APPLICATION NOTE

Adding remote monitoring and sequence of events in Arcteq arc flash protection system

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1   BACKGROUND

The protective devices based on arc light sensors were first introduced in early eighties more than 30 years ago. Modern arc flash protection systems contain full self-supervision capabilities in order to provide highest level of dependability by alarming of any erroneous conditions. More selective and flexible programmable tripping scenarios have been added to arc flash protection systems. Previously it has been a common practice to isolate the substation totally in case of an arcing faults, i.e. tripping the main feeding circuit breakers. Today's most complex systems require total selectivity limiting the effected zone to minimum in case of an arc fault. Added complexity of tripping schemes leads to considerations for remote monitoring and event analyses. This document describes several alternative ways of adding these features in Arcteq arc flash protection systems.

1.1   AVAILABLE REMOTE AND LOCAL DATA

Arc flash protection systems are designed to operate only in an event of arcing fault. Arc flash systems may well be installed for years without actual events. The most important remote data of the installed arc flash protection is *system healthy* indication (or system failure indication) of all and any system components and interconnections. After system activation the *trip event* data transfer to operator is of outmost importance. Transferring *fault location* can be considered a merit for faster fault restoration but it should be noted that availability of this data greatly depends on system configuration and selected sensor types.

It is important to note that system failure or trip event always requires operator assistance locally at the switchgear. Therefore clarity of the local data at arc flash protection system's Human Machine Interface (HMI) is at least as important as the well formulated remote data. Often, depending on auxiliary power supply arrangement, the substation is totally powerless after arc flash protection trip event. Therefore local data at HMI shall be stored in non-volatile memory.

1.2   LOCAL DATA IN ARCTEQ ARC FLASH PROTECTION SYSTEM

Arcteq AQ 100 arc flash system is designed to provide only the much needed operator local data. All inputs and outputs have a designated LED with text pocket for adding the description. Units are operated with single push button.

Figure 1: AQ 100 arc flash protection system HMI with clear LED indication and single push-button arrangement

An additional alarm annunciator unit, AQ S214 is available for additional local data. The AQ S214 provides for time stamped sequence of events with freely programmable descriptions. Maximum 48 LED indications can be added. The AQ S214 serves also for communicating data to remote monitoring location (SCADA) with variety of standard protocols including IEC 61850, DNP 3, DNP 3 over TCP, Modbus RTU, Modbus TCP, IEC 103, IEC 101, IEC 104 and SPA bus.
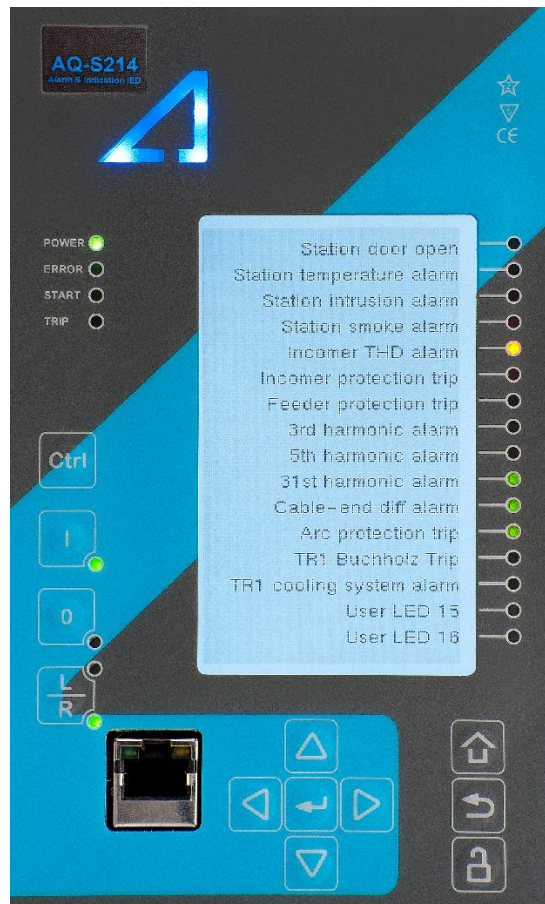

