

# DeviceNet protocol

## Overview

DeviceNet protocol is available on VAMP relay with an optional external VSE 009 DeviceNet module. The protocol can be used to read / write data from the relay using request / response communication and via cyclic I/O messages, transporting data assigned to assemblies (sets of data). VAMP relay with the DeviceNet protocol selected on the Remote port serves as an adapter which means that it is not able to initiate communication with other devices in the network.

## Main configuration

Main configuration parameters of the DeviceNet interface are as follows:

Parameter	Range	Description
Bit rate	[125, 250, 500] kbps	DeviceNet network's bit rate
Slave unit	0-63	Slave unit address on the network
Vendor ID	1-65535	Identification of a vendor by number
Device Type	0-65535	Indication of general type of product
Product Code	1-65535	Identification of a particular product of an individual vendor
Major Revision	1-127	Major revision of the item the Identity Object represents
Minor Revision	1-255	Minor revision of the item the Identity Object represents
Serial Number	0-4294967295	Serial number of a device
Product Name	32 chars	Human readable identification

## Bit rate

This is a baud rate of the DeviceNet network. For the device to work properly in the network, its Bit rate parameter must match baud rate used on the network. The Bit rate parameter can be set to one of three possible values: 125, 250 or 500 kbps. Default value of this parameter is 125 kbps as required by the DeviceNet specification.

## Slave unit

This is a MAC ID of the device. It uniquely identifies the device in the DeviceNet network. Main range of this parameter is 0 to 63 and it has to be set to a value that will not cause a duplicate MAC ID problem. There is also a possibility to set this parameter to -1 (only available via GETSET) to allow MAC ID setting from the network. Default value of this parameter is 63.

## Required objects

DeviceNet implementation on VAMP relay supports all required standard objects with their required attributes. The required objects are:

- Identity Object (Class Code 0x01)
- Message Router Object (Class Code 0x02)
- DeviceNet Object (Class Code 0x03)
- Assembly Object (Class Code 0x04)
- Connection Object (Class Code 0x05)

## Data model

VAMP process data are mapped into 2 standard objects (Control Supervisor Object and Overload Object) and 2 private objects (VAMP Digital Object and Vamp Analog Object). All attributes of these objects are available to be included in assemblies. Object definitions are as follows:

### Overload Object, Class Code 0x2C

Attribute ID	Access Rule	Name	Data Type	Description of Attribute
5	GET	AvgCurrent	INT	Average of the three phase current
6	GET	%PhImbal	USINT	% Phase Imbalance
7	GET	%Thermal	USINT	% Thermal Capacity
8	GET	CurrentL1	INT	Actual motor phase current L1
9	GET	CurrentL2	INT	Actual motor phase current L2
10	GET	CurrentL3	INT	Actual motor phase current L3
11	GET	GroundCurrent	INT	Ground Current

Control Supervisor Object, Class Code 0x29

Attribute ID	Access Rule	Name	Data Type	Description of Attribute
10	GET	Faulted	BOOL	1 = Fault Occurred (latched); 0 = No Faults present
12	SET	FaultRst	BOOL	0->1 = Fault Reset 0 = No action To make possible standard assembly content (FaultReset bit is 3rd), this item shall be written as 0x04 instead of 0x01
13	GET	FaultCode	UINT	If in Faulted state, FaultCode indicates the fault that caused the transition to Faulted state. If not in Faulted state, FaultCode indicates the fault that caused the last transition to the Faulted state. Power up state of fault code is 0.
22	GET   SET	CycleCount	UDINT	Number of operations (motor starts) on the equipment.  Note: Vamp variable used for this attribute is UINT (unsigned 16 bit integer)
23	GET	Fault/Warning Code Style	USINT	Identifies the error and warning codes produced by this instance of Control Supervisor. Default = 0

VAMP Digital Object, Class Code 0x64 (private object)

Attribute ID	Access	Name	Data Type	Scaling
1	GET	DI	UDINT	1 = 1
2	GET	Output relays	UINT	1 = 1
3	GET	Alive indicator	BOOL	1 = 1
4	GET	Events	STRUCT OF: UDINT – secSinceGenesis UINT – milliseconds UINT – event code	1 = 1
5	GET	Obj1 state	USINT	Open=0,Close=1,Undef=2
6	GET	Obj2 state	USINT	Open=0,Close=1,Undef=2
7	GET	Obj3 state	USINT	Open=0,Close=1,Undef=2
8	GET	Obj4 state	USINT	Open=0,Close=1,Undef=2
9	GET	Obj5 state	USINT	Open=0,Close=1,Undef=2
10	GET	Obj6 state	USINT	Open=0,Close=1,Undef=2
11	GET   SET	Remote/Local State	BOOL	REMOTE=0,LOCAL=1
12	GET   SET	Open select Obj1	BOOL	1 = 1
13	GET   SET	Close select Obj1	BOOL	1 = 1
14	SET	Execute operation Obj1	BOOL	1 = 1
15	SET	Cancel selected operation	BOOL	1 = 1
16	GET   SET	Max ctrl pulse length of Obj1	USINT	1.00 s = 100
17	GET   SET	Open select Obj2	BOOL	1 = 1
18	GET   SET	Close select Obj2	BOOL	1 = 1
19	SET	Execute operation Obj2	BOOL	1 = 1
20	GET   SET	Max ctrl pulse length of Obj2	USINT	1.00 s = 100
21	GET   SET	OM_MB_Reset Latches	BOOL	1 = 1
22	GET   SET	Synchronize minutes	BOOL	1 = 1
23	GET   SET	Open select Obj3	BOOL	1 = 1
24	GET   SET	Close select Obj3	BOOL	1 = 1

25	SET	Execute operation Obj3	BOOL	1 = 1
26	GET   SET	Max ctrl pulse length of Obj3	USINT	1.00 s = 100
27	GET   SET	Open select Obj4	BOOL	1 = 1
28	GET   SET	Close select Obj4	BOOL	1 = 1
29	SET	Execute operation Obj4	BOOL	1 = 1
30	GET   SET	Max ctrl pulse length of Obj4	USINT	1.00 s = 100
31	GET	Pos. sequence I1	INT	1 A = 1
32	GET	Neg. sequence I2	INT	1 A = 1
33	GET	Current - seq./+seq.	INT	1.0 % = 10
34	GET	Current phase seq.	USINT	??=0,OK=1,Reverse=2
35	GET	Pos. sequence U1	INT	1000 V = 1000
36	GET	Neg. sequence U2	INT	1000 V = 1000
37	GET	Voltage - seq./+seq.	INT	1.0 % = 10
38	GET	Voltage phase seq.	SINT	??=0,OK=1,Reverse=2
39	GET	DI1 counter	UINT	1 = 1
40	GET	DI2 counter	UINT	1 = 1
41	GET	DI3 counter	UINT	1 = 1
42	GET	DI4 counter	UINT	1 = 1
43	GET	DI5 counter	UINT	1 = 1
44	GET	DI6 counter	UINT	1 = 1
45	GET	DI19 counter	UINT	1 = 1
46	GET	DI20 counter	UINT	1 = 1
47	GET	Shot1 start counter	UINT	1 = 1
48	GET	Shot2 start counter	UINT	1 = 1
49	GET	Shot3 start counter	UINT	1 = 1
50	GET	Shot4 start counter	UINT	1 = 1
51	GET	Shot5 start counter	UINT	1 = 1
52	GET	AR start counter	UINT	1 = 1

