

Features

- Reporting of up to ten disturbances.
- Trigger recording from analog or binary events.
- Trigger recording from local HMI, front port connected PC or via remote communication.
- Programmable HMI LED indication for operator alert.
- Structured information report.
- Recordings are retained during power loss.
- Lists binary signals that have been active during the fault phase of disturbances.
- Event recorder stores up to 150 timetagged events for each disturbance.
- Event signals can be either physical binary input signals or internally created logical signals.
- Disturbance recording of up to ten analog and 48 binary signals.
- Programmable selection of signals to record.
- High resolution and wide dynamic range.
- Trip value recorder with fault and prefault value phasor display of currents and voltages.

Application**Disturbance report**

Use the disturbance report to provide the network operator with proper information about disturbances in the primary network. The function comprises several subfunctions enabling different types of users to access relevant information in a structured way.

Select appropriate binary signals to trigger the red HMI LED to indicate trips or other important alerts.

Indications

Use the indications list to view the state of binary signals during the fault. All binary input signals to the disturbance report function are listed.

Event recorder

Use the event recorder to obtain a list of binary signal events that occurred during the disturbance.

Disturbance recorder

Use the disturbance recorder to record analog and binary signals during fault conditions in order to analyze disturbances. The analysis may include fault severity, fault duration and protection performance. Replay the recorded data in a test set to verify protection performance.

Trip value recorder

Use the trip value recorder to record fault and prefault phasor values of voltages and currents to be used in detailed analysis of the severity of the fault and the phases that are involved. The recorded values can also be used to simulate the fault with a test set.

Functionality**Disturbance report**

The disturbance report collects data from each subsystem for up to ten disturbances. The data is stored in nonvolatile memory, used as a cyclic buffer, always storing the lat-

est occurring disturbances. Data is collected during an adjustable time frame, the collection window. This window allows for data collection before, during and after the fault.

The collection is started by a trigger. Any binary input signal or function block output signal can be used as a trigger. The analog signals can also be set to trigger the data collection. Both over levels and under levels are available. The trigger is common for all subsystems, hence it activates them all simultaneously.

A triggered report cycle is indicated by the yellow HMI LED, which will be lit. Binary signals may also be used to activate the red HMI LED for additional alerting of fault conditions. A disturbance report summary can be viewed on the local HMI.

Indications

The indications list tracks zero-to-one changes of binary signals during the fault period of the collection window. This means that constant logic zero, constant logic one or state changes from logic one to logic zero will not be visible in the indications list. Signals are not time tagged. In order to be listed in the indications list the:

1. signal must be connected to the DRP function block.
2. setting parameter, IndicationMask, for the input must be set to Show.

Output signals of other function blocks of the configuration will be listed by the signal name listed in the corresponding signal list. Binary input signals are listed by the name defined in the configuration.

The indications can be viewed on the local HMI and via SMS.

Event recorder

When a trigger condition for the disturbance report is activated, the event recorder collects time tagged events from the 48 binary signals that are connected to disturbance report and lists the changes in status in chronological order. Each list can contain up to 150 time tagged events that can come from both internal logic signals and binary input channels. Events are recorded during the total recording time which depends on the set recording times and the actual fault time.

Events can be viewed via SMS and SCS.

Disturbance recorder

The disturbance recorder records both analog and binary signal information.

Analog and digital signals can be used as triggers. A trigger signal does not need to be recorded.

A trigger is generated when the analog signal moves under and/or over set limit values. The trig level is compared to the signal's average peak-to-peak value, making the function insensitive to DC offset. The trig condition must occur during at least one full period, that is, 20 ms for a 50 Hz network.

The recorder continuously records data in a cyclic buffer capable of storing the amount of data generated during the set pre-fault time of the collection window. When triggered, the pre-fault data is saved and the data for the fault and post-fault parts of the collection window is recorded.

The RAM area for temporary storage of recorded data is divided into subareas, one for each recording. The size of a subarea depends on the set recording times. There is sufficient memory for four consecutive recordings with a maximum number of analog channels recorded and with maximum time settings. Should no subarea be free at a new disturbance, the oldest recording is overwritten.

When a recording is completed, the post recording process:

- merges the data for analog channels with corresponding data for binary signals stored in an event buffer
- compresses the data without losing any data accuracy
- stores the compressed data in a non-volatile memory

The disturbance recordings can be viewed via SMS or SCS.

Trip value recorder

Pre-fault and fault phasors of currents and voltages are filtered from disturbance data stored in digital sample buffers.

When the disturbance report function is triggered, the function looks for non-periodic change in the analog channels. Once the fault interception is found, the function calculates the pre-fault RMS values during one period

