. It will erase the error messages from the Field Controller display. This status is reported with any HeartBeat or Mode/Alarm notification so once the status is known the messages may be cleared

Payload			
Offset			
N/A Command does not carry data	item	Variable/ Data	Data Type

0x5A – Set Pause Mode

This command places the controller in a pause mode. Pause will stop irrigation and stop all run time clocks. This is the same command as pressing the Pause button on the controller faceplate. The command can be cancelled by a command from the Central or by pressing the Pause button again on the controller faceplate.

Payload			
Offset			
N/A Command does not carry data	item	Variable/ Data	Data Type

0x5B – Cancel Pause Mode

This command will cancel the pause mode if enabled.

Payload			
Offset			
N/A Command does not carry data	item	Variable/ Data	Data Type

0x5C – Start Manual One Station

Starts the specified station/pump/SSG for the specified time.

Uses the config param Hunter_option1 to control which device is being commanded. The RunTime is extracted from the data array.

Payload Offset	item	Variable/ Data	Data Type
Hunter_option1			
0	1	Device	UInt16
	2	RunTime	UInt16

0x5D – Start Custom Manual Program

This command will start a custom manual program from the specified event number.

Uses the config param Hunter_option1 to control which program is being commanded. The Event param is extracted from the data array.

Payload Offset	item	Variable/ Data	Data Type
Hunter_option1			
0	1	ProgNum	Byte
	2	Event	Byte

0x72 – REPORT Stations ON

Controller returns a bit array indicating stations active at the time of report as well as various bytes of status information. Data included in the command is a time stamp, mode/alarms for the controller, the current flow rate, active pump outputs, the size of the controller and finally the status of each station.

The request does not contain a payload / params. The response data is extracted and stored as shown below.

Store Offset

	item	Variable/ Data	Data Type
0			
1	1	TimeStamp	UINT32
2	2	CurrentGPM	Uint32
3	3	StationSize	UINT16
4	4	Pump1	Bit
5	5	Pump2	Bit
6	6	Pump3	Bit
7	7	Pump4	Bit
8	8	bit 00: Station Size is Zero.	Bit
9	9	bit 01: Programmable Off Active	Bit
10	10	bit 02: All Data Reset	Bit
11	11	bit 03: Power Outage (Power Has Been Off).	Bit
12	12	bit 04: Flow Alarm.	Bit
13	13	bit 05: Sensor Alarm.	Bit
14	14	bit 06: ADM Overload.	Bit
15	15	bit 07: Decoder Failed.	Bit
16	16	bit 08: FCP Changed.	Bit
17	17	bit 09: SSG Programming Changed.	Bit
18	18	bit 10: Controller is Irrigating.	Bit
19	19	bit 11: Station/Pump Overload.	Bit
20	20	bit 12: Mute is Active.	Bit
21	21	bit 13: Controller Suspend Mode Active.	Bit
22	22	bit 14: Controller Pause Mode is Active.	Bit
23	23	bit 15: A Program was Suspended.	Bit
24	24	bit 16: A Program was Paused.	Bit
25	25	bit 17: System Mode Active (No FCP Starts).	Bit
26	26	bit 18: Staging Watering Queue is Full (25 stations max).	Bit
27	27	bit 19: PINs Have Been Reset.	Bit
28	28	bit 20: Dial in OFF Position	Bit
29	29	bit 21: Controller Program Overlap Option Changed	Bit
30	30	bit 22: Station Size Changed	Bit
31	31	bit 23: Time/Date Properties Changed (Time, Date, Format, Daylight Savings & Units of Measure)	Bit
32	32	bit 24: Custom Manual Programs Changed	Bit
33	33	bit 25: Pump Settings Changed (Station Assignments, Style, Location)	Bit
34	34	bit 26: Cycle & Soak Settings Changed	Bit
35	35	bit 27: Flow Properties Changed (Learned Flow, Limit %, Delay, Sensor Type, Sensor Location)	Bit
36	36	bit 28: Names Changed (Contact, Program, Station, SSG)	Bit
37	37	bit 29: Historical Data Reset (Flow Totals and/or Logs)	Bit

