

QuadraTherm[®] 640i & 780i Profibus DP

P R O F I

Instruction Manual

Profibus DP Device Specification for Models: 640i and 780i Thermal Mass Flow Meters



Part Number: IM-640i/780i-DP, Rev. V1 June 2014



GLOBAL SUPPORT LOCATIONS: WE ARE HERE TO HELP!

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Sierra Instruments, Inc. is not liable for any damage or personal injury, whatsoever, resulting from the use of Sierra Instruments standard mass flow meters for oxygen gas. You are responsible for determining if this mass flow meter is appropriate for your oxygen application. You are responsible for cleaning the mass flow meter to the degree required for your oxygen flow application.

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TRADEMARKS

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Warnings and Cautions



Warning! Agency approval for hazardous location installations varies between flow meter models. Consult the flow meter nameplate for specific flow meter approvals before any hazardous location installation.

Warning! Hot tapping must be performed by a trained professional. U.S. regulations often require a hot tap permit. The manufacturer of the hot tap equipment and/or the contractor performing the hot tap is responsible for providing proof of such a permit.

Warning! All wiring procedures must be performed with the power off.

Warning! To avoid potential electric shock, follow National Electric Code safety practices or your local code when wiring this unit to a power source and to peripheral devices. Failure to do so could result in injury or death. All AC power connections must be in accordance with published CE directives.

Warning! Do not power the flow meter with the sensor remote (if applicable) wires disconnected. This could cause damage to the electronics.

Warning! Before attempting any flow meter repair, verify that the line is de-pressurized.

Warning! Always remove main power before disassembling any part of the mass flow meter.



Caution! Before making adjustments to the device, verify the flow meter is not actively monitoring or reporting to any master control system. Adjustments to the electronics will cause direct changes to flow control settings.

Caution! All flow meter connections, isolation valves and fittings for hot tapping must have the same or higher pressure rating as the main pipeline.

Caution! Changing the length of cables or interchanging sensors or sensor wiring will affect the accuracy of the flow meter. You cannot add or subtract wire length without returning the meter to the factory for re-calibration.

Caution! When using toxic or corrosive gases, purge the line with inert gas for a minimum of four hours at full gas flow before installing the meter.

Caution! The AC wire insulation temperature rating must meet or exceed 80°C (176°F).

Caution! Printed circuit boards are sensitive to electrostatic discharge. To avoid damaging the board, follow these precautions to minimize the risk of damage:

- · Before handling the assembly, discharge your body by touching a grounded, metal object
- Handle all cards by their edges unless otherwise required
- When possible, use grounded electrostatic discharge wrist straps when handling sensitive components

Note and Safety Information

We use caution and warning statements throughout this book to drawyour attention to important information.





This statement appears with information that is important to protect people and equipment from damage. Pay very close attention to all warnings that apply to your application. This statement appears with information that is important for protecting your equipment and performance. Read and follow all cautions that apply to your application.

Receipt of System Components

When receiving a Sierra mass flow meter, carefully check the outside packing carton for damage incurred in shipment. If the carton is damaged, notify the local carrier and submit a report to the factory or distributor. Remove the packing slip and check that all ordered components are present. Make sure any spare parts or accessories are not discarded with the packing material. Do not return any equipment to the factory without first contacting Sierra Customer Service.

Technical Assistance

If you encounter a problem with your flow meter, review the configuration information for each step of the installation, operation, and setup procedures. Verify that your settings and adjustments are consistent with factory recommendations. Installation and troubleshooting information can be found in the <u>QuadraTherm 640i/780i Instruction</u> <u>Manual</u>.

If the problem persists after following the troubleshooting procedures outlined in the 640i or 780i product manuals, contact Sierra Instruments by fax or by E-mail(see inside front cover). For urgent phone support you may call (800) 866-0200 or (831) 373-0200 between 8:00 a.m. and 5:00 p.m. PST. In Europe, contact Sierra Instruments Europe at +31 72 5071400. In the Asia-Pacific region, contact Sierra Instruments Asia at +86-21-58798521. When contacting Technical Support, make sure to include this information:

- The flow range, serial number, and Sierra order number (all marked on the meter nameplate)
- The software version (visible at start up)
- The problem you are encountering and any corrective action taken
- Application information (gas, pressure, temperature, and piping configuration)

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Chapter 1: Introduction

This manual will explain how to add a Sierra flow meter to a Profibus DP network. Profibus DP allows access to all relevant data available in the flow meter. This manual does not cover the operation of the QuadraTherm 640i/780i. See the <u>QuadraTherm 640i/780i Instruction</u> Manual for more information 640i/780i.

The 640i/780i process data flow, temp, pressure, totalizer, and alarm status supports Profibus DP V0 cyclic data communications. The 640i/780i also supports Profibus DP V1 acyclic data for meter information and setup data. If your Class 1 master doesn't support DPV1 data, then a separate Class 2 supervisory master may be used to access it. The acyclic data would only need to be accessed occasionally for setup and informational reasons.

Set Up Step Plan

To successfully add the flow meter to a Profibus DP network you need the following:

- Profibus DP network with a DP master
- GSD file
- Bitmap files (Optional)
- Connection cable
- Power supply (for the flow meter)

Setup steps:

- 1. Load GSD
- 2. Copy bitmaps
- 3. Add slave (640i/780i) device to system
- 4. Set slave configuration
- 5. Set slave station address
- 6. Download configuration
- 7. Test configuration

Chapter 2: Field Bus Installation

Wiring

Option DP1

This option uses a full five-wire Profibus DP connection using the M12 connector per the Profibus DP standard. This connection allows you to use ready-made cables, tees, and terminators which maintain a daisy chain topology.

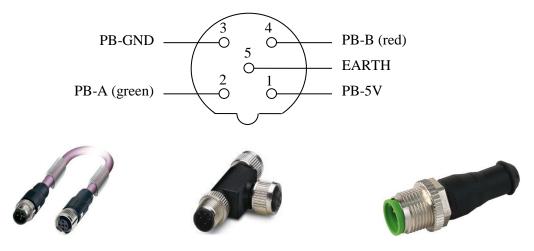


Figure 1: Ready-made cables, tees, and terminators

The Profibus DP connects to the M12 connector to the right of the QuadraTherm (shown below). The 24 VDC@1A power to power the meter connects pins 1 and 2.

