

IEC 60870-5-103 Interoperability List VAMP 40/96/210/230/245/255/257/259/260/265 v.22

1. Physical layer

1.1 Electrical interface

EIA RS-485

Number of load for one equipment: 32

1.2 Optical interface

Glass fibre
 F-SMA type connector

Plastic fibre
 BFOC/2,5 type connector

1.3 Transmission speed

9600 b/s

19200 b/s

2. Link layer

There are no choices for the link layer.

3. Application layer

3.1 Transmission mode for application data Mode 1 (least significant octet first) as defined in 4.10 of IEC 60870-5-103

3.2 Common address of ASDU

One common address of ASDU (identical with station address)

More than one common address of ASDU

3.3 Selection of standard information numbers in monitor direction

3.3.1 System functions in monitor direction

	INF	
<input checked="" type="checkbox"/>	0	End of general interrogation
<input checked="" type="checkbox"/>	0	Time synchronization
<input checked="" type="checkbox"/>	2	Reset FCB

	INF	
<input checked="" type="checkbox"/>	3	Reset CU
<input checked="" type="checkbox"/>	4	Start/restart
<input checked="" type="checkbox"/>	5	Power on

3.3.2 Status indications in monitor direction

	INF	
<input checked="" type="checkbox"/>	16	Auto-recloser active
	17	Teleprotection active
	18	Protection active
	19	LED reset
	20	Monitor direction blocked
	21	Test mode
	22	Local parameter setting
	23	Characteristics 1

	INF	
	24	Characteristics 2
	25	Characteristics 3
	26	Characteristics 4
<input checked="" type="checkbox"/>	27	Auxiliary input 1
<input checked="" type="checkbox"/>	28	Auxiliary input 2
<input checked="" type="checkbox"/>	29	Auxiliary input 3
<input checked="" type="checkbox"/>	30	Auxiliary input 4

X = Indication enabled

(X) = Indication can be enabled, but is disabled or mapped to private area by default

Note! Voltage and power measurements are not available in VAMP 245 and VAMP 265.

3.3.3 Supervision indications in monitor direction

	INF	
(X)	32	Measurand supervision I
(X)	33	Measurand supervision V
(X)	35	Phase sequence supervision
	36	Trip circuit supervision
	37	I>> back up operation

	INF	
	38	VT fuse failure
	39	Teleprotection disturbed
	46	Group warning
	47	Group alarm

3.3.4 Earth fault indications in monitor direction

	INF	
	48	Earth fault L1
	49	Earth fault L2
	50	Earth fault L3

	INF	
	51	Earth fault forward, i.e. line
	52	Earth fault reverse, i.e. busbar

3.3.5 Fault indications in monitor direction

	INF	
	64	Start / pick-up L1
	65	Start / pick-up L2
	66	Start / pick-up L3
X	67	Start / pick-up N
	68	General trip
X	69	Trip L1
X	70	Trip L2
X	71	Trip L3
	72	Trip I>> (back-up protection)
(X)	73	Fault location in X ohms
	74	Fault forward / line
	75	Fault reverse / busbar
	76	Teleprotection signal transmitted
	77	Teleprotection signal received
	78	Zone 1

	INF	
	79	Zone 2
	80	Zone 3
	81	Zone 4
	82	Zone 5
	83	Zone 6
X	84	General start / pick-up
(X)	85	Breaker failure
	86	Trip measuring system L1
	87	Trip measuring system L2
	88	Trip measuring system L3
	89	Trip measuring system E
X	90	Trip I>
X	91	Trip I>>
X	92	Trip IN>
X	93	Trip IN>>

3.3.6 Autoreclosure indications in monitor direction

	INF	
	128	CB 'on' by AR
	129	CB 'on' by long-time AR

	INF	
X	130	AR blocked

3.3.7 Measurands in monitor direction

	INF	
X	144	Measurand I
(X)	145	Measurands I, V
(X)	146	Measurands I, V, P, Q

	INF	
X	147	Measurands IN, VEN
X	148	Measurands IL1, IL2, IL3, VL1, VL2, VL3, P, Q, f

3.3.8 Generic functions in monitor direction

	INF	
	240	Read headings of all defined groups
	241	Read values of attr of all entries of one group
	243	Read directory of a single entry
	244	Read value or attr of a single entry

	INF	
	245	End of general interrogation of generic data
	249	Write entry with confirmation
	250	Write entry with execution
	251	Write entry aborted

X = Indication enabled

(X) = Indication can be enabled, but is disabled or mapped to private area by default

Note: **Voltage and power measurements are not available in VAMP 245 and VAMP 265. Fault location is not available in VAMP 40, VAMP 210, VAMP 245, 260 and VAMP 265.**

3.4 Selection of standard information numbers in control direction

3.4.1 System functions in control direction

	INF	
X	0	Initiation of general interrogation

	INF	
X	0	Time synchronization

3.4.2 General commands in control direction

	INF	
X	16	Auto-recloser on / off
	17	Teleprotection on / off
	18	Protection on / off
X	19	LED reset