38	38	bit 30: Sensor Decoder Alarm Polling Status Changed	Bit
39	39	bit 31: Not Used	Bit
40	40	bit 32: ET Sensor Comm Fault	Bit
41	41	bit 33: RTC Fault	Bit
42	42	Bit 34:Reserved for future	Bit
43	43	Bit 34:Reserved for future	Bit
44	44	Reserved for future Bit 35	Bit
45	45	Reserved for future Bit 36	Bit
46	46	Reserved for future Bit 37	Bit
47	47	Reserved for future Bit 38	Bit
48	48	Reserved for future Bit 39	Bit
49	49	Reserved for future Bit 40	Bit
50	50	Reserved for future Bit 41	Bit
51	51	Reserved for future Bit 42	Bit
52	52	Reserved for future Bit 43	Bit
53	53	Reserved for future Bit 44	Bit
54	54	Reserved for future Bit 45	Bit
55	55	Reserved for future Bit 46	Bit
56	56	Reserved for future Bit 47	Bit
57	57	Reserved for future Bit 48	Bit
58	58	Reserved for future Bit 49	Bit
59	59	Reserved for future Bit 50	Bit
60	60	Reserved for future Bit 51	Bit
61	61	Reserved for future Bit 52	Bit
62	62	Reserved for future Bit 53	Bit
63	63	Reserved for future Bit 54	Bit
64	64	Reserved for future Bit 55	Bit
65	65	Reserved for future Bit 56	Bit
66	66	Reserved for future Bit 57	Bit
67	67	Reserved for future Bit 58	Bit
68	68	Reserved for future Bit 59	Bit
69	69	Reserved for future Bit 60	Bit
70	70	Reserved for future Bit 61	Bit
71	71	Reserved for future Bit 62	Bit
72	72	Reserved for future Bit 63	Bit
73	73	Active Station 1	Bit
74	74	Active Station 2	Bit
75	75	Active Station 3	Bit
76	76	Active Station 4	Bit
77	77	Active Station 5	Bit
78	78	Active Station 6	Bit
79	79	Active Station 7	Bit

80	80	Active Station 8	Bit
81	81	Active Station 9	Bit
82	82	Active Station 10	Bit
83	83	Active Station 11	Bit
84	84	Active Station 12	Bit
85	85	Active Station 13	Bit
86	86	Active Station 14	Bit
87	87	Active Station 15	Bit
88	88	Active Station 16	Bit
89	89	Active Station 17	Bit
90	90	Active Station 18	Bit
91	91	Active Station 19	Bit
92	92	Active Station 20	Bit
93	93	Active Station 21	Bit
94	94	Active Station 22	Bit
95	95	Active Station 23	Bit
96	96	Active Station 24	Bit
97	97	Active Station 25	Bit
98	98	Active Station 26	Bit
99	99	Active Station 27	Bit
100	100	Active Station 28	Bit
101	101	Active Station 29	Bit
102	102	Active Station 30	Bit
103	103	Active Station 31	Bit
104	104	Active Station 32	Bit
105	105	Active Station 33	Bit
106	106	Active Station 34	Bit
107	107	Active Station 35	Bit
108	108	Active Station 36	Bit
109	109	Active Station 37	Bit
110	110	Active Station 38	Bit
111	111	Active Station 39	Bit
112	112	Active Station 40	Bit
113	113	Active Station 41	Bit
114	114	Active Station 42	Bit
115	115	Active Station 43	Bit
116	116	Active Station 44	Bit
117	117	Active Station 45	Bit
118	118	Active Station 46	Bit
119	119	Active Station 47	Bit
120	120	Active Station 48	Bit
121	121	Active Station 49	Bit