Figure 2: AQ S214 alarm annunciator HMI with clear text indications and programmable LEDs
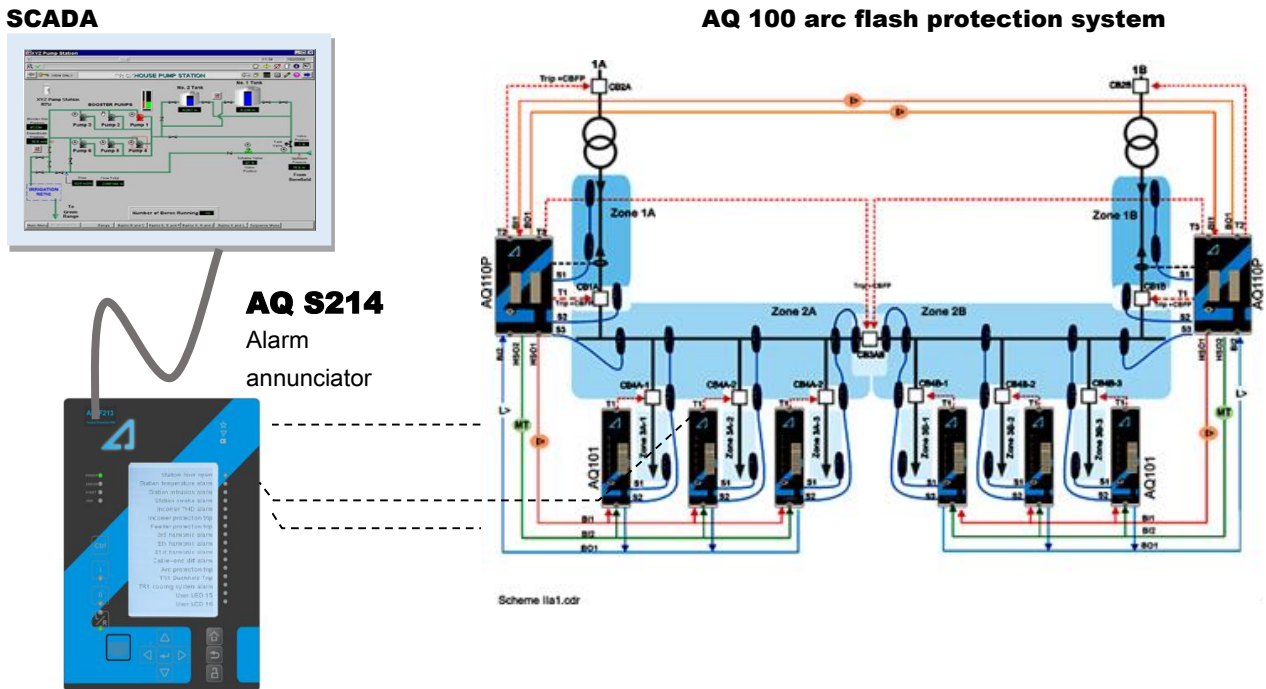
SCADA   **AQ 100 arc flash protection system**

AQ S214

Alarm
annunciator

Figure 3: AQ S214 used for local alarm annunciation, sequence of events and communication link to SCADA system.

1.3   REMOTE DATA TRANSFER ALTERNATIVES

As the required amount of data from arc flash protection system is limited there are various solutions on transferring the data to remote location. Traditional *hard-wiring* of trip information and system failure/healthy data either to local PLC, RTU or digital protective relays is the most straight forward solution. All Arcteq arc flash units come with several trip/signal contacts for multiplying trip and system failure information. These contacts can be used also to trigger disturbance recorder in digital relays.

Adding a *digital alarm annunciating* unit according to figure 3 above provides for both variety of communication protocols and additional local HMI and sequence of events.