53	GET	AR fail counter	UINT	1 = 1
54	GET	Stage start state	BOOL	Start=1
55	GET	Stage trip state	BOOL	Trip=1
56	GET	AR shot number	USINT	1,2,3,4,5,END=6
57	GET	Critical AR req.	BOOL	1 = 1
58	GET	Reclose locked	BOOL	1 = 1
59	GET	Reclose running	BOOL	1 = 1
60	GET	Final trip	BOOL	1 = 1
61	GET	Autoreclose on	BOOL	1 = 1
62	GET	N> alarm	BOOL	1 = 1
63	GET	Motor start disabled	BOOL	1 = 1
64	GET	Motor starting	BOOL	1 = 1
65	GET	Motor running	BOOL	1 = 1
66	GET	Voltage interrupt	USINT	LOW=0,ok=1
67	GET	Timer 1 status	BOOL	0=1,1=2
68	GET	Timer 2 status	BOOL	0=1,1=2
69	GET	Timer 3 status	BOOL	0=1,1=2
70	GET	Timer 4 status	BOOL	0=1,1=2
71	GET	Voltage status	USINT	OK=0,LOW=1,HIGH=2,LOW/HIGH=3, (OK)=4,(LOW)=5,(HIGH)=6,(LOW)/HIGH=7
72	GET	Logic output states 1...10	BOOL	1 = 1
73	GET	Alarm 2	BOOL	1 = 1
74	GET	Alarm 2	BOOL	1 = 1
75	GET	Alarm L1..L3	BOOL	1 = 1
76	GET	Fault L1..L3	BOOL	1 = 1
77	GET	SetGrp common change	BOOL	1=0,2=1
78	GET   SET	Open select Obj5	BOOL	1 = 1
79	GET   SET	Close select Obj5	BOOL	1 = 1
80	SET	Execute operation Obj5	BOOL	1 = 1
81	GET   SET	Max ctrl pulse length of Obj5	USINT	1.00 s = 100

82	GET   SET	Open select Obj6	BOOL	1 = 1
83	GET   SET	Close select Obj6	BOOL	1 = 1
84	SET	Execute operation Obj6	BOOL	1 = 1
85	GET   SET	Max ctrl pulse length of Obj6	USINT	1.00 s = 100
86	GET	Sync1 req.	BOOL	1 = 1
87	GET	Sync1 OK	BOOL	1 = 1
88	GET	Bypass	BOOL	1 = 1
89	GET	Sync1 fail	BOOL	1 = 1
90	GET	Phase angle difference	INT	1 ° = 1
91	GET	Sync2 req.	BOOL	1 = 1
92	GET	Sync2 OK	BOOL	1 = 1
93	GET	Bypass	BOOL	1 = 1
94	GET	Sync2 fail	BOOL	1 = 1
95	SET	DirectO1O	BOOL	1 = 1
96	SET	DirectO1C	BOOL	1 = 1
97	SET	DirectO2O	BOOL	1 = 1
98	SET	DirectO2C	BOOL	1 = 1
99	SET	DirectO3O	BOOL	1 = 1
100	SET	DirectO3C	BOOL	1 = 1
101	SET	DirectO4O	BOOL	1 = 1
102	SET	DirectO4C	BOOL	1 = 1
103	SET	DirectO5O	BOOL	1 = 1
104	SET	DirectO5C	BOOL	1 = 1
105	SET	DirectO6O	BOOL	1 = 1
106	SET	DirectO6C	BOOL	1 = 1
107	GET   SET	Virtual input 1	BOOL	0,1
108	GET   SET	Virtual input 2	BOOL	0,1
109	GET   SET	Virtual input 3	BOOL	0,1
110	GET   SET	Virtual input 4	BOOL	0,1
111	GET	Obj7 state	USINT	Open=0,Close=1,Undef=2
112	GET	Obj8 state	USINT	Open=0,Close=1,Undef=2
113	GET	Logic output states 9...16	USINT	1 = 1
114	GET	Logic output states 17...20	USINT	1 = 1
115	GET	Virtual outputs	USINT	1 = 1
116	GET	Diagnostic register 1	UINT	1 = 1
117	GET	Diagnostic register 2	UINT	1 = 1
118	GET	Diagnostic register 3	UINT	1 = 1
119	GET	Diagnostic register 4	UINT	1 = 1

120	GET	Engine running hours	UDINT	1 h = 1
121	GET	Engine running seconds	UINT	1 s = 1
122	GET	Start counter	UINT	1 = 1
123	GET   SET	Reset diagnostics	BOOL	RESET=1
124	GET	Clear min & max	BOOL	Clear=1
125	GET	Pos. sequence I'1	INT	1 A = 1
126	GET	Neg. sequence I'2	INT	1 A = 1
127	GET	Current I' - seq./+seq.	INT	1.0 % = 10
128	GET	Current I' phase seq.	SINT	??=0,OK=1,Reverse=2

VAMP Analog Object, Class Code 0x65 (private object)

Attribute ID	Access	Name	Data Type	Scaling
1	GET	Phase current IL1	INT	1 A = 1
2	GET	Phase current IL2	INT	1 A = 1
3	GET	Phase current IL3	INT	1 A = 1
4	GET	Frequency	INT	50.000 Hz = 5000
5	GET	Io1 residual current	INT	1.000 pu = 1000
6	GET	Io2 residual current	INT	1.000 pu = 1000
7	GET	Zero sequence voltage	INT	1.0 % = 10
8	GET	Active power	INT	1000 kW = 1000
9	GET	Reactive power	INT	1000 kvar = 1000
10	GET	Apparent power	INT	1000 kVA = 1000
11	GET	Line-to-line voltage U12	UINT	1000 V = 1000
12	GET	Line-to-line voltage U23	UINT	1000 V = 1000
13	GET	Line-to-line voltage U31	UINT	1000 V = 1000
14	GET	Exported energy	UDINT	1.000 MWh = 1000
15	GET	Imported energy	UDINT	1.000 MWh = 1000

16	GET	Exp. reactive energy	UDINT	1.000 Mvarh = 1000
17	GET	Imp. reactive energy	UDINT	1.000 Mvarh = 1000
18	GET	Power factor	USINT	1.00 = 100
19	GET	Phase-to-earth voltage UL1	UINT	1000 V = 1000
20	GET	Phase-to-earth voltage UL2	UINT	1000 V = 1000
21	GET	Phase-to-earth voltage UL3	UINT	1000 V = 1000
22	GET	Tan phii	INT	1.000 = 1000
23	GET	Phase current IL	INT	1 A = 1
24	GET	Average line voltage	UINT	1000 V = 1000
25	GET	Average phase voltage	UINT	1000 V = 1000
26	GET	Phase current THD	INT	1.0 % = 10
27	GET	IL1 THD	INT	1.0 % = 10
28	GET	IL2 THD	INT	1.0 % = 10
29	GET	IL3 THD	INT	1.0 % = 10
30	GET	HARMONICS of IL1	SINT	1 % = 1
31	GET	HARMONICS of IL2	SINT	1 % = 1
32	GET	HARMONICS of IL3	SINT	1 % = 1
33	GET	Min. of IL1 IL2 IL3	INT	1 A = 1
34	GET	Max. of IL1 IL2 IL3	INT	1 A = 1
35	GET	Phase current ILRMS	INT	1 Arms = 1
36	GET	Phase current IL1RMS	INT	1 Arms = 1
37	GET	Phase current IL2RMS	INT	1 Arms = 1
38	GET	Phase current IL3RMS	INT	1 Arms = 1
39	GET	Temperature rise	INT	1.0 % = 10
40	GET   SET	Ambient temperature	SINT	1 °C = 1
41	GET	IL1da demand	INT	1 A = 1
42	GET	IL2da demand	INT	1 A = 1

43	GET	IL3da demand	INT	1 A = 1
44	GET	IoCalc demand	INT	1.00 pu = 100
45	GET	Io1 demand	INT	1.000 pu = 1000
46	GET	Io2 demand	INT	1.000 pu = 1000
47	GET	Voltage THD	UINT	1.0 % = 10
48	GET	Ua THD	UINT	1.0 % = 10
49	GET	Ub THD	UINT	1.0 % = 10
50	GET	Uc THD	UINT	1.0 % = 10
51	GET	HARMONICS of Ua	USINT	1 % = 1
52	GET	HARMONICS of Ub	USINT	1 % = 1
53	GET	HARMONICS of Uc	USINT	1 % = 1
54	GET	Min of line voltages	UINT	1000 V = 1000
55	GET	Max of line voltages	UINT	1000 V = 1000
56	GET	Min. of phase voltages	UINT	1000 V = 1000
57	GET	Max. of phase voltages	UINT	1000 V = 1000
58	GET	Voltage mean	UINT	1000 Vrms = 1000
59	GET	Input voltage Ua	UINT	1000 Vrms = 1000
60	GET	Input voltage Ub	UINT	1000 Vrms = 1000
61	GET	Input voltage Uc	UINT	1000 Vrms = 1000
62	GET	U12 demand	UINT	1000 V = 1000
63	GET	U23 demand	UINT	1000 V = 1000
64	GET	U31 demand	UINT	1000 V = 1000
65	GET	UL1 demand	UINT	1000 V = 1000
66	GET	UL2 demand	UINT	1000 V = 1000
67	GET	UL3 demand	UINT	1000 V = 1000
68	GET	Cosine phii	USINT	1.00 = 100
69	GET	Cosine of phase L1	USINT	1.00 = 100
70	GET	Cosine of phase L2	USINT	1.00 = 100
71	GET	Cosine of phase L3	USINT	1.00 = 100
72	GET	Power angle	INT	1 ° = 1
73	GET	Phase L1 active power	INT	1000 kW = 1000
74	GET	Phase L2 active power	INT	1000 kW = 1000
75	GET	Phase L3 active power	INT	1000 kW = 1000

