# Profibus Concentrator: GSD information to build the Hardware Catalog

Original doc: MH-3/21/14, 3/27/14 –MH, JY, DO 3/28/14

Conductivity 11/05/15, Valve Out 11/03/14, ORP 10/02/2014, Totalizer Flow 12/02/14,

Valve In 12/11/14

Table of Contents

[Profibus Concentrator: GSD information to build the Hardware Catalog 1](#_Toc402945733)

[General 4](#_Toc402945734)

[Slot 1 to 6: 4](#_Toc402945735)

[Slot 7: 4](#_Toc402945736)

[Total Cyclical Data 4](#_Toc402945737)

[Acyclical Data 4](#_Toc402945738)

[Catalog Modules 5](#_Toc402945739)

[Module 1: Available Channel (slots 1 to 6) 5](#_Toc402945740)

[Configuration - User Parameters (Id: 0xFFFE GSD) 5](#_Toc402945741)

[Module 2: Valve Control (slot 7) 5](#_Toc402945742)

[Signal output: 5](#_Toc402945743)

[Signal source: 5](#_Toc402945744)

[Calculations: 5](#_Toc402945745)

[Cyclical Data 5](#_Toc402945746)

[Status bits: 5](#_Toc402945747)

[Configuration - User Parameters (ID: 2468 GSD) 5](#_Toc402945748)

[Module 3: Flow - Frequency type (slots 1-4) 6](#_Toc402945749)

[Signal source: 6](#_Toc402945750)

[Calculations: 6](#_Toc402945751)

[Cyclical Data 6](#_Toc402945752)

[Status bits: 6](#_Toc402945753)

[Configuration - User Parameters (Id: 515 GSD) 6](#_Toc402945754)

[Module 4: 4-20mA Built-in Input (Slots 5-6) 7](#_Toc402945755)

[Signal source: 7](#_Toc402945756)

[Calculations: 7](#_Toc402945757)

[Cyclical Data 7](#_Toc402945758)

[Status bits: 7](#_Toc402945759)

[Configuration - User Parameters (id: 9990 GSD) 7](#_Toc402945760)

[Module 5: Relay Module (Slots 1-6) 9](#_Toc402945761)

[Signal output: 9](#_Toc402945762)

[Calculations: 9](#_Toc402945763)

[Cyclical Data 9](#_Toc402945764)

[Status bits: 9](#_Toc402945765)

[Configuration - User Parameters ( Id: 8059 GSD) 9](#_Toc402945766)

[Module 6: Temperature Sensor (Slots 1-6) 10](#_Toc402945767)

[Signal source: 10](#_Toc402945768)

[Calculations: 10](#_Toc402945769)

[Cyclical Data 10](#_Toc402945770)

[Status bits: 10](#_Toc402945771)

[Configuration - User Parameters ( id: 2350 GSD) 10](#_Toc402945772)

[Module 7: 4-20mA Input- iGo (Slots 1-6) 11](#_Toc402945773)

[Signal source: 11](#_Toc402945774)

[Calculations: 11](#_Toc402945775)

[Cyclical Data 11](#_Toc402945776)

[Status bits: 11](#_Toc402945777)

[Configuration - User Parameters (id: 8058 GSD) 11](#_Toc402945778)

[Module 8: Conductivity (Slots 1-6) –TBD CELL CONSTANT 12](#_Toc402945779)

[Signal source: 12](#_Toc402945780)

[Calculations: 12](#_Toc402945781)

[Cyclical Data 12](#_Toc402945782)

[Status bits: 12](#_Toc402945783)

[Configuration - User Parameters (id: 2850 GSD) 12](#_Toc402945784)

[Module 9: Flow – Magmeter type (Slots 1-6) 13](#_Toc402945785)

[Signal source: 13](#_Toc402945786)

[Calculations: 13](#_Toc402945787)

[Cyclical Data 13](#_Toc402945788)

[Status bits: 13](#_Toc402945789)

[Configuration - User Parameters (Id: 2551 GSD) 14](#_Toc402945790)

[Module 10: Pressure Sensor (Slots 1-6) 16](#_Toc402945791)

[Signal source: 16](#_Toc402945792)

[Calculations: 16](#_Toc402945793)

[Cyclical Data 16](#_Toc402945794)

[Status bits: 16](#_Toc402945795)