	INF	
	23	Activate characteristics 1
	24	Activate characteristics 2
	25	Activate characteristics 3
	26	Activate characteristics 4

3.4.3 Generic functions control direction

	INF	
	240	Read headings of all defined groups
	241	Read values of attr of all entries of one group
	243	Read directory of a single entry
	244	Read value or attr of a single entry
	245	General interrogation of generic data

	INF	
	248	Write entry
	249	Write entry with confirmation
	250	Write entry with execution
	251	Write entry abort

3.5 Basic application functions

	Test mode
	Blocking of monitor direction
X	Disturbance data

	Generic services
X	Private data

3.6 Miscellaneous

Measurands are transmitted with ASDU 3 or ASDU 9. The maximum MVAL can either be 1,2 or 2,4 times the rated value. No different rating shall be used in ASDU 3 and ASDU 9 i.e. for each measurand there is only one choice.

Measurand	Max. MVAL = rated value times	
	1,2	2,4
Current L1		X
Current L2		X
Current L3		X
Voltage L1-E		X *
Voltage L2-E		X *
Voltage L3-E		X *
Active power P		X *
Reactive power Q		X *
Frequency f		X
Voltage L1 - L2		X

Note: **Voltage and power measurements are not available in VAMP 245 and VAMP 265.**

----- End of Interoperability List -----

Summary of Interoperable data and Private data

Data is categorized under two function types 160 and 55. Function type 160 is the standard type assigned to "overcurrent protection" and function type 55 is taken from the private range.

Indications

Default On	FUN	INF	GI	ASDU	Standard / Private	40	96	210	230	245	255	257	259	260	265	
Yes	160	84	1	1	S	X		X	X	X	X	X	X		X	I > Start (General start / pick-up)
Yes	160	90	-	1	S	X		X	X	X	X	X	X		X	I > Trip
Yes	160	91	-	1	S	X		X	X	X	X	X	X		X	I >> Trip
Yes	160	94	1	1	P	X		X	X	X	X	X	X		X	I >> Start
Yes	160	95	1	1	P	X		X	X	X	X	X	X		X	I >>> Start
Yes	160	96	-	1	P	X		X	X	X	X	X	X		X	I >>> Trip
Yes	160	67	1	1	S	X		X	X	X	X	X	X		X	I N> Start (Start / pick-up N)
Yes	160	92	-	1	S	X		X	X	X	X	X	X		X	IN > Trip
Yes	160	97	1	1	P	X		X	X	X	X	X	X		X	IN >> Start
Yes	160	93	-	1	S	X		X	X	X	X	X	X		X	IN >> Trip
Yes	160	98	1	1	P	X		X	X		X	X	X			INdir > Start
Yes	160	99	-	1	P	X		X	X		X	X	X			INdir > Trip
Yes	160	100	1	1	P	X		X	X		X	X	X			INdir >> Start
Yes	160	101	-	1	P	X		X	X		X	X	X			INdir >> Trip
Yes	160	102	1	1	P	X		X	X		X	X	X			UN > Start
Yes	160	103	-	1	P	X		X	X		X	X	X			UN > Trip
Yes	160	104	1	1	P	X		X	X		X	X	X			UN >> Start
Yes	160	105	-	1	P	X		X	X		X	X	X			UN >> Trip
Yes	160	106	1	1	P	X		X	X	X	X	X	X		X	I2 > Start (Unbalance protection)
Yes	160	107	-	1	P	X		X	X	X	X	X	X		X	I2 > Trip (Unbalance protection)
Yes	160	108	1	1	P	X		X	X	X	X	X	X		X	T > Start (Thermal overload protection)
Yes	160	109	-	1	P	X		X	X	X	X	X	X		X	T > Trip (Thermal overload protection)
Yes	160	110	-	1	P	X		X	X	X	X	X	X		X	Arc L> on (Arc protection, light detected)
Yes	160	111	-	1	P	X		X	X	X	X	X	X		X	I > Arc Trip (Arc protection)
Yes	160	112	-	1	P	X		X	X	X	X	X	X		X	Io > Arc Trip (Arc protection)
No	Any	Any	-/1	1	P	X		X	X		X	X	X			Idir> Start