76	GET	Phase L1 reactive power	INT	1000 kvar = 1000
77	GET	Phase L2 reactive power	INT	1000 kvar = 1000
78	GET	Phase L3 reactive power	INT	1000 kvar = 1000
79	GET	Phase L1 apparent power	INT	1000 kVA = 1000
80	GET	Phase L2 apparent power	INT	1000 kVA = 1000
81	GET	Phase L3 apparent power	INT	1000 kVA = 1000
82	GET	RMS active power	INT	1000 kW = 1000
83	GET	RMS reactive power	INT	1000 kvar = 1000
84	GET	RMS apparent power	INT	1000 kVA = 1000
85	GET	Active power demand	INT	1000 kW = 1000
86	GET	Reactive power demand	INT	1000 kvar = 1000
87	GET	Apparent power demand	INT	1000 kVA = 1000
88	GET	Power factor demand	INT	1.00 = 100
89	GET	RMS active power demand	INT	1000 kW = 1000
90	GET	RMS reactive power demand	INT	1000 kvar = 1000
91	GET	RMS apparent power demand	INT	1000 kVA = 1000
92	GET	Calculated I <sub>o</sub>	INT	1.000 pu = 1000
93	GET	Fault current of I <sub>&gt;</sub>	INT	1.00 = 100
94	GET	Fault current of I <sub>&gt;&gt;</sub>	INT	1.00 = 100
95	GET	Fault current of I <sub>&gt;&gt;&gt;</sub>	INT	1.00 = 100
96	GET	Fault reactance	UINT	1.00 ohm = 100

97	GET	Frequency fy	UINT	50.000 Hz = 5000
98	GET	Line-to-line voltage U12y	INT	1000 V = 1000
99	GET	Frequency fz	UINT	50.000 Hz = 5000
100	GET	Line-to-line voltage U12z	INT	1000 V = 1000
101	GET	Phase angle difference	INT	1 ° = 1
102	GET   SET	Minimum frequency	INT	50.000 Hz = 50000
103	GET   SET	Minimum active power	INT	1 kW = 1
104	GET   SET	Minimum react. power	INT	1 kvar = 1
105	GET   SET	Minimum apparent power	INT	1 kVA = 1
106	GET   SET	Min power factor	INT	1.000 = 1000
107	GET   SET	Minimum of Io	INT	1.0 % = 10
108	GET   SET	Minimum of Io2	INT	1.0 % = 10
109	GET   SET	Minimum active power	INT	1 kW = 1
110	GET   SET	Minimum react. power	INT	1 kvar = 1
111	GET   SET	Minimum apparent power	INT	1 kVA = 1
112	GET   SET	15 min minimum power factor	INT	1.000 = 1000
113	GET   SET	Minimum active power	INT	1 kW = 1
114	GET   SET	Minimum react. power	INT	1 kvar = 1
115	GET   SET	Minimum apparent power	INT	1 kVA = 1
116	GET   SET	Minimum of IL1	INT	1 A = 1
117	GET   SET	Minimum of IL2	INT	1 A = 1
118	GET   SET	Minimum of IL3	INT	1 A = 1
119	GET   SET	RMS minimum of IL1	INT	1 Arms = 1
120	GET   SET	RMS minimum of IL2	INT	1 Arms = 1
121	GET   SET	RMS minimum of IL3	INT	1 Arms = 1

122	GET   SET	Minimum of IL1	INT	1 A = 1
123	GET   SET	Minimum of IL2	INT	1 A = 1
124	GET   SET	Minimum of IL3	INT	1 A = 1
125	GET   SET	RMS minimum of IL1	INT	1 Arms = 1
126	GET   SET	RMS minimum of IL2	INT	1 Arms = 1
127	GET   SET	RMS minimum of IL3	INT	1 Arms = 1
128	GET   SET	Minimum of U12	INT	1 V = 1
129	GET   SET	Minimum of U23	INT	1 V = 1
130	GET   SET	Minimum of U31	INT	1 V = 1
131	GET   SET	Maximum frequency	INT	50.000 Hz = 50000
132	GET   SET	Maximum active power	INT	1 kW = 1
133	GET   SET	Maximum react. power	INT	1 kvar = 1
134	GET   SET	Maximum apparent power	INT	1 kVA = 1
135	GET   SET	Max power factor	INT	1.000 = 1000
136	GET   SET	Maximum of Io	INT	1.0 % = 10
137	GET   SET	Maximum of Io2	INT	1.0 % = 10
138	GET   SET	Maximum active power	INT	1 kW = 1
139	GET   SET	Maximum react. power	INT	1 kvar = 1
140	GET   SET	Maximum apparent power	INT	1 kVA = 1
141	GET   SET	15 min maximum power factor	INT	1.000 = 1000
142	GET   SET	Maximum active power	INT	1 kW = 1
143	GET   SET	Maximum react. power	INT	1 kvar = 1
144	GET   SET	Maximum apparent power	INT	1 kVA = 1
145	GET   SET	Maximum of IL1	INT	1 A = 1

146	GET   SET	Maximum of IL2	INT	1 A = 1
147	GET   SET	Maximum of IL3	INT	1 A = 1
148	GET   SET	RMS maximum of IL1	INT	1 Arms = 1
149	GET   SET	RMS maximum of IL2	INT	1 Arms = 1
150	GET   SET	RMS maximum of IL3	INT	1 Arms = 1
151	GET   SET	Maximum of IL1	INT	1 A = 1
152	GET   SET	Maximum of IL2	INT	1 A = 1
153	GET   SET	Maximum of IL3	INT	1 A = 1
154	GET   SET	RMS maximum of IL1	INT	1 Arms = 1
155	GET   SET	RMS maximum of IL2	INT	1 Arms = 1
156	GET   SET	RMS maximum of IL3	INT	1 Arms = 1
157	GET   SET	Maximum of U12	INT	1 V = 1
158	GET   SET	Maximum of U23	INT	1 V = 1
159	GET   SET	Maximum of U31	INT	1 V = 1
160	GET	Z12 primary impedance	INT	1.00 ohm = 100
161	GET	Z23 primary impedance	INT	1.00 ohm = 100
162	GET	Z31 primary impedance	INT	1.00 ohm = 100
163	GET	Z12 secondary impedance	INT	1.00 ohm = 100
164	GET	Z23 secondary impedance	INT	1.00 ohm = 100
165	GET	Z31 secondary impedance	INT	1.00 ohm = 100
166	GET	Z12 angle	INT	1 ° = 1
167	GET	Z23 angle	INT	1 ° = 1
168	GET	Z31 angle	INT	1 ° = 1
169	GET	Phase current I'L1	INT	1 A = 1
170	GET	Phase current I'L2	INT	1 A = 1
171	GET	Phase current I'L3	INT	1 A = 1
172	GET	IL1 difference	INT	1.00 xIn = 100
173	GET	IL2 difference	INT	1.00 xIn = 100