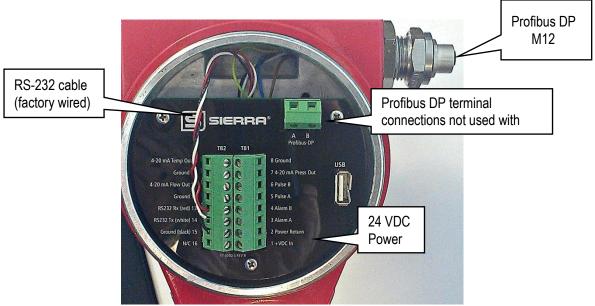


Figure 2: 640i/780i Wiring Connection DP1

Option DP2

For applications where the Profibus DP cable needs to be protected in conduit, we offer an alternate terminal block Profibus DP connection. This must be requested at the time of ordering. The PB-5V and PB-GND will not be available to power a terminator. The last device on the Profibus DP segment may need an external "powered terminator" or at minimum a 220 Ω resistor across A&B. The daisy chain topography cannot be maintained, so spur lines may be unavoidable. Make sure to account for maximum number of spur lines in your application. For higher baud rates and longer wire runs, repeaters or hubs may be needed.

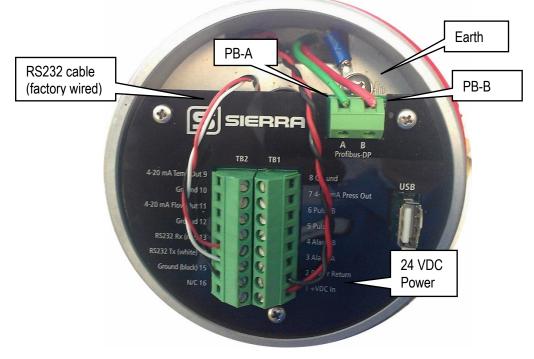


Figure 3: 640i/780i Wiring Connection DP2

Cable

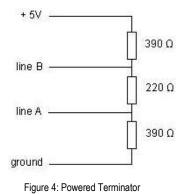
Profibus DP cables are shielded, twisted-pair copper cables which differ from each other in the type of wire (fixed/flexible) and/or sheath. The two inner cores of a Profibus DP cable have green and red insulation. The specifications in this chapter are primarily intended to provide a general introduction and describe the cable properties to be considered (see also IEC 61784-5-3). A good cabling guide can be found online at: http://verwertraining.com/wp-content/uploads/InstallationGuideV9_2.pdf.

The cable must conform to the following specifications:

- Impedance: 150 Ohm (nominal) at frequencies from 3 to 20 MHz
- Cable capacitance: < 30 pF per meter
- Core diameter: > 0.34 mm², corresponds to AWG 22
- Cable type: twisted pair cable. 1x2 or 2x2 or 1x4 lines
- Resistance: < 110 Ohm per km
- Signal attenuation: max. 9 dB over total length of line section
- Shielding: CU shielding braid or shielding braid and shielding foil
- Max. Bus length: 200 m at 1500 Kbit/s, up to 1.2 km at 93.75 Kbit/s

Termination

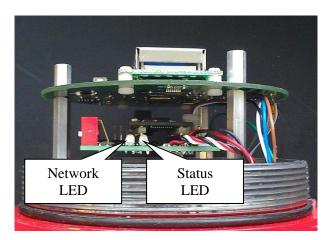
The Profibus DP physical layer is based on RS-485, and therefore termination resistors of 220Ω are needed at both ends of the network to prevent reflections. 390Ω resistors are used to bias the idle state voltages. This power terminator circuit is shown below:



Ready-made terminators are available for easy installation.

Status LEDs

The interface has two multi-color LED's mounted inside the enclosure to indicate the status. To access the LED's, remove the display side cap.



Status LED

Status	Description
Flashing Green/red	Initializing
Steady Green	Device operational
Flashing Red	Recoverable hardware failure
Steady Red	Hardware failure – attention required (RS232 wires may be disconnected)

Network LED

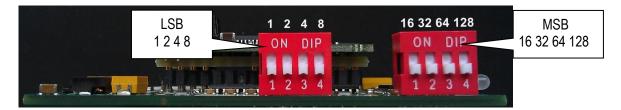
Status	Description
Off	Not online – waiting for configuration
Steady Green	Data exchange
Flashing Red	Connection lost

Slave Address

Once the interface is installed, the slave address of the interface can be set. DP instruments will be delivered with slave address 126. This address has been agreed by the Profibus DP organization to be free for installing new devices to the bus. Changing the station address is done in two ways, either through a dip switch or through the master.

Dip Switch

The dip switches are located to the left of the LEDs.



The dip switch is binary encoded with the LSB (least significant bit) on the left side. The switch is only read during power-up.

The switch becomes active when the slider is moved upwards to "On". Below is an example of some addresses:

Address ID		Dip Switch							
	1	2	3	4	1	2	3	4	
1	On	Off	Off	Off	Off	Off	Off	Off	
14	Off	On	On	On	Off	Off	Off	Off	
60	Off	Off	On	On	On	On	Off	Off	
125	On	Off	On	On	On	On	On	Off	



Note: An address set with the dip switch has the highest priority and the slave address will use this address when powering up.

Server Assigned Address

It is possible to change the address of the unit through the server. Perform the following steps to change the address:

- 1. Assign a new address from the server
- 2. Set the dip switch to address to >128 (last switch on) or higher.

The assigned address will be used each time that the unit is powered.

Set Address (126)

It is possible to force the address of the unit to 126. Set the dip switch to zero and power cycle the unit. The address is set to 126. The address can be changed by the server if needed. Do keep in mind that if the dip switch remains set to zero, the address will be set to 126 at each power-up.

Chapter 3: Configuration

GSD File

Each Profibus DP device comes with its own <u>GSD-file</u>. The GSD file can be obtained from the documents and downloads page (<u>http://www.sierrainstruments.com/products/downloads/Profibus DP-dp</u>). The GSD file contains the instrument specifications telling the master configuration software which facilities/features the instrument offers to the Profibus DP system.

