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CANopen device documentation

SatDriveController

SatDrive Controller Node EDS

Project File	SatDriveController.xdd
File Version	1
Created	06/29/2021 01:27:52
Created By	
Modified	04/17/2023 02:48:35
Modified By	

This file was automatically generated with libedssharp Object Dictionary Editor v

[TOC]

Device Information

Vendor Name	Dawn Aerospace
Vendor ID	0
Product Name	SatDriveController
Product ID	0
Granularity	8
RPDO count	4
TPDO count	4
LSS Slave	False
LSS Master	False

Supported Baud rates

- ☒ 10 kBit/s
- ☒ 20 kBit/s
- ☒ 50 kBit/s
- ☒ 125 kBit/s
- ☒ 250 kBit/s
- ☒ 500 kBit/s
- ☒ 800 kBit/s
- ☒ 1000 kBit/s
- ☐ auto

PDO Mapping

Communication Specific Parameters

0x1000 - Device type

Object Type	Count Label	Storage Group
VAR	NMT	ROM

Data Type	SDO	PDO	SRDO	Default Value
UNSIGNED32	ro	no	no	0x00000000

- bit 16-31: Additional information
- bit 0-15: Device profile number

0x1008 - Manufacturer device name

Object Type	Count Label	Storage Group
VAR		ROM

Data Type	SDO	PDO	SRDO	Default Value
VISIBLE_STRING	ro	no	no	

0x1009 - Manufacturer hardware version

Object Type	Count Label	Storage Group
VAR		ROM

Data Type	SDO	PDO	SRDO	Default Value
VISIBLE_STRING	ro	no	no	

0x100A - Manufacturer software version

Object Type	Count Label	Storage Group
VAR		ROM

Data Type	SDO	PDO	SRDO	Default Value
VISIBLE_STRING	ro	no	no	

0x1010 - Save persistent data

Object Type	Count Label	Storage Group
ARRAY		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Val
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x04
0x01	Save all parameters	UNSIGNED32	wo	no	no	0
0x02	Save communcations parameters	UNSIGNED32	wo	no	no	0
0x03	Save application parameters	UNSIGNED32	wo	no	no	0

Sub	Name	Data Type	SDO	PDO	SRDO	Default Val
0x04	Save manufacturer defined default parameters	UNSIGNED32	wo	no	no	0

Sub-indexes 1 and above:

- Node must not be operational, set to preop
- Writing value 0x65766173 ('s' 'a' 'v' 'e' from LSB to MSB) saves corresponding data.

0x1011 - Restore default parameters

Object Type	Count Label	Storage Group
ARRAY		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x04
0x01	Restore all default parameters	UNSIGNED32	rwo	no	no	0x00000001
0x02	Restore communication default parameters	UNSIGNED32	rwo	no	no	0x00000001
0x03	Restore application default parameters	UNSIGNED32	rwo	no	no	0x00000001
0x04	Restore manufacturer defined default parameters	UNSIGNED32	rwo	no	no	0x00000001

Sub-indexes 1 and above:

- Reading provides information about its restoring capability:
  - bit 0: If set, CANopen device restores parameters
- Writing value 0x64616F6C ('l','o','a','d' from LSB to MSB) restores corresponding data.

0x1012 - COB-ID time stamp object

Object Type	Count Label	Storage Group
VAR	TIME	RAM

Data Type	SDO	PDO	SRDO	Default Value
UNSIGNED32	rw	no	no	0x00000100

- bit 31: If set, CANopen device consumes TIME message
- bit 30: If set, CANopen device produces TIME message
- bit 11-29: set to 0
- bit 0-10: 11-bit CAN-ID

0x1016 - Consumer heartbeat time

Object Type	Count Label	Storage Group
ARRAY	HB_CONS	RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x08
0x01	Consumer heartbeat time	UNSIGNED32	rw	no	no	0x00000000
0x02	Consumer heartbeat time	UNSIGNED32	rw	no	no	0x00000000
0x03	Consumer heartbeat time	UNSIGNED32	rw	no	no	0x00000000
0x04	Consumer heartbeat time	UNSIGNED32	rw	no	no	0x00000000
0x05	Consumer heartbeat time	UNSIGNED32	rw	no	no	0x00000000
0x06	Consumer heartbeat time	UNSIGNED32	rw	no	no	0x00000000
0x07	Consumer heartbeat time	UNSIGNED32	rw	no	no	0x00000000
0x08	Consumer heartbeat time	UNSIGNED32	rw	no	no	0x00000000

Consumer Heartbeat Time:

- bit 24-31: set to 0
- bit 16-23: Node ID of the monitored node. If 0 or greater than 127, sub-entry is not used.
- bit 0-15: Heartbeat time in ms (if 0, sub-intry is not used). Value should be higher than the corresponding producer heartbeat time.

0x1017 - Producer heartbeat time

Object Type	Count Label	Storage Group
VAR	HB_PROD	RAM

Data Type	SDO	PDO	SRDO	Default Value
UNSIGNED16	rw	no	no	0

Heartbeat producer time in ms (0 = disable transmission).

0x1018 - Identity

Object Type	Count Label	Storage Group
RECORD		ROM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x04
0x01	Vendor-ID	UNSIGNED32	ro	no	no	0x00000000
0x02	Product code	UNSIGNED32	ro	no	no	0x00000000
0x03	Revision number	UNSIGNED32	ro	no	no	0x00000000
0x04	Serial number	UNSIGNED32	ro	no	no	0x00000000

- Vendor-ID, assigned by CiA
- Product code, manufacturer specific
- Revision number:
  - bit 16-31: Major revision number (CANopen behavior has changed)
  - bit 0-15: Minor revision num. (CANopen behavior has not changed)
- Serial number, manufacturer specific

Manufacturer Specific Parameters

0x2000 - Bus Management

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	Bdefault	UNSIGNED8	rw	t	tx	0
0x02	Ttoggle	UNSIGNED8	rw	t	tx	0
0x03	Ntoggle	UNSIGNED8	rw	t	tx	0
0x04	Count	UNSIGNED8	rw	t	tx	0
0x05	Active bus	UNSIGNED8	rw	t	tx	0

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x06	Primary physical bus	UNSIGNED8	rw	t	tx	0
0x07	Secondary physical bus	UNSIGNED8	rw	t	tx	0

- 01: Default bus on boot (read only) 0=primary, 1=secondary
- 02: Number of missed heartbeats before toggling
- 03: Number of times toggling is allowed (0=disabled)
- 04: Number of time bus has toggled
- 05: Active bus, 0= primary, 1= secondary
- 06: The physical bus assigned to primary (test only) (0=CAN1, 1=CAN2)
- 07: The physical bus assigned to secondary (test only) (0=CAN1, 1=CAN2)

0x2001 - SCET

Object Type	Count Label	Storage Group
VAR		RAM

Data Type	SDO	PDO	SRDO	Default Value
DOMAIN	rw	no	no	

0x2002 - UTC

Object Type	Count Label	Storage Group
VAR		RAM

Data Type	SDO	PDO	SRDO	Default Value
DOMAIN	rw	no	no	

0x2003 - CPU

Object Type	Count Label	Storage Group
ARRAY		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x08

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x01	Single Error Corrections	UNSIGNED32	rw	no	no	0
0x02	Double Error Detections	UNSIGNED32	rw	no	no	0
0x03	Bus fault count	UNSIGNED32	rw	no	no	0
0x04	Hard fault status	UNSIGNED32	rw	no	no	0
0x05	System handler status	UNSIGNED32	rw	no	no	0
0x06	Config fault status	UNSIGNED32	rw	no	no	0
0x07	Bus fault address	UNSIGNED32	rw	no	no	0
0x08	Hard fault count	UNSIGNED32	rw	no	no	0

0x2004 - Power Supplies

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x02
0x01	Supplies switches control	UNSIGNED8	rw	no	no	0
0x02	Supplies status	UNSIGNED8	rw	no	no	0

- 0x01: switches control:
  - Bit 0: VDIG_EN
  - Bit 1: VDIG_EN (backup)
  - Bit 2: VACT_EN
  - Bit 3: VACT_EN (backup)
  - Bit 4: VACT_OUT_EN
  - Bit 5: VACT_OUT_EN (backup)
- 0x02: status
  - Bit 0: VDIG Power Good
  - Bit 1: VACT Fault
  - Bit 2: VACT Power Good
  - Bit 3: Internal 5V regulator Power Good
  - Fault Output = 0 indicates that the device has shut down due to an overcurrent fault condition
  - Power-Good Signal = 1 indicates that the supply voltage is within tolerance.