174	GET	IL3 difference	INT	1.00 xIn = 100
175	GET	Phase current I' THD	INT	1.0 % = 10
176	GET	I'L1 THD	INT	1.0 % = 10
177	GET	I'L2 THD	INT	1.0 % = 10
178	GET	I'L3 THD	INT	1.0 % = 10
179	GET	HARMONICS of I'L1	USINT	1 % = 1
180	GET	HARMONICS of I'L2	USINT	1 % = 1
181	GET	HARMONICS of I'L3	USINT	1 % = 1
182	GET	Min. of I'L1 I'L2 I'L3	INT	1 A = 1
183	GET	Max. of I'L1 I'L2 I'L3	INT	1 A = 1
184	GET	Phase current I'LRMS	INT	1 Arms = 1
185	GET	Phase current I'L1RMS	INT	1 Arms = 1
186	GET	Phase current I'L2RMS	INT	1 Arms = 1
187	GET	Phase current I'L3RMS	INT	1 Arms = 1

Additionally, the interface implementation includes 4 private objects with the configuration parameters of VAMP relay protection stages (VAMP StgProtCurrent Object, VAMP StgProtEF Object, VAMP StgProtOther Object, VAMP StgGeneral Object). Attributes of these objects are not available for including in the assemblies. Their definitions are as follows:

VAMP StgProtCurrent Object, Class Code 0x66 (private object)

NOTE: Whenever in consecutive rows there are two attributes with the same names, the first attribute is for Setting Group 1 and the second for Setting Group 2. In the EDS file there will be also two attributes with the same description for first and second setting group respectively. This concerns group dependent parameters in all four objects.

Attribute ID	Access	Name	Data Type	Scaling
1	GET   SET	Enable for l>	BOOL	Off=0,On=1
2	GET   SET	Group	USINT	1=0,2=1
3	GET   SET	Pick-up setting	UDINT	1.00 xln = 100
4	GET   SET	Pick-up setting	UDINT	1.00 xln = 100
5	GET   SET	Delay curve family	USINT	DT=0,IEC=1,IEEE=2,IEEE2=3,RI=4, Prg1=5,Prg2=6,Prg3=7
6	GET   SET	Delay curve family	USINT	DT=0,IEC=1,IEEE=2,IEEE2=3,RI=4, Prg1=5,Prg2=6,Prg3=7
7	GET   SET	Delay type	USINT	DT=0,NI=1,VI=2,EI=3,LTI=4,LTEI=5, LTVI=6,MI=7,STI=8,STEI=9,RI=10,R XIDG=11,
8	GET   SET	Delay type	USINT	DT=0,NI=1,VI=2,EI=3,LTI=4,LTEI=5, LTVI=6,MI=7,STI=8,STEI=9,RI=10,R XIDG=11,
9	GET   SET	Inv. time coefficient k	UDINT	1.00 = 100
10	GET   SET	Inv. time coefficient k	UDINT	1.00 = 100
11	GET   SET	Include harmonics	BOOL	Off=0,On=1
12	GET   SET	Constant A	UDINT	1.000 = 1000
13	GET   SET	Constant B	UDINT	1.000 = 1000
14	GET   SET	Constant C	UDINT	1.000 = 1000
15	GET   SET	Constant D	UDINT	1.000 = 1000
16	GET   SET	Constant E	UDINT	1.000 = 1000
17	GET   SET	Enable for l>>	BOOL	Off=0,On=1
18	GET   SET	Group	USINT	1=0,2=1
19	GET   SET	Pick-up setting	UDINT	1.00 xln = 100
20	GET   SET	Pick-up setting	UDINT	1.00 xln = 100
21	GET   SET	Operation delay	UDINT	1.00 s = 100
22	GET   SET	Operation delay	UDINT	1.00 s = 100
23	GET   SET	Enable for l>>>	BOOL	Off=0,On=1
24	GET   SET	Group	USINT	1=0,2=1
25	GET   SET	Pick-up setting	UDINT	1.00 xln = 100
26	GET   SET	Pick-up setting	UDINT	1.00 xln = 100
27	GET   SET	Operation delay	UDINT	1.00 s = 100
28	GET   SET	Operation delay	UDINT	1.00 s = 100
29	GET   SET	Enable for IDir>	BOOL	Off=0,On=1
30	GET   SET	Group	USINT	1=0,2=1
31	GET   SET	Pick-up setting	UDINT	1.00 xln = 100
32	GET   SET	Pick-up setting	UDINT	1.00 xln = 100

33	GET   SET	Direction mode	USINT	Dir=0,Undir=1
34	GET   SET	Direction mode	USINT	Dir=0,Undir=1
35	GET   SET	Angle offset	UINT	1 ř = 1
36	GET   SET	Angle offset	UINT	1 ř = 1
37	GET   SET	Delay curve family	USINT	DT=0,IEC=1,IEEE=2,IEEE2=3,RI=4, Prg1=5,Prg2=6,Prg3=7
38	GET   SET	Delay curve family	USINT	DT=0,IEC=1,IEEE=2,IEEE2=3,RI=4, Prg1=5,Prg2=6,Prg3=7
39	GET   SET	Delay type	USINT	DT=0,NI=1,VI=2,EI=3,LTI=4,LTEI=5, LTVI=6,MI=7,STI=8,STEI=9,RI=10,R XIDG=11,
40	GET   SET	Delay type	USINT	DT=0,NI=1,VI=2,EI=3,LTI=4,LTEI=5, LTVI=6,MI=7,STI=8,STEI=9,RI=10,R XIDG=11,
41	GET   SET	Inv. time coefficient k	UDINT	1.00 = 100
42	GET   SET	Inv. time coefficient k	UDINT	1.00 = 100
43	GET   SET	Constant A	UDINT	1.000 = 1000
44	GET   SET	Constant B	UDINT	1.000 = 1000
45	GET   SET	Constant C	UDINT	1.000 = 1000
46	GET   SET	Constant D	UDINT	1.000 = 1000
47	GET   SET	Constant E	UDINT	1.000 = 1000
48	GET   SET	Enable for IDir>>	BOOL	Off=0,On=1
49	GET   SET	Group	USINT	1=0,2=1
50	GET   SET	Pick-up setting	UDINT	1.00 xln = 100
51	GET   SET	Pick-up setting	UDINT	1.00 xln = 100
52	GET   SET	Direction mode	USINT	Dir=0,Undir=1
53	GET   SET	Direction mode	USINT	Dir=0,Undir=1
54	GET   SET	Angle offset	UINT	1 ř = 1
55	GET   SET	Angle offset	UINT	1 ř = 1
56	GET   SET	Delay curve family	USINT	DT=0,IEC=1,IEEE=2,IEEE2=3,RI=4, Prg1=5,Prg2=6,Prg3=7
57	GET   SET	Delay curve family	USINT	DT=0,IEC=1,IEEE=2,IEEE2=3,RI=4, Prg1=5,Prg2=6,Prg3=7
58	GET   SET	Delay type	USINT	DT=0,NI=1,VI=2,EI=3,LTI=4,LTEI=5, LTVI=6,MI=7,STI=8,STEI=9,RI=10,R XIDG=11,
59	GET   SET	Delay type	USINT	DT=0,NI=1,VI=2,EI=3,LTI=4,LTEI=5, LTVI=6,MI=7,STI=8,STEI=9,RI=10,R XIDG=11,
60	GET   SET	Inv. time coefficient k	UDINT	1.00 = 100
61	GET   SET	Inv. time coefficient k	UDINT	1.00 = 100
62	GET   SET	Constant A	UDINT	1.000 = 1000