[Configuration - User Parameters (id: 2450 GSD) 16](#_Toc402945796)

[Module 11: Level Measurement - using Pressure Sensor (Slots 1-6) 17](#_Toc402945797)

[Signal source: 17](#_Toc402945798)

[Calculations: 17](#_Toc402945799)

[Cyclical Data 17](#_Toc402945800)

[Status bits: 17](#_Toc402945801)

[Configuration - User Parameters ( 2250 GSD) 17](#_Toc402945802)

[Module 12: pH (Slots 1-6) 18](#_Toc402945803)

[Signal source: 18](#_Toc402945804)

[Calculations: 18](#_Toc402945805)

[Cyclical Data 18](#_Toc402945806)

[Status bits: 18](#_Toc402945807)

[Acyclical Data 19](#_Toc402945808)

[Configuration - User Parameters ( ID = 2750 GSD) 19](#_Toc402945809)

[Module 13: ORP (Slots 1-6) 19](#_Toc402945810)

[Signal source: 19](#_Toc402945811)

[Calculations: 19](#_Toc402945812)

[Cyclical Data 20](#_Toc402945813)

[Acyclical Data 20](#_Toc402945814)

[Configuration - User Parameters ( Id: 1750 GSD) 20](#_Toc402945815)

[Module 14: Dissolved Oxygen 21](#_Toc402945816)

[Signal source: 21](#_Toc402945817)

[Calculations: 21](#_Toc402945818)

[Configuration - User Parameters ( 2610 GSD) 21](#_Toc402945819)

[Cyclical Data 21](#_Toc402945820)

[Status bits: 21](#_Toc402945821)

[List of TBD items 22](#_Toc402945822)

## General

This document provides information on the Concentrator as seen on the PLC side, during hardware configuration. In this context, the Profibus concentrator is referred as a Slave Modular Station with devices connected in its seven slots. The data direction convention is as seen by the fieldbus.

### Slot 1 to 6:

* Devices are configurable, and the station is prefilled with “*Available device*” in all these slots. This is necessary to provide configuration for the cyclical data. User needs to delete the “*Available device*” module and select from the catalog (drag and drop) any:
  + Channels 1-4: S3L or frequency input
  + Channels 5-6: S3L or local 4-20mA input
* Cyclical data
  + (2) floats OUT, provides Primary and Secondary readings
  + (1) uint8 OUT, Device Status
  + (1) uint16 IN, Control

### Slot 7:

* This slot is preset with “*Valve Control*” device. User if is not planning to use a valve, delete the module and add a “Empty Valve Control” (drag and drop).
* Cyclical data
  + (1) uint16 OUT, Valve actual position (12 bits resolution)
  + (1) uint8 OUT, Valve Status (see specific section)
  + (1) uint16 IN, Valve ref position (12bits resolution)

## Total Cyclical Data

Any device in slots 1 to 6 always produces (2) floats plus (1) uint8 and always consumes (1) unt16. No matters if something is connected.

Total Concentrator Cyclical bytes = 6x( 9 out, 2 in) + ( 3 out, 2 in) = **57 out, 14 in bytes**

## Acyclical Data

When a device connected to a specific channel can provide more information, it will need DPV1 support to access the information. User application needs DPV1 services provided by the Profibus master used.

Acyclical data starts with a DPV1 uint16 status/control word that provides a simple method to monitor the data. At startup, this word is zero and when the device has completed all information, it changes to a code. See the specific sensor for possible values.

* DPV1 data source is always at Slot=0, index depends on the channel starting at Index = 28 for channel 1.
* The Sensor type determines the amount and organization of data

# Catalog Modules

Configuration for modules on the slots 1-6 are the same, the User Parameter section is used to identify and provide parameters that modify the operation of the module.

## Module 1: Available Channel (slots 1 to 6)

Model: N/A.

Created to fill unused channels in the concentrator with consistent configuration; this configuration should allow module interchangeability.

### Configuration - User Parameters (Id: 0xFFFE GSD)

## Module 2: Valve Control (slot 7)

Model: Built-in

### Signal output:

* Valve Position Reference: 4-20mA output, 16 bits resolution

### Signal source:

* Valve Actual Position: 4-20mA input, 12bits

### Calculations:

* Verifiy valve position for open wire, over range.
* Update time: 100mS

### Cyclical Data

* First out is Valve Actual position, uint16. Second is the status bit, uint8
* Control is Valve Position reference, uint16.