0x2008 - Bridge

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x03
0x01	Bridge Enabled	UNSIGNED8	rw	no	no	0
0x02	Active can bus	UNSIGNED8	rw	no	no	0
0x03	Bridge CAN bus baudrate	UNSIGNED32	rw	no	no	1000000

- 0x01: 0= disabled, 1= enabled
- 0x02: 0= primary, 1= secondary

0x200B - Anomaly handler

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x6C
0x01	No valid message within heartbeat period (internal communication)	UNSIGNED8	rw	no	no	1
0x02	No valid message within heartbeat period (ex communication)	UNSIGNED8	rw	no	no	1
0x03	Invalid command received	UNSIGNED8	rw	no	no	1
0x04	Reserved	UNSIGNED8	rw	no	no	0
0x05	Peripheral node in invalid / unexpected state	UNSIGNED8	rw	no	no	0
0x06	Reserved	UNSIGNED8	rw	no	no	0
0x07	Reserved	UNSIGNED8	rw	no	no	0
0x08	Reserved	UNSIGNED8	rw	no	no	0
0x09	Reserved	UNSIGNED8	rw	no	no	0
0x0A	Reserved	UNSIGNED8	rw	no	no	0

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x0B	Digital power supply current under minimum warning threashold	UNSIGNED8	rw	no	no	1
0x0C	Digital power supply current under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x0D	Digital power supply current over maximum warning threshold	UNSIGNED8	rw	no	no	1
0x0E	Digital power supply current over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x0F	Digital power supply voltage under minimum warning threashold	UNSIGNED8	rw	no	no	1
0x10	Digital power supply voltage under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x11	Digital power supply voltage over maximum warning threshold	UNSIGNED8	rw	no	no	1
0x12	Digital power supply voltage over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x13	High voltage power supply current under minimum warning threashold	UNSIGNED8	rw	no	no	1
0x14	High voltage power supply current under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x15	High voltage power supply current over maximum warning threshold	UNSIGNED8	rw	no	no	1
0x16	High voltage power supply current over maximum abort threshold	UNSIGNED8	rw	no	no	3

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x17	High voltage power supply voltage under minimum warning threashold	UNSIGNED8	rw	no	no	1
0x18	High voltage power supply voltage under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x19	High voltage power supply voltage over maximum warning threshold	UNSIGNED8	rw	no	no	1
0x1A	High voltage power supply voltage over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x1B	Actuator 1 voltage under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x1C	Actuator 1 voltage over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x1D	Actuator 2 voltage under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x1E	Actuator 2 voltage over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x1F	Actuator 3 voltage under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x20	Actuator 3 voltage over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x21	Actuator 4 voltage under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x22	Actuator 4 voltage over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x23	Heater 1 temperature under minimum warning threshold	UNSIGNED8	rw	no	no	1

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x24	Heater 1 temperature under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x25	Heater 1 temperature over maximum warning threshold	UNSIGNED8	rw	no	no	1
0x26	Heater 1 temperature over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x27	Heater 2 temperature under minimum warning threshold	UNSIGNED8	rw	no	no	1
0x28	Heater 2 temperature under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x29	Heater 2 temperature over maximum warning threshold	UNSIGNED8	rw	no	no	1
0x2A	Heater 2 temperature over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x2B	Heater 3 temperature under minimum warning threshold	UNSIGNED8	rw	no	no	1
0x2C	Heater 3 temperature under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x2D	Heater 3 temperature over maximum warning threshold	UNSIGNED8	rw	no	no	1
0x2E	Heater 3 temperature over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x2F	Heater 4 temperature under minimum warning threshold	UNSIGNED8	rw	no	no	1
0x30	Heater 4 temperature under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x31	Heater 4 temperature over maximum warning threshold	UNSIGNED8	rw	no	no	1

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x32	Heater 4 temperature over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x33	Pressure sensor 1 under minimum warning threshold	UNSIGNED8	rw	no	no	1
0x34	Pressure sensor 1 under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x35	Pressure sensor 1 over maximum warning threshold	UNSIGNED8	rw	no	no	1
0x36	Pressure sensor 1 over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x37	Pressure sensor 2 under minimum warning threshold	UNSIGNED8	rw	no	no	1
0x38	Pressure sensor 2 under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x39	Pressure sensor 2 over maximum warning threshold	UNSIGNED8	rw	no	no	1
0x3A	Pressure sensor 2 over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x3B	Igniter current under minimum warning threashold	UNSIGNED8	rw	no	no	1
0x3C	Igniter current under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x3D	Igniter current over maximum warning threshold	UNSIGNED8	rw	no	no	1
0x3E	Igniter current over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x3F	Igniter voltage under minimum warning threashold	UNSIGNED8	rw	no	no	1

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x40	Igniter voltage under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x41	Igniter voltage over maximum warning threshold	UNSIGNED8	rw	no	no	1
0x42	Igniter voltage over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x43	Ambient temperature under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x44	Ambient temperature over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x45	Thruster temperature under minimum warning threshold	UNSIGNED8	rw	no	no	1
0x46	Thruster temperature under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x47	Thruster temperature over maximum warning threshold	UNSIGNED8	rw	no	no	1
0x48	Thruster temperature over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x49	Thruster pressure under minimum warning threshold	UNSIGNED8	rw	no	no	1
0x4A	Thruster pressure under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x4B	Thruster pressure over maximum warning threshold	UNSIGNED8	rw	no	no	1
0x4C	Thruster pressure over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x4D	Ox/Fuel ratio under minimum warning threshold	UNSIGNED8	rw	no	no	1

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x4E	Ox/Fuel ratio under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x4F	Ox/Fuel ratio over maximum warning threshold	UNSIGNED8	rw	no	no	1
0x50	Ox/Fuel ratio over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x51	Fuel tanks near empty - warning threshold	UNSIGNED8	rw	no	no	1
0x52	Oxidizer tanks near empty - warning threshold	UNSIGNED8	rw	no	no	1
0x53	Fuel tanks near empty - abort threshold	UNSIGNED8	rw	no	no	3
0x54	Oxidizer tanks near empty - abort threshold	UNSIGNED8	rw	no	no	3
0x55	Fuel tanks out of balance - warning threshold	UNSIGNED8	rw	no	no	1
0x56	Oxidizer tanks out of balance - warning threshold	UNSIGNED8	rw	no	no	1
0x57	Fuel tanks out of balance - abort threshold	UNSIGNED8	rw	no	no	3
0x58	Oxidizer tanks out of balance - abort threshold	UNSIGNED8	rw	no	no	3
0x59	Fuel tanks pressure under minimum warning threshold	UNSIGNED8	rw	no	no	1
0x5A	Fuel tanks pressure under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x5B	Fuel tanks pressure over maximum warning threshold	UNSIGNED8	rw	no	no	1
0x5C	Fuel tanks pressure over maximum abort threshold	UNSIGNED8	rw	no	no	3

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x5D	Oxidizer tanks pressure under minimum warning threshold	UNSIGNED8	rw	no	no	1
0x5E	Oxidizer tanks pressure under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x5F	Oxidizer tanks pressure over maximum warning threshold	UNSIGNED8	rw	no	no	1
0x60	Oxidizer tanks pressure over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x61	Fuel feedline pressure under minimum warning threshold	UNSIGNED8	rw	no	no	1
0x62	Fuel feedline pressure under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x63	Fuel feedline pressure over maximum warning threshold	UNSIGNED8	rw	no	no	1
0x64	Fuel feedline pressure over maximum abort threshold	UNSIGNED8	rw	no	no	3
0x65	Oxidizer feedline pressure under minimum warning threshold	UNSIGNED8	rw	no	no	1
0x66	Oxidizer feedline pressure under minimum abort threshold	UNSIGNED8	rw	no	no	3
0x67	Oxidizer feedline pressure over maximum warning threshold	UNSIGNED8	rw	no	no	1
0x68	Oxidizer feedline pressure over maximum abort threshold	UNSIGNED8	rw	no	no	3

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x69	Fuel tanks loss of pressure over abort threshold	UNSIGNED8	rw	no	no	3
0x6A	Oxidizer tanks loss of pressure over abort threshold	UNSIGNED8	rw	no	no	3
0x6B	Fuel feedline loss of pressure over abort threshold	UNSIGNED8	rw	no	no	3
0x6C	Oxidizer feedline loss of pressure over abort threshold	UNSIGNED8	rw	no	no	3

Anomaly list and flags setting (1st bit is active flag, 2nd bit is abort flag)

If active flag is set, any tripping of this anomoaly is logged and set in 0x200C Last Anomaly.

If abort flag is set, any tripping of this anomaly generates an abort event. The specific action taken in response to the abort event depends on the anomaly. Generally it will initiate an emergency procedure to make the system safe. Additionally the system will enter the Error state and will need to be reset to Idle by the user.