122	122	Active Station 50	Bit
123	123	Active Station 51	Bit
124	124	Active Station 52	Bit
125	125	Active Station 53	Bit
126	126	Active Station 54	Bit
127	127	Active Station 55	Bit
128	128	Active Station 56	Bit
129	129	Active Station 57	Bit
130	130	Active Station 58	Bit
131	131	Active Station 59	Bit
132	132	Active Station 60	Bit
133	133	Active Station 61	Bit
134	134	Active Station 62	Bit
135	135	Active Station 63	Bit
136	136	Active Station 64	Bit
137	137	Active Station 65	Bit
138	138	Active Station 66	Bit
139	139	Active Station 67	Bit
140	140	Active Station 68	Bit
141	141	Active Station 69	Bit
142	142	Active Station 70	Bit
143	143	Active Station 71	Bit
144	144	Active Station 72	Bit
145	145	Active Station 73	Bit
146	146	Active Station 74	Bit
147	147	Active Station 75	Bit
148	148	Active Station 76	Bit
149	149	Active Station 77	Bit
150	150	Active Station 78	Bit
151	151	Active Station 79	Bit
152	152	Active Station 80	Bit
153	153	Active Station 81	Bit
154	154	Active Station 82	Bit
155	155	Active Station 83	Bit
156	156	Active Station 84	Bit
157	157	Active Station 85	Bit
158	158	Active Station 86	Bit
159	159	Active Station 87	Bit
160	160	Active Station 88	Bit
161	161	Active Station 89	Bit
162	162	Active Station 90	Bit
163	163	Active Station 91	Bit

164	164	Active Station 92	Bit
165	165	Active Station 93	Bit
166	166	Active Station 94	Bit
167	167	Active Station 95	Bit
168	168	Active Station 96	Bit
169	169	Active Station 97	Bit
170	170	Active Station 98	Bit
171	171	Active Station 99	Bit
172	172	Active Station 100	Bit
173	173	Active Station 101	Bit
174	174	Active Station 102	Bit
175	175	Active Station 103	Bit
	176	Active Station 104	Bit

0x73 – REPORT MODE/ALARM

Controller returns display flags indicating current operational status and current mode of operation

The request does not contain a payload / params. The response data is extracted and stored as shown below.

Store Offset	item	Variable/ Data	Data Type
0			
1	1	bit 00: Station Size is Zero.	Bit
2	2	bit 01: Programmable Off Active	Bit
3	3	bit 02: All Data Reset	Bit
4	4	bit 03: Power Outage (Power Has Been Off).	Bit
5	5	bit 04: Flow Alarm.	Bit
6	6	bit 05: Sensor Alarm.	Bit
7	7	bit 06: ADM Overload.	Bit
8	8	bit 07: Decoder Failed.	Bit
9	9	bit 08: FCP Changed.	Bit
10	10	bit 09: SSG Programming Changed.	Bit
11	11	bit 10: Controller is Irrigating.	Bit
12	12	bit 11: Station/Pump Overload.	Bit
13	13	bit 12: Mute is Active.	Bit
14	14	bit 13: Controller Suspend Mode Active.	Bit
15	15	bit 14: Controller Pause Mode is Active.	Bit
16	16	bit 15: A Program was Suspended.	Bit
17	17	bit 16: A Program was Paused.	Bit