63	GET   SET	Constant B	UDINT	1.000 = 1000
64	GET   SET	Constant C	UDINT	1.000 = 1000
65	GET   SET	Constant D	UDINT	1.000 = 1000
66	GET   SET	Constant E	UDINT	1.000 = 1000
67	GET   SET	Enable for IDir>>>	BOOL	Off=0,On=1
68	GET   SET	Group	USINT	1=0,2=1
69	GET   SET	Pick-up setting	UDINT	1.00 xln = 100
70	GET   SET	Pick-up setting	UDINT	1.00 xln = 100
71	GET   SET	Direction mode	USINT	Dir=0,Undir=1
72	GET   SET	Direction mode	USINT	Dir=0,Undir=1
73	GET   SET	Angle offset	UINT	1 ř = 1
74	GET   SET	Angle offset	UINT	1 ř = 1
75	GET   SET	Operation delay	UDINT	1.00 s = 100
76	GET   SET	Operation delay	UDINT	1.00 s = 100
77	GET   SET	Enable for IDir>>>>	BOOL	Off=0,On=1
78	GET   SET	Group	USINT	1=0,2=1
79	GET   SET	Pick-up setting	UDINT	1.00 xln = 100
80	GET   SET	Pick-up setting	UDINT	1.00 xln = 100
81	GET   SET	Direction mode	USINT	Dir=0,Undir=1
82	GET   SET	Direction mode	USINT	Dir=0,Undir=1
83	GET   SET	Angle offset	UINT	1 ř = 1
84	GET   SET	Angle offset	UINT	1 ř = 1
85	GET   SET	Operation delay	UDINT	1.00 s = 100
86	GET   SET	Operation delay	UDINT	1.00 s = 100
87	GET   SET	Enable for I2>	BOOL	Off=0,On=1
88	GET   SET	Group	USINT	1=0,2=1
89	GET   SET	Pick-up setting	UDINT	1 % = 1
90	GET   SET	Pick-up setting	UDINT	1 % = 1
91	GET   SET	Delay type	USINT	DT=0,INV=1
92	GET   SET	Delay type	USINT	DT=0,INV=1
93	GET   SET	Operation delay	UDINT	1.0 s = 10
94	GET   SET	Operation delay	UDINT	1.0 s = 10
95	GET   SET	Enable for I2>>	BOOL	Off=0,On=1
96	GET   SET	Enable for Ist>	BOOL	Off=0,On=1
97	GET   SET	Motor start detection current	UDINT	1.00 xln = 100

98	GET   SET	Nom motor start current	UDINT	1.00 xIn = 100
99	GET   SET	Delay type	USINT	DT=0,INV=1
100	GET   SET	Operation delay	UDINT	1.0 s = 10
101	GET   SET	Enable for N>	BOOL	Off=0,On=1
102	GET   SET	Max motor starts/hour	UDINT	1 = 1
103	GET   SET	Min time between motor starts	UDINT	1.0 min = 10
104	GET   SET	Alarm on event	BOOL	Off=0,On=1
105	GET   SET	Alarm off event	BOOL	Off=0,On=1
106	GET   SET	Motor start disabled	BOOL	Off=0,On=1
107	GET   SET	Motor start enabled	BOOL	Off=0,On=1
108	GET   SET	Enable for l<	BOOL	Off=0,On=1
109	GET   SET	Group	USINT	1=0,2=1
110	GET   SET	Pick-up setting	UDINT	1 %In = 1
111	GET   SET	Pick-up setting	UDINT	1 %In = 1
112	GET   SET	Operation delay	UDINT	1.0 s = 10
113	GET   SET	Operation delay	UDINT	1.0 s = 10
114	GET   SET	Enable for Arcl>	BOOL	Off=0,On=1
115	GET   SET	Pick-up setting	UDINT	1.0 pu = 10
116	GET   SET	Arc inputs in use	USINT	S1=1,S2=2,S1/S2=3,BI=4,S1/BI=5,S2/BI=6,S1/S2/BI=7
117	GET   SET	Enable for Δl>	BOOL	Off=0,On=1
118	GET   SET	dl> pick-up (lbias < 0.5lgn)	UDINT	1 %In = 1
119	GET   SET	Slope1	UDINT	1 % = 1
120	GET   SET	lbias for start of slope 2	UDINT	1.00 xIn = 100
121	GET   SET	Slope2	UDINT	1 % = 1
122	GET   SET	dl> 2.harm. block enable	BOOL	Off=0,On=1
123	GET   SET	dl> 2.harm. block limit	UDINT	1 % = 1
124	GET   SET	Enable for Δl>>	BOOL	Off=0,On=1
125	GET   SET	Pick-up setting	UDINT	1.0 xIn = 10
126	GET   SET	Enable for l'2>	BOOL	Off=0,On=1
127	GET   SET	Group	USINT	1=0,2=1
128	GET   SET	Pick-up setting	UDINT	1 % = 1
129	GET   SET	Pick-up setting	UDINT	1 % = 1
130	GET   SET	Delay type	USINT	DT=0,INV=1

131	GET   SET	Delay type	USINT	DT=0,INV=1
132	GET   SET	Operation delay	UDINT	1.0 s = 10
133	GET   SET	Operation delay	UDINT	1.0 s = 10
134	GET   SET	Enable for l'>	BOOL	Off=0,On=1
135	GET   SET	Group	USINT	1=0,2=1
136	GET   SET	Pick-up setting	UDINT	1.00 xln = 100
137	GET   SET	Pick-up setting	UDINT	1.00 xln = 100
138	GET   SET	Delay curve family	USINT	DT=0,IEC=1,IEEE=2,IEEE2=3,RI=4, Prg1=5,Prg2=6,Prg3=7
139	GET   SET	Delay curve family	USINT	DT=0,IEC=1,IEEE=2,IEEE2=3,RI=4, Prg1=5,Prg2=6,Prg3=7
140	GET   SET	Delay type	USINT	DT=0,NI=1,VI=2,EI=3,LTI=4,LTEI=5, LTVI=6,MI=7,STI=8,STEI=9,RI=10,R XIDG=11,
141	GET   SET	Delay type	USINT	DT=0,NI=1,VI=2,EI=3,LTI=4,LTEI=5, LTVI=6,MI=7,STI=8,STEI=9,RI=10,R XIDG=11,
142	GET   SET	Inv. time coefficient k	UDINT	1.00 = 100
143	GET   SET	Inv. time coefficient k	UDINT	1.00 = 100
144	GET   SET	Constant A	UDINT	1.000 = 1000
145	GET   SET	Constant B	UDINT	1.000 = 1000
146	GET   SET	Constant C	UDINT	1.000 = 1000
147	GET   SET	Constant D	UDINT	1.000 = 1000
148	GET   SET	Constant E	UDINT	1.000 = 1000
149	GET   SET	Enable for l'>>	BOOL	Off=0,On=1
150	GET   SET	Group	USINT	1=0,2=1
151	GET   SET	Pick-up setting	UDINT	1.00 xln = 100
152	GET   SET	Pick-up setting	UDINT	1.00 xln = 100
153	GET   SET	Operation delay	UDINT	1.00 s = 100
154	GET   SET	Operation delay	UDINT	1.00 s = 100

VAMP StgProtEF, Class Code 0x67 (private object)

Attribute ID	Access	Name	Data Type	Scaling
1	GET   SET	Enable for lo>	BOOL	Off=0,On=1
2	GET   SET	Group	USINT	1=0,2=1
3	GET   SET	Pick-up setting	UDINT	1.000 pu = 1000
4	GET   SET	Pick-up setting	UDINT	1.000 pu = 1000
5	GET   SET	Delay curve family	USINT	DT=0,IEC=1,IEEE=2,IEEE2=3,RI=4, Prg1=5,Prg2=6,Prg3=7
6	GET   SET	Delay curve family	USINT	DT=0,IEC=1,IEEE=2,IEEE2=3,RI=4, Prg1=5,Prg2=6,Prg3=7
7	GET   SET	Delay type	USINT	DT=0,NI=1,VI=2,EI=3,LTI=4,LTEI=5, LTVI=6,MI=7,STI=8,STEI=9,RI=10,R XIDG=11,
8	GET   SET	Delay type	USINT	DT=0,NI=1,VI=2,EI=3,LTI=4,LTEI=5, LTVI=6,MI=7,STI=8,STEI=9,RI=10,R XIDG=11,
9	GET   SET	Operation delay	UDINT	1.00 s = 100
10	GET   SET	Operation delay	UDINT	1.00 s = 100
11	GET   SET	Intermittent time	UDINT	1.00 s = 100
12	GET   SET	Constant A	UDINT	1.000 = 1000
13	GET   SET	Constant B	UDINT	1.000 = 1000
14	GET   SET	Constant C	UDINT	1.000 = 1000
15	GET   SET	Constant D	UDINT	1.000 = 1000
16	GET   SET	Constant E	UDINT	1.000 = 1000
17	GET   SET	Enable for lo>>	BOOL	Off=0,On=1
18	GET   SET	Group	USINT	1=0,2=1
19	GET   SET	Pick-up setting	UDINT	1.00 pu = 100
20	GET   SET	Pick-up setting	UDINT	1.00 pu = 100
21	GET   SET	Operation delay	UDINT	1.00 s = 100
22	GET   SET	Operation delay	UDINT	1.00 s = 100
23	GET   SET	Enable for loDir>	BOOL	Off=0,On=1
24	GET   SET	Group	USINT	1=0,2=1
25	GET   SET	Direction mode	USINT	ResCap=0,Sector=1,Undir=2
26	GET   SET	Direction mode	USINT	ResCap=0,Sector=1,Undir=2
27	GET   SET	Char ctrl. in ResCap mode	USINT	Res=0,Cap=1,DI1=2,DI2=3,DI3=4 ,DI4=5,DI5=6,DI6=7,DI7=8,DI8=9, DI9=10,DI10=11,
28	GET   SET	Char ctrl. in ResCap mode	USINT	Res=0,Cap=1,DI1=2,DI2=3,DI3=4 ,DI4=5,DI5=6,DI6=7,DI7=8,DI8=9, DI9=10,DI10=11,