Default On	FUN	INF	GI	ASDU	Standard / Private	40	96	210	230	245	255	257	259	260	265	
No	Any	Any	-/1	1	P	X		X	X		X	X	X			Idir> Trip
No	Any	Any	-/1	1	P	X		X	X		X	X	X			Idir>> Start
No	Any	Any	-/1	1	P	X		X	X		X	X	X			Idir>> Trip
No	Any	Any	-/1	1	P	X		X	X		X	X	X			Idir>>> Start
No	Any	Any	-/1	1	P	X		X	X		X	X	X			Idir>>> Trip
No	Any	Any	-/1	1	P	X		X	X		X	X	X			Idir>>>> Start
No	Any	Any	-/1	1	P	X		X	X		X	X	X			Idir>>>> Trip
Yes	160	121	1	1	P	X		X	X	X	X	X	X			If2> Start (Second harmonic)
Yes	160	122	-	1	P	X		X	X	X	X	X	X			If2> Trip (Second harmonic)
Yes	160	123	1	1	P	X		X	X	X	X	X	X		X	Io2> Start
Yes	160	124	-	1	P	X		X	X	X	X	X	X		X	Io2> Trip
Yes	160	125	1	1	P	X		X	X	X	X	X	X		X	Io2>> Start
Yes	160	126	-	1	P	X		X	X	X	X	X	X		X	Io2>> Trip
Yes	160	127		1	P	X		X	X	X	X	X	X		X	Io2> Arc Trip (Arc protection)
No	Any	Any	-	1	P	X		X	X	X	X	X	X		X	Io2> Trig Unbalance
No	Any	Any	-	1	P	X		X	X	X	X	X	X		X	Io2>> Trig Unbalance
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Virtual input 1
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Virtual input 2
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Virtual input 3
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Virtual input 4
Yes	160	16	1	1	S	X			X	X	X	X	X			AR Active (AR on/off)
Yes	160	130	1	1	S	X			X	X	X	X	X			AR Blocked (Reclose Locked)
Yes	160	131	-	1	P	X			X	X	X	X	X			AR request 1
Yes	160	132	-	1	P	X			X	X	X	X	X			AR request 2
Yes	160	133	-	1	P	X			X	X	X	X	X			AR request 3
Yes	160	134	-	1	P	X			X	X	X	X	X			AR request 4
Yes	160	135	-	1	P	X			X	X	X	X	X			AR request 5
Yes	160	136	-	1	P	X			X	X	X	X	X			AR shot 1 start
Yes	160	137	-	1	P	X			X	X	X	X	X			AR shot 2 start
Yes	160	138	-	1	P	X			X	X	X	X	X			AR shot 3 start

Default On	FUN	INF	GI	ASDU	Standard / Private	40	96	210	230	245	255	257	259	260	265	
Yes	160	139	-	1	P	X			X	X	X	X	X			AR shot 4 start
Yes	160	140	-	1	P	X			X	X	X	X	X			AR shot 5 start
Yes	160	141	-	1	P	X			X	X	X	X	X			Critical AR
No	Any	Any	-/1	1	P	X			X	X	X	X	X			Final Trip
No	Any	Any	-	1	P	X			X	X	X	X	X			Critical Final Trip
No	Any	Any	-/1	1	P	X			X	X	X	X	X			AR Running
No	Any	Any	-	1	P	X			X	X	X	X	X			AR1 Final Trip
No	Any	Any	-	1	P	X			X	X	X	X	X			AR2 Final Trip
No	Any	Any	-	1	P	X			X	X	X	X	X			AR3 Final Trip
No	Any	Any	-	1	P	X			X	X	X	X	X			AR4 Final Trip
Yes	160	160	1	1	P	X		X	X		X	X	X			U> Start
Yes	160	161	-	1	P	X		X	X		X	X	X			U> Trip
Yes	160	162	1	1	P	X		X	X		X	X	X			U>> Start
Yes	160	163	-	1	P	X		X	X		X	X	X			U>> Trip
Yes	160	164	1	1	P	X		X	X		X	X	X			U>>> Start
Yes	160	165	-	1	P	X		X	X		X	X	X			U>>> Trip
Yes	160	166	1	1	P	X		X	X		X	X	X			U< Start
Yes	160	167	-	1	P	X		X	X		X	X	X			U< Trip
Yes	160	168	1	1	P	X		X	X		X	X	X			U<< Start
Yes	160	169	-	1	P	X		X	X		X	X	X			U<< Trip
Yes	160	170	1	1	P	X		X	X		X	X	X			U<<< Start
Yes	160	171	-	1	P	X		X	X		X	X	X			U<<< Trip
No	Any	Any	-/1	1	P	X		X	X		X	X	X			f>< Start
No	Any	Any	-/1	1	P	X		X	X		X	X	X			f>< Trip
No	Any	Any	-/1	1	P	X		X	X		X	X	X			f>><< Start
No	Any	Any	-/1	1	P	X		X	X		X	X	X			f>><< Trip
No	Any	Any	-/1	1	P	X		X	X		X	X	X			f< Start
No	Any	Any	-/1	1	P	X		X	X		X	X	X			f< Trip