The GSD-file is a text file containing:

- Identification info:
 - Model name: "QuadraTherm 640i/780i"
 - Vendor name: "Sierra Instruments Inc."
 - o File name SIER0E14
 - o Identification number: 0x014E
 - Bitmap device: "640i_de"
 - Bitmap diagnostics: "640i_di"
 - Bitmap SF: "640i_sf"
 - (Bitmap files are used in configuration software to indicate instrument status)
- Revision numbers
- Hardware characteristics:
 - VPC3+C dependable properties
- Software characteristics:
 - Supported features of Profibus DP: freeze, sync, auto baud rate detection
- Maximum bus data lengths
- Size of used data buffers
- DPV0 modules with cyclic inputs definitions
- DPV1 acyclic input/output data definitions

Cyclic Data Overview (inputs)

The tables below (Incoming Cyclic Data (Slave to Master Module 1) and Incoming Cyclic Data (Slave to Master Module 2) shows the cyclic input buffer supported by the device. To make configuration more flexible the process data has be divided between three modules. Three more modules were added to allow combination of Module 1, 2, and 3. Only one module can be configured at a time. The actual data address (index) will depend on preceding devices on your bus and what modules are configured. The matrix example below shows the actual data addresses, assuming the 640i/780i is the first device on your Profibus DP network, and Module 6(1+2+3) was configured.

Incoming Cyclic Data (Slave to Master Module 1)

Data Address	Description	Size (bytes)	Format
0	Flow	4	Real

Data Address	Description	Size (bytes)	Format
4	Temperature	4	Real
8	Pressure	4	Real
12	Totalizer	4	Real

Incoming Cyclic Data (Slave to Master Module 2)

Incoming Cyclic Data (Slave to Master Module 3)

Data Address	Description	Size (bytes)	Format
16	Totalizer	4	32 INT
20	Alarm Status	1	8 INT

Module 4, Module 1+2

Module 5, Module 2+3

Module 6, Module 1+2+3

DPV0 Cyclic Data Reads (inputs)

Flow

Data type: 32 bit real (same as 32 bit floating point or IEEE 754) Description: The actual flow as measured by the instrument in the active flow units on the 640i/780i.

Temperature

Data type: 32 bit real

Description: The actual process temperature as measured by the instrument in the active temperature units on the 640i/780i.

Pressure

Data type: 32 bit real

Description: The actual process pressure as measured by the instrument in the active pressure units on the 640i/780i.

Totalizer

Data type: 32 bit real

Description: The totalized flow as measured by the instrument in the active flow units on the 640i/780i. This total is in the common IEEE 754 data type, but will start rounding off at flow above 40,000.

Totalizer

Data type: 32 bit unsigned integer (byte order LSB – MSB)

Description: The totalized flow as measured by the instrument in the active flow units on the 640i/780i. This total will count to 2^23, or 4,294,967,296. It will not round off, or include a decimal point.

Alarm Status

Data type: Byte (Boolean)

Description: This is the status of the 640i/780i alarm. (0=inactive, 1=active) The alarm setup can be done through the keypad or the 640i/780i SIP software.

DPV1 Acyclic Writes (outputs)

Slot 0

Total Reset: 16 bit integer data type. Resets the totalizer to zero when sending a hex 00,01.

Slot 1

Password: Four character ASCII string. This sends a new password to the 640i/780i keypad, which over writes the old one. The password can be any four text numbers as in (i.e. 1, 2, 3, 4). This is useful to lockout unauthorized changes to the 640i/780i from the keypad.

Slot 2

Meter Tune: This 32 bit real number will adjust the flow calibration of the active gas. The factory calibration should be already correct. However this can be used to correct an undetermined application issue. Example 1.100 would increase the flow readings by 10%.

Slot 3

Change Active Gas: This is a 16 bit integer data type. The 640i/780i can hold up to four gas calibrations. Index "0" is always set to air. Indexes 1, 2, or 3 can be calibrated for other gases. Sending a hex 00,00 would be air, hex 00,01 would be gas 2, hex 00,02 would be gas 3, and hex 00,03 would be gas 4.

Slot 4

Write Full Scale: This is a 32 bit real data type that will set the meter full scale. When reading the flow using the Profibus DP, this doesn't really matter. This just sets the 4-20 mA. Full scale can also be useful information to indicate a meter in your system.

Slot 5

Internal Pipe Diameter: This is a 32 bit real data type that can be used to change the calibrated pipe diameter. In order to measure flow accurately, the pipe ID must be correct on a 640i/780i. At the factory we used the Pipe ID that was supplied at the time the meter was ordered. If this has changed, you may enter a new pipe ID here or use the 640i/780i keypad.

DPV1 Acyclic Reads (inputs)

Slot 7

Read Full Scale: This is a 32 bit real data type. This is the meter full scale. When reading the flow using the Profibus DP, this doesn't really matter. Read Full Scale is just a 4-20 mA full scale. This data can also be useful information to indicate a meter full scale in your system.

Slot 8

Reads Meter Tune: This is a 32 bit real number that can be used to adjust the flow calibration of the active gas. At the factory calibration this should always be set to 1.000.

Slot 9

Reads Gas Name: This 10 character ASCII string with the name of the currently active gas. This should be the same as the calibration certificate. This will change as the active gas is changed.

Slot 10

Reads Internal Pipe Diameter: This is a 32 bit real data type that represents the calibrated pipe diameter. In order to measure flow accurately, the pipe ID must be correct on a 640i/780i. At the factory, we used the Pipe ID that was supplied at the time the meter was ordered.

Slot 11

Reads Active Gas: This is a 16 bit integer data type. The 640i/780i can hold up to four gas calibrations. Index 0 is always set to Air. Indexes 1, 2, or 3 can be calibrated for other gases. Reading a hex 00,00 would be air, hex 00,01 would be gas 2, hex 00,02 would be gas 3, and hex 00,03 would be gas 4.

Slot 12

Reads all Active Engineering Units: This is a 22-character ASCII string. This string contains the active engineering units for temperature, pressure, flow, and total using a semicolon to separate each. Example: F;PSIA;SCFM; SCFM

Slot 13

Reads Serial Number: This is a 6-character ASCII string with the unique serial number of the meter.

Slot 14

Reads the Last Factory Calibration Date: This 10-character ASCII string has the most recent factory calibration date. Example: 10/10/2010

Slot 15:

Reads T1 Wattage: This is an 8-character ASCII string with the reference T1 wattage done at ambient conditions during calibration.

Reference Application Examples

For a DPV0 Class 1 master for the cyclic data, below we will be using a Hilscher CIF50-PB PCI card as the master. Configuration will be done by using Hilscher's Syscon software. Sycon is a tool for the configuration of a fieldbus networks using a Hilscher CIF50-PB master. You may be using different configuration software and different master. However, you will need to accomplish the same functions. No specific slave DTMs (Device Type Manager) of the 640i/780i are available. Below we will be using the Syscon generic slave DTM.

Online diagnostic indicators and auto-scan function for the reading of network participants can be used to assist in the commissioning of the network.