Third alternative is to utilize *digital protective relay* as a "master" unit of the system as per figure 4 below. Arcteq AQ 200 series protection IEDs come with IEC 61850, DNP 3, DNP 3 over TCP, Modbus RTU, Modbus TCP, IEC 103, IEC 101, IEC 104 and SPA protocols. This alternative provides also for integrated disturbance recorder and back-up or primary 50/51 protections.
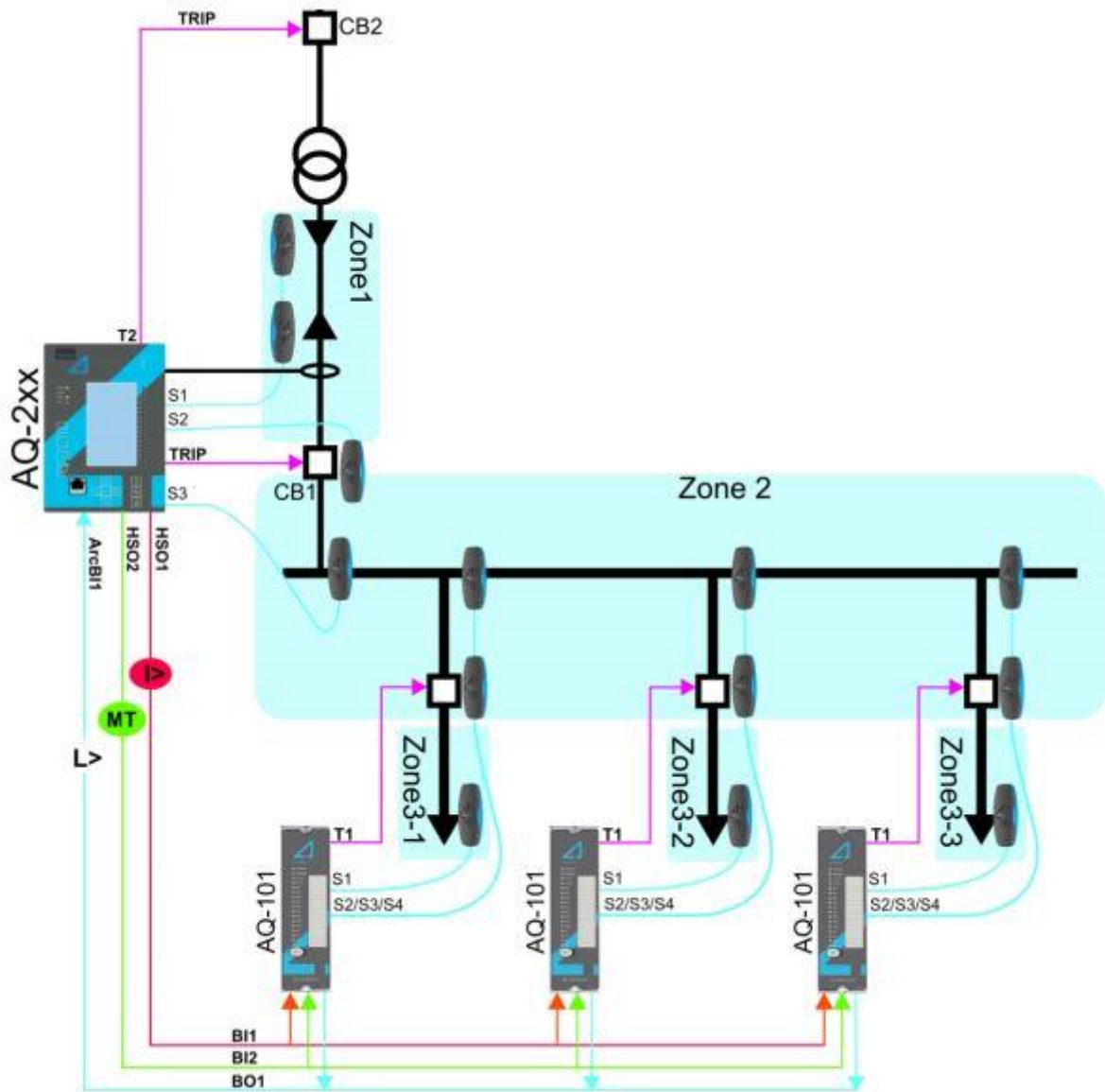
Figure 4: Arc flash protection scheme utilizing AQ 200 series digital protective relay with integrated arc protection card.