Default On	FUN	INF	GI	ASDU	Standard / Private	40	96	210	230	245	255	257	259	260	265	
No	Any	Any	-/1	1	P	X		X	X		X	X	X			f<< Start
No	Any	Any	-/1	1	P	X		X	X		X	X	X			f<< Trip
No	Any	Any	-/1	1	P	X			X	X	X	X	X			Motor starting
No	Any	Any	-/1	1	P	X			X	X	X	X	X			Motor running
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X			I< Start (Undercurrent)
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X			I< Trip (Undercurrent)
No	Any	Any	-/1	1	P	X			X	X	X	X	X			I2>> Start (Phase sequence)
No	Any	Any	-/1	1	P	X			X	X	X	X	X			I2>> Trip (Phase sequence)
No	Any	Any	-/1	1	P	X			X	X	X	X	X			Ist> Start (Stall protection)
No	Any	Any	-/1	1	P	X			X	X	X	X	X			Ist> Trip (Stall protection)
No	Any	Any	-/1	1	P	X			X	X	X	X	X			N> Alarm (1 start left)
No	Any	Any	-/1	1	P	X			X	X	X	X	X			N> Trip (motor starting disabled)
Yes	160	180	1	1	P	X		X	X	X	X	X	X		X	CBFP Start
Yes	160	181	-	1	P	X		X	X	X	X	X	X		X	CBFP Trip
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X		X	CBWEAR Alarm 1
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X		X	CBWEAR Alarm 2
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X		X	CT supervisor Alarm
No	Any	Any	-/1	1	P	X		X	X		X	X	X			VT supervisor Alarm
No	Any	Any	-/1	1	P				X		X	X	X			Synchrocheck 1 request
No	Any	Any	-/1	1	P				X		X	X	X			Synchrocheck 1 OK
No	Any	Any	-/1	1	P				X		X	X	X			Synchrocheck 1 bypass
No	Any	Any	-/1	1	P				X		X	X	X			Synchrocheck 1 fail
No	Any	Any	-/1	1	P				X		X	X	X			Synchrocheck 2 request
No	Any	Any	-/1	1	P				X		X	X	X			Synchrocheck 2 OK
No	Any	Any	-/1	1	P				X		X	X	X			Synchrocheck 2 bypass
No	Any	Any	-/1	1	P				X		X	X	X			Synchrocheck 2 fail

Default On	FUN	INF	GI	ASDU	Standard / Private	40	96	210	230	245	255	257	259	260	265	
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Programmable stage 1 start
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Programmable stage 2 start
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Programmable stage 3 start
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Programmable stage 4 start
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Programmable stage 5 start
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Programmable stage 6 start
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Programmable stage 7 start
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Programmable stage 8 start
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Programmable stage 1 trip
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Programmable stage 2 trip
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Programmable stage 3 trip
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Programmable stage 4 trip
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Programmable stage 5 trip
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Programmable stage 6 trip
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Programmable stage 7 trip
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	X	Programmable stage 8 trip
No	Any	Any	-/1	1	P										X	I> Start
No	Any	Any	-/1	1	P										X	I> Trip
No	Any	Any	-/1	1	P										X	I>> start
No	Any	Any	-/1	1	P										X	I>> trip
No	Any	Any	-/1	1	P										X	I'2 start
No	Any	Any	-/1	1	P										X	I'2 trip
No	Any	Any	-/1	1	P										X	dI start
No	Any	Any	-/1	1	P										X	dI trip
No	Any	Any	-/1	1	P								X			Z1< start
No	Any	Any	-/1	1	P								X			Z1< trip
No	Any	Any	-/1	1	P								X			Z2< start

Default On	FUN	INF	GI	ASDU	Standard / Private	40	96	210	230	245	255	257	259	260	265	
No	Any	Any	-/1	1	P								X			Z2< trip
No	Any	Any	-/1	1	P								X			Z3< start
No	Any	Any	-/1	1	P								X			Z3< trip
No	Any	Any	-/1	1	P								X			Z4< start
No	Any	Any	-/1	1	P								X			Z4< trip
No	Any	Any	-/1	1	P								X			Z5< start
No	Any	Any	-/1	1	P								X			Z5< trip
No	Any	Any	-/1	1	P	X		X	X		X	X	X			ROCOF (df/dt) Start
No	Any	Any	-/1	1	P	X		X	X		X	X	X			ROCOF (df/dt) Trip
No	Any	Any	-/1	1	P	X		X	X		X	X	X			P< Start (Reverse power stage)
No	Any	Any	-/1	1	P	X		X	X		X	X	X			P< Trip (Reverse power stage)
No	Any	Any	-/1	1	P	X		X	X		X	X	X			P<< Start (Reverse power stage)
No	Any	Any	-/1	1	P	X		X	X		X	X	X			P<< Trip (Reverse power stage)
No	Any	Any	-/1	1	P			X								Q< Start (Loss of excitation)
No	Any	Any	-/1	1	P			X								Q< Trip (Loss of excitation)
No	Any	Any	-/1	1	P			X								U1< Start
No	Any	Any	-/1	1	P			X								U1< Trip
No	Any	Any	-/1	1	P			X								U1<< Start
No	Any	Any	-/1	1	P			X								U1<< Trip
No	Any	Any	-/1	1	P			X								Uf> Start (Overexcitation)
No	Any	Any	-/1	1	P			X								Uf> Trip (Overexcitation)
No	Any	Any	-/1	1	P			X								Iv> Start
No	Any	Any	-/1	1	P			X								Iv> Trip
No	Any	Any	-/1	1	P			X								Uof3> Start (Earth-fault stage)
No	Any	Any	-/1	1	P			X								Uof3> Trip (Earth-fault stage)
No	Any	Any	-/1	1	P			X								Z< Start (Underimpedance)
No	Any	Any	-/1	1	P			X								Z< Trip (Underimpedance)
No	Any	Any	-/1	1	P			X								Z<< Start (Underimpedance)
No	Any	Any	-/1	1	P			X								Z<< Trip (Underimpedance)