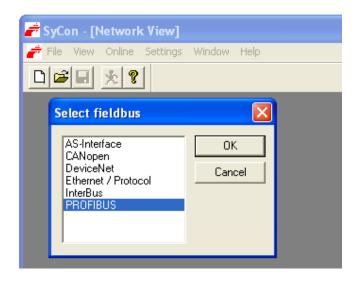
This manual will explain step by step how to configure the system to support various fieldbus slaves on a Hilscher CIF50-PB master.

Before starting make sure that the necessary device description files (GSD & bit maps) are available in your device catalog. These are available on our <u>web site</u>.

Import Device Description Files

In order to use a Profibus DP device, its properties need to be added to the server. This is done by importing the device description files into the Sycon configuration software. Follow the steps below to import device description (DD) files:

1. Start Sycon and create a new document (File -> New). A dialog window appears asking to select a fieldbus. For this example select "PROFIBUS DP."



2. The main window is loaded. Go to the file menu and select "Copy GSD."

	SyCon - [l											
55	File Edit	View	Insert	Online	Settings	Tools	Window	Help				_ 8 ×
С	New				Ctrl+N	1						
ď,	Open Close				Ctrl+0	-						
<u></u>	Save				Ctrl+S							
	Save As					L						
	Export				•							
	Copy GS	5D										
	Print				Ctrl+P							
	Print Pre											
	Print Set	:up										
	1 Unigat											
	2 Testin 3 Master			dn								
	4 Master											
	Exit											
l	LAIC					1						
Copi	ies a GSD file	e into t	he GSD o	directory	/					PROFIBUS	Config Mode	

3. Locate the <u>SIEROE14.gsd</u> GSD file and load it. The GSD file is added to the Sycon library but it isn't available yet. Quit the program and restart it to make it available.

Configuring a Slave

Create a New Configuration and Insert a Master

1. Place the master at the top of the line. A dialog window appears where a master needs to be selected from a list. The list shows every type of master supported by Sycon. Select the Profibus DP master which has been installed on the PC:

💣 SyCon - [Unnamed1]	sert Online Settings Tools Window Help		- 8 ×
	Master Slave Communication Reference connection Predefined Slave		
		dd Master Here	
Inserts a new Master	1	PROFIBUS	Config Mode

2. Leave the station address set to zero. Press the "Add" button and then the "OK" button.

Insert Master					×
Available masters CIF100-PB CIF104-DP-AB CIF104-PB / CIF104C-PB CIF30-DPM / CIF104-DPM / CIF30-PB / CIF104-DPM / CIF30-PB / CIF104-PB CIF50-PB CIF50-PB CIF50-PB CIF51-DPM CIF51-DPM	R	Add >> Add All >> << Remove All << Remove	Selected masters		OK Cancel
Vendorname HilscherGm Identnumber 0x1645 GSD filename HIL_1645.0			Station address Description	0 Master0	

3. A window pops up showing the driver linked to the selected master. Press "Yes" to use the hardware.

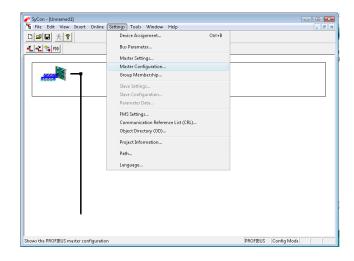




Note: The board ID number changes when extra PCI cards are added to the PC. Older configurations must be checked before trying to run them.

Auto Addressing

After inserting the master as shown in the previous section, the master needs to be set to auto addressing. To do this, go under the file menu "Settings" and select "Master Configuration."



Check the box next to "Auto addressing," if the box is not checked.

Master Configuration	×
General Description Master0 Station address O Device CIF50-PB	OK Cancel
DP Support DP Master Settings	
FMS Support FMS Settings CRL OD	Actual Master

Insert a Slave in the Configuration

1. To insert a slave to the configuration, go under "Insert" and select "Slave." Place the slave below the **master** as shown below.

SyCon - [Unnamed1] File Edit View (_ n <mark>×</mark>
	Master Slave Communication Reference connection Predefined Slave Master0 Station address 0 FMS/DP/Master CIF50-PB	
	Add Slave Here	

2. Set the slave filter to "Sierra Instruments Inc." Select the desired GSD file, press the "Add" button, set the slave address and description to match the slave and press the "OK" button.

isert Slave						×
Slave Filter Vendor Si Slave type All		•	Master 0 / CI	F50-PB	•	OK Cancel
Available slaves			Selected slaves			
640i Quadrather 640i Quadrather <mark>640i Quadrather</mark> Smart Trak 1009	m m	Add >> Add All >> << Remove All << Remove	640i Quadrather	m		
Vendor name Ident number GSD file name GSD Revision	Sierra Instruments Inc. 0x0E14 SIER0E14.GSD V1.0		, Station address Description	1 Slave1		



Note: If a slave device does not appear in the window then the GSD file hasn't been copied into Sycon.

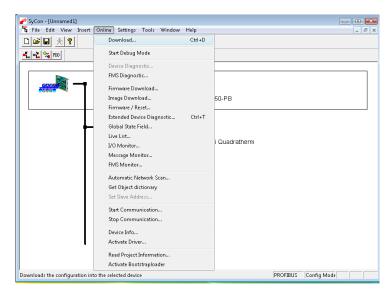
3. Double click on the added slave in the main window. The slave configuration window appears.