18	18	bit 17: System Mode Active (No FCP Starts).	Bit	
19	19	bit 18: Staging Watering Queue is Full (25 stations max).	Bit	
20	20	bit 19: PINs Have Been Reset.	Bit	
21	21	bit 20: Dial in OFF Position	Bit	
22	22	bit 21: Controller Program Overlap Option Changed	Bit	
23	23	bit 22: Station Size Changed	Bit	
24	24	bit 23: Time/Date Properties Changed (Time, Date, Format, Daylight Savings & Units of Measure)	Bit	
25	25	bit 24: Custom Manual Programs Changed	Bit	
26	26	bit 25: Pump Settings Changed (Station Assignments, Style, Location)	Bit	
27	27	bit 26: Cycle & Soak Settings Changed	Bit	
28	28	bit 27: Flow Properties Changed (Learned Flow, Limit %, Delay, Sensor Type, Sensor Location)	Bit	
29	29	bit 28: Names Changed (Contact, Program, Station, SSG)	Bit	
30	30	bit 29: Historical Data Reset (Flow Totals and/or Logs)	Bit	
31	31	bit 30: Sensor Decoder Alarm Polling Status Changed	Bit	
32	32	bit 31: Not Used	Bit	
33	33	bit 32: ET Sensor Comm Fault	Bit	
Other bits reserved for future use		34	bit 33: RTC Fault	Bit

0x74 – REPORT LOGS

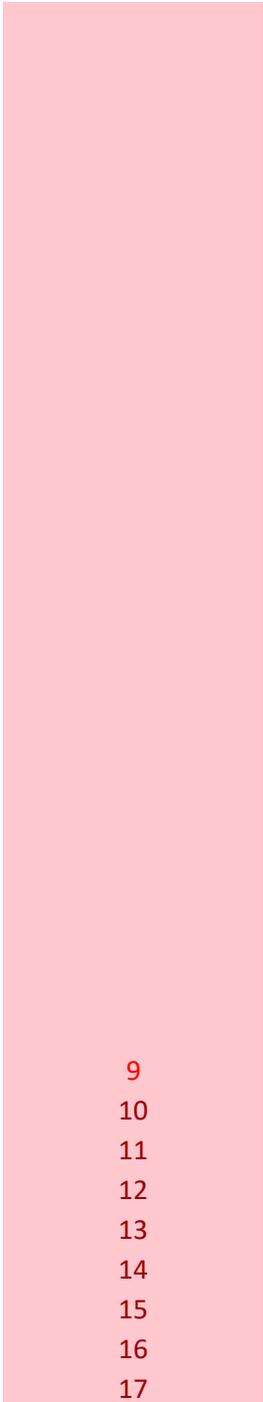
This command will return entries from one of the three logs stored in the controller. The log entries to be returned are specified in the command. After each successful transmission from the controller, the central shall issue command 28H (Purge Log) to signal the controller to reset the pointers in the log to the last entry transmitted. This sequence will continue until the controller reports a 0 for the log count.

Uses the config param Hunter_option1 to control which Log is being requested. The Log data in the response is extracted and stored in the Data Array as shown below.

Hunter_Option1= 1 System
 Hunter_Option1= 2 Controller
 System Log
 Hunter_Option1= 3 Station
 Alarm Log Log

Store Offset	item	Variable/ Data	Data Type
0			
1	1	Month	Byte

2	2	Day	Byte
3	3	Year	Byte
4	4	SAM	24Bit
5	5	Idiom	Byte
6	6	Field1	Byte
7	7	Field2	Uint16
8	8	Field3	Uint16



9	9	Field4	UInt16
10	10	Month	Byte
11	11	Day	Byte
12	12	Year	Byte
13	13	SAM	24Bit
14	14	Idiom	Byte
15	15	Field1	Byte
16	16	Field2	UInt16
17	17	Field3	UInt16
... 9 Items stored per log record.	18	Field4	UInt16

0x75 – REPORT CURRENT FLOW DATA

This command will report current flow measured in the controller.

This request does not carry a payload. The data in the response is extracted and stored as shown below.

Store Offset	item	Variable/ Data	Data Type
0	1	CurrentFlow	24Bit

0x76 – REPORT SENSOR DATA

This command will report current sensor status and configuration for sensors 1 to 4.

This command will report current sensor status and configuration for sensors 1 to 4. Data from response is extracted and stored as shown below.

