Contents *Page*

1 DISTURBANCE REPORT - INTRODUCTION 2
1.1 Recording times 5
1.2 Analogue signals 6
1.3 Binary signals 6
1.4 Trig signals 7

1 DISTURBANCE REPORT - INTRODUCTION

The aim of the Disturbance report is to contribute to the highest possible quality of electrical supply. This is done by a continuous collection of system data and, upon occurrence of a fault, storing a certain amount of pre-fault, fault and post-fault data.

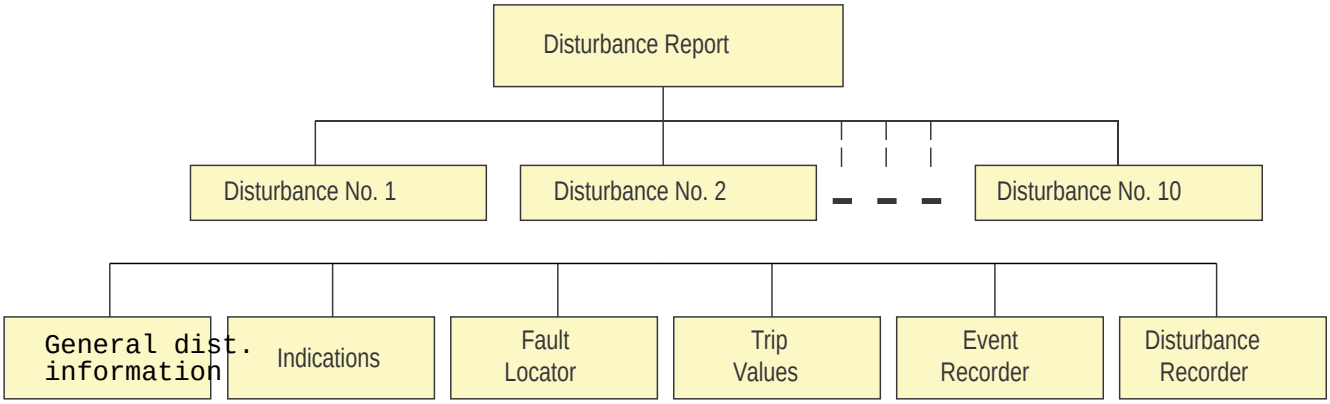
The stored data can be used for analysis and decision making in order to find and eliminate possible system and/or equipment weaknesses.

The Disturbance report is a common name for a number of facilities to supply the user with more information about the disturbances and the system. Some of the facilities are basic and some are optional in the different products. For some products not all facilities are available.

The facilities included in the Disturbance report are:

- General disturbance information
- Indications
- Event recorder
- Fault locator
- Trip values (Phase values)
- Disturbance recorder

The whole Disturbance report can contain information for up to 10 disturbances, each with the data coming from all the parts mentioned above, depending on the options installed. All information in the disturbance report is stored in non-volatile flash memories. This implies that no information will be lost in case of loss of power supply.



(X80028-1 (3))

Fig. 1 Disturbance report structure

Up to ten disturbances can always be stored. If a new disturbance is to be recorded when the memory is full, the oldest disturbance will be overwritten by the new one.

The memory for the Disturbance recorder is limited to 10 seconds with up to 10 analogue and 48 binary signals recorded, which means that in case of long recording times, fewer than ten disturbances will be stored. If fewer analogue signals are recorded, a longer total recording time will be available. This memory limit does not affect the rest of the disturbance report.

Table 1: Option required

General disturbance information	Basic
Indications	Basic
Event recorder	Basic or option “Event recorder”
Fault locator	Option “Fault locator”
Trip values	Option “Fault locator” or option “Phase values”
Disturbance recorder	Option “Disturbance recorder”

General disturbance information

Disturbance overview is a summary of all the stored disturbances. The overview is available only on a front connected personal computer (PC) or via the Station Monitoring System (SMS). The overview contains:

- Disturbance index
- Date and time
- Trip signals
- Trig signal that activated the recording
- Distance to fault (requires Fault locator)
- Fault loop selected by the Fault locator (requires Fault locator)

Disturbance summary is scrolled automatically on the man machine interface, (MMI). Here the two latest disturbances (DisturbSummary 1, which is the latest one, and DisturbSummary 2 which is the second latest) are presented with:

- Date and time
- Selected indications (set with the Indication mask)
- Distance to fault and fault loop selected by the Fault locator

Disturbance data on the MMI presented at:

DisturbReport
Disturbances
Disturbance n (1 - 10)

the date and time of the disturbance, the trig signal, the indications, the fault locator result and the trip values are available providing the corresponding functions are installed.

Indications

contains a list over which signals that were activated during the fault time of the disturbance. A part (or all) of these signals are scrolled automatically on the built-in MMI after a disturbance. See “Indications”, 1MRK 580 031-XEN.

Event recorder

contains an event list with time tagged events. In the Station Monitoring System, this list is directly connected to a disturbance. See “Event recorder - Station Monitoring System”, 1MRK 580 032-XEN.

Fault locator

contains information about the distance to the fault, and which measuring loop that was selected for the calculation. After changing the system parameters in the protection, a recalculation of the fault distance can be made in the protection. See “Fault locator and phasors of currents and voltages”, 1MRK 580 020-XEN.