	neral – vice	640i Q	uadratherm	n Station address 2							2	[ОК
De	scriptic	on 640i											Cancel
		ate device in le watchdog		igura	ation		GSD fi	le S	IER013	.GSD			Parameter Data
lax.	length	n of in-/output	t data	70 Byte Length of in-/output d			tput dat	a 21	Byte		DPV1 Settings		
Max. length of input data Max. length of output data Max. number of modules		lta	46 Byte 24 Byte 2			Length of input data Length of output data Number of modules			21 0 1	Byte Byte	Statio	Assigned master Station address 0 Master0	
lod	ule			Inp	uts	00	atputs	In/Out	Iden	tifier		070	IF50-PB
		て			yte				0x93	, 0x93, , 0x93,		Actu	
				4 B 4 B 4 B	yte yte yte yte yte				0x93			Statio 640i	al slave n address 2 40i Quadratherm
510	tIdx	Module	Symbol	4 B 4 B 4 B 1 B	yte yte yte yte	та	Addr	T Len	0x93 0x93	, 0x93, , 0x90	•	Statio 640i 276	n address 2 40i Quadratherm
51o	t Idx	Module Modul 6,	Symbol Modulel	4 B 4 B 4 B 1 B	yte yte yte yte	I 3		I Len. 4	0x93 0x93	, 0x93,	•	Statio 640i 276	n address 2
			Modulel	4 B 4 B 1 B T ₃	yte yte yte yte B	0.000			0x93 0x93	, 0x93, , 0x90	•	Statio 640i 276	n address 2 40i Quadratherm
5	1	Modul 6,	Modulel Modulel	4 B 4 B 1 B T ₃ . II	yte yte yte yte ype B B	0		4	0x93 0x93	, 0x93, , 0x90	•	Statio 640i 276	n address 2 40i Quadratherm
))	1 2 3 4	Modul 6, Modul 6, Modul 6, Modul 6,	Modulel Modulel Modulel Modulel	4 B 4 B 1 B 73 11 11 11 11	yte yte yte yte B B B	0 0		4 4	0x93 0x93	, 0x93, , 0x90	•	Statio 640i 276	n address 2 40i Quadratherm
)))	1 2 3	Modul 6, Modul 6, Modul 6,	Modulel Modulel Modulel Modulel Modulel	4 B 4 B 1 B 1 B 1 II 11 11 11 11 11 11	yte yte yte yte ype B B B B B B B B	0 0 0		4 4 4	0x93 0x93	, 0x93, , 0x90	•	Statio 640i 276	n address 2 40i Quadratherm

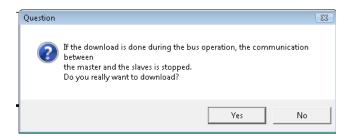
- 4. Select the desired module (one only) by double clicking on the module name. Note that you have a choice between module 1, 2, 3, 4, 5, and 6. In the above example, module 6 is chosen for all cyclic data. Once the desired module is selected, press the "OK" button.
- 5. When done save the new configuration by clicking "OK."

Download Configuration

The configuration needs to be downloaded to the master. To do this, click on "Online" and choose "Download" as shown below.



A pop-up may appear warning you that the communication may stop. See example below.



Press "Yes" to continue. The data is downloaded to the master:

Download Station Address	0
· 🛃	
Data base	640i_test.pb
Length of data base	3488
Error	0
0	3300

After the download, you can double click the new slave again and see the actual data addresses assigned to your network under the "I Addr." column.

lave	Config	guration															E
De	neral— vice scriptio	_		uadratherm	1				Sta	ation	n addre	ss	2				OK Cancel
~	Activa	1.	e in	actual con control	figur	ation		GSD fi	le	SI	IER0E1	14.	GSD				Parameter Data
Max. Max.	length length	of in-/ou of input of outpu er of mod	data it da	a ta	46	Byte Byte Byte		Lengtł Lengtł	n of in-/ n of inpu n of outp er of mo	ut d put	ata data	a	21 21 0 1	Byte Byte Byte	ſ		DPV1 Settings gned master on address 0 er0
Mod Mod		. 4 byt		in		puts Byte	0u	tputs	In/0	ut	Iden 0x93		fier	_ 4		070	CIF50-PB
		-		ytes in	4 H 4 H	-							0x93,				al slave on address 2
Mod	ul 3,	. 4B 1B	3 i)	n		Byte Byte					0x93		0x90		-	_	640i Quadratherm 💌
_		Modul		Symbol	_			.ddr.	,	ì.	Туре	0	Addr.	O L	en.	-	Append Module
0 0	1 2			Module] Module]			0 4	K	4								Remove Module
0 0	3 4			Modulel Modulel		-	8 12		4		,						Insert Module
0	5	Modul	6,	Modulel	. 1	в	16		4	~							Predefined Modules
0	6	Modul	6,	Modulel	. I	в	20		1							•	Symbolic Names

The QuadraTherm is now configured. Click "OK" to close this window. You can now save this configuration file in a convenient location to be used later. In this case File> Save $As...> 640i_test$.

Check The Configuration

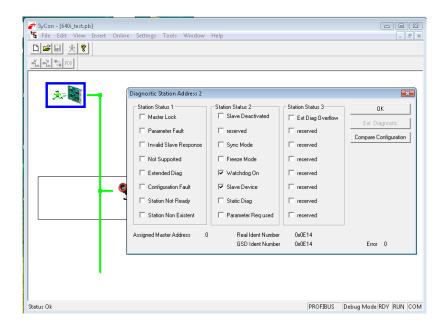
To confirm the configuration worked, you can start the debug mode.

💣 SyCon - [640i_test.pb]		
堶 File Edit View Insert	Online Settings Tools Window Help	_ B ×
□ 📽 🖬 🟃 💡	Download Ctrl+D	
📲 📲 🌠 PDD	Start Debug Mode	
	Device Diagnostic FMS Diagnostic	
25092	Firmware Download Image Download Firmware / Reset	50-PB
	Extended Device Diagnostic Ctrl+T Global State Field Live List I/O Monitor Message Monitor FMS Monitor	
	Automatic Network Scan Get Object dictionary Set Slave Address	i Quadratherm
	Start Communication Stop Communication	
	Device Info Activate Driver	
	Read Project Information Activate Bootstraploader	
Debugging		PROFIBUS Config Mode

If everything is working correctly then the line between the master and the slave will be green and the bit map shows a green check.

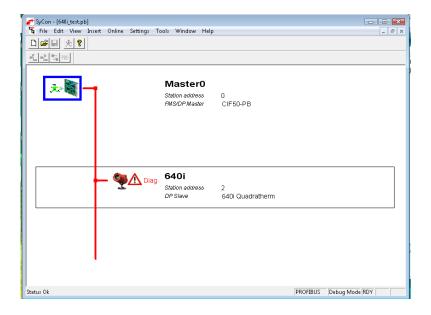
SycCon - [640i_test.pb] File Edit View Insert Online Settings Set Set Set Set Set Set	Tools Window Help				×
***	Master0 Station address FMS/DP Master	0 CIF50-PB			
r 🦉 🗸 Dia	640i Station address DP Slave	2 640i Quadratherm			
Status Ok			PROFIBUS	Debug Mode RI	DY RUN COM

To see the diagnostic status, double click on the slave.



Press the "OK" button and leave the debug mode (Online -> Stop Debug Mode).

If the line turns red (error found), double click the slave to find out what the problem is.