- 0x43-0x44: Electronics outside operational range
- 0x4D-0x50: Fuel and oxidiser temperature difference too high
- 0x51-0x52: Temp and pressure off vapour pressure curve
- 0x53-0x54: Abort only pertinent fire modes
- 0x55-0x58: Difference of temperature between tanks too high

0x200C - Last Anomaly

Object Type	Count Label	Storage Group
VAR		RAM

Data Type	SDO	PDO	SRDO	Default Value
UNSIGNED16	rw	t	no	0

Bits 15..8: Node ID (that raised the anomaly) Bits 7..0: Anomaly ID

0x200D - Sensors

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x0A
0x01	CPU Voltage [0.1K]	UNSIGNED16	ro	no	no	0
0x02	CPU Temperature [0.1K]	UNSIGNED16	ro	no	no	0
0x03	VACT_V [mV]	UNSIGNED16	ro	no	no	0
0x04	VACT_I [mA]	UNSIGNED16	ro	no	no	0
0x05	VDIG_V [mV]	UNSIGNED16	ro	no	no	0
0x06	VDIG_I [mV]	UNSIGNED16	ro	no	no	0
0x07	VACT_SYS [mV]	UNSIGNED16	ro	no	no	0
0x08	VDIG_OUT [mV]	UNSIGNED16	ro	no	no	0
0x09	RBF [mV]	UNSIGNED16	ro	no	no	0
0x0A	TID [mV]	UNSIGNED16	ro	no	no	0

0x200E - Gateway

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	Serial Baud rate	UNSIGNED32	rw	no	no	115200
0x02	Good rx frame counter	UNSIGNED32	rw	no	no	0
0x03	Good tx frame counter	UNSIGNED32	rw	no	no	0
0x04	Serial rx CRC faiilures	UNSIGNED32	rw	no	no	0
0x05	Serial rx aborts	UNSIGNED32	rw	no	no	0
0x06	Serial tx retries	UNSIGNED32	rw	no	no	0
0x07	Serial tx failures	UNSIGNED32	rw	no	no	0

Writing zero to subobject 0 clears all statistics

0x2018 - Logging Domain

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x08
0x01	Region 1	DOMAIN	rw	no	no	
0x02	Region 2	DOMAIN	rw	no	no	
0x03	Region 3	DOMAIN	rw	no	no	
0x04	Region 4	DOMAIN	rw	no	no	
0x05	Region 5	DOMAIN	rw	no	no	
0x06	Region 6	DOMAIN	rw	no	no	
0x07	Region 7	DOMAIN	rw	no	no	
0x08	Region 8	DOMAIN	rw	no	no	

0x2019 - Logging Control

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x08
0x01	Region 1	UNSIGNED32	rw	no	no	0
0x02	Region 2	UNSIGNED32	rw	no	no	0
0x03	Region 3	UNSIGNED32	rw	no	no	0
0x04	Region 4	UNSIGNED32	rw	no	no	0
0x05	Region 5	UNSIGNED32	rw	no	no	0
0x06	Region 6	UNSIGNED32	rw	no	no	0
0x07	Region 7	UNSIGNED32	rw	no	no	0
0x08	Region 8	UNSIGNED32	rw	no	no	0

Write: 0 to reset 1 to erase log

Read: Size of the log in bytes

0x201A - ActiveLog

Object Type	Count Label	Storage Group
VAR		RAM

Data Type	SDO	PDO	SRDO	Default Value
UNSIGNED16	rw	no	no	0

0x2030 - Fu Pressure

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x03
0x01	Node Id	UNSIGNED8	rw	no	no	57
0x02	Sensor Input Number	UNSIGNED8	rw	no	no	0
0x03	Pressure	UNSIGNED32	ro	r	no	0

- 0x01: The FU pressure sensor is located on this node ID
- 0x02: The FU pressure sensor is located on this sensor input (0 = sensor1, 1 = sensor2)
- 0x03: Pressure value in mBar

0x2031 - Ox Pressure

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x03
0x01	Node Id	UNSIGNED8	rw	no	no	57
0x02	Sensor Input Number	UNSIGNED8	rw	no	no	1
0x03	Pressure	UNSIGNED32	ro	r	no	0

- 0x01: The OX pressure sensor is located on this node ID
- 0x02: The OX pressure sensor is located on this sensor input (0 = sensor1, 1 = sensor2)
- 0x03: Pressure value in mBar

0x2032 - Fuel Pressure (redundant)

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x03
0x01	Node Id	UNSIGNED8	rw	no	no	48
0x02	Sensor Input Number	UNSIGNED8	rw	no	no	0
0x03	Pressure	UNSIGNED32	ro	r	no	0

- 0x01: The FU pressure sensor is located on this node ID
- 0x02: The FU pressure sensor is located on this sensor input (0 = sensor1, 1 = sensor2)
- 0x03: Pressure value in mBar

0x2033 - Ox Pressure (redundant)

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x03
0x01	Node Id	UNSIGNED8	rw	no	no	48
0x02	Sensor Input Number	UNSIGNED8	rw	no	no	1
0x03	Pressure	UNSIGNED32	ro	r	no	0

- 0x01: The Ox pressure sensor is located on this node ID
- 0x02: The OX pressure sensor is located on this sensor input (0 = sensor1, 1 = sensor2)
- 0x03: Pressure value in mBar

0x2100 - Calibration

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x1E
0x01	CPU Voltage Offset	REAL32	rw	no	no	0
0x02	CPU Voltage Linear	REAL32	rw	no	no	
0x03	CPU Voltage Quadratic	REAL32	rw	no	no	0
0x04	CPU Temperature Offset	REAL32	rw	no	no	
0x05	CPU Temperature Linear term	REAL32	rw	no	no	
0x06	CPU Temperature Quadratic term	REAL32	rw	no	no	0
0x07	VACT V Offset term	REAL32	rw	no	no	0
0x08	VACT V Linear term	REAL32	rw	no	no	
0x09	VACT V Quadratic term	REAL32	rw	no	no	0
0x0A	VACT I Offset term	REAL32	rw	no	no	0
0x0B	VACT I Linear term	REAL32	rw	no	no	
0x0C	VACT I Quadratic term	REAL32	rw	no	no	0
0x0D	VDIG V Offset term	REAL32	rw	no	no	0
0x0E	VDIG V Linear term	REAL32	rw	no	no	
0x0F	VDIG V Quadratic term	REAL32	rw	no	no	0
0x10	VDIG I Offset term	REAL32	rw	no	no	0
0x11	VDIG I Linear term	REAL32	rw	no	no	
0x12	VDIG I Quadratic term	REAL32	rw	no	no	0
0x13	VACT_SYS Offset term	REAL32	rw	no	no	0
0x14	VACT_SYS Linear term	REAL32	rw	no	no	
0x15	VACT_SYS Quadratic term	REAL32	rw	no	no	0
0x16	VDIG_OUT Offset term	REAL32	rw	no	no	0
0x17	VDIG_OUT Linear term	REAL32	rw	no	no	
0x18	VDIG_OUT Quadratic term	REAL32	rw	no	no	0
0x19	RBF Offset erm	REAL32	rw	no	no	0
0x1A	RBF Linear term	REAL32	rw	no	no	1
0x1B	RBF Quadratic term	REAL32	rw	no	no	0
0x1C	TID Offset term	REAL32	rw	no	no	0
0x1D	TID Linear term	REAL32	rw	no	no	1
0x1E	TID Quadratic term	REAL32	rw	no	no	0

Each sensor has offset, linear and quaradtic terms for converting the raw value to meaningful unit of measurement

y = Quadratic * xˆ2 + linear * x + offset

Default Values (dcfchk prevents decimals):

- CPU voltage:
  - linear: 0.8056640625
- CPU temp:
  - offset: -68.5
  - linear: 1.0070800781255
- Vact V:

  - linear: 4.632568359375
- Vact I:
  - linear: 1.007080078125
- Vdig V:
  - linear: 0.59634937959558
- Vdig I:
  - linear: 0.25177001953125
- Vact Sys:
  - linear: 4.632568359375
- Vdig Out:
  - linear: 0.59634937959558

0x2400 - Configuration

Object Type	Count Label	Storage Group
RECORD		PERSIST_COMM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x0D
0x01	Feedline Temperature Difference	UNSIGNED16	rw	no	no	60
0x02	Dryout Delay	UNSIGNED16	rw	no	no	60
0x03	Dryout Temperature	UNSIGNED16	rw	no	no	3082
0x05	Fire cmd bridge	BOOLEAN	rw	no	no	0
0x06	Fuel Pressure PID - Kp	REAL32	rw	no	no	4
0x07	Fuel Pressure PID - Ki	REAL32	rw	no	no	2
0x08	Fuel Pressure PID - Kd	REAL32	rw	no	no	0
0x09	Fuel Pressure PID - Integral limit	REAL32	rw	no	no	1000
0x0A	Oxidizer Pressure PID - Kp	REAL32	rw	no	no	6
0x0B	Oxidizer Pressure PID - Ki	REAL32	rw	no	no	3
0x0C	Oxidizer Pressure PID - Kd	REAL32	rw	no	no	0
0x0D	Oxidizer Pressure PID - Integral limit	REAL32	rw	no	no	2000

Configuration parameters for the SatDrive system

- 0x01: During automated thermal control, the feedline temperature is set x 0.1K more than the tank temperature.
- 0x02: Delay in seconds during which the feedline continue heating to dryout
- 0x03: Temperature target in 0.1K for feedline dryout
- 0x05: Bridge closed / false by default. When that bridge is open (bool true, var>0), the controller transmit all fire cmds to the thruster nodes without state filtering.