29	GET   SET	Pick-up setting	UDINT	1.000 pu = 1000
30	GET   SET	Pick-up setting	UDINT	1.000 pu = 1000
31	GET   SET	Uo setting for loDir> stage	UDINT	1 % = 1
32	GET   SET	Uo setting for loDir> stage	UDINT	1 % = 1
33	GET   SET	Angle offset	UINT	1 ř = 1
34	GET   SET	Angle offset	UINT	1 ř = 1
35	GET   SET	Pick up sector size	UINT	1 ř = 1
36	GET   SET	Pick up sector size	UINT	1 ř = 1
37	GET   SET	Delay curve family	USINT	DT=0,IEC=1,IEEE=2,IEEE2=3,RI=4, Prg1=5,Prg2=6,Prg3=7
38	GET   SET	Delay curve family	USINT	DT=0,IEC=1,IEEE=2,IEEE2=3,RI=4, Prg1=5,Prg2=6,Prg3=7
39	GET   SET	Delay type	USINT	DT=0,NI=1,VI=2,EI=3,LTI=4,LTEI=5, LTVI=6,MI=7,STI=8,STEI=9,RI=10,R XIDG=11,
40	GET   SET	Delay type	USINT	DT=0,NI=1,VI=2,EI=3,LTI=4,LTEI=5, LTVI=6,MI=7,STI=8,STEI=9,RI=10,R XIDG=11,
41	GET   SET	Operation delay	UDINT	1.00 s = 100
42	GET   SET	Operation delay	UDINT	1.00 s = 100
43	GET   SET	Constant A	UDINT	1.000 = 1000
44	GET   SET	Constant B	UDINT	1.000 = 1000
45	GET   SET	Constant C	UDINT	1.000 = 1000
46	GET   SET	Constant D	UDINT	1.000 = 1000
47	GET   SET	Constant E	UDINT	1.000 = 1000
48	GET   SET	Enable for loDir>>	BOOL	Off=0,On=1
49	GET   SET	Group	USINT	1=0,2=1
50	GET   SET	Direction mode	USINT	ResCap=0,Sector=1,Undir=2
51	GET   SET	Direction mode	USINT	ResCap=0,Sector=1,Undir=2
52	GET   SET	Char ctrl. in ResCap mode	USINT	Res=0,Cap=1,DI1=2,DI2=3,DI3=4 ,DI4=5,DI5=6,DI6=7,DI7=8,DI8=9, DI9=10,DI10=11,
53	GET   SET	Char ctrl. in ResCap mode	USINT	Res=0,Cap=1,DI1=2,DI2=3,DI3=4 ,DI4=5,DI5=6,DI6=7,DI7=8,DI8=9, DI9=10,DI10=11,
54	GET   SET	Pick-up setting	UDINT	1.00 pu = 100
55	GET   SET	Pick-up setting	UDINT	1.00 pu = 100
56	GET   SET	Uo setting for loDir> stage	UDINT	1 % = 1
57	GET   SET	Uo setting for loDir> stage	UDINT	1 % = 1
58	GET   SET	Angle offset	UINT	1 ř = 1

59	GET   SET	Angle offset	UINT	1 ř = 1
60	GET   SET	Pick up sector size	UINT	1 ř = 1
61	GET   SET	Pick up sector size	UINT	1 ř = 1
62	GET   SET	Delay curve family	USINT	DT=0,IEC=1,IEEE=2,IEEE2=3,RI=4, Prg1=5,Prg2=6,Prg3=7
63	GET   SET	Delay curve family	USINT	DT=0,IEC=1,IEEE=2,IEEE2=3,RI=4, Prg1=5,Prg2=6,Prg3=7
64	GET   SET	Delay type	USINT	DT=0,NI=1,VI=2,EI=3,LTI=4,LTEI=5, LTVI=6,MI=7,STI=8,STEI=9,RI=10,R XIDG=11,
65	GET   SET	Delay type	USINT	DT=0,NI=1,VI=2,EI=3,LTI=4,LTEI=5, LTVI=6,MI=7,STI=8,STEI=9,RI=10,R XIDG=11,
66	GET   SET	Operation delay	UDINT	1.00 s = 100
67	GET   SET	Operation delay	UDINT	1.00 s = 100
68	GET   SET	Constant A	UDINT	1.000 = 1000
69	GET   SET	Constant B	UDINT	1.000 = 1000
70	GET   SET	Constant C	UDINT	1.000 = 1000
71	GET   SET	Constant D	UDINT	1.000 = 1000
72	GET   SET	Constant E	UDINT	1.000 = 1000
73	GET   SET	Enable for lo>>>	BOOL	Off=0,On=1
74	GET   SET	Group	USINT	1=0,2=1
75	GET   SET	Pick-up setting	UDINT	1.00 pu = 100
76	GET   SET	Pick-up setting	UDINT	1.00 pu = 100
77	GET   SET	Operation delay	UDINT	1.00 s = 100
78	GET   SET	Operation delay	UDINT	1.00 s = 100
79	GET   SET	Compensation mode	BOOL	Off=0,On=1
80	GET   SET	Compensation current	UDINT	1.000 pu = 1000
81	GET   SET	Save unbalance current	USINT	Get=1
82	GET   SET	'Saving unbal' event	BOOL	Off=0,On=1
83	GET   SET	'Unbal saved' event	BOOL	Off=0,On=1
84	GET   SET	Enable for lo>>>>	BOOL	Off=0,On=1
85	GET   SET	Group	USINT	1=0,2=1
86	GET   SET	Pick-up setting	UDINT	1.00 pu = 100
87	GET   SET	Pick-up setting	UDINT	1.00 pu = 100
88	GET   SET	Operation delay	UDINT	1.00 s = 100

89	GET   SET	Operation delay	UDINT	1.00 s = 100
90	GET   SET	Compensation mode	BOOL	Off=0,Normal=1,Location=2
91	GET   SET	Compensation current	UDINT	1.000 pu = 1000
92	GET   SET	Save unbalance current	USINT	Get=1
93	GET   SET	Max allowed faults	UINT	1 = 1
94	GET   SET	Clear location counters	USINT	Clear=1
95	GET   SET	'Saving unbal' event	BOOL	Off=0,On=1
96	GET   SET	'Unbal saved' event	BOOL	Off=0,On=1
97	GET   SET	Enable for Iolnt>	BOOL	Off=0,On=1
98	GET   SET	Group	USINT	1=0,2=1
99	GET   SET	Uo pick-up	UDINT	1 % = 1
100	GET   SET	Uo pick-up	UDINT	1 % = 1
101	GET   SET	Operation delay	UDINT	1.00 s = 100
102	GET   SET	Operation delay	UDINT	1.00 s = 100
103	GET   SET	Intermittent time	UDINT	1.00 s = 100
104	GET   SET	Enable for Uo>	BOOL	Off=0,On=1
105	GET   SET	Group	USINT	1=0,2=1
106	GET   SET	Pick-up setting	UDINT	1 % = 1
107	GET   SET	Pick-up setting	UDINT	1 % = 1
108	GET   SET	Operation delay	UDINT	1.0 s = 10
109	GET   SET	Operation delay	UDINT	1.0 s = 10
110	GET   SET	Enable for Uo>>	BOOL	Off=0,On=1
111	GET   SET	Group	USINT	1=0,2=1
112	GET   SET	Pick-up setting	UDINT	1 % = 1
113	GET   SET	Pick-up setting	UDINT	1 % = 1
114	GET   SET	Operation delay	UDINT	1.0 s = 10
115	GET   SET	Operation delay	UDINT	1.0 s = 10
116	GET   SET	Enable for Arclo1>	BOOL	Off=0,On=1
117	GET   SET	Pick-up setting	UDINT	1.00 pu = 100
118	GET   SET	Arc inputs in use	USINT	S1=1,S2=2,S1/S2=3,BI=4,S1/BI=5,S2/BI=6,S1/S2/BI=7