Trip values

includes phasors of currents and voltages before the fault and during the fault. See “Fault locator and phasors of currents and voltages”, 1MRK 580 020-XEN, or “Presentation of phase values”, 1MRK 580 078-XEN.

Disturbance recorder

makes registration of analogue and binary signal data before, during and after the fault. See “Disturbance recorder”, 1MRK 580 034-XEN.

On the built-in MMI, the indications, the fault locator result (when applicable) and the trip values are available. For a complete disturbance report, front communication with a PC or remote communication with SMS is required.

1.1 Recording times

The recording times are valid for the whole disturbance report. The disturbance recorder and the event recorder register disturbance data and events during the total recording time, tRecording. Indications however, are only registered during the fault time.

The total recording time, tRecording, of a recorded disturbance will be:

tRecording = tPre + tFault + tPost, or tPre + tLim, depending on which criterion that stops the current disturbance recording.

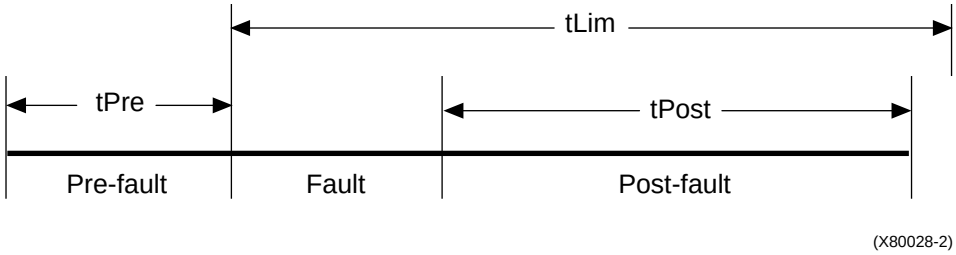


Fig. 2 Recording times relationship.

The different time periods are described below:

tPre is the pre-fault recording time. More correctly it should be called pre-triggering time, since it consists of not only a pre-fault time but also includes the operating time for the trigger itself.

tFault is the fault time of the recording. The fault time is not settable and continues as long as any valid trigger condition, binary or analogue, persists (unless limited by the limit time tLim, see below).

tPost is the post-fault recording time. When all activated triggers during the fault time have been reset, the current disturbance recording will continue according to the set post-fault time.

tLim is the limit time, which is the maximum recording time after the disturbance recording was triggered. The limit time is used to eliminate the consequences of a faulty trigger, that does not reset within a reasonable time interval. It limits the maximum recording time of a recording and prevents subsequent overwriting of already stored disturbances.

1.2 Analogue signals

Up to ten analogue signals (up to five voltages and up to five currents) can be selected for recording and trig if the Disturbance recorder function is installed. If fewer than ten signals are selected, the maximum storing capacity in the flash memories, regarding total recording time will be increased.

A user defined name for each of the signals can be programmed in the terminal.

For each of the ten analogue signals, Operation = On means that it will be recorded by the Disturbance recorder. The triggering itself is independent of the setting of Operation, and will trigger even if operation is set to Off. Both undervoltage and overvoltage can be used as trig condition. The same applies for the current signals.

The check of the trig condition is based on peak to peak values. When this is found, the absolute average value of these two peak values is calculated. If the average value is above the threshold level for an overvoltage or overcurrent trig, this trig will be indicated with “>” together with the user defined name.

If the average value is below the set threshold level for an undervoltage or undercurrent trig, this trig will be indicated with “<“ together with its name. The procedure is carried out separately for each channel.

This method of checking the analogue start conditions gives a function which is insensitive to dc offset in the signal. The operating time for this start is typically in the range of one cycle, i.e. 20 ms for a 50 Hz network.

The analogue signals will be presented only in the disturbance recording, but they will affect the whole disturbance report when being used for triggering.

1.3 Binary signals

Up to 48 binary signals can be selected from the signal list, where all available signals are grouped under its respective function. The 48 signals can be selected among internal logical signals and binary input signals. For each of the 48 signals, it is also selected if the signal is to be used as a trigger of the disturbance report, and if the trig should be activated on a 1 or a 0.

The selected 48 signals will be presented in the event list and the disturbance recording. They will however affect the whole disturbance report when they are used for triggering.

The indications that are to be scrolled automatically on the MMI when a disturbance has been recorded, are also selected from these 48 signals with the MMI Indication Mask.

1.4 Trig signals

The trig conditions affect the whole disturbance report. As soon as a trig condition is fulfilled, a complete disturbance report will be recorded. On the other hand, if no trig condition is fulfilled, there will be no disturbance report at all, i.e. no calculation of distance to fault, no indications etc. This implies the importance of choosing the right signals as trig conditions.

A trig can be of type:

- Manual trig
- Binary signal trig
- Analogue signal trig (over/under function)

Manual trig

Manual trig is initiated from the built-in MMI or with a front connected PC (or SMS). This is found on the MMI menu tree at:

DisturbReport
Manual Trig

Binary trig

A trig on a binary signal can be activated on either a logical 1 or a logical 0. When a binary input is used as trig, it is required that the signal stays for at least 15 ms to be picked-up.

Note that when a binary signal is programmed to trig on a logical 0, this signal will not be presented as an indication in the disturbance report.

Analogue trig

All analogue signals are available for trigger purposes, no matter if they are recorded in the disturbance recorder or not. The Disturbance recorder function must however be installed in the protection terminal.