0x2401 - Thruster Node 1

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x0A
0x01	PDO 0 timer	UNSIGNED16	rw	t	no	1000
0x02	PDO 1 timer	UNSIGNED16	rw	t	no	1000
0x03	PDO 2 timer	UNSIGNED16	rw	t	no	0
0x04	PDO 3 timer	UNSIGNED16	rw	t	no	0
0x05	Toggle Count	UNSIGNED8	ro	r	no	0
0x06	Last Anomaly	UNSIGNED8	ro	r	no	0
0x07	CPU Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x08	VACT Voltage [mV]	UNSIGNED16	ro	r	no	0
0x09	VACT Current [mA]	UNSIGNED16	ro	r	no	0
0x0A	Last Data Received [ms]	UNSIGNED32	ro	no	no	0

Physical peripheral node to which functional object are linked (thruster, feedline or tank)

- 0x01-0x04: Transmission rate by the peripheral node of the TPDO 0-3
- 0x05: ECSS CAN bus toggle count
- 0x06: Last anomaly ID (0 = allgood)
- 0x0A: Timestamp of last data reception (0 = node is not detected)

0x2402 - Thruster Node 2

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x0A
0x01	PDO 0 timer	UNSIGNED16	rw	t	no	1000
0x02	PDO 1 timer	UNSIGNED16	rw	t	no	1000
0x03	PDO 2 timer	UNSIGNED16	rw	t	no	0
0x04	PDO 3 timer	UNSIGNED16	rw	t	no	0
0x05	Toggle Count	UNSIGNED8	ro	r	no	0
0x06	Last Anomaly	UNSIGNED8	ro	r	no	0
0x07	CPU Temperature [0.1K]	UNSIGNED16	ro	r	no	0

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x08	VACT Voltage [mV]	UNSIGNED16	ro	r	no	0
0x09	VACT Current [mA]	UNSIGNED16	ro	r	no	0
0x0A	Last Data Received [ms]	UNSIGNED32	ro	no	no	0

Physical peripheral node to which functional object are linked (thruster, feedline or tank)

- 0x01-0x04: Transmission rate by the peripheral node of the TPDO 0-3
- 0x05: ECSS CAN bus toggle count
- 0x06: Last anomaly ID (0 = allgood)
- 0x0A: Timestamp of last data reception (0 = node is not detected)

0x2403 - Thruster Node 3

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x0A
0x01	PDO 0 timer	UNSIGNED16	rw	t	no	1000
0x02	PDO 1 timer	UNSIGNED16	rw	t	no	1000
0x03	PDO 2 timer	UNSIGNED16	rw	t	no	0
0x04	PDO 3 timer	UNSIGNED16	rw	t	no	0
0x05	Toggle Count	UNSIGNED8	ro	r	no	0
0x06	Last Anomaly	UNSIGNED8	ro	r	no	0
0x07	CPU Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x08	VACT Voltage [mV]	UNSIGNED16	ro	r	no	0
0x09	VACT Current [mA]	UNSIGNED16	ro	r	no	0
0x0A	Last Data Received [ms]	UNSIGNED32	ro	no	no	0

Physical peripheral node to which functional object are linked (thruster, feedline or tank)

- 0x01-0x04: Transmission rate by the peripheral node of the TPDO 0-3
- 0x05: ECSS CAN bus toggle count
- 0x06: Last anomaly ID (0 = allgood)
- 0x0A: Timestamp of last data reception (0 = node is not detected)

0x2404 - Thruster Node 4

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x0A
0x01	PDO 0 timer	UNSIGNED16	rw	t	no	1000
0x02	PDO 1 timer	UNSIGNED16	rw	t	no	1000
0x03	PDO 2 timer	UNSIGNED16	rw	t	no	0
0x04	PDO 3 timer	UNSIGNED16	rw	t	no	0
0x05	Toggle Count	UNSIGNED8	ro	r	no	0
0x06	Last Anomaly	UNSIGNED8	ro	r	no	0
0x07	CPU Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x08	VACT Voltage [mV]	UNSIGNED16	ro	r	no	0
0x09	VACT Current [mA]	UNSIGNED16	ro	r	no	0
0x0A	Last Data Received [ms]	UNSIGNED32	ro	no	no	0

Physical peripheral node to which functional object are linked (thruster, feedline or tank)

- 0x01-0x04: Transmission rate by the peripheral node of the TPDO 0-3
- 0x05: ECSS CAN bus toggle count
- 0x06: Last anomaly ID (0 = allgood)
- 0x0A: Timestamp of last data reception (0 = node is not detected)

0x2405 - Thruster Node 5

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x0A
0x01	PDO 0 timer	UNSIGNED16	rw	t	no	1000
0x02	PDO 1 timer	UNSIGNED16	rw	t	no	1000
0x03	PDO 2 timer	UNSIGNED16	rw	t	no	0
0x04	PDO 3 timer	UNSIGNED16	rw	t	no	0
0x05	Toggle Count	UNSIGNED8	ro	r	no	0
0x06	Last Anomaly	UNSIGNED8	ro	r	no	0
0x07	CPU Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x08	VACT Voltage [mV]	UNSIGNED16	ro	r	no	0
0x09	VACT Current [mA]	UNSIGNED16	ro	r	no	0

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x0A	Last Data Received [ms]	UNSIGNED32	ro	no	no	0

Physical peripheral node to which functional object are linked (thruster, feedline or tank)

- 0x01-0x04: Transmission rate by the peripheral node of the TPDO 0-3
- 0x05: ECSS CAN bus toggle count
- 0x06: Last anomaly ID (0 = allgood)
- 0x0A: Timestamp of last data reception (0 = node is not detected) T

0x2412 - Feedline Node 1

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x0B
0x01	PDO 0 timer	UNSIGNED16	rw	t	no	1000
0x02	PDO 1 timer	UNSIGNED16	rw	t	no	1000
0x03	PDO 2 timer	UNSIGNED16	rw	t	no	1000
0x04	PDO 3 timer	UNSIGNED16	rw	t	no	0
0x05	Toggle Count	UNSIGNED8	ro	r	no	0
0x06	Last Anomaly	UNSIGNED8	ro	r	no	0
0x07	CPU Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x08	VACT Voltage [mV]	UNSIGNED16	ro	r	no	0
0x09	VACT Current [mA]	UNSIGNED16	ro	r	no	0
0x0A	Last Data Received [ms]	UNSIGNED32	ro	no	no	0
0x0B	Mixed propellants	BOOLEAN	rw	no	no	1

Physical peripheral node to which functional object are linked (thruster, feedline or tank)

- 0x01-0x04: Transmission rate by the peripheral node of the TPDO 0-3
- 0x05: ECSS CAN bus toggle count
- 0x06: Last anomaly ID (0 = allgood)
- 0x0A: Timestamp of last data reception (0 = node is not detected)
- 0x0B:
  - 0 means
    - Valve 1 = Fu iso
    - Heater 3 = Fu line heater
    - Heater 4 = Fu line heater

  - 1 means
    - Valve 1 = Fu iso
    - Valve 2 = Ox iso
    - Heater 3 = Fu line heater
    - Heater 4 = Ox line heater
  - Note that feedline node 2 must be the same setting mix setting

0x2413 - Feedline Node 2

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x0B
0x01	PDO 0 timer	UNSIGNED16	rw	t	no	1000
0x02	PDO 1 timer	UNSIGNED16	rw	t	no	1000
0x03	PDO 2 timer	UNSIGNED16	rw	t	no	1000
0x04	PDO 3 timer	UNSIGNED16	rw	t	no	0
0x05	Toggle Count	UNSIGNED8	ro	r	no	0
0x06	Last Anomaly	UNSIGNED8	ro	r	no	0
0x07	CPU Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x08	VACT Voltage [mV]	UNSIGNED16	ro	r	no	0
0x09	VACT Current [mA]	UNSIGNED16	ro	r	no	0
0x0A	Last Data Received [ms]	UNSIGNED32	ro	no	no	0
0x0B	Mixed propellants	BOOLEAN	rw	no	no	1