Default On	FUN	INF	GI	ASDU	Standard / Private	40	96	210	230	245	255	257	259	260	265	
No	Any	Any	-/1	1	P			X								X< Start (Underreactance)
No	Any	Any	-/1	1	P			X								X< Trip (Underreactance)
No	Any	Any	-/1	1	P			X								X<< Start (Underreactance)
No	Any	Any	-/1	1	P			X								X<< Trip (Underreactance)
Yes	055	161	1	1	P	X		X	X	X	X	X	X	X	X	State of digital input 1
Yes	055	162	1	1	P	X		X	X	X	X	X	X	X	X	State of digital input 2
Yes	055	163	1	1	P			X	X	X	X	X	X	X	X	State of digital input 3
Yes	055	164	1	1	P			X	X	X	X	X	X	X	X	State of digital input 4
Yes	055	165	1	1	P			X	X	X	X	X	X	X	X	State of digital input 5
Yes	055	166	1	1	P			X	X	X	X	X	X	X	X	State of digital input 6
No	Any	Any	-/1	1	P						X	X	X			State of digital input 7-18
No	Any	Any	-/1	1	P				X	X	X	X	X			State of digital input 19-20
No	Any	Any	-/1	1	P							X	X			State of digital input 21-32
No	Any	Any	-	3 / 9	P	X		X	X	X	X	X	X	X	X	Counter for digital input 1-6
No	Any	Any	-	3 / 9	P						X	X	X			Counter for digital input 7-18
No	Any	Any	-	3 / 9	P				X	X	X	X	X			Counter for digital input 19-20
No	Any	Any	-	3 / 9	P							X	X			Counter for digital input 21-32

Note 1 : Digital inputs 19..20 are only available in Arc option with 2 digital inputs.

Note 2 : The following parameters of the Indications are configurable with the VAMPSET tool:

- FUN (Function Type)
- INF (Information Number)
- GI (it can be decided whether the item is sent via General Interrogation or not)

Note 3: Each Indication can be activated / deactivated by enabling / disabling the corresponding event in the device.

Note 4: Any of the above mentioned indications can be removed from the list and new indications can be added to the list with the VAMPSET tool.

Indications

Default On	FUN	INF	GI	ASDU	Standard / Private	40	96	210	230	245	255	257	260	265	
Yes	055	181	1	1	P	X		X	X	X	X	X	X	X	State of Object 1 (2 states)
Yes	055	182	1	1	P	X		X	X	X	X	X	X	X	State of Object 2 (2 states)
Yes	055	183	1	1	P	X		X	X	X	X	X	X	X	State of Object 3 (2 states)
Yes	055	184	1	1	P	X		X	X	X	X	X	X	X	State of Object 4 (2 states)
Yes	055	185	1	1	P	X		X	X	X	X	X	X	X	State of Object 5 (2 states)
Yes	055	186	1	1	P	X		X	X	X	X	X	X	X	State of Object 6 (2 states)
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Object 7 (2 states)
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Object 8 (2 states)
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	Extended state of Object 1 (4 states)
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	Extended state of Object 2 (4 states)
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	Extended state of Object 3 (4 states)
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	Extended state of Object 4 (4 states)
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	Extended state of Object 5 (4 states)
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	Extended state of Object 6 (4 states)
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	Extended state of Object 7 (4 states)
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	Extended state of Object 8 (4 states)
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	Local/remote state (On = local, Off = remote)
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 1
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 2
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 3
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 4
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 5
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 6
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 7
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 8
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 9
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 10

Default On	FUN	INF	GI	ASDU	Standard / Private	40	96	210	230	245	255	257	260	265	
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 11
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 12
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 13
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 14
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 15
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 16
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 17
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 18
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 19
No	Any	Any	-/1	1	P	X		X	X	X	X	X	X	X	State of Logic output 20
Yes	160	69	-/1	1	S	X		X	X	X	X	X		X	Trip L1 (Line 1 fault)
Yes	160	70	-/1	1	S	X		X	X	X	X	X		X	Trip L2 (Line 2 fault)
Yes	160	71	-/1	1	S	X		X	X	X	X	X		X	Trip L3 (Line 3 fault)

Note 1 : The following parameters of the Indications are configurable with the VAMPSET tool:

- FUN (Function Type)
- INF (Information Number)
- GI (it can be decided whether the item is sent via General Interrogation or not)

Note 2: Each Indication can be activated / deactivated by enabling / disabling the corresponding event in the device.