### Status bits:

0 Valve Position within range.

### Configuration - User Parameters (ID: 2468 GSD)

* Valve Output at Failsafe , 16 bit
  + Range is 0 - 24000 (0 to 24.000 mA)
  + Default is 0
* *Measurement Filter* 
  + Averaging 4 bits
    - Range is “No filter”, “Low”, “Medium” and “High” (0, 4, 10, 30 Secs)
    - Default is 0

## Module 3: Flow - Frequency type (slots 1-4)

Models: 515, 525, 2000, 2100, 2507, 2536, 2537, 2540, 2551, 2552, 220/330, U3000/U400

### Signal source:

* Raw frequency, 1 to 1500Hz

### Calculations:

* Calculate Flow from the input Frequency, calculate average filter, float type.
* Keep flow totalizer, engineering units, floating point 64 bits. Only integer portion is displayed.
* Update time: 100mS

### Cyclical Data

* Primary reading is Flow, float type. If a K-factor other than zero is provided the output data is Flow in engineering units; otherwise it is the raw frequency in Hz output.
* Secondary reading is the Totalizer, uint32 in calibrated user units. Calibration is provided by multiplier constant explained bellow. Totalizer is calculated as double (float 64) but only the integer portion is sent up to 9 digits (999,999,999). If K-factor is zero, no totalizer is output.
* Control Word
  + Bit 0 – The Low to High transition of this bit resets the totalizer t zero.
  + Bit 1- The Low to High transition of this bit resets the Rollover flag

### Status bits:

1. Frequency detected above the 0.5 Hz minimum
2. Out of range ( >1500Hz, saturation is being applied to output data).
3. Indicates that the integer part of Totalizer has been rollover. Totalizer keeps accumulating as normal. This bit stays ON until user resets with Control word bit 1

NOTE: When frequency bellow 1Hz, the input of Average Filter is set to ZERO, and bit 0 is Low.

### Configuration - User Parameters (Id: 515 GSD)

* *K-Factor*, Pulse/EngUnits
  + Value is uint32, fixed decimal position (selectable, next parameter):
    - Range is 0 to 99,999,999 (up to 8 digits)
    - Default value is 0
  + Number of decimal places (right to left), enumeration 2 bits
    - Range is 0, 1, 2, 4
    - Default is 4, which makes range 0.0000 to 9999.9999
  + EngUnits, enumeration 5 bits
    - Range is “liter/sec”, “liter/min”, “liter/h”, “liter/day”, “GPS”, “GPM”, “GPH”, “GPD”, ”m3/sec”, “m3/min”, “m3/h”, “m3/d”, “ft3/s”, “ft3/m”, “ft3/h”, “ft3/d”, “MPS”, “ft/sec” (TBD1, if proper tag names)
    - Default value is “GPM”
* *Totalizer* 
  + Multiplication constant used to totalize flow. Expressed as uint16 fraction.
    - Numerator Range is 0 to 65,535
    - Denominator Range 1 to 65,535
    - Default is: Numerator 0, Denominator 1
  + Keep value on power up, enumeration 1 bit
    - Range is “Reset on power up”, “Keep last saved value”
    - Default is “Reset on power Up”
* *Measurement Filter* 
  + Averaging 4 bits
    - Range is “No filter”, “Low”, “Medium” and “High” (0, 10, 40, 120 Secs)
    - Default is 0
  + Sensitivity 4 bits
    - Range is 100%, 50%, 30%, 25%, 20%, 15%, 10%, 7.5%, 5.0% and 2.5%
    - Default is 100%
* *Frequency Sensor Type* 
  + Type 1 bits
    - Range is: “Open Collector”, “Sinusoidal”
    - Default is 0 (Open collector)

## Module 4: 4-20mA Built-in Input (Slots 5-6)[[1]](#footnote-1)

Model: Built-in in slots 5 and 6

### Signal source:

* On board 4-20mA input, 12bits

### Calculations:

* Read input value check out of range.
* Update time: 100mS

### Cyclical Data

* First reading is scaled value , float
* Second reading is current in mA, float.