Physical peripheral node to which functional object are linked (thruster, feedline or tank)

- 0x01-0x04: Transmission rate by the peripheral node of the TPDO 0-3
- 0x05: ECSS CAN bus toggle count
- 0x06: Last anomaly ID (0 = allgood)
- 0x0A: Timestamp of last data reception (0 = node is not detected)
- 0x0B:
  - 0 means
    - Valve 1 = Fu iso
    - Heater 3 = Fu line heater
    - Heater 4 = Fu line heater
  - 1 means
    - Valve 1 = Fu iso
    - Valve 2 = Ox iso
    - Heater 3 = Fu line heater
    - Heater 4 = Ox line heater
  - Note that feedline node 1 must be the same setting mix setting

0x2416 - Tank Node 1

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x0B
0x01	PDO 0 timer	UNSIGNED16	rw	t	no	1000
0x02	PDO 1 timer	UNSIGNED16	rw	t	no	1000
0x03	PDO 2 timer	UNSIGNED16	rw	t	no	1000
0x04	PDO 3 timer	UNSIGNED16	rw	t	no	1000
0x05	Toggle Count	UNSIGNED8	ro	r	no	0
0x06	Last Anomaly	UNSIGNED8	ro	r	no	0
0x07	CPU Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x08	VACT Voltage [mV]	UNSIGNED16	ro	r	no	0
0x09	VACT Current [mA]	UNSIGNED16	ro	r	no	0
0x0A	Last Data Received [ms]	UNSIGNED32	ro	no	no	0
0x0B	Mixed propellants	BOOLEAN	rw	no	no	1

Physical peripheral node to which functional object are linked (thruster, feedline or tank)

- 0x01-0x04: Transmission rate by the peripheral node of the TPDO 0-3
- 0x05: ECSS CAN bus toggle count
- 0x06: Last anomaly ID (0 = allgood)
- 0x0A: Timestamp of last data reception (0 = node is not detected)
- 0x0B:
  - 0 means
    - All heaters are connected to tanks same of the same propellant type
  - 1 means
    - Heater 1 = Fu tank
    - Heater 2 = Ox tank
    - Heater 3 = Fu tank
    - Heater 4 = Ox tank

0x2417 - Tank Node 2

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x0B
0x01	PDO 0 timer	UNSIGNED16	rw	t	no	1000
0x02	PDO 1 timer	UNSIGNED16	rw	t	no	1000
0x03	PDO 2 timer	UNSIGNED16	rw	t	no	1000
0x04	PDO 3 timer	UNSIGNED16	rw	t	no	1000
0x05	Toggle Count	UNSIGNED8	ro	r	no	0
0x06	Last Anomaly	UNSIGNED8	ro	r	no	0
0x07	CPU Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x08	VACT Voltage [mV]	UNSIGNED16	ro	r	no	0
0x09	VACT Current [mA]	UNSIGNED16	ro	r	no	0
0x0A	Last Data Received [ms]	UNSIGNED32	ro	no	no	0
0x0B	Mixed propellants	BOOLEAN	rw	no	no	1

Physical peripheral node to which functional object are linked (thruster, feedline or tank)

- 0x01-0x04: Transmission rate by the peripheral node of the TPDO 0-3
- 0x05: ECSS CAN bus toggle count
- 0x06: Last anomaly ID (0 = allgood)
- 0x0A: Timestamp of last data reception (0 = node is not detected)
- 0x0B:
  - 0 means
    - All heaters are connected to tanks same of the same propellant type
  - 1 means
    - Heater 1 = Fu tank
    - Heater 2 = Ox tank
    - Heater 3 = Fu tank
    - Heater 4 = Ox tank

0x2418 - Tank Node 3

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x0B
0x01	PDO 0 timer	UNSIGNED16	rw	t	no	1000
0x02	PDO 1 timer	UNSIGNED16	rw	t	no	1000
0x03	PDO 2 timer	UNSIGNED16	rw	t	no	1000
0x04	PDO 3 timer	UNSIGNED16	rw	t	no	1000

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x05	Toggle Count	UNSIGNED8	ro	r	no	0
0x06	Last Anomaly	UNSIGNED8	ro	r	no	0
0x07	CPU Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x08	VACT Voltage [mV]	UNSIGNED16	ro	r	no	0
0x09	VACT Current [mA]	UNSIGNED16	ro	r	no	0
0x0A	Last Data Received [ms]	UNSIGNED32	ro	no	no	0
0x0B	Mixed propellants	BOOLEAN	rw	no	no	1

Physical peripheral node to which functional object are linked (thruster, feedline or tank)

- 0x01-0x04: Transmission rate by the peripheral node of the TPDO 0-3
- 0x05: ECSS CAN bus toggle count
- 0x06: Last anomaly ID (0 = allgood)
- 0x0A: Timestamp of last data reception (0 = node is not detected)
- 0x0B:
  - 0 means
    - All heaters are connected to tanks same of the same propellant type
  - 1 means
    - Heater 1 = Fu tank
    - Heater 2 = Ox tank
    - Heater 3 = Fu tank
    - Heater 4 = Ox tank

0x2419 - Tank Node 4

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x0B
0x01	PDO 0 timer	UNSIGNED16	rw	t	no	1000
0x02	PDO 1 timer	UNSIGNED16	rw	t	no	1000
0x03	PDO 2 timer	UNSIGNED16	rw	t	no	1000
0x04	PDO 3 timer	UNSIGNED16	rw	t	no	1000
0x05	Toggle Count	UNSIGNED8	ro	r	no	0
0x06	Last Anomaly	UNSIGNED8	ro	r	no	0
0x07	CPU Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x08	VACT Voltage [mV]	UNSIGNED16	ro	r	no	0
0x09	VACT Current [mA]	UNSIGNED16	ro	r	no	0

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x0A	Last Data Received [ms]	UNSIGNED32	ro	no	no	0
0x0B	Mixed propellants	BOOLEAN	rw	no	no	1

Physical peripheral node to which functional object are linked (thruster, feedline or tank)

- 0x01-0x04: Transmission rate by the peripheral node of the TPDO 0-3
- 0x05: ECSS CAN bus toggle count
- 0x06: Last anomaly ID (0 = allgood)
- 0x0A: Timestamp of last data reception (0 = node is not detected)
- 0x0B:
  - 0 means
    - All heaters are connected to tanks same of the same propellant type
  - 1 means
    - Heater 1 = Fu tank
    - Heater 2 = Ox tank
    - Heater 3 = Fu tank
    - Heater 4 = Ox tank

0x2500 - Control

Object Type	Count Label	Storage Group
RECORD		PERSIST_APP

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	State / Command	UNSIGNED8	rw	no	no	0
0x02	Fire Command	UNSIGNED32	rw	no	no	0
0x03	Thermal Control Type	UNSIGNED8	rw	no	no	2
0x04	Fuel Tank Pressure Setpoint	UNSIGNED32	rw	no	no	7780
0x05	Oxidizer Tank Pressure Setpoint	UNSIGNED32	rw	no	no	40000
0x06	Fuel Tank Temperature Setpoint	UNSIGNED16	ro	no	no	2832
0x07	Oxidizer Tank Temperature Setpoint	UNSIGNED16	ro	no	no	2832

Commands to the SatDrive Controller

- 0x01:
  - Read = State:
    - CONTROLLER_STATE_IDLE = 0,
    - CONTROLLER_STATE_PREPARING = 1,

        * CONTROLLER_STATE_ARMED = 2,
        * CONTROLLER_STATE_ERROR = 3,
        * CONTROLLER_STATE_DRYOUT = 4,
        * CONTROLLER_STATE_MANUAL = 5,
    - Write = Command:
        * CONTROLLER_CMD_STANDBY = 0, // from prepare/dryout/manual to idle
        * CONTROLLER_CMD_PREPARE = 1, // from idle to prepare
        * CONTROLLER_CMD_ARM = 2, // from prepare to arm
        * CONTROLLER_CMD_DISARM = 3, // from arm to idle
        * CONTROLLER_CMD_DRYOUT = 4, // from idle to dryout
        * CONTROLLER_CMD_HEAT = 5, // from idle to manual heating
- 0x02: Only accepted when in Armed State
    - Two bits per thruster (00 off, 01 fu-cold, 10 ox-cold, 11 hot)
    - Thruster 1 is least significant bits
- 0x03: Determine current thermal control approach:
    - THERMAL_CONTROL_DIRECT = 0, // User commands individual setpoints via Tank&Feedline objects (on in Manual Heating State)
    - THERMAL_CONTROL_TEMPERATURE = 1, // User commands Fu and Ox temperature setpoints via Control object (on in Preparing State)
    - THERMAL_CONTROL_PRESSURE = 2, // User commands Fu and Ox pressure setpoints via Control object
    - THERMAL_CONTROL_THRUST = 3, // User commands Thrust setpoint via Control object
    - THERMAL_CONTROL_DRYOUT = 4, // Automated mode where feedlines are dried out (on in Dryout State)