Note 3: Any of the above mentioned indications can be removed from the list and new indications can be added to the list with the VAMPSET tool.

Measurements

Default On	Max MVAL	FUN	INF	ASDU	Standard / Private	40	96	210	230	245	255	257	259	260	265	
Yes	2,4	160	162	3.1	P	X		X	X	X	X	X	X		X	Io
Yes	2,4	160	163	3.1	P	X		X	X	X	X	X	X		X	Io2
Yes	2,4	160	177	3.1	P	X		X	X	X	X	X	X	X	X	IoC
Yes	2,4	160	170	3.1	P	X		X	X	X	X	X	X			Uo
Yes	2,4	160	147	3.4	S	X		X	X	X	X	X	X			Io, Uo (IN, VEN)
Yes	2,4	160	148	9	S			X	X		X	X	X	X		IL1, IL2, IL3, UL1, UL2, UL3, P, Q, f
Yes		160	180	4	P	X		X	X	X	X	X	X		X	Fault current of I>
Yes		160	181	4	P	X		X	X	X	X	X	X		X	Fault current of I>>
Yes		160	182	4	P	X		X	X	X	X	X	X		X	Fault current of I>>>
No	2,4	Any	Any	3 / 9	P	X		X	X		X	X	X	X		U12
No	2,4	Any	Any	3 / 9	P			X	X		X	X	X	X		U23
No	2,4	Any	Any	3 / 9	P			X	X		X	X	X	X		U31
No	2,4	Any	Any	3 / 9	P	X		X	X		X	X	X	X		S
No	2,4	Any	Any	3 / 9	P	X		X	X		X	X	X	X		P.F.
No	2,4	Any	Any	3 / 9	P	X		X	X		X	X	X	X		Cos φ
No	2,4	Any	Any	3 / 9	P	X		X	X	X	X	X	X	X	X	IL1 RMS
No	2,4	Any	Any	3 / 9	P	X		X	X	X	X	X	X	X	X	IL2 RMS
No	2,4	Any	Any	3 / 9	P	X		X	X	X	X	X	X	X	X	IL3 RMS
No	2,4	Any	Any	3 / 9	P			X	X		X	X	X	X		P RMS
No	2,4	Any	Any	3 / 9	P			X	X		X	X	X	X		Q RMS
No	2,4	Any	Any	3 / 9	P			X	X		X	X	X	X		S RMS
No	2,4	Any	Any	3 / 9	P	X		X	X	X	X	X	X	X	X	IL1 15 min
No	2,4	Any	Any	3 / 9	P	X		X	X	X	X	X	X	X	X	IL2 15 min
No	2,4	Any	Any	3 / 9	P	X		X	X	X	X	X	X	X	X	IL3 15 min
No	2,4	Any	Any	3 / 9	P			X	X		X	X	X	X		P 15 min
No	2,4	Any	Any	3 / 9	P			X	X		X	X	X	X		Q 15 min
No	2,4	Any	Any	3 / 9	P			X	X		X	X	X	X		S 15 min
No	2,4	Any	Any	3 / 9	P			X	X		X	X	X	X		F 15 min
No	2,4	Any	Any	3 / 9	P			X	X		X	X	X	X		P.F. 15 min
No	2,4	Any	Any	3 / 9	P			X	X		X	X	X	X		Cos φ 15 min