### Status bits:

1. Current Input within range.
2. Current Error ( Not in range but in ISA limits >= 3.6mA or <= 22mA)
3. Out of range (<3.6mA or >22mA)

### Configuration - User Parameters (id: 9990 GSD)

* *4 mA Setpoint* , fixed point number, int32, fixed decimal position (selectable, next parameter):
  + Range is -99,999,999 to 99,999,999 (8 digits plus sign)
  + Default value is 0
* *Number of decimal places for 4mA Setpoint* (right to left), enumeration 2 bits
  + Range is 0, 1, 2, 4
  + Default is 4, which makes 4mA range -9999.9999 to +9999.9999
* *20 mA Setpoint* , fixed point number, int32, fixed decimal position (selectable, next parameter):
  + Range is -99,999,999 to 99,999,999 (8 digits plus sign)
  + Default value is 1,000,000 ( i.e. 100.0000 for 4 decimal point places)
* *Number of decimal places for 20mA Setpoint* (right to left), enumeration 2 bits
  + Range is 0, 1, 2, 4
  + Default is 4, which makes 20mA range -9999.9999 to +9999.9999
* *Measurement Filter* 
  + Averaging 4 bits
    - Range is “No filter”, “Low”, “Medium” and “High” (0, 4, 10, 30 Secs)
    - Default is 0

## Module 5: Relay Module (Slots 1-6)

Model: 8059

### Signal output:

* S3L, update 100mS, 2 Secs drop-out

### Calculations:

* Send command to relays.
* Update time: 100mS

### Cyclical Data

* First Reading is actual Status, uint8
  + Bit 0 : Status Relay 1
  + Bit 1 : Status Relay 2
  + Bit 2 : Status Relay 3
  + Bit 3 : Status Relay 4
* Control has the Relay command, uint16.
  + Bit 0 : Command Relay 1
  + Bit 1 : Command Relay 2
  + Bit 2 : Command Relay 3
  + Bit 3 : Command Relay 4

### Status bits:

1. Relay is communicating.
2. Wrong Device Found
3. Missing Device

### Configuration - User Parameters ( Id: 8059 GSD)

* Relay 1 Failsafe values, 1 bit
  + Range is “OPEN”, “CLOSE”
  + Default is “OPEN”
* Relay 2 Failsafe values, 1 bit
  + Range is “OPEN”, “CLOSE”
  + Default is “OPEN”
* Relay 3 Failsafe values, 1 bit
  + Range is “OPEN”, “CLOSE”
  + Default is “OPEN”
* Relay 4 Failsafe values, 1 bit
  + Range is “OPEN”, “CLOSE”
  + Default is “OPEN”

## Module 6: Temperature Sensor (Slots 1-6)

Model: 2350

### Signal source:

* S3L: Temperature C float. 100/500mS update/startup

### Calculations:

* Convert to different units (if necessary), float.
* update Measurement error bit
* Update time: 100mS

### Cyclical Data

* Primary reading is temperature , float.
* Secondary variable is always zero.

### Status bits:

1. Temperature sensor is ready and communicating.
2. Wrong Device Found
3. Missing Sensor
4. Device Error (internal error code)

### Configuration - User Parameters ( id: 2350 GSD)

* *Temperature Units, 1 bit* 
  + Range is “C”, “F”
  + Default is “C”
* *Measurement Filter* 
  + Averaging 4 bits
    - Range is “No filter”, “Low”, “Medium” and “High” (0, 3, 10, 30 Secs)
    - Default is 0

## Module 7: 4-20mA Input- iGo (Slots 1-6)[[2]](#footnote-2)

Model 8058

### Signal source:

* S3L: 4-20mA input, float. 300/500mS update/startup

### Calculations:

* Read input value check out of range.
* Update time: 300mS

### Cyclical Data

* First reading is scaled value , float
* Second reading is current in mA, float.