119	GET   SET	Enable for Arclo2>	BOOL	Off=0,On=1
120	GET   SET	Pick-up setting	UDINT	1.00 pu = 100
121	GET   SET	Arc inputs in use	USINT	S1=1,S2=2,S1/S2=3,BI=4,S1/BI=5,S2/BI=6,S1/S2/BI=7

VAMP StgProtOther, Class Code 0x68 (private object)

Attribute ID	Access	Name	Data Type	Scaling
1	GET   SET	Enable for U>	BOOL	Off=0,On=1
2	GET   SET	Group	USINT	1=0,2=1
3	GET   SET	Pick-up setting	UDINT	1 %Un = 1
4	GET   SET	Pick-up setting	UDINT	1 %Un = 1
5	GET   SET	Operation delay	UDINT	1.00 s = 100
6	GET   SET	Operation delay	UDINT	1.00 s = 100
7	GET   SET	Release delay	UDINT	1.00 s = 100
8	GET   SET	Hysteresis	UDINT	1.0 % = 10
9	GET   SET	Enable for U>>	BOOL	Off=0,On=1
10	GET   SET	Group	USINT	1=0,2=1
11	GET   SET	Pick-up setting	UDINT	1 %Un = 1
12	GET   SET	Pick-up setting	UDINT	1 %Un = 1
13	GET   SET	Operation delay	UDINT	1.00 s = 100
14	GET   SET	Operation delay	UDINT	1.00 s = 100
15	GET   SET	Hysteresis	UDINT	1.0 % = 10
16	GET   SET	Enable for U>>>	BOOL	Off=0,On=1
17	GET   SET	Group	USINT	1=0,2=1
18	GET   SET	Pick-up setting	UDINT	1 %Un = 1
19	GET   SET	Pick-up setting	UDINT	1 %Un = 1
20	GET   SET	Operation delay	UDINT	1.00 s = 100
21	GET   SET	Operation delay	UDINT	1.00 s = 100
22	GET   SET	Hysteresis	UDINT	1.0 % = 10
23	GET   SET	Enable for U<	BOOL	Off=0,On=1
24	GET   SET	Group	USINT	1=0,2=1
25	GET   SET	Pick-up setting	UDINT	1 %Un = 1
26	GET   SET	Pick-up setting	UDINT	1 %Un = 1
27	GET   SET	Operation delay	UDINT	1.00 s = 100
28	GET   SET	Operation delay	UDINT	1.00 s = 100
29	GET   SET	Low voltage blocking	UDINT	1 %Un = 1
30	GET   SET	Low voltage blocking	UDINT	1 %Un = 1

31	GET   SET	Release delay	UDINT	1.00 s = 100
32	GET   SET	Hysteresis	UDINT	1.0 % = 10
33	GET   SET	Enable for U<<	BOOL	Off=0,On=1
34	GET   SET	Group	USINT	1=0,2=1
35	GET   SET	Pick-up setting	UDINT	1 %Un = 1
36	GET   SET	Pick-up setting	UDINT	1 %Un = 1
37	GET   SET	Operation delay	UDINT	1.00 s = 100
38	GET   SET	Operation delay	UDINT	1.00 s = 100
39	GET   SET	Low voltage blocking	UDINT	1 %Un = 1
40	GET   SET	Low voltage blocking	UDINT	1 %Un = 1
41	GET   SET	Hysteresis	UDINT	1.0 % = 10
42	GET   SET	Enable for U<<<	BOOL	Off=0,On=1
43	GET   SET	Group	USINT	1=0,2=1
44	GET   SET	Pick-up setting	UDINT	1 %Un = 1
45	GET   SET	Pick-up setting	UDINT	1 %Un = 1
46	GET   SET	Operation delay	UDINT	1.00 s = 100
47	GET   SET	Operation delay	UDINT	1.00 s = 100
48	GET   SET	Low voltage blocking	UDINT	1 %Un = 1
49	GET   SET	Low voltage blocking	UDINT	1 %Un = 1
50	GET   SET	Hysteresis	UDINT	1.0 % = 10
51	GET   SET	Enable for fX	BOOL	Off=0,On=1
52	GET   SET	Group	USINT	1=0,2=1
53	GET   SET	Pick-up setting	UDINT	50.00 Hz = 5000
54	GET   SET	Pick-up setting	UDINT	50.00 Hz = 5000
55	GET   SET	Operation delay	UDINT	1.00 s = 100
56	GET   SET	Operation delay	UDINT	1.00 s = 100
57	GET   SET	Low voltage blocking	UDINT	1 %Un = 1
58	GET   SET	Enable for fXX	BOOL	Off=0,On=1
59	GET   SET	Group	USINT	1=0,2=1
60	GET   SET	Pick-up setting	UDINT	50.00 Hz = 5000
61	GET   SET	Pick-up setting	UDINT	50.00 Hz = 5000
62	GET   SET	Operation delay	UDINT	1.00 s = 100
63	GET   SET	Operation delay	UDINT	1.00 s = 100
64	GET   SET	Low voltage blocking	UDINT	1 %Un = 1
65	GET   SET	Enable for f<	BOOL	Off=0,On=1
66	GET   SET	Group	USINT	1=0,2=1

67	GET   SET	Pick-up setting	UDINT	50.00 Hz = 5000
68	GET   SET	Pick-up setting	UDINT	50.00 Hz = 5000
69	GET   SET	Operation delay	UDINT	1.00 s = 100
70	GET   SET	Operation delay	UDINT	1.00 s = 100
71	GET   SET	Low voltage blocking	UDINT	1 %Un = 1
72	GET   SET	Enable for f<<	BOOL	Off=0,On=1
73	GET   SET	Group	USINT	1=0,2=1
74	GET   SET	Pick-up setting	UDINT	50.00 Hz = 5000
75	GET   SET	Pick-up setting	UDINT	50.00 Hz = 5000
76	GET   SET	Operation delay	UDINT	1.00 s = 100
77	GET   SET	Operation delay	UDINT	1.00 s = 100
78	GET   SET	Low voltage blocking	UDINT	1 %Un = 1
79	GET   SET	Enable for df/dt	BOOL	Off=0,On=1
80	GET   SET	Group	USINT	1=0,2=1
81	GET   SET	Pick-up setting	UDINT	1.0 Hz/s = 10
82	GET   SET	Pick-up setting	UDINT	1.0 Hz/s = 10
83	GET   SET	Operation delay	UDINT	1.00 s = 100
84	GET   SET	Operation delay	UDINT	1.00 s = 100
85	GET   SET	Minimum delay	UDINT	1.00 s = 100
86	GET   SET	Minimum delay	UDINT	1.00 s = 100
87	GET   SET	Enable for P<	BOOL	Off=0,On=1
88	GET   SET	Group	USINT	1=0,2=1
89	GET   SET	Pick-up setting	UDINT	1.0 %Sn = 10
90	GET   SET	Pick-up setting	UDINT	1.0 %Sn = 10
91	GET   SET	Operation delay	UDINT	1.0 s = 10
92	GET   SET	Operation delay	UDINT	1.0 s = 10
93	GET   SET	Enable for P<<	BOOL	Off=0,On=1
94	GET   SET	Group	USINT	1=0,2=1
95	GET   SET	Pick-up setting	UDINT	1 %Sn = 1
96	GET   SET	Pick-up setting	UDINT	1 %Sn = 1
97	GET   SET	Operation delay	UDINT	1.0 s = 10
98	GET   SET	Operation delay	UDINT	1.0 s = 10
99	GET   SET	Enable for T>	BOOL	Off=0,On=1
100	GET   SET	Maximum continuous current	UDINT	1.00 xIn = 100