The diagnostic window gives an indication of a problem, "Station Non Existent" wrong address here:

Diagnostic Station Address 2			×
Station Status 1 Master Lock Parameter Fault Invalid Slave Response Not Supported Extended Diag Configuration Fault Station Not Ready Station Not Ready Station Not Existent	Station Status 2 Slave Deactivated Slave Deactivated Sync Mode Freeze Mode Watchdog On Slave Device Static Diag Parameter Req used Beal Ident Number	Station Status 3 Ext Diag Overflow reserved reserved reserved reserved reserved reserved reserved 0x0E14	OK Ext. Diagnostic Compare Configuration
Assigned Master Address	GSD Ident Number		Error 0

In this case the slave is deactivated. Check the address of "Slave1" to see if it matches with the physical address of the hardware slave.

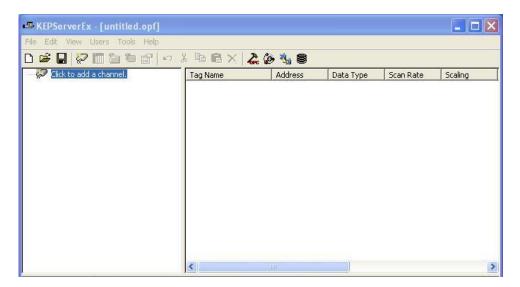
Correct any error found. If the slave address in the configuration is incorrect, adjust it and download the configuration.

Kepserverex 4.0

Now that the QuadraTherm has been configured to the network, you will need software to read the cyclic process data. You may be using different software or a PLC. This example shows how to use the KepserverEx 4.0 free demo software on a windows PC. For your convenience we put a copy on our <u>website</u>.

After you have installed the KepserverEx software, start a new project.

1. In the main menu click on "Click to add a channel."



2. A window titled "New Channel- Identification" will appear. Type in the new channel name in the "Channel name" field then **click "Next."**

A channel name can be from 1 to 256 characters in length. Names can not contain periods, double quotations or start with an underscore.
Channel name: profibus master

3. Choose a master. Below we are using a Hilscher CIF50 master. After choosing a master, click "Next."

Select the device driver you want to assign to the channel. The drop-down list below contains the names of all the drivers that are installed on your system.
Device driver: Hilscher Universal Enable diagnostics
< Back Next > Cancel Help

4. Leave the default selections (shown below). They will work. Click "Next" to move the next screen.

this channel. Set the optimization method and write-to-read duty cycle below. Note: Writing only the latest value can affect batch processing or the equivalent.
Optimization Method C Write all values for all tags C Write only latest value for non-boolean tags Write only latest value for all tags
Duty Cycle Perform 10 🛁 writes for every 1 read

5. Chose the board and type then click "Next."

Select the board through which communications will occur. To access data from a local slave board, select the board corresponding to that slave and select the appropriate slave board type. Otherwise select a local master board and type. Board: Board T Type: Profibus DP Master T
< Back Next > Cancel Help

6. You'll need to import the setup 640i_test.pb file that we created earlier in Syscon. You may browse to the location where you saved it. Click on the Browse button.

Set the location of the SyCon Configuration Database file to be used in tag database creation. The file's extension is representative of the fieldbus in question. For example, myconfig.dn is a DeviceNet database.							
Tag Import File:							
Options							
 <pre></pre>							

7. Browse to the 640i_test.pb you just created in Sycon. Once highlighted, click "Open."

Look in: 🚺	640i-profi	•	+ 🖻 🗅	* 💷 🔹
Name	^	Date modified	Type	
💣 640i_test	pb	4/28/2014 11:48 AM	PROFIB	US Config
e [>		
(Laname:	640i_test			Open

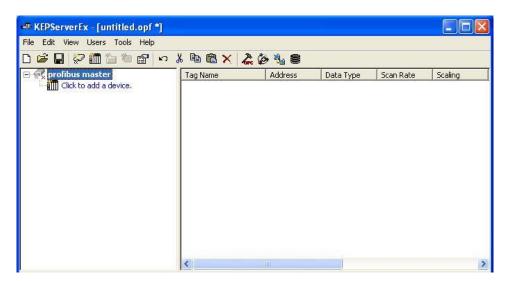
8. You should see the warning shown below. Click "OK" to synchronize.

KEPServ	verEx 🔀
	'Synchronize' must be performed to synchronize with and regenerate tags based on the currently selected database.
	OK

9. You can review the summary of the new channel you just created.

<u>م</u>	Name: 640i_2 Model: Hilscher Universal ID: 2	
E	Request Timeout: 1500 ms Fail after 2 attempts	
	Auto-Demotion: Disabled Device Type: Profibus DP Slave	
	Channel Assignment: Profibus Master Driver Name: Hilscher Universal	
	Device Type: Profibus DP Slave Channel Assignment: Profibus Master	

10. You may now add your first slave device. Click on "Click to add a device."



11. Give your new device a name.

A device name can be from 1 to 256 characters in length. Names can not contain periods, double quotations or start with an underscore.	
Device name: 640i_2	
 < Back Next > Cancel Help	

12. Set the device ID. Note: ID# 0 was already used for the master, so chose #2.

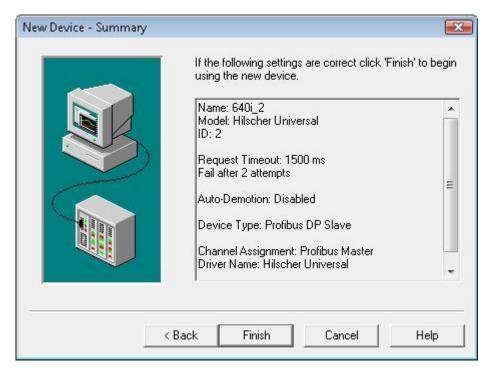
The device you are defining may be multidropped as part of a network of devices. In order to communicate with the device, it must be assigned a unique ID. Your documentation for the device may refer to this as a "Network ID" or "Network Address."
Device ID:
 < Back Next > Cancel Help

The next two screens will be fine at the default settings. Click "Next."

13. In the "New Device – Device Type" window choose the "Profibu DP Slave" type. Click "Next."

	×
Select a type that best describes the device you are defining.	
Type: Profibus DP Slave	
ack Next > Cancel Help	1
	Select a type that best describes the device you are defining.

14. To review the new device summary, click "Next."



15. You have now created a new salve device for your network. Click "Finish."

Adding Tags to Cyclic Data

You will now need to create tags to access each piece of cyclic data.

Click on "Click to add a static tag" below as shown below.