### Status bits:

1. Current input sensor is within range and communicating.
2. Wrong Device Found
3. Missing Sensor
4. Current Under range ( < 3.6mA)
5. Current Over range ( > 22mA)

### Configuration - User Parameters (id: 8058 GSD)

* *4 mA Setpoint* , fixed point number, int32, fixed decimal position (selectable, next parameter):
  + Range is -99,999,999 to 99,999,999 (8 digits plus sign)
  + Default value is 0
* *Number of decimal places for 4mA Setpoint* (right to left), enumeration 2 bits
  + Range is 0, 1, 2, 4
  + Default is 4, which makes 4mA range -9999.9999 to +9999.9999
* *20 mA Setpoint* , fixed point number, int32, fixed decimal position (selectable, next parameter):
  + Range is -99,999,999 to 99,999,999 (8 digits plus sign)
  + Default value is 1,000,000 ( i.e. 100.0000 for 4 decimal point places)
* *Number of decimal places for 20mA Setpoint* (right to left), enumeration 2 bits
  + Range is 0, 1, 2, 4
  + Default is 4, which makes 20mA range -9999.9999 to +9999.9999
* *Measurement Filter* 
  + Averaging 4 bits
    - Range is 0, 4, 10, 30 Secs
    - Default is 0

## Module 8: Conductivity (Slots 1-6) –TBD CELL CONSTANT

Model: 2850

### Signal source:

* S3L: conductivity float **uS**, raw conductivity float **RuS**, Temp float **C**. 600/3500mS update/startup

Note: Cool-fit simulator reports 4000mS startup

### Calculations:

* Read Conductivity **uS** (first field) and Temperature in **C**; change temperature units, if needed.
* If error codes, get information from the device and update status bits
* Filter conductivity and temperature
* Temperature Compensation Routine
* Update time: 600mS

### Cyclical Data

* Primary reading is Conductivity, float.
* Secondary reading Temperature, float

### Status bits:

1. Conductivity sensor is ready and communicating.
2. Wrong Device Found
3. Missing Sensor
4. Device Error (internal error code)
5. Sensor is BUSY and not ready to provide data
6. Conductivity Number is too large (infinite)
7. Detected a negative conductivity calculation

### Configuration - User Parameters (id: 2850 GSD)

* *Temperature Units*, 1 bit
  + Range is “C”, “F”
  + Default is “C”
* *Conductivity Units*, enumeration, 2 bits:
  + Range: “uS”, “mS” and “MOhm”
  + Default “uS”
* *Temperature Compensation Method*, enumeration 2 bits
  + None
  + Linear
  + Pure Water
  + Default is No compensation
* *Temperature Compensation %*, 3 position decimal, uint16
  + Range 0 to 6000, representing 0.000 to 6.000
  + Default value 2000, representing 2.000%
* *Cell Constant, 4 digits precision with adjustable decimal position*
  + Cell Constant Value ranges from 0 to 9999, default is 1000
  + Decimal point position to the left of cell constant value, range is **2** to **6** which provides a Cell constant range from *dd.dd* to *0.00dddd*
  + Default cell constant is 1.000 (value of 1000 with 3 decimal positions)
* *Conductivity Filter*
  + Averaging 4 bits
    - Range is “No filter”, “Low”, “Medium” and “High” (0, 4, 6, 12 Secs)
    - Default is 0

Note: The temperature used for conductivity calculations is filtered using half the Conductivity average value.

## Module 9: Flow – Magmeter type (Slots 1-6)[[3]](#footnote-3)

Models: 2551, 2552

### Signal source:

* S3L: flow float Hz, Raw totalizer 0 to 9999,9999, Temp C float. 100/400mS update/startup

### Calculations:

* Convert Flow to desired units, float.
* Keep a pulse totalizer by filtering the Hz frequency (not using internal totalizer)
* If error codes, get information and update status bits
* Update time: 100mS

### Cyclical Data

* Primary reading is Flow, float type. If a K-factor other than zero is provided the output data is Flow in engineering units; otherwise it is the raw frequency in Hz output.
* Secondary reading is the Totalizer, uint32 in calibrated user units. Calibration is provided by multiplier constant explained bellow. Totalizer is calculated as double (float 64) but only the integer portion is sent up to 9 digits (999,999,999). If K-factor is zero, no totalizer is output.
* Control Word
  + Bit 0 – The Low to High transition of this bit resets the totalizer t zero.
  + Bit 1- The Low to High transition of this bit resets the Rollover flag

### Status bits:

1. Flow sensor is ready and communicating.
2. Wrong Device Found
3. Missing Sensor
4. Device Error (Device is sending error code “?”)
5. Indicates that the integer part of Totalizer has been rollover. Totalizer keeps accumulating as normal. This bit stays ON until user resets with Control word bit 1

