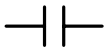


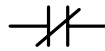
Configuring Alarms & Relays in the Enhanced Transformer Advantage

The Transformer Advantage product family offers a variety of relay options. Some choices are made when the Advantage is specified and ordered. Other choices are made during installation and setup. The following information will help make the best use of this flexibility.

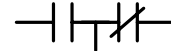
Relay terminology used in the Transformer Advantage documentation:



Form A contact: normally open (NO) when power to the Advantage is off.



Form B contact: normally closed (NC) when power to the Advantage is off.



Form C, also called a changeover contact, provides both form A & form B contacts.

Normally Energized (NE) or Normally De-energized (ND) refers to the relay coil state when the Advantage is powered and the relay is in the non-alarmed condition.

Setpoint relays are used for control and alarm outputs. Up to 11 form C relays can be ordered by selecting the appropriate code in the fourth digit of the part number. All relays in the Transformer Advantage are single pole. The contacts are rated for 10A (1/2HP) @250Vac or 1A @125Vdc and include AC transient protection. For higher loads or longer relay life, an interposing relay should be used.

The alarm conditions for each setpoint relay are defined at setup. More than one alarm can be linked to a relay. 24 alarms are available in the Advantage, regardless of the number of relays ordered. This allows complex control with minimal wiring. The alarm condition for temperature and current inputs is a signal value ABOVE the setpoint.

Setpoint relay contact state:

Setpoint Relay configured Normally De-Energized			
Contact	Power OFF	Power ON	
		Below Setpoint	Above Setpoint
NC	closed	closed	open
NO	open	open	closed

Setpoint Relay configured Normally Energized			
Contact	Power OFF	Power ON	
		Below Setpoint	Above Setpoint
NC	closed	open	closed
NO	open	closed	open

The Advantage automatically runs periodic sensor and internal self checks. In addition to the setpoint relays, each Advantage includes an extra relay for a sensor fail (watchdog) function. When a fault is detected, the Sensor Fail Relay (SFR) changes from a normal to an alarm state. Relay 6 is typically setup as the SFR, although any relay can be used. For redundancy in critical applications, more than one relay can be assigned to this function.

Each setpoint relay will respond to a sensor or internal failure as determined by two configuration variables: Sensor Fail Response (SNFAL) and Sensor Fail Effect (SNEFF). When SNFAL is enabled, the setpoint relay will respond in the manner defined by SNEFF. SNEFF choices are energize (EN), de-energize (DE) or toggle.

Setpoint Relay configured Normally De-Energized, SNEFF on					
Contact	Power OFF	Power ON			
		Below SP	Above SP	Sense Fail	
				SNFAL DE	SNFAL EN
NC	closed	closed	open	closed	open
NO	open	open	closed	open	closed

Setpoint Relay configured Normally Energized, SNEFF on					
Contact	Power OFF	Power ON			
		Below SP	Above SP	Sense Fail	
				SNFAL DE	SNFAL EN
NC	closed	open	closed	closed	open
NO	open	closed	open	open	closed

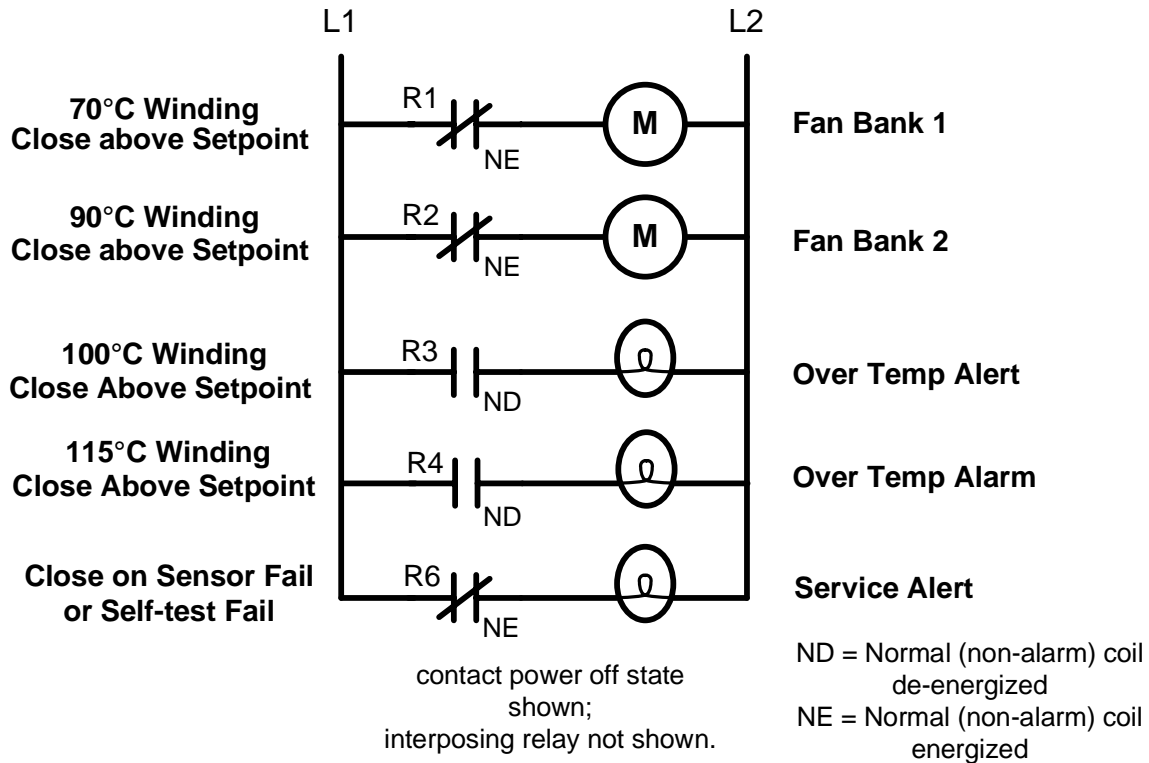
Setpoint relays can also be configured to allow a serviceman to test relay operation in the field. Once this feature is enabled on a relay, testing can be done from the front panel or with a laptop using the supplied Advantage Monitoring software.