Default On	Max MVAL	FUN	INF	ASDU	Standard / Private	40	96	210	230	245	255	257	259	260	265	
No	2,4	Any	Any	3 / 9	P			X	X		X	X	X	X		P RMS 15 min
No	2,4	Any	Any	3 / 9	P			X	X		X	X	X	X		Q RMS 15 min
No	2,4	Any	Any	3 / 9	P			X	X		X	X	X	X		S RMS 15 min
No	1	Any	Any	3 / 9	P	X		X	X	X	X	X	X	X	X	DI 1...20 counters (12 bit)
No	2,4	Any	Any	3 / 9	P	X		X	X	X	X	X	X	X	X	THD IL
No	2,4	Any	Any	3 / 9	P	X		X	X	X	X	X	X	X	X	THD IL1
No	2,4	Any	Any	3 / 9	P	X		X	X	X	X	X	X	X	X	THD IL2
No	2,4	Any	Any	3 / 9	P	X		X	X	X	X	X	X	X	X	THD IL3
No	2,4	Any	Any	3 / 9	P			X	X		X	X	X	X		THD U
No	2,4	Any	Any	3 / 9	P	X		X	X		X	X	X	X		THD Ua
No	2,4	Any	Any	3 / 9	P			X	X		X	X	X	X		THD Ub
No	2,4	Any	Any	3 / 9	P			X	X		X	X	X	X		THD Uc
No		Any	Any	4	P				X		X	X	X			Fault reactance
No		Any	Any	4	P	X		X	X		X	X	X	X		Exported energy
No		Any	Any	4	P	X		X	X		X	X	X	X		
No		Any	Any	4	P	X		X	X		X	X	X	X		
No		Any	Any	4	P	X		X	X	X	X	X	X	X	X	
No	2,4	Any	Any	3 / 9	P				X		X	X	X			
No	2,4	Any	Any	3 / 9	P				X		X	X	X			
No	2,4	Any	Any	3 / 9	P				X		X	X	X			
No	2,4	Any	Any	3 / 9	P				X		X	X	X			
No		Any	Any	4	P				X		X	X	X			
No		Any	Any	4	P				X		X	X	X			

Note 1: The following parameters of the Measurands are configurable:

- FUN (Function Type)
- INF (Information Number)
- ASDU type

Note 2: Any of the above mentioned measurands can be removed from the list and new measurands can be added to the list with the VAMPSET tool.

External IO via ModBus

Default On	FUN	INF	GI	ASDU	Standard / Private	40	96	210	230	245	255	257	259	260	265	
No	Any	Any	-/1	1	P						X	X	X	X		State of external digital input 1
No	Any	Any	-/1	1	P						X	X	X	X		State of external digital input 2
No	Any	Any	-/1	1	P						X	X	X	X		State of external digital input 3
No	Any	Any	-/1	1	P						X	X	X	X		State of external digital input 4
No	Any	Any	-/1	1	P						X	X	X	X		State of external digital input 5
No	Any	Any	-/1	1	P						X	X	X	X		State of external digital input 6
No	Any	Any	-/1	1	P						X	X	X			State of external digital input 7
No	Any	Any	-/1	1	P						X	X	X			State of external digital input 8
No	Any	Any	-/1	1	P						X	X	X			State of external digital input 9
No	Any	Any	-/1	1	P						X	X	X			State of external digital input 10
No	Any	Any	-/1	1	P						X	X	X			State of external digital input 11
No	Any	Any	-/1	1	P						X	X	X			State of external digital input 12
No	Any	Any	-/1	1	P						X	X	X			State of external digital input 13
No	Any	Any	-/1	1	P						X	X	X			State of external digital input 14
No	Any	Any	-/1	1	P						X	X	X			State of external digital input 15
No	Any	Any	-/1	1	P						X	X	X			State of external digital input 16
No	Any	Any	-/1	1	P						X	X	X			State of external digital input 17
No	Any	Any	-/1	1	P						X	X	X			State of external digital input 18
No		Any	Any	4	P	X		X	X	X	X	X	X	X	X	External analog input 1
No		Any	Any	4	P	X		X	X	X	X	X	X	X	X	External analog input 2
No		Any	Any	4	P	X		X	X	X	X	X	X	X	X	External analog input 3
No		Any	Any	4	P	X		X	X	X	X	X	X	X	X	External analog input 4
No		Any	Any	4	P	X		X	X	X	X	X	X	X	X	External analog input 5
No		Any	Any	4	P	X		X	X	X	X	X	X	X	X	External analog input 6
No		Any	Any	4	P	X		X	X	X	X	X	X	X	X	External analog input 7
No		Any	Any	4	P	X		X	X	X	X	X	X	X	X	External analog input 8
No		Any	Any	4	P	X		X	X	X	X	X	X	X	X	External analog input 9
No		Any	Any	4	P	X		X	X	X	X	X	X	X	X	External analog input 10
No		Any	Any	4	P	X		X	X	X	X	X	X	X	X	External analog input 11
No		Any	Any	4	P	X		X	X	X	X	X	X	X	X	External analog input 12

Default On	FUN	INF	GI	ASDU	Standard / Private	40	96	210	230	245	255	257	259	260	265	
No		Any	Any	4	P	X		X	X	X	X	X	X	X	X	External analog input 13
No		Any	Any	4	P	X		X	X	X	X	X	X	X	X	External analog input 14
No		Any	Any	4	P	X		X	X	X	X	X	X	X	X	External analog input 15
No		Any	Any	4	P	X		X	X	X	X	X	X	X	X	External analog input 16

Note 1: External IO can be added to the relay by using ModBus protocol in the RS-485 port.