### Configuration - User Parameters (Id: 2551 GSD)

* *K-Factor*,
  + Value is uint32, fixed decimal position (selectable, next parameter):
    - Range is 0 to 99,999,999 (up to 8 digits)
    - Default value is 0
  + Number of decimal places (right to left), enumeration 2 bits
    - Range is 0, 1, 2, 4
    - Default is 4, which makes range 0.0000 to 9999.9999
  + EngUnits, enumeration 5 bits
    - Range is “liter/sec”, “liter/min”, “liter/h”, “liter/day”, “GPS”, “GPM”, “GPH”, “GPD”, ”m3/sec”, “m3/min”, “m3/h”, “m3/d”, “ft3/s”, “ft3/m”, “ft3/h”, “ft3/d”, “MPS”, “ft/sec” (TBD1, if proper tag names)
  + Default value is “GPM”
* *Totalizer* 
  + Multiplication constant used to totalize flow. Expressed as uint16 fraction.
    - Numerator Range is 0 to 65,535
    - Denominator Range 1 to 65,535
    - Default is: Numerator 0, Denominator 1
  + Keep value on power up, enumeration 1 bit
    - Range is “Reset on power up”, “Keep last saved value”
    - Default is “Reset on power Up”
* *Measurement Filter* 
  + Averaging 4 bits
    - Range is “No filter”, “Low”, “Medium” and “High” (0, 10, 40,120 Secs)
    - Default is 0
* *Sensitivity* enumeration, 4 bits
  + Range is 100%, 50%, 30%, 25%, 20%, 15%, 10%, 7.5%, 5.0% and 2.5%
  + Default is 100%
* *Low Flow Cutoff* in percent of Flow full scale[[4]](#endnote-1)
  + Value is uint8, percent of full scale
    - Range is 0 to 100
    - Default value is 0
* *50/60Hz Notch Filter*(enumerated)
  + Range is “50 Hz”, “60 Hz”
  + Default is “50 Hz”

GSD NOTE:

Magmeter UserParameters:

(3) ID + (4) K-factor + (1) K-Unit&NbrDec&TKeep + (4) Tot p/q + (1) Ave&Sens + (4) LowFlwCutOff + (1) NotchFilter = 18

The Anybus standard buffer size reserves 160 bytes, with 6 magmeters we are using 108+4= 112 bytes

## Module 10: Pressure Sensor (Slots 1-6)

Models: 2450

### Signal source:

* S3L: Pressure PSI float, Temp C float. 100/500mS update/startup

### Calculations:

* Convert pressure (if needed), float.
* If error information, update status bit
* Update time: 100mS

### Cyclical Data

* Primary reading is Pressure , float.
* Secondary variable is always zero.

### Status bits:

1. Pressure sensor is ready and communicating.
2. Wrong Device Found
3. Missing Sensor
4. Measurement Error

### Configuration - User Parameters (id: 2450 GSD)

* Pressure Unit,
  + Units, enumeration 2 bits
    - Range is “PSI”, “Bar”, “kPa”
    - Default value is “PSI”
* *Measurement Filter* 
  + Averaging 4 bits
    - Range is “No filter”, “Low”, “Medium” and “High” (0, 4, 10, 30 Secs)
    - Default is 0

## Module 11: Level Measurement - using Pressure Sensor (Slots 1-6)[[5]](#footnote-4)

Models: 2250, 2450

### Signal source:

* S3L: Pressure PSI float, Temp C float. 100/500mS update/startup

### Calculations:

* Convert pressure to distance, float.
* If error info, update status bits
* Update time: 100mS

### Cyclical Data

* Primary reading is Level, float.
* Secondary variable is always zero.

### Status bits:

1. Level sensor is ready and communicating.
2. Wrong Device Found
3. Missing Sensor
4. Measurement Error

### Configuration - User Parameters ( 2250 GSD)

* *Specific Gravity,* 
  + Value is uint16, representing a 3 fixed decimal position
    - Range is 100 to 9,999 ( 0.1 to 9.999 specific gravity)
    - Default value is 1000 (water gravity 1.000)
  + Units, enumeration 2 bits (4 possible values)
    - Range is “Centimeters”, “Meters”, “Inches”, “Feet”
    - Default value is “Centimeters”
* *Measurement Filter* 
  + Averaging 4 bits
    - Range is “No filter”, “Low”, “Medium” and “High” (0, 4, 10, 30 Secs)
    - Default is 0