Relays installed in the Enhanced Transformer Advantage:

Relay Option Code		<u>AMT202</u>	<u>AMT201 & prior</u>
D		1, 2, 6	1, 2, 8
E		1, 2, 3, 4, 6	1, 2, 3, 4, 8
H		1 - 6	----
F		1 - 4, 6-10	1-4, 8, 9-12
L		1 - 12	----
Miscellaneous Option	V	----	7

The following examples are intended to show some of the features available for relays & alarms in the Transformer Advantage. Contact Weschler's factory support specialists for assistance in configuring a Transformer Advantage for your application.

Example 1: Set the Advantage to control two fan banks in a failsafe configuration, plus two external alarms. Use a separate service alert to warn of a sensor fail, self-test fail or power loss to the Advantage.



To implement, wire as shown above. Configure 2 relays for cooling fans and 3 relays for external alarms. Define the normal (non-alarmed) coil state for standard or fail-safe mode. Then set up the internal alarms for setpoint, hysteresis & delay. Link each alarm to a relay. Enable sensor failure response & effect for the alarms tied to fan stages.

RELAY PARAMETERS:

RELAY #	CONNECTED EQUIPMENT	NORMAL COIL STATUS	RELAY CHECK	RELAY SEQUENCING	SENSOR FAILURE EFFECT
1	ONAF	Energized	Enabled	Disabled	De-Energized
2	ONAF	Energized	Enabled	Disabled	De-Energized
3	Alarm	De-Energized	Enabled	Disabled	NA
4	Alarm	De-Energized	Disabled	Disabled	NA
5	None	De-Energized	Enabled	Disabled	NA
6	Alarm	Energized	Disabled	Disabled	NA

ALARM PARAMETERS:

ALARM #	SOURCE	SETPOINT	HYST.	PICKUP (secs)	DROPOUT (secs)	OPERATE RELAY #	ALARM TRIGGER	SEASONAL SETBACK	SENSOR FAILURE
1	Winding 1 Temp	70.0 °C	3.0 °C	5	0	1	None	Disabled	Enabled
2	Winding 1 Temp	75.0 °C	3.0 °C	5	0	2	None	Disabled	Enabled
3	Winding 1 Temp	100.0 °C	1.0 °C	1	0	3	None	Disabled	Disabled
4	Winding 1 Temp	115.0 °C	1.0 °C	1	0	4	None	Disabled	Disabled
5	None	NA	NA	0	0	None	None	NA	NA
6	Sensor Failure	NA	NA	10	0	6	NA	NA	NA

Notes:

- Five setpoint relays ordered (option H). Relay 5 is not used, available as a spare.
- 1 to 1 alarm:relay association used for convenience.
- Relay check disabled on the over temperature alarm and the sensor fail relay.
- Pickup delay applied to reduce rapid cycling and transients.

Enhancement 1: Add cooling and external alarm activation based on top oil temperature.
 Set Fan Stage 1 to operate at 70° oil; set Over Temperature Alarm for 95° oil.

To implement, enable additional internal alarms and program for the desired top oil temperatures. No change to relay setup needed.