/!\ Temperature and Thrust modes are not yet implemented

- 0x06-0x07: Currently read-only, calculated from the Pressure SetPoint

0x2600 - System Monitoring

Object Type	Count Label	Storage Group
RECORD		PERSIST_COMM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x04
0x01	System Cycle	UNSIGNED32	ro	no	no	0
0x02	System Runtime	UNSIGNED32	ro	no	no	0
0x03	Heating Cycle	UNSIGNED32	ro	no	no	0

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x04	Heating Runtime	UNSIGNED32	ro	no	no	0

Monitoring of the SatDrive Controller (persistent data)

- 0x01: Number of power cycle of the system
- 0x02: Total runtime of the system in seconds
- 0x03: Number of cycle in modes involving heating
- 0x04: Total duration in modes involving heating in seconds

0x2601 - Thruster 1

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x10
0x01	Command	UNSIGNED8	rw	t	no	0
0x02	State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x04	Pressure [mBar]	UNSIGNED16	ro	r	no	0
0x05	Burn Duration [ms]	UNSIGNED16	rw	t	no	100
0x06	Burn Start Time [ms]	UNSIGNED16	rw	t	no	0
0x07	Pressure Integral [mBar.s]	UNSIGNED16	ro	r	no	0
0x08	Hot Firing Count	UNSIGNED16	ro	no	no	0
0x09	Hot Firing Total Burntime [ms]	UNSIGNED32	ro	no	no	0
0x0A	Hot Firing Total Pint [mbar.s]	UNSIGNED32	ro	no	no	0
0x0B	Cold Fuel Firing Count	UNSIGNED16	ro	no	no	0
0x0C	Cold Fuel Firing Total Burntime [ms]	UNSIGNED32	ro	no	no	0
0x0D	Cold Fuel Firing Total Pint [mbar.s]	UNSIGNED32	ro	no	no	0
0x0E	Cold Ox Firing Count	UNSIGNED16	ro	no	no	0
0x0F	Cold Ox Firing Total Burntime [ms]	UNSIGNED32	ro	no	no	0
0x10	Cold Ox Firing Total Pint [mbar.s]	UNSIGNED32	ro	no	no	0

Monitoring and configuration of Thruster 1

- 0x01: Should not be used directly (see 0x2500)
  - THRUSTER_CMD_DISARM = 0,
  - THRUSTER_CMD_PREPARE = 1,
  - THRUSTER_CMD_ARM = 2,
  - THRUSTER_CMD_FIRE_HOT = 3, // hot bi-prop firing

  - THRUSTER_CMD_FIRE_FU = 4, // cold fire, fuel only
  - THRUSTER_CMD_FIRE_OX = 5, // cold fire, oxidiser only
  - THRUSTER_CMD_STOP = 6,
  - THRUSTER_CMD_ABORT = 7, // emergency stop
- 0x02:
  - THRUSTER_STATE_DISARMED = 0,
  - THRUSTER_STATE_PREPARING = 1,
  - THRUSTER_STATE_ARMED = 2,
  - THRUSTER_STATE_STARTING_HOT = 3,
  - THRUSTER_STATE_STARTING_FU = 4,
  - THRUSTER_STATE_STARTING_OX = 5,
  - THRUSTER_STATE_FIRING_HOT = 6,
  - THRUSTER_STATE_FIRING_FU = 7,
  - THRUSTER_STATE_FIRING_OX = 8,
  - THRUSTER_STATE_STOPPING = 9,
  - THRUSTER_STATE_EMERGENCY_STOP = 10,
- 0x07: Integral of pressure over time for this arming period
- 0x08: Total number of commanded hot firing during Thruster lifetime
- 0x09: Total commanded hot firing burntime of the Thruster
- 0x0A: Total integral of pressure for hot firing over the Thruster lifetime
- 0x0B: Total number of commanded cold fuel firing during Thruster lifetime
- 0x0C: Total commanded cold fuel firing burntime of the Thruster
- 0x0D: Total integral of pressure for cold fuel firing over the Thruster lifetime
- 0x0E: Total number of commanded cold oxidizer firing during Thruster lifetime
- 0x0F: Total commanded cold oxidizer firing burntime of the Thruster
- 0x10: Total integral of pressure for cold ox firing over the Thruster lifetime

0x2602 - Thruster 2

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x10
0x01	Command	UNSIGNED8	rw	t	no	0

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x02	State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x04	Pressure [mBar]	UNSIGNED16	ro	r	no	0
0x05	Burn Duration [ms]	UNSIGNED16	rw	t	no	100
0x06	Burn Start Time [ms]	UNSIGNED16	rw	t	no	0
0x07	Pressure Integral [mBar.s]	UNSIGNED16	ro	r	no	0
0x08	Hot Firing Count	UNSIGNED16	ro	no	no	0
0x09	Hot Firing Total Burntime [ms]	UNSIGNED32	ro	no	no	0
0x0A	Hot Firing Total Pint [mbar.s]	UNSIGNED32	ro	no	no	0
0x0B	Cold Fuel Firing Count	UNSIGNED16	ro	no	no	0
0x0C	Cold Fuel Firing Total Burntime [ms]	UNSIGNED32	ro	no	no	0
0x0D	Cold Fuel Firing Total Pint [mbar.s]	UNSIGNED32	ro	no	no	0
0x0E	Cold Ox Firing Count	UNSIGNED16	ro	no	no	0
0x0F	Cold Ox Firing Total Burntime [ms]	UNSIGNED32	ro	no	no	0
0x10	Cold Ox Firing Total Pint [mbar.s]	UNSIGNED32	ro	no	no	0

Monitoring and configuration of Thruster 2

- 0x01: Should not be used directly (see 0x2500)
  - THRUSTER_CMD_DISARM = 0,
  - THRUSTER_CMD_PREPARE = 1,
  - THRUSTER_CMD_ARM = 2,
  - THRUSTER_CMD_FIRE_HOT = 3, // hot bi-prop firing
  - THRUSTER_CMD_FIRE_FU = 4, // cold fire, fuel only
  - THRUSTER_CMD_FIRE_OX = 5, // cold fire, oxidiser only
  - THRUSTER_CMD_STOP = 6,
  - THRUSTER_CMD_ABORT = 7, // emergency stop
- 0x02:
  - THRUSTER_STATE_DISARMED = 0,
  - THRUSTER_STATE_PREPARING = 1,
  - THRUSTER_STATE_ARMED = 2,
  - THRUSTER_STATE_STARTING_HOT = 3,
  - THRUSTER_STATE_STARTING_FU = 4,
  - THRUSTER_STATE_STARTING_OX = 5,
  - THRUSTER_STATE_FIRING_HOT = 6,
  - THRUSTER_STATE_FIRING_FU = 7,
  - THRUSTER_STATE_FIRING_OX = 8,
  - THRUSTER_STATE_STOPPING = 9,
  - THRUSTER_STATE_EMERGENCY_STOP = 10,
- 0x07: Integral of pressure over time for this arming period
- 0x08: Total number of commanded hot firing during Thruster lifetime

- 0x09: Total commanded hot firing burntime of the Thruster
- 0x0A: Total integral of pressure for hot firing over the Thruster lifetime
- 0x0B: Total number of commanded cold fuel firing during Thruster lifetime
- 0x0C: Total commanded cold fuel firing burntime of the Thruster
- 0x0D: Total integral of pressure for cold fuel firing over the Thruster lifetime
- 0x0E: Total number of commanded cold oxidizer firing during Thruster lifetime
- 0x0F: Total commanded cold oxidizer firing burntime of the Thruster
- 0x10: Total integral of pressure for cold ox firing over the Thruster lifetime

0x2603 - Thruster 3

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x10
0x01	Command	UNSIGNED8	rw	t	no	0
0x02	State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x04	Pressure [mBar]	UNSIGNED16	ro	r	no	0
0x05	Burn Duration [ms]	UNSIGNED16	rw	t	no	100
0x06	Burn Start Time [ms]	UNSIGNED16	rw	t	no	0
0x07	Pressure Integral [mBar.s]	UNSIGNED16	ro	r	no	0
0x08	Hot Firing Count	UNSIGNED16	ro	no	no	0
0x09	Hot Firing Total Burntime [ms]	UNSIGNED32	ro	no	no	0
0x0A	Hot Firing Total Pint [mbar.s]	UNSIGNED32	ro	no	no	0
0x0B	Cold Fuel Firing Count	UNSIGNED16	ro	no	no	0
0x0C	Cold Fuel Firing Total Burntime [ms]	UNSIGNED32	ro	no	no	0
0x0D	Cold Fuel Firing Total Pint [mbar.s]	UNSIGNED32	ro	no	no	0
0x0E	Cold Ox Firing Count	UNSIGNED16	ro	no	no	0
0x0F	Cold Ox Firing Total Burntime [ms]	UNSIGNED32	ro	no	no	0
0x10	Cold Ox Firing Total Pint [mbar.s]	UNSIGNED32	ro	no	no	0