Store Offset	item	Variable/ Data	Data Type
0			
1	1	SenInfo1	Byte
2	2	SenInfo2	Byte
3	3	SenInfo3	Byte
4	4	SenInfo4	Byte

5	5	lastReading	UInt16
6	6	SenInfo1	Byte
7	7	SenInfo2	Byte
8	8	SenInfo3	Byte
9	9	SenInfo4	Byte
.. Total of 4 sets of data			
	10	lastReading	UInt16

0x77 - Report ADM Status

This command will report the current state and current draw of the transmission line in a decoder controller along with any fault information. The FacePack must query the DOM using CAN msg #1420 to obtain the latest data. The DOM will respond with CAN msg #231.

Uses the config param Hunter_option1 to control the ADMNum being requested. The response data is extracted and stored in the Data Arrays as shown below.

Store Offset	item	Variable/ Data	Data Type
0			
1	1	ADMNum	Byte
c	2	Status	Byte
3	3	MaxCurrent	UInt16
4	4	ActualCurrent	UInt16
5	5	Spare	Byte
6	6	ASInterval	Byte
7	7	Status Bit 0	Bit
8	8	Status Bit 1	Bit

9	9	Status Bit 2	Bit
10	10	Status Bit 3	Bit
11	11	Status Bit 4	Bit
12	12	Status Bit 5	Bit
13	13	Status Bit 6	Bit
	14	Status Bit 7	Bit

0x78 - Report Overloaded Pumps/Stations

This command will report all the overloaded stations including pumps.

The response data is extracted and stored in the Data Array as shown below. The request payload is blank.

Store Offset	item	Variable/ Data	Data Type
0	1	Pump1 Overload	Byte
1	2	Pump2 Overload	Byte
2	3	Pump3 Overload	Byte
3	4	Pump4 Overload	Byte
4	5	StnCount	Byte
5	6	Stn #1 Overload	Byte
6	7	Stn #2 Overload	Byte
7	8	Stn #3 Overload	Byte
...	Byte
244	245	Stn #240 Overload	Byte

0x7A – REPORT FLOW TOTALS

This command will report flow accumulations. The Today and Yesterday values are x 10 or 1 decimal. All values are in gallons.

Uses the config param Hunter_option1 to control the Category being requested. Uses the config param Hunter_option2 to control the Start Index of the data being requested. The response data is extracted and stored in the Data Array as shown below. The protocol command can contain 8 sets of data. This driver only processes one.

- Hunter_option1=0 Field Controller
- Hunter_option1=1 program
- Hunter_option1=2 SSG

Hunter_option1=3 Station

Store Offset	item	Variable/ Data	Data Type
0	1	Category	Byte
2	2	StartIndex	Uint16
3	3	Count	Byte
4	4	Today	24Bit
5	5	Yesterday	24Bit
6	6	WTD	24Bit
7	7	LastWeek	24Bit
8	8	MTD	24Bit
9	9	LastMonth	24Bit
10	10	YTD	24Bit
11	11	Last year	24Bit
12	12	Today	24Bit
13	13	Yesterday	24Bit
14	14	WTD	24Bit
15	15	LastWeek	24Bit
16	16	MTD	24Bit
17	17	LastMonth	24Bit
18	18	SysDChour	24Bit
	19	YTD	24Bit

0x7B - Report Flow Detail Data

This command will report detailed flow data that is stored in the facepack’s EEPROM. The facepack is able to store flow detail at one-minute intervals for a 30 day period. All flow values returned are in gallons.

When this service is executed the driver extracts 4 data items from the Data Array and uses them to format the request message. When a response is received, the payload data is extracted and stored as shown below.

**Payload
Offset**

Payload Offset	item	Variable/ Data	Data Type
0	1	Date	Byte
1	2	Month	Byte
2	3	Year	Byte
	4	StartMinute	24Bit
Payload Offset	item	Variable/ Data	Data Type
4	1	Count	Byte
5	2	FlowData 1	Uint16
..	
125	126	FlowData 120	Uint16

0x92 - Report Comm Module Globals

Transmits to the central current global values contained in the specific field controller’s Com Module

This request does not carry a payload. The data in the response is extracted and stored as shown below.