ALARM PARAMETERS:

ALARM #	SOURCE	SETPOINT	HYST.	PICKUP (secs)	DROPOUT (secs)	OPERATE RELAY #	ALARM TRIGGER	SEASONAL SETBACK	SENSOR FAILURE
1	Winding 1 Temp	70.0 °C	3.0 °C	5	0	1	None	Disabled	Enabled
2	Winding 1 Temp	75.0 °C	3.0 °C	5	0	2	None	Disabled	Enabled
3	Winding 1 Temp	100.0 °C	1.0 °C	1	0	3	None	Disabled	Disabled
4	Winding 1 Temp	115.0 °C	1.0 °C	1	0	4	None	Disabled	Disabled
5	None	NA	NA	0	0	None	None	NA	NA
6	Sensor Failure	NA	NA	10	0	6	NA	NA	NA
7	Top Oil Temp	55.0 °C	3.0 °C	5	0	1	None	Disabled	Enabled
8	Top Oil Temp	95.0 °C	1.0 °C	1	0	4	None	Disabled	Disabled
9	None	NA	NA	0	0	None	None	NA	NA
10	None	NA	NA	0	0	None	None	NA	NA

Enhancement 2: Add a pre-cooling function to anticipate the temperature rise from heavy transformer loading.

To implement, program an unused alarm for a winding current setpoint and have it activate the fan relay.

ALARM PARAMETERS:

ALARM #	SOURCE	SETPOINT	HYST.	PICKUP (secs)	DROPOUT (secs)	OPERATE RELAY #	ALARM TRIGGER	SEASONAL SETBACK	SENSOR FAILURE
1	Winding 1 Temp	70.0 °C	3.0 °C	5	0	1	None	Disabled	Enabled
2	Winding 1 Temp	75.0 °C	3.0 °C	5	0	2	None	Disabled	Enabled
3	Winding 1 Temp	100.0 °C	1.0 °C	1	0	3	None	Disabled	Disabled
4	Winding 1 Temp	115.0 °C	1.0 °C	1	0	4	None	Disabled	Disabled
5	None	NA	NA	0	0	None	None	NA	NA
6	Sensor Failure	NA	NA	10	0	6	NA	NA	NA
7	Top Oil Temp	55.0 °C	3.0 °C	5	0	1	None	Disabled	Enabled
8	Top Oil Temp	95.0 °C	1.0 °C	1	0	4	None	Disabled	Disabled
9	Winding 1 Current	300 A	50 A	30	0	1	None	Disabled	NA
10	None	NA	NA	0	0	None	None	NA	NA

Enhancement 3: Add daily fan exercise to each fan bank.

To implement, set up the daily system time trigger and enable that trigger for alarm 1 and alarm 2.

ALARM TIME and SEASONAL SETBACK PARAMETERS:

TYPE	START DATE	START TIME	STOP DATE	STOP TIME
Daily	01/01	03:00	12/31	03:05
Weekly	Disabled			
Monthly	Disabled			

ALARM PARAMETERS:

ALARM #	SOURCE	SETPOINT	HYST.	PICKUP (secs)	DROPOUT (secs)	OPERATE RELAY #	ALARM TRIGGER	SEASONAL SETBACK	SENSOR FAILURE
1	Winding 1 Temp	70.0 °C	3.0 °C	5	0	1	Daily	Disabled	Enabled
2	Winding 1 Temp	75.0 °C	3.0 °C	5	0	2	Daily	Disabled	Enabled
3	Winding 1 Temp	100.0 °C	1.0 °C	1	0	3	None	Disabled	Disabled
4	Winding 1 Temp	115.0 °C	1.0 °C	1	0	4	None	Disabled	Disabled
5	None	NA	NA	0	0	None	None	NA	NA
6	Sensor Failure	NA	NA	10	0	6	NA	NA	NA
7	Top Oil Temp	55.0 °C	3.0 °C	5	0	1	None	Disabled	Enabled
8	Top Oil Temp	95.0 °C	1.0 °C	1	0	4	None	Disabled	Disabled
9	Winding 1 Current	300 A	50 A	30	0	1	None	Disabled	NA
10	None	NA	NA	0	0	None	None	NA	NA

Enhancement 4: Run fan bank 1 continuously in the summer.

To implement, set up the calendar time trigger. Add calendar activation for alarm 1.

ALARM TIME and SEASONAL SETBACK PARAMETERS:

TYPE	START DATE	START TIME	STOP DATE	STOP TIME
Daily	01/01	03:00	12/31	03:05
Weekly	Disabled			
Monthly	Disabled			
Calendar	06/01	08:00	09/15	21:00

ALARM PARAMETERS:

ALARM #	SOURCE	SETPOINT	HYST.	PICKUP (secs)	DROPOUT (secs)	OPERATE RELAY #	ALARM TRIGGER	SEASONAL SETBACK	SENSOR FAILURE
1	Winding 1 Temp	70.0 °C	3.0 °C	5	0	1	DC	Disabled	Enabled
2	Winding 1 Temp	75.0 °C	3.0 °C	5	0	2	Daily	Disabled	Enabled
3	Winding 1 Temp	100.0 °C	1.0 °C	1	0	3	None	Disabled	Disabled
4	Winding 1 Temp	115.0 °C	1.0 °C	1	0	4	None	Disabled	Disabled
5	None	NA	NA	0	0	None	None	NA	NA
6	Sensor Failure	NA	NA	10	0	6	NA	NA	NA
7	Top Oil Temp	55.0 °C	3.0 °C	5	0	1	None	Disabled	Enabled
8	Top Oil Temp	95.0 °C	1.0 °C	1	0	4	None	Disabled	Disabled
9	Winding 1 Current	300 A	50 A	30	0	1	None	Disabled	NA
10	None	NA	NA	0	0	None	None	NA	NA

For multiple ALARM TRIGGER: D->Daily, W->Weekly, M->Monthly and C->Calendar

Enhancement 5: Activate a relay when an auxiliary input signal exceeds a threshold level. *

To implement, set the channel jumpers on the LCAM module to the correct function & range. In the software, set up the auxiliary input (LCAM) channel for the input signal type and full scale value. In addition to the 24 setpoint alarms in the Transformer Advantage, each LCAM channel has one alarm available. Set the high and low thresholds (LCAM alarms have dual limits - alarm condition occurs when signal goes outside these limits). Program it to operate an unused relay (#5 in this example) and configure the relay as an alarm.

LCAM ALARM PARAMETERS:

ALARM #	INPUT SCALE	THRESHOLD LOW	THRESHOLD HIGH	HYST.	ASSOC. RELAY #	PICKUP (secs)	DROPOUT (secs)	OPERATE RELAY #	ALARM TRIGGER
2	20.00mA DC	4.00mA DC	15.00mA DC	1.00mA DC	None	0	0	5	None

RELAY PARAMETERS:

RELAY #	CONNECTED EQUIPMENT	NORMAL COIL STATUS	RELAY CHECK	RELAY SEQUENCING	SENSOR FAILURE EFFECT
1	ONAF	Energized	Enabled	Disabled	De-Energized
2	ONAF	Energized	Enabled	Disabled	De-Energized
3	Alarm	De-Energized	Enabled	Disabled	NA
4	Alarm	De-Energized	Disabled	Disabled	NA
5	Alarm	De-Energized	Enabled	Disabled	NA
6	Alarm	Energized	Disabled	Disabled	NA

* Requires optional auxiliary analog/digital input. For this example, the Advantage receives a 4-20mA signal from a DG analyzer or an LTC position monitor. Low threshold can be used to detect an out-of-bounds condition or an open input.

Enhancement 6: Use current readback to confirm operation of a cooling stage.

This enhancement requires an optional analog/digital input and a compatible Weschler current transducer. To implement, clamp the current transducer (CT) around the cooling stage supply wire. Connect the CT leads to an auxiliary input on the LCAM module. Set the LCAM channel jumpers to the 5V range. In the software, set the input scale on the corresponding LCAM alarm to the transducer full scale rating. Select the high and low thresholds to detect improper operation (such as locked rotor or blown fuse). Associate this channel to the cooling stage being monitored (so the alarm is enabled only when the cooling stage should be on). Add a pickup delay to prevent false alarms due to motor starting current. For a 50A transducer monitoring fan stage 1 and connected to LCAM channel 3:

LCAM ALARM PARAMETERS:

ALARM #	INPUT SCALE	THRESHOLD LOW	THRESHOLD HIGH	HYST.	ASSOC. RELAY #	PICKUP (secs)	DROPOUT (secs)	OPERATE RELAY #	ALARM TRIGGER
2	20.00mA DC	4.00mA DC	15.00mA DC	1.00mA DC	None	0	0	5	None
3	50.0A AC	25.0A AC	62.0A AC	5.0A AC	1	10	0	None	None

Cooling stage readback also allows the Advantage to apply the correct gradient when a cooling stage is activated external to the Advantage (e.g. by a manual switch). As programmed above, this LCAM alarm is available on the SCADA digital output. It can also be set up to operate a relay by selecting one in the "Operate Relay #" field. This can be an unused relay, if available, or an additional alarm condition for a relay already in use (e.g. relay 3 in this example).

Enhancement 7: Equalize running time between multiple cooling stages.

For equalization of run time between 2 or more fan stages, a sequencing function can be enabled. Similarly, if there is more than one pump stage, sequencing can be enabled to equalize the run time of the pumps.

To implement, enable sequencing in the relay setup for fan or pump stages. A run time counter in the Advantage tracks operating hours for each stage. At the next call for fan cooling, the fan stage with the fewest hours will turn on.

RELAY PARAMETERS:

RELAY #	CONNECTED EQUIPMENT	NORMAL COIL STATUS	RELAY CHECK	RELAY SEQUENCING	SENSOR FAILURE EFFECT