Monitoring and configuration of Thruster 3

- 0x01: Should not be used directly (see 0x2500)
  - THRUSTER_CMD_DISARM = 0,

  - THRUSTER_CMD_PREPARE = 1,
  - THRUSTER_CMD_ARM = 2,
  - THRUSTER_CMD_FIRE_HOT = 3, // hot bi-prop firing
  - THRUSTER_CMD_FIRE_FU = 4, // cold fire, fuel only
  - THRUSTER_CMD_FIRE_OX = 5, // cold fire, oxidiser only
  - THRUSTER_CMD_STOP = 6,
  - THRUSTER_CMD_ABORT = 7, // emergency stop
- 0x02:
  - THRUSTER_STATE_DISARMED = 0,
  - THRUSTER_STATE_PREPARING = 1,
  - THRUSTER_STATE_ARMED = 2,
  - THRUSTER_STATE_STARTING_HOT = 3,
  - THRUSTER_STATE_STARTING_FU = 4,
  - THRUSTER_STATE_STARTING_OX = 5,
  - THRUSTER_STATE_FIRING_HOT = 6,
  - THRUSTER_STATE_FIRING_FU = 7,
  - THRUSTER_STATE_FIRING_OX = 8,
  - THRUSTER_STATE_STOPPING = 9,
  - THRUSTER_STATE_EMERGENCY_STOP = 10,
- 0x07: Integral of pressure over time for this arming period
- 0x08: Total number of commanded hot firing during Thruster lifetime
- 0x09: Total commanded hot firing burntime of the Thruster
- 0x0A: Total integral of pressure for hot firing over the Thruster lifetime
- 0x0B: Total number of commanded cold fuel firing during Thruster lifetime
- 0x0C: Total commanded cold fuel firing burntime of the Thruster
- 0x0D: Total integral of pressure for cold fuel firing over the Thruster lifetime
- 0x0E: Total number of commanded cold oxidizer firing during Thruster lifetime
- 0x0F: Total commanded cold oxidizer firing burntime of the Thruster
- 0x10: Total integral of pressure for cold ox firing over the Thruster lifetime

0x2604 - Thruster 4

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x10
0x01	Command	UNSIGNED8	rw	t	no	0
0x02	State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x04	Pressure [mBar]	UNSIGNED16	ro	r	no	0
0x05	Burn Duration [ms]	UNSIGNED16	rw	t	no	100
0x06	Burn Start Time [ms]	UNSIGNED16	rw	t	no	0
0x07	Pressure Integral [mBar.s]	UNSIGNED16	ro	r	no	0
0x08	Hot Firing Count	UNSIGNED16	ro	no	no	0
0x09	Hot Firing Total Burntime [ms]	UNSIGNED32	ro	no	no	0
0x0A	Hot Firing Total Pint [mbar.s]	UNSIGNED32	ro	no	no	0
0x0B	Cold Fuel Firing Count	UNSIGNED16	ro	no	no	0
0x0C	Cold Fuel Firing Total Burntime [ms]	UNSIGNED32	ro	no	no	0
0x0D	Cold Fuel Firing Total Pint [mbar.s]	UNSIGNED32	ro	no	no	0
0x0E	Cold Ox Firing Count	UNSIGNED16	ro	no	no	0
0x0F	Cold Ox Firing Total Burntime [ms]	UNSIGNED32	ro	no	no	0
0x10	Cold Ox Firing Total Pint [mbar.s]	UNSIGNED32	ro	no	no	0

Monitoring and configuration of Thruster 4

- 0x01: Should not be used directly (see 0x2500)
  - THRUSTER_CMD_DISARM = 0,
  - THRUSTER_CMD_PREPARE = 1,
  - THRUSTER_CMD_ARM = 2,
  - THRUSTER_CMD_FIRE_HOT = 3, // hot bi-prop firing
  - THRUSTER_CMD_FIRE_FU = 4, // cold fire, fuel only
  - THRUSTER_CMD_FIRE_OX = 5, // cold fire, oxidiser only
  - THRUSTER_CMD_STOP = 6,
  - THRUSTER_CMD_ABORT = 7, // emergency stop
- 0x02:
  - THRUSTER_STATE_DISARMED = 0,
  - THRUSTER_STATE_PREPARING = 1,
  - THRUSTER_STATE_ARMED = 2,
  - THRUSTER_STATE_STARTING_HOT = 3,
  - THRUSTER_STATE_STARTING_FU = 4,
  - THRUSTER_STATE_STARTING_OX = 5,
  - THRUSTER_STATE_FIRING_HOT = 6,
  - THRUSTER_STATE_FIRING_FU = 7,
  - THRUSTER_STATE_FIRING_OX = 8,
  - THRUSTER_STATE_STOPPING = 9,
  - THRUSTER_STATE_EMERGENCY_STOP = 10,
- 0x07: Integral of pressure over time for this arming period

- 0x08: Total number of commanded hot firing during Thruster lifetime
- 0x09: Total commanded hot firing burntime of the Thruster
- 0x0A: Total integral of pressure for hot firing over the Thruster lifetime
- 0x0B: Total number of commanded cold fuel firing during Thruster lifetime
- 0x0C: Total commanded cold fuel firing burntime of the Thruster
- 0x0D: Total integral of pressure for cold fuel firing over the Thruster lifetime
- 0x0E: Total number of commanded cold oxidizer firing during Thruster lifetime
- 0x0F: Total commanded cold oxidizer firing burntime of the Thruster
- 0x10: Total integral of pressure for cold ox firing over the Thruster lifetime

0x2605 - Thruster 5

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x10
0x01	Command	UNSIGNED8	rw	t	no	0
0x02	State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x04	Pressure [mBar]	UNSIGNED16	ro	r	no	0
0x05	Burn Duration [ms]	UNSIGNED16	rw	t	no	100
0x06	Burn Start Time [ms]	UNSIGNED16	rw	t	no	0
0x07	Pressure Integral [mBar.s]	UNSIGNED16	ro	r	no	0
0x08	Hot Firing Count	UNSIGNED16	ro	no	no	0
0x09	Hot Firing Total Burntime [ms]	UNSIGNED32	ro	no	no	0
0x0A	Hot Firing Total Pint [mbar.s]	UNSIGNED32	ro	no	no	0
0x0B	Cold Fuel Firing Count	UNSIGNED16	ro	no	no	0
0x0C	Cold Fuel Firing Total Burntime [ms]	UNSIGNED32	ro	no	no	0
0x0D	Cold Fuel Firing Total Pint [mbar.s]	UNSIGNED32	ro	no	no	0
0x0E	Cold Ox Firing Count	UNSIGNED16	ro	no	no	0
0x0F	Cold Ox Firing Total Burntime [ms]	UNSIGNED32	ro	no	no	0
0x10	Cold Ox Firing Total Pint [mbar.s]	UNSIGNED32	ro	no	no	0

Monitoring and configuration of Thruster 5

- 0x01: Should not be used directly (see 0x2500)

  - THRUSTER_CMD_DISARM = 0,
  - THRUSTER_CMD_PREPARE = 1,
  - THRUSTER_CMD_ARM = 2,
  - THRUSTER_CMD_FIRE_HOT = 3, // hot bi-prop firing
  - THRUSTER_CMD_FIRE_FU = 4, // cold fire, fuel only
  - THRUSTER_CMD_FIRE_OX = 5, // cold fire, oxidiser only
  - THRUSTER_CMD_STOP = 6,
  - THRUSTER_CMD_ABORT = 7, // emergency stop

- 0x02:
  - THRUSTER_STATE_DISARMED = 0,
  - THRUSTER_STATE_PREPARING = 1,
  - THRUSTER_STATE_ARMED = 2,
  - THRUSTER_STATE_STARTING_HOT = 3,
  - THRUSTER_STATE_STARTING_FU = 4,
  - THRUSTER_STATE_STARTING_OX = 5,
  - THRUSTER_STATE_FIRING_HOT = 6,
  - THRUSTER_STATE_FIRING_FU = 7,
  - THRUSTER_STATE_FIRING_OX = 8,
  - THRUSTER_STATE_STOPPING = 9,
  - THRUSTER_STATE_EMERGENCY_STOP = 10,