## Module 12: pH (Slots 1-6)[[6]](#footnote-5)

Models: 2750, 2751

### Signal source:

* S3L: pH/mV float, RmV float[[7]](#endnote-2) , Temp[[8]](#endnote-3) C float. 500mS update/ 4000mS startup

### Calculations:

* Convert data to proper units.
* If error codes, get information and update status bits
* When commanded, initiate a Glass impedance measurement (2751 only), report the measured value
* Update time: 500mS
* Identify preamp type and get probe information if available (memory chip)

### Cyclical Data

* Primary reading is pH, float
* Secondary reading depends on status bits
  + Status bit 3 – Error Code (uint32) indicating
    - Bit 0 Missing Probe
    - Bit 1 Wrong Probe
  + Status bit 5 set: Temperature, float.
  + Status bit 6 set: Glass Impedance, float.
  + Status bit 7 set: Raw millivolts, float
* Control word (2751 Only)
  + Bit 0: On the transition from 0 to 1, it initiates a Glass Impedance Measurement
  + Bit 1: While set to 1, second reading will be Raw mV

### Status bits:

1. Sensor is ready and communicating.
2. Wrong Device Found
3. Missing Sensor
4. Device is sending an Error Code. The secondary reading provides more information
5. Sensor is Busy[[9]](#footnote-6)
6. Second reading is Temperature
7. Second reading is the Glass impedance
8. Second reading is Raw millivolts

### Acyclical Data

When detected preamplifier is 2751 and the electrode has “Memory Chip”, the following data can be retrieved using DPV1 services on the master.

* DPV1 Control uint16
  + Bit 0 Data for this channel is completed
  + Bit 1 Preamplifier is 2750, no data available
  + Bit 2 No memory chip
  + Bit 3 Electrode is not differential type, Reference Impedance not available
  + Bit 4 Wrong probe
* Pre Amplifier S/N, string 10 bytes max
* Probe S/N (1001), string 10 bytes max
* Probe Model (1002), string 8 bytes max
* Factory Glass Impedance at 25 C (1051) float, MOhms norm to 25 C
* Minimum pH recorded (1023), float, pH
* Maximum pH recorded (1022), float, pH
* Minimum Temperature recorded (1025), float, deg C
* Maximum Temperature recorded (1024), float, deg C
* Calibration Slope (1043), float, ratio (no units)
* Calibration Offset (1042), float, pH
* Temperature Offset (1041), float, deg C
* Reference Z (1050), float, MOhms =🡺 read 1053, 1 = means this value is available
* Runtime (1021), float, hours

### Configuration - User Parameters ( ID = 2750 GSD)

* *Temperature Units*, 1 bit
  + Range is “C”, “F”
  + Default is “C”
* *Measurement Filter* 
  + Averaging 4 bits
    - Range is “No filter”, “Low”, “Medium” and “High” (0, 2, 4, 12 Secs)
    - Default is 0

## Module 13: ORP (Slots 1-6)[[10]](#footnote-7)

Models: 2750, 2751

### Signal source:

* S3L: pH/mV float, RmV[[11]](#endnote-4) float, Temp[[12]](#endnote-5) C float. 100/500mS update/startup

### Calculations:

* Convert data to proper units.
* If error codes, get information and update status bits
* When commanded, initiate a Glass impedance measurement, report the measured value
* Update time: 500mS
* Identify preamp type and get probe information if available (memory chip)

### Cyclical Data

* Primary reading is mV, float
* Secondary reading is Raw millivolts, float

Status bits:

1. Sensor is ready and communicating.
2. Wrong Device Found
3. Missing Sensor
4. Device Error (internal error code or missing probe)
5. Missing Probe
6. Wrong Probe

### Acyclical Data

When electrode sensor is 2751 and it has memory chip, the following data can be retrieved using DPV1 services on the master (TBD Consultant in how is this implemented, what the master needs to do?, if examples preferred with s7-1200, if possible compatible with Profinet)