KEPServerEx - [untitled.opf *]							×
File Edit View Users Tools Help							
🗅 📽 📕 🛜 🋅 🏠 🗃 🗠 👗 ங 🖻	🗙 🏖 🏷 🐂						
🖃 🖗 Profibus master	Tag Name	Address	Data Type	Scan Rate	Scaling	Description	
640i_2	Click to add a static tag	g. Tags are not	required, but a	re browsable by	OPC clients.		
		"					
Ready					Clients: 0	Active tags: 0 of 0	1.

The dialog box above will appear. Fill out all the tag properties boxes as shown below.

General	Scaling					
ldenti	ification					
	Name:	Flow			81	
	Address:	IODOS			? 🗸	0
De	escription:	Flow Rate				
	C	Data type: lient access:	Float Read Only	•		
		Scan rate:	100 🗄	milliseconds		

The example above is for the Flow. Module 6 was configured so tags for Temperature (IOD4S Float), Pressure (IOD8S Float), Total (IOD12S Float), Total (IOD16S Dword), and Alarm Status (IOB20S) may also be added. Click Ok when done

ProfiCore Ultra Diagnostic Kit

For a DPV1 data example, we will be using the popular ProfiCore Ultra diagnostic kit. Some Class 1 masters do include DPV1 acyclic data access, but we'll be using the ProfiCaptain Class 2 supervisory master in the ProfiCore kit. Profibus DP allows for two masters by using a token ring protocol. Unless you "steal" the slave, the DPV0 master will not be affected.



Note: Before starting, you'll need to import the GSD file to the ProfiTrace and ProfiCaptain. See Chapter 3 regarding GSD files.

- 1. Connect the ProfiCore Ultra to a test port on your Profibus DP network. Start the ProfiTrace software on your PC or laptop.
- 2. Click on Init ProfiCore Ultra to initialize the ProfiCore Ultra. The software will automatically detect the baud rate and will show a "live list" of all devices on the Profibus DP network. A good slave will show up as a green block.

IData Save Data File view			message recording		Set record filter	Set view filter					
rofiCore Ultra Close ProfiCore U			et baudrate 1.5 Mbps	Wizard							
n activity: Live list : 👤 Messa anel]					ation statistics view 🖡 🔎	Data increation 1					
	HSA-2		tion Info Panel data:			e Info Panel Show so	ope image				
		0	1	2	3	4	5	6	7	8	9
	0	0		2	3	4	5	6		8	9
	10			12	13	14	15	16		18	19
	20					24	25	26		28	29
	30	30				34	35	36		38	39
	40	40	41	42	43	44	45	46	47	48	49
	50	50	51	52	53	54	55	56	57	58	59
	60	60	61	62	63	64	65	66	67	68	69
	70				73	74	75	76		78	79
	80	80	81	82	83	84	85	86	87	88	89
	90	90	91	92	93	94	95	96	97	98	99
	100	100			103	104	105	106		108	109
	110				113	114		116			119
	120					124	125	126			
			1					I			

If you cycle the power on a slave, it will also display it's name. You can also click on the highlighted square and it will display more information about it to the left.

ProfiTrace for ProfiCore Ultra V2.9.1				56	RORYSLA	ртор		.e×			
e Action Filter Trigger Toolba sfiTrace 🌑 Overview ScopeWare											
.oad Data Save Data File viewe				Stop message recording	Set record filter	Set view filter					
					Secrecord liker	Set view liker					
nit ProfiCore Ultra Close ProfiCore Ul			et baudrate 1.5 Mbp:	• Wizard							
stem activity: Live list : 🤦 Messag	-										
o Panel	🔸 Live			w filter applied) 🛛 😵 Sta	ation statistics view 🔎	Data inspection					
tion Address: 2	HSA=2	Reset selected sta	ition Info Panel data:	Diagnostics		Info Panel 🔲 Shows	cope image				
nestructure: SD2 message urce address: 2		0	1	2	3	4	5	6	7	8	9
odel_Name: 640i Quadratherm stination address: 0 metype: Response message	0	0		640i Quadratherm	3	4	5	6		8	9
FIBUS DP-V0 Message:	10					14	15	16		18	19
et Diagnostics (Con/Res) tatus bits; Watchdog -on	20	20				24	25	26		28	29
aster_Add: 0 ent_Number: 1234 (hex)	30	30				34	35	36		38	39
	40	40	41	42	43	44	45	46	47	48	49
	50	50	51		53	54	55	56	57	58	59
	60	60	61	62	63	64	65	66	67	68	69
	70	70				74	75	76		78	79
	80	80	81	82	83	84	85	86	87	88	89
	90	90	91	92	93	94	95	96	97	98	99
	100	100				104	105	106		108	109
	110					114	115	116		118	119
	120					124	125	126			
		C 00 00 12 34	lugin output								
n 🗉 🔼 😁								_			8:40 A
🗿 🖪 🛃 📜]	- 🤒 /	2	E 📉	S. 🖳	-			U 💩 🦁 🕷	e 💿 🖸 🏟 口	1/25

3. Click on the ProfiCaptain tab. For this test, you won't need to add the 640i/780i slave to the network sheet. Start the ProfiCaptain master by double clicking the black square on the "NetWork Sheet." Then click the "Operate" button.

tup Master Class 2 Commands	om in Zoom out Draw Wire DP-V1 Class2 I&M functions	Watch/Modify I.							
ob.Cmd. Sync UnSync F Catalog	Freeze UnFreeze Group NetWork Sheet]	1 🗆 2 🗆 3 Г	4 🗆 5 🗆 6 🗆 7 🗆 8						
Filter GSDs General			Master system configuration	×					
Drives Switching devices I/D Valves	1 - ProfiCore		Set/autodetect Busparameters Setup DP busparameters						
Controllers HMI / MMI Encoders NC/RC Gateway			Current State : Operate Mode Master mode selection Select requested master states by pressing buttons below :		•	•	•	•	
PLCs Ident Systems Profibus PA			DP Master mode Mode description:						
			Master only transmits tokens on the bus. Stop Profibus DP date exchange not active.						
			Clear All culpuits are zero or set to fail-safe state.			•			
			Operate DP Master fully active.		•	•	•	•	
			Close						•
re Info Modules									

4. Next, click on the "DP-V1 Class2" tab. The Class 2 dialog box will appear. Set the address of the 640i/780i slave and click "Initiat." For a Read example, we will try Slot 12 which is all the active engineering units in the 640i/780i. For a "Write" example, we will reset the totalizer using Slot 1.