- 0x07: Integral of pressure over time for this arming period
- 0x08: Total number of commanded hot firing during Thruster lifetime
- 0x09: Total commanded hot firing burntime of the Thruster
- 0x0A: Total integral of pressure for hot firing over the Thruster lifetime
- 0x0B: Total number of commanded cold fuel firing during Thruster lifetime
- 0x0C: Total commanded cold fuel firing burntime of the Thruster
- 0x0D: Total integral of pressure for cold fuel firing over the Thruster lifetime
- 0x0E: Total number of commanded cold oxidizer firing during Thruster lifetime
- 0x0F: Total commanded cold oxidizer firing burntime of the Thruster
- 0x10: Total integral of pressure for cold ox firing over the Thruster lifetime

0x2612 - Fuel Feedline 1

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x0A
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Valve Command	UNSIGNED8	ro	t	no	0
0x04	Valve State	UNSIGNED8	ro	r	no	0
0x05	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x07	Heater Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2892
0x08	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x09	Valve heating voltage [mV]	UNSIGNED16	rw	t	no	0
0x0A	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Fuel Feedline 1

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,
- 0x03: Should not be used directly (see 0x2500)
  - VALVE_CMD_CLOSE = 0,
  - VALVE_CMD_OPEN = 1,
  - VALVE_CMD_HEAT = 2,
- 0x04:
  - VALVE_STATE_CLOSED = 0,
  - VALVE_STATE_HIT = 1,
  - VALVE_STATE_HOLD = 2,
  - VALVE_STATE_CLOSING = 3,
  - VALVE_STATE_HEATING = 4,
- 0x0A: heater duty cycle when not manually overrided - stored in non-volatile memory

0x2613 - Fuel Feedline 2

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x0A

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Valve Command	UNSIGNED8	ro	t	no	0
0x04	Valve State	UNSIGNED8	ro	r	no	0
0x05	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x07	Heater Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2892
0x08	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x09	Valve heating voltage [mV]	UNSIGNED16	rw	t	no	0
0x0A	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Fuel Feedline 2

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,
- 0x03: Should not be used directly (see 0x2500)
  - VALVE_CMD_CLOSE = 0,
  - VALVE_CMD_OPEN = 1,
  - VALVE_CMD_HEAT = 2,
- 0x04:
  - VALVE_STATE_CLOSED = 0,
  - VALVE_STATE_HIT = 1,
  - VALVE_STATE_HOLD = 2,
  - VALVE_STATE_CLOSING = 3,
  - VALVE_STATE_HEATING = 4,
- 0x0A: heater duty cycle when not manually overrided - stored in non-volatile memory

0x2614 - Oxidizer Feedline 1

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x0A
0x01	Heater Command	UNSIGNED8	rw	t	no	0

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Valve Command	UNSIGNED8	ro	t	no	0
0x04	Valve State	UNSIGNED8	ro	r	no	0
0x05	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x07	Heater Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2892
0x08	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x09	Valve heating voltage [mV]	UNSIGNED16	rw	t	no	0
0x0A	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Oxidizer Feedline 1

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,
- 0x03: Should not be used directly (see 0x2500)
  - VALVE_CMD_CLOSE = 0,
  - VALVE_CMD_OPEN = 1,
  - VALVE_CMD_HEAT = 2,
- 0x04:
  - VALVE_STATE_CLOSED = 0,
  - VALVE_STATE_HIT = 1,
  - VALVE_STATE_HOLD = 2,
  - VALVE_STATE_CLOSING = 3,
  - VALVE_STATE_HEATING = 4,
- 0x0A: heater duty cycle when not manually overrided - stored in non-volatile memory

0x2615 - Oxidizer Feedline 2

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x0A
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x03	Valve Command	UNSIGNED8	ro	t	no	0
0x04	Valve State	UNSIGNED8	ro	r	no	0
0x05	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x07	Heater Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2892
0x08	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x09	Valve heating voltage [mV]	UNSIGNED16	rw	t	no	0
0x0A	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Oxidizer Feedline 2

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,
- 0x03: Should not be used directly (see 0x2500)
  - VALVE_CMD_CLOSE = 0,
  - VALVE_CMD_OPEN = 1,
  - VALVE_CMD_HEAT = 2,
- 0x04:
  - VALVE_STATE_CLOSED = 0,
  - VALVE_STATE_HIT = 1,
  - VALVE_STATE_HOLD = 2,
  - VALVE_STATE_CLOSING = 3,
  - VALVE_STATE_HEATING = 4,
- 0x0A: heater duty cycle when not manually overrided - stored in non-volatile memory

0x2616 - Fuel Tank 1

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x05	Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2832
0x06	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x07	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Fuel Tank 1

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,
- 0x07: heater duty cycle when not manually overrided - stored in non-volatile memory

0x2617 - Fuel Tank 2

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x05	Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2832
0x06	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x07	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Fuel Tank 2

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,

- 0x07: heater duty cycle when not manually overrided - stored in non-volatile memory

0x2618 - Fuel Tank 3

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x05	Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2832
0x06	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x07	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Fuel Tank 3

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,
- 0x07: heater duty cycle when not manually overrided - stored in non-volatile memory

0x2619 - Fuel Tank 4

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x05	Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2832
0x06	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x07	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Fuel Tank 4

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,
- 0x07: heater duty cycle when not manually overrided - stored in non-volatile memory

0x261A - Fuel Tank 5

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x05	Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2832
0x06	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x07	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Fuel Tank 5

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,

- 0x07: heater duty cycle when not manually overrided - stored in non-volatile memory

0x261B - Fuel Tank 6

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x05	Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2832
0x06	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x07	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Fuel Tank 6

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,
- 0x07: heater duty cycle when not manually overrided - stored in non-volatile memory

0x261C - Fuel Tank 7

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x05	Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2832
0x06	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x07	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Fuel Tank 7

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,
- 0x07: heater duty cycle when not manually overrided - stored in non-volatile memory

0x261D - Fuel Tank 8

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x05	Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2832
0x06	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x07	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Fuel Tank 8

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,

- 0x07: heater duty cycle when not manually overrided - stored in non-volatile memory

0x261E - Oxidizer Tank 1

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x05	Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2832
0x06	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x07	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Oxidizer Tank 1

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,
- 0x07: heater duty cycle when not manually overrided - stored in non-volatile memory

0x261F - Oxidizer Tank 2

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x05	Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2832
0x06	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x07	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Oxidizer Tank 2

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,
- 0x07: heater duty cycle when not manually overrided - stored in non-volatile memory

0x2620 - Oxidizer Tank 3

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x05	Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2832
0x06	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x07	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Oxidizer Tank 3

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,

- 0x07: heater duty cycle when not manually overrided - stored in non-volatile memory

0x2621 - Oxidizer Tank 4

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x05	Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2832
0x06	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x07	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Oxidizer Tank 4

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,
- 0x07: heater duty cycle when not manually overrided - stored in non-volatile memory

0x2622 - Oxidizer Tank 5

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x05	Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2832
0x06	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x07	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Oxidizer Tank 5

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,
- 0x07: heater duty cycle when not manually overrided - stored in non-volatile memory

0x2623 - Oxidizer Tank 6

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x05	Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2832
0x06	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x07	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Oxidizer Tank 6

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,

- 0x07: heater duty cycle when not manually overrided - stored in non-volatile memory

0x2624 - Oxidizer Tank 7

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0
0x05	Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2832
0x06	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x07	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Oxidizer Tank 7

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,
- 0x07: heater duty cycle when not manually overrided - stored in non-volatile memory

0x2625 - Oxidizer Tank 8

Object Type	Count Label	Storage Group
RECORD		RAM

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x00	Highest sub-index supported	UNSIGNED8	ro	no	no	0x07
0x01	Heater Command	UNSIGNED8	rw	t	no	0
0x02	Heater State	UNSIGNED8	ro	r	no	0
0x03	Temperature [0.1K]	UNSIGNED16	ro	r	no	0

Sub	Name	Data Type	SDO	PDO	SRDO	Default Value
0x05	Temperature Setpoint [0.1K]	UNSIGNED16	rw	t	no	2832
0x06	Heater Duty Cycle [%]	UNSIGNED8	rw	t	no	70
0x07	Default Heater Duty Cycle [%]	UNSIGNED8	rw	no	no	70

Monitoring and configuration of Oxidizer Tank 8

- 0x01: Should not be used directly (see 0x2500)
  - HEATER_CMD_OFF = 0,
  - HEATER_CMD_ON = 1,
  - HEATER_CMD_AUTO = 2,
- 0x02:
  - HEATER_STATE_OFF = 0,
  - HEATER_STATE_ON = 1,
  - HEATER_STATE_AUTO = 2,
- 0x07: heater duty cycle when not manually overrided - stored in non-volatile memory