* DPV1 Control uint16
  + Bit 0 Data for this channel is completed
  + Bit 1 Preamplifier is 2750, no data available
  + Bit 2 No memory chip
  + Bit 3 Electrode is not differential type, Reference Impedance not available
  + Bit 4 Wrong Probe
* Pre Amplifier S/N, string 10 bytes max
* Probe S/N (1001), string 10 bytes max
* Probe Model (1002), string 8 bytes max
* Minimum mV recorded (1023), float, mV
* Maximum mV recorded (1022), float, mV
* Calibration Slope (1043), float, ratio (no units)
* Calibration Offset (1042), float, mV
* Reference Z (1050), float, MOhms =🡺 read 1053, 1 = means this value is available
* Runtime (1021), float, hours

### Configuration - User Parameters ( Id: 1750 GSD)

* *Memory Chip Electrode* 1 bit
  + Range is “No Mem Chip”, “Memory Chip”
  + Default is “No Mem Chip”
* *Measurement Filter* 
  + Averaging 4 bits
    - Range is “No filter”, “Low”, “Medium” and “High” (0, 2, 4, 12 Secs)
    - Default is 0

## Module 14: Dissolved Oxygen

Model 2610-41

### Signal source:

* S3L for Search and S3L special mode (register based) on cyclical data

### Calculations:

* Read sequentially: desired DO, its Quality of Data and Temperature.
* Verify the Quality of data from the sensor and update bits.
* Update time: 1 Sec

### Configuration - User Parameters ( 2610 GSD)

* Dissolved Oxygen Engineering units, 2 bits
  + Range “ppm”, “%Saturation”, “Torr”
  + Default “ppm”
* Temperature Units, 1 bit
  + Range is “C”, “F”
  + Default is “C”
* Barometric pressure in mBar, uint32, implicit 2 decimal position
  + Range is 50,700 to 111,450 ( 507.00 to 1114.50 mBar)
  + Default is 101325 (1013.25 milliBar)
* Salinity in PSU, uint32 with one implicit decimal position
  + Range is 0 to 420 (0 to 42.0 PSU)
  + Default is 0 ( 00.0)
* Range is “No filter”, “Low”, “Medium” and “High” (0, 10, 40, 120 Secs)
  + Default is “No Filter”

### Cyclical Data

* First reading is Dissolved Oxygen, float
* Second reading
  + Temperature, float
  + Cap expiration date, 4 bytes, Unix time
* Control Word
  + Bit 0 – While this bit is 1, second reading is Expiration Date
  + Bit 1- While this bit is 1, second reading is Cap current time

### Status bits:

1. Current input sensor is ready and communicating.
2. Wrong Device Found
3. Missing Sensor
4. Measurement Error (Missing Cap, Temperature measurement)
5. Missing Cap
6. Expired Cap
7. Second reading is Temperature
8. Second reading is Unix time

#### Note:

The DO sensor automatically report the Expiration Date every time an event on the Sensor CAP is detected (replaced, expired)

# List of TBD items

TBD1

Provide the Flow EU proper list – Action Item.

The GSD string: upto 32 visible chars. (Ref, Device Description and Device Integration Vol 1: GSD, 2.122 Annex A – located in Profibus Docs folder)

1. 5/15/14 revised 4 and 20 mA setpoints can be -9999.9999 to +9999.9999 [↑](#footnote-ref-1)
2. 5/15/14 revised 4 and 20 mA setpoints can be -9999.9999 to +9999.9999 [↑](#footnote-ref-2)
3. 5/15/14 Magmeter can’t report Empty Pipe [↑](#footnote-ref-3)
4. Full scale is 10 mt/sec [↑](#endnote-ref-1)
5. Changed default to 1.000 (water) and range > liquid acetylene, 0.398 SG (Wikipedia) [↑](#footnote-ref-4)
6. 5/15/14 Impedance measurement with 2751 only. Added Temperature offset to Acyclical, DPV1 reads floats [↑](#footnote-ref-5)
7. Raw mV is for Diagnostic Only [↑](#endnote-ref-2)
8. Temperature provides error code, at least -999.9 means that pH reading is not correct [↑](#endnote-ref-3)
9. When **Busy**, sensor won’t answer any S3L measurements. We can consider warmup and while performing a Meas-Z. The concentrator will reset the timeout timer [↑](#footnote-ref-6)
10. 5/15/14 Added Acyclical data when using 2751. DPV1 can read floats (preferred over fixed point) [↑](#footnote-ref-7)
11. Raw mV is for Diagnostic Only [↑](#endnote-ref-4)
12. Temperature is not used in ORP mode [↑](#endnote-ref-5)