Store Offset	item	Variable/ Data	Data Type
0	1	FwVers	Uint16
1	2	EngRev	Byte
2	3	MaxPacketSize	Uint16
3	4	Siteld	Byte
4	5	ControllerId	Uint16
5	6	Contrast	Byte
6	7	Radio_Type	Byte
7	8	RadioBaud	Byte

9	9	DtmfTimeout	Byte
10	10	DefaultMR	Byte
11	11	WimBaud	Byte
12	12	ModemType	Byte
13	13	ModemBaud	Byte
14	14	ModemCountryCode	Byte
15	15	Spare_NULL	Byte
16	16	Master	Byte
17	17	IMEI[0]	Byte
18	18	IMEI[1]	Byte
19	19	IMEI[2]	Byte
20	20	IMEI[3]	Byte
21	21	IMEI[4]	Byte
22	22	...	Byte
23	23		Byte
24	24		Byte
25	25		Byte
26	26		Byte
27	27		Byte
28	28		Byte
29	29		Byte
30	30		Byte
31	31		Byte
32	32	...	Byte
33	33	IMEI[16]	Byte
34	34	Modem_Init[0]	Byte
35	35	Modem_Init[1]	Byte
36	36		Byte
37	37		Byte
38	38		Byte
39	39		Byte
40	40		Byte
41	41		Byte
42	42		Byte
43	43		Byte

44	44	Byte
45	45	Byte
46	46	Byte
47	47	Byte
48	48	Byte
49	49	Byte
	50	Modem_Init[16]

0x9A - Report ACC Com Module Firmware Version Type 0-19

This command will report the current firmware version for the Com Model Types 0-9 Communication module and various other components in the ACC controller.

This request does not carry a payload. The data in the response is extracted and stored as shown below.

Store Offset	item	Variable/ Data	Data Type
0			
1	1	FwVers	Uint16
2	2	EngRev	Byte
3	3	Model	Byte
4	4	HVerH	Byte
5	5	HVerL	Byte
	6	HEng	Byte

5. Configuring the FieldServer as a Hunter Irrigation Controller Server

This driver cannot be used to emulate a Hunter ACC device. In other words, you can use this driver to make some other irrigation system function as if it were a Hunter System.

Appendix 1. Advanced Topics

Appendix 1.1. Driver Error Messages

Error Message	Explanation and corrective action
<p>We have shown place holders for the parts of the message which change.</p> <p>%s is a place holder for a text string.</p> <p>%d is a place holder for a number</p> <p>%c is a place holder for an alpha character.</p>	<p><i>FYI messages are informational and do not require a corrective action. Simply use them to confirm configuration / behaviors are what you expect.</i></p>
<p>ACC#01 Err. hunter_master Driver parameter error</p>	
<p>ACC#02 Err. Slave toolkit driver parameter error</p>	
<p>ACC:#03 Err. Cant find Hunter_Interface</p>	
<p>ACC#04 Err. Cmd=0x%02x not supported</p>	
<p>ACC#05a FYI Connect:NON DEFAULT PORT=%d</p> <p>ACC#05b FYI Connect:Default Port=%d"</p>	

Appendix 1.2. Driver Debug Mode

The driver has a number of diagnostic and debug messages. Normally these are suppressed. Turn them on if directed by tech support. To turn them on, define the Hunter Interface Array and populate it with some non-zero data to turn on the diagnostic function

```

Data_Arrtys

Data Array Name , Data Array Format , Length

DA_Hunter_Debug , UINT16      , 1000
    
```

Offset	
1	Display Send Buffer
2	Display Rcv Buffer
3	Display 10 bytes of data
4	Display Response Payload
5	Display Poll Payload
6	Display the Recv() function in state2

Revision History

Date	Resp	Driver Ver.	Doc. Rev.	Comment
2019Feb11	PMC	1.00	1.00	Released