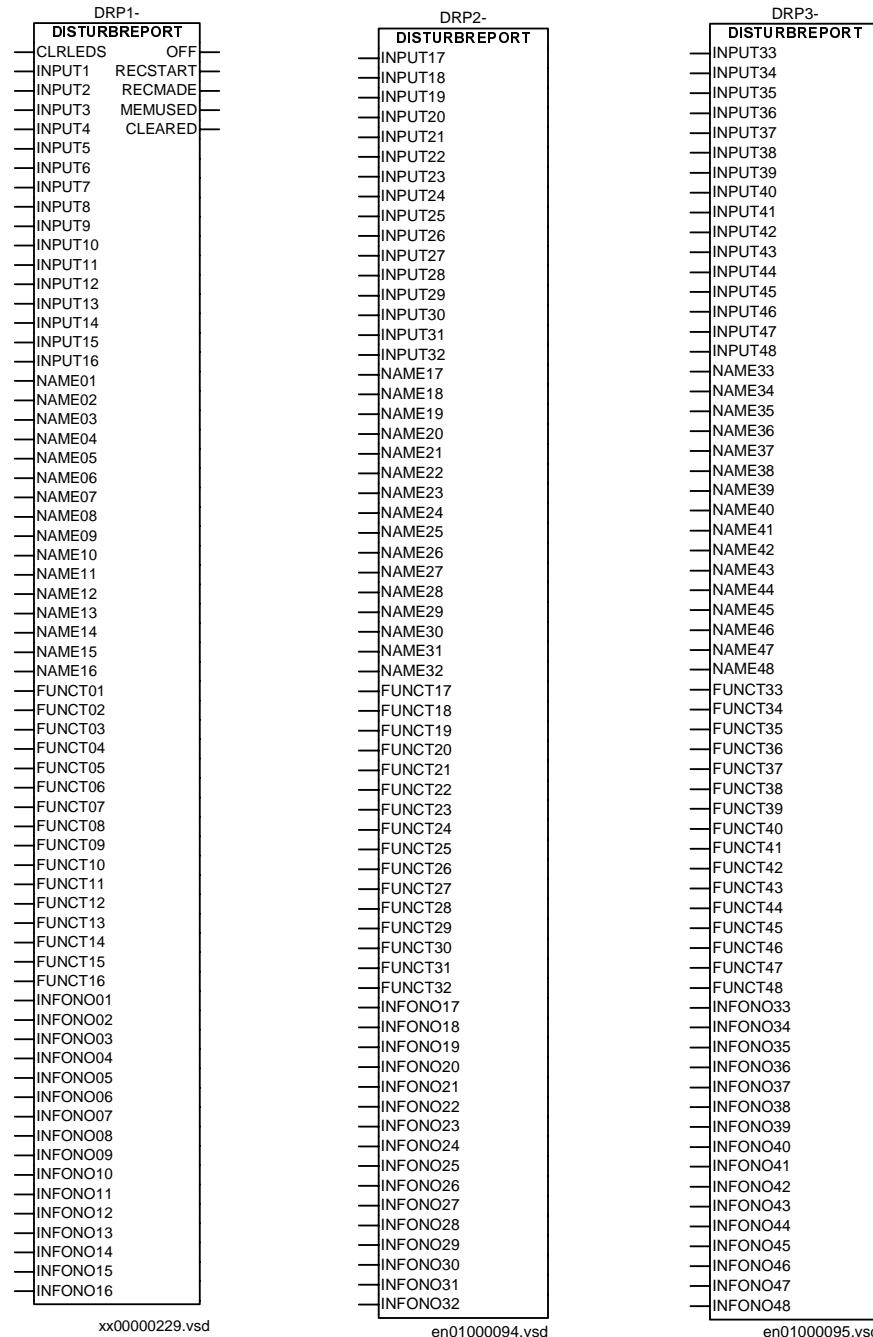
starting 1,5 period before the fault interception. The fault values are calculated starting a few samples after the fault interception and uses samples during 1/2 - 2 periods depending on the waveform.

If no error sample is found the trigger sample is used as the start sample for the calculations. The estimation is based on samples one

period before the trigger sample. In this case the calculated values are used both as pre-fault and fault values.

The recording can be viewed on the local HMI or via SMS.

Function block



Input and output signals**Table 1: Input signals for the DISTURBREPORT (DRPn-) function blocks**

Signal	Description
CLRLEDS	Clear HMI LEDs (only DRP1)
INPUT1 - INPUT48	Select binary signal to be recorded as signal no. xx were xx=1 - 48.
NAME01-48	Signal name set by user, 13 char., for disturbance presentation
FuncT01-48	Function type, set by user (for IEC)
InfoNo01-48	Information number, set by user (for IEC)

Path in local HMI: ServiceReport/Functions/
DisturbReport

Table 2: Output signals for the DISTURBREPORT (DRP1-) function block

Signal	Description
OFF	Disturbance Report function turned off
RECRESTART	Disturbance recording started
RECMADAE	Disturbance recording made
MEMUSED	More than 80% of recording memory used
CLEARED	All disturbances in Disturbance Report cleared

Technical data**Table 3: Disturbance report setting performance**

Data	Setting range
Pre-fault time	50-300 ms in steps of 10 ms
Post-fault time	100-5000 ms in steps of 100 ms
Limit time	500-6000 ms in steps of 100 ms
Number of recorded disturbances	Max. 10

Table 4: Event recorder

Function	Value
Event buffering capacity	Max. number of events/disturbance report
	Max. number of disturbance reports

Table 5: Disturbance recorder setting performance

Function	Setting range
Overcurrent triggering	0-5000% of Inb in steps of 1%
Undercurrent triggering	0-200% of Inb in steps of 1%
Overvoltage triggering	0-200% of Unb in steps of 1% at 100 V sec.
Undervoltage triggering	0-110% of Unb in steps of 1%

Table 6: Disturbance recorder performance

Data	Value	
Number of binary signals	48	
Number of analog signals	10	
Sampling rate	2 kHz	
Recording bandwidth	5-250 Hz	
Total recording time with ten analog and 48 binary signals recorded. (The amount of harmonics can affect the maximum storage time)	40 s typically	
Voltage channels	Dynamic range	(0.01-2.0) $\times U_r$ at 100/200 V sec.
	Resolution	0.1% of U_r
	Accuracy at rated frequency	$U \leq U_r$ 2.5% of U_r $U > U_r$ 2.5% of U
Current channels	Dynamic range	Without DC off-set $(0.01-110) \times I_r$ With full DC off-set $(0.01-60) \times I_r$
	Resolution	0.5 % of I_r
	Accuracy at rated frequency	$I \leq I_r$ +/- 2.5 % of I_r $I > I_r$ +/- 2.5 % of I

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