General commands in control direction

Default On	FUN	INF	GI	ASDU	Standard / Private	40	96	210	230	245	255	257	259	260	265	
Yes	160	19	20	S	X	X		X	X	X	X	X	X	X	X	LED reset (Release latches)
Yes	160	16	20	S	X	X			X	X	X	X	X	X		Auto-recloser on/off
Yes	055	161	20	P	X	X		X	X	X	X	X	X	X	X	Object 1 control
Yes	055	162	20	P	X	X		X	X	X	X	X	X	X	X	Object 2 control
No	any	any	20	P	X	X		X	X	X	X	X	X	X	X	Object 3 control
No	any	any	20	P	X	X		X	X	X	X	X	X	X	X	Object 4 control
No	any	any	20	P	X	X		X	X	X	X	X	X	X	X	Object 5 control
No	any	any	20	P	X	X		X	X	X	X	X	X	X	X	Object 6 control
No	any	any	20	P	X	X		X	X	X	X	X	X	X	X	Local / Remote control mode (On = local, Off = remote)
Yes	055	23	20	S	X	X		X	X	X	X	X	X		X	Setting group 1 (characteristic 1)
Yes	055	24	20	S	X	X		X	X	X	X	X	X		X	Setting group 2 (characteristic 2)
Yes	055	163	20	P	X	X		X	X	X	X	X	X	X	X	Control of Output relay A1
Yes	055	164	20	P				X	X	X	X	X	X	X	X	Control of Output relay A2
Yes	055	165	20	P				X	X	X	X	X	X	X	X	Control of Output relay A3
Yes	055	166	20	P				X	X	X	X	X	X	X	X	Control of Output relay A4
Yes	055	167	20	P				X	X	X	X	X	X	X	X	Control of Output relay A5
No	any	any	20	P	X	X		X	X	X	X	X	X	X	X	Control of virtual input 1
No	any	any	20	P	X	X		X	X	X	X	X	X	X	X	Control of virtual input 2
No	any	any	20	P	X	X		X	X	X	X	X	X	X	X	Control of virtual input 3
No	any	any	20	P	X	X		X	X	X	X	X	X	X	X	Control of virtual input 4

Note 1: The following parameters of the commands are configurable:

- FUN (Function Type)
- INF (Information Number)

Note 2: Any of the above mentioned commands can be removed from the list and new commands can be added to the list with the VAMPSET tool.

Analog channels for disturbance recorder

Measurement	Standard / Private	Channel	Unit
IL1	S	01	A
IL2	S	02	A
IL3	S	03	A
Io1 (measured)	S	04	A
Io2 (measured)	P	64	A
U12	P	65	V
U23	P	66	V
U31	P	67	V
UL1	S	05	V
UL2	S	06	V
UL3	S	07	V
Uo	S	08	%
f	P	68	Hz
P	P	69	kW
Q	P	70	kvar
S	P	71	kVA
PF	P	72	
Cos ϕ	P	73	
Io (calculated)	P	74	A
I1	P	75	A
I2	P	76	A
I2 / I1	P	77	%
I2 / In (I2 / Imot)	P	78	%
U1	P	79	V
U2	P	80	V
U2 / U1	P	81	%
Phase current (avr. of IL1...IL3)	P	82	A
Phase Voltage (avr. of UL1..UL3)	P	83	V
Line Voltage (avr. of U12..U31)	P	84	V
Tan ϕ	P	85	
Prms	P	86	kW
Qrms	P	87	kvar
Srms	P	88	kVa
IL1 THD	P	89	%
IL2 THD	P	90	%
IL3 THD	P	91	%
Ua THD	P	92	%
Ub THD	P	93	%
Uc THD	P	94	%
fy (synchrocheck side y)	P	95	Hz
fy (synchrocheck side z)	P	96	Hz
U12y (synchrocheck side y)	P	97	V
U12z (synchrocheck side z)	P	98	V
Digital inputs	S	TAGS	
Digital outputs	S	TAGS	

Digital outputs for disturbance recorder

Default On	FUN	INF	GI	ASDU	Standard / Private	
No	Any	Any	-/1	1	P	Trip relay 1-2
No	Any	Any	-/1	1	P	Trip relay 3-4 (Vamp 40/255/257 only)
No	Any	Any	-/1	1	P	Trip relay 5-8 (Vamp 257 only)
No	Any	Any	-/1	1	P	Alarm relay 1
No	Any	Any	-/1	1	P	Alarm relay 2 (No 40)
No	Any	Any	-/1	1	P	Alarm relay 3 (No 40)
No	Any	Any	-/1	1	P	Alarm relay 4 (No 40)
No	Any	Any	-/1	1	P	Alarm relay 5 (No 40)
No	Any	Any	-/1	1	P	Binary out (with Arc option only)
No	Any	Any	-/1	1	P	Virtual output 1
No	Any	Any	-/1	1	P	Virtual output 2
No	Any	Any	-/1	1	P	Virtual output 3
No	Any	Any	-/1	1	P	Virtual output 4
No	Any	Any	-/1	1	P	Virtual output 5
No	Any	Any	-/1	1	P	Virtual output 6

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