101	GET   SET	Alarm setting	UDINT	1 % = 1
102	GET   SET	Time constant tau	UINT	1 min = 1
103	GET   SET	Rel. cooling time constant	UDINT	1.0 x tau = 10
104	GET   SET	Max overload at +40C	UDINT	1 %In = 1
105	GET   SET	Max overload at +70C	UDINT	1 %In = 1
106	GET   SET	Ambient temperature	UINT	1 řC = 1
107	GET   SET	Ambient temp. sensor	USINT	ExtAI1=1,ExtAI2=2,ExtAI3=3,ExtAI4=4,ExtAI5=5,ExtAI6=6,ExtAI7=7,ExtAI8=8,
108	GET   SET	Enable for CBFP	BOOL	Off=0,On=1
109	GET   SET	Monitored Trip relay	USINT	T1=1,T2=2,T3=3,T4=4,T5=5,T6=6,T7=7,T8=8,T9=9,T10=10,T11=11,T12=12,T13=13,
110	GET   SET	Operation delay	UDINT	1.00 s = 100

VAMP StgGeneral, Class Code 0x69 (private object)

Attribute ID	Access	Name	Data Type	Scaling
1	GET   SET	CT primary	UDINT	1 A = 1
2	GET   SET	CT secondary	UINT	1 A = 1
3	GET	Nominal input	UINT	1 A = 1
4	GET   SET	Io1 CT primary	UDINT	1 A = 1
5	GET   SET	Io1 CT secondary	UDINT	1.0 A = 10
6	GET	Nominal Io1 input	UDINT	1.0 A = 10
7	GET   SET	Io2 CT primary	UDINT	1 A = 1
8	GET   SET	Io2 CT secondary	UDINT	1.0 A = 10
9	GET	Nominal Io2 input	UDINT	1.0 A = 10
10	GET   SET	VT primary	UDINT	1 V = 1
11	GET   SET	VT secondary	UINT	1 V = 1
12	GET   SET	VTo secondary	UDINT	1.000 V = 1000
13	GET   SET	Motor nom current	UDINT	1.0 A = 10
14	GET   SET	Generator nom voltage	UINT	1 V = 1
15	GET   SET	Generator nom power	UDINT	1 kVA = 1
16	GET   SET	Nominal shaft power Pm	UDINT	1 kW = 1

17	GET   SET	Is there a unit trafo?	BOOL	Off=0,On=1
18	GET   SET	Bus bar nominal voltage	UDINT	1 V = 1
19	GET   SET	Genrtr side nom voltage	UDINT	1 V = 1
20	GET   SET	Connection group	USINT	Yy0=0,Yy6=1,Yd1=2,Yd5=3,Yd7=4,Yd11=5,Dy1=6,Dy5=7,Dy7=8,Dy11=9,Dd0=10,

## Assemblies

DeviceNet implementation on VAMP relay includes one consuming assembly (Rx) and one producing assembly (Tx). Assemblies have to be configured during the device setup. By default both assemblies are configured with one byte of data each. Consuming assembly by default is configured with Control Supervisor Object / FaultRst attribute and producing assembly is by default configured with Control Supervisor Object / Faulted attribute.

Main configuration parameters of the assemblies are as follows:

Parameter	Range	Description
Producing Instance	1-1278	Instance number of producing assembly
Consuming Instance	1-1278	Instance number of consuming assembly

### Producing Instance

Instance number of producing assembly. This value is available in the EDS file and is used by the configuration tool as a reference path during I/O connection opening. Default value of Producing Instance is 100. Every change to this parameter requires restarting the device and generation of the new EDS file.

### Consuming Instance

Instance number of consuming assembly. This value is available in the EDS file and is used by the configuration tool as a reference path during I/O connection opening. Default value of Consuming Instance is 150. Every change to this parameter requires restarting the device and generation of the new EDS file.

There are also two additional items available to be added to assemblies:

- 1 byte padding
- 2 bytes padding

They can be used when the configuration tool requires assembly data to be word or double-word aligned, to appropriately align the assembly contents.

## EDS file

The Electronic Data Sheet (EDS) is a specially formatted ASCII file that provides information about device configuration data. It mainly contains:

- device's identity information – main configuration parameters described in section 2,
- parameters list – all of the attributes available in the data model; see section 4,
- assemblies info – current configuration of producing and consuming assemblies.

Every change to main configuration parameters or assemblies configuration requires a new EDS file to be generated (once all changes are made and the device is about to be used in the network).

Some of the configuration tools are capable of simplifying device configuration based on the EDS file. In the current implementation the EDS file can only be generated from Vampset tool – EDS file extraction over the DeviceNet network is not supported in VAMP relay.

## Communication

DeviceNet implementation in VAMP relay supports two types of communication:

- Explicit Requests and Responses – used mainly for establishing I/O connections, but can also be used for one time requests to attributes of data model objects.
- I/O Messaging connections – used for very frequent exchange of process data. Polled, Change of State and Cyclic I/O Messaging types are supported.

## Supported services

Supported services for data model objects (see section 4) are only Set Attribute Single (SAS) and Get Attribute Single (GAS). GAS service is available for all attributes with the GET or GET | SET access type and the SAS service is available for all attributes with the GET | SET or SET access type.

Standard objects support the following services:

- Identity Object – Get Attribute Single (GAS)
- DeviceNet Object – Get Attribute Single (GAS) and Set Attribute Single (SAS)
- Assembly Object – Get Attribute Single (GAS) and Set Attribute Single (SAS)
- Connection Object – Get Attribute Single (GAS)

## Events

VAMP events are available under the 4<sup>th</sup> attribute of the VAMP Digital Object (0x64), called Events. The attribute is a structure of:

- secSinceGenesis (UDINT) – seconds since 01.01.1996 00:00:00, first part of the timestamp
- milliseconds (UINT) – second part of the timestamp
- event code (UINT) – presented as: (channel << 6) & event number

Events are read starting with the oldest one in the Event Buffer. When there are no more events in the Event Buffer the structure is filled with zeroes.

Reading of Events depends from the communication type:

- Unconnected request – VAMP responds with the oldest available event. Next request will result in next oldest event (the one previously read is not available any more).
- I/O connection – consecutive event is sent in each transmitted message (without retransmissions) as long as there are events in the Event Buffer pending for transmission, in case of no events a structure filled with zeroes will be sent.

In case of using Unconnected request, the PLC controls the flow of events by allowing the transmission of the next event. In case of using I/O connection events are spontaneously transmitted by VAMP.

## Fault codes

Translation table of VAMP protection states to DeviceNet Fault Codes:

Fault Code	Description	VAMP protection stage	
20	CURRENT TRIP	Overcurrent Stage I>	50/51
		Overcurrent Stage I>>	50/51
		Overcurrent Stage I>>>	50/51
21	THERMAL OVERLOAD	Thermal Overload Stage T>	49
26	PHASE IMBALANCE	Unbalance Stage I2>	46
27	GROUND FAULT	Earth Fault Stage Io>	50N/51N
		Earth Fault Stage Io>>	50N/51N
		Earth Fault Stage Io>>>	50N/51N
		Earth Fault Stage Io>>>>	50N/51N
29	UNDERLOAD	Under Current Stage I<	37
31	STALL	Stall Protection Ist>	48
51	UNDERVOLTAGE	U<, U<<, U<<<	
52	OVERVOLTAGE	U>, U>>, U>>>	

54	PHASE REVERSAL	Unbalance Stage I2>>	47
55	FREQUENCY	f<, f<<, f><, f>><<	
73	START/HOURS EXCEEDED	Frequent Start Protection N>	66

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