💽 ProfiTrace for ProfiCore Ultra V2.9.1 (c) 200	014 PROCENTEC ProfiCore Ser.Nr: xxxxx010456	- 6 - 3
File Settings Help		
ProfiTrace 🦲 Overview ScopeWare Bargra	Topology Network Manager ProfiCaptain	
Load Project Save Project Zoom in	m out T Draw Wre	
Setup Master Class 2 Commands DP-V1	ss2 18M functions Watch/Modfy 1/D	
Glob.Cmd. 🗆 Sync 🗆 UnSync 🗖 Freeze	UnFreeze Group 1 1 2 1 3 1 4 1 5 1 6 1 7 1 8	
GSD Catalog	letWork Sheet DP-VI Class 2 dialog	
Filter GSDs	DP-VI Class 2 dialog	<u>^</u>
B. General - Drives - Switching devices B. V/O - Valves B. V/O - Valves B. Controlers - Hull / MMI - Encoders - NC/FIC B. Gateway - PLCa - Ident Systems B. Profibus PA	- ProfiCore Initiate Address: 2 - Abott Status: Correction active - Read Status: Status: - Read Clear Reset assistance data	ш.
		F
Slave Info Modules		
🕘 🏉 📋 O	S S S S S S S S S S S S S S S S S S S	8:59 AM 4/29/2014

The box above shows the "Read" results in hex and text in blue. The engineering units are ";F;Psia;SCFM;SCFM". The "Write" result to reset the totalizer do not return any data, however the 640i/780i totalizer has been reset.

You can use this method to read or write to any DPV1 acyclic Slots.

GSD File (SIEROE14.gsd)

Below is a printed copy of the SIER0E14.gsd file

; ; This GSD-File is intended for the Smart Trak mass flow meter ; This Unit support DPV0, DPV1					
; ======== ; V1.0 January 2012 Initial version					
; ; Incoming cyclic data (slave to master): ; Process data:					
Size (bytes)	Format				
4	REAL				
4 4 4	REAL REAL INT				
	ion master): Size (bytes) + 4 4 4 4				

;Modul 3					
; 5	Totl		4		REAL
;6	Stat		1		INT
;					
; ====================================					
	s from 1 - 6 from	n Maste	er		
; $Idx = 0$ for all		i ivitubie	-		
	clic data (Write	: maste	r to slave)	
;	·		(1		
; Slot Descri	ption	Size	(bytes)	Forma	t
;0	Totz Rset				
; 1	Password			ASCII	
; 2	Meter Tune	4		REAL	
; 3	Gas Index Full Scale	2		INT	
;4	Full Scale	4		REAL	
; 5	Pipe ID	4		REAL	
, ====================================	==== clic data (Read:	slave	o master		
;	the data (Redu	514701	is muster)		
; Slot	Description		Size (b	ytes)	Format
· ·	Gas_ [0] Flsc				т
; 8	Spln [0]	4 4		REAI	1
;9	Gas_ [0] Gnic		10	ASCII	
; 10	Pipe[0]	1.	10	1	ASCII
; 11	User_Gasi				ASCII
; 12	User		10		ASCII
; 13	Info		10		ASCII
; 14	-		10		ASCII
; 15	System Respo	nse	10		ASCII
;					
; ·					
, GSD_Revision	=4				
; –					
Vendor_Name	= "Sierra In	strume	nts Inc."		
Model_Name	= "640i Qua	adrathe	rm"		
Revision	= "V1.0"				
Ident_Number					
Protocol_Ident Station_Type					
FMS_supp	= 0 = 0				
Hardware_Rele					
Software_Release = "V1.4"					
;					
9.6_supp	= 1				
19.2_supp	= 1				
45.45_supp	= 1				
93.75_supp	= 1				
187.5_supp 500_supp	= 1 = 1				
1.5M_supp	= 1 = 1				
3M_supp	= 1				
6M_supp	= 1				
12M_supp	= 1				
;					
MaxTsdr_9.6	= 60				

MaxTsdr_19.2 = 60MaxTsdr_45.45 = 60 MaxTsdr_93.75 = 60MaxTsdr_187.5 = 60 MaxTsdr_500 = 100MaxTsdr_1.5M = 150MaxTsdr_3M = 250MaxTsdr_6M = 450MaxTsdr_12M = 800Redundancy = 0 Repeater Ctrl Sig = 024V Pins = 0Implementation_Type = "VPC3+C" Bitmap_Device = "640i_De" = "640i_Di" Bitmap_Diag Bitmap_SF = "640i_Sf" Freeze_Mode_supp = 1 Sync Mode supp = 1Auto_Baud_supp = 1 $Set_Slave_Add_supp = 1$ Min_Slave_Intervall = 1 Publisher_supp = 0 Modular Station = 1 Max_Module = 2Max Input Len = 46Max_Output_Len = 24 Max_Data_Len = 70 Modul_Offset = 0Fail Safe = 0= 9 Slave Family $Max_Diag_Data_Len = 11$ DPV1_Slave = 1 ;C1_Read_Write_supp = 0 ;Max_Initiate_PDU_Length = 52 C2_Read_Write_supp = 1 C2 Max Data Len = 80 $C2_Response_Timeout = 300$ $C2_Read_Write_required = 1$ $C2_Max_Count_Channels = 2$ DPV1_Data_Types = 0 Max_User_Prm_Data_Len = 237 ;depending from used Hardware (9..237) PrmText=1 Text(0)="disabled" Text(1)="enabled" EndPrmText ExtUserPrmData=1 "DPV1mode" Bit(7) 0 0-1

Prm_Text_Ref=1 EndExtUserPrmData

$Ext_User_Prm_Data_Const(0) = 0x00,0x00,0x00$ $Ext_User_Prm_Data_Ref(0) = 1$				
; ; <module-definition-lis Module 1 EndModule</module-definition-lis 	t> = "Modul 1, 4 bytes in" 0x93			
Module 2 EndModule	= "Modul 2, 3 x 4 bytes in" 0x93,0x93,0x93			
Module 3 EndModule	= "Modul 3, 4B 1B in" 0x93,0x90			
Module 4 EndModule	= "Modul 4, M1 + M2" 0x93,0x93,0x93,0x93			
Module 5 EndModule	= "Modul 5, M1 + M3" 0x93,0x93,0x90			
Module 6 EndModule	= "Modul 6, M1 + M2 + M3" 0x93,0x93,0x93,0x93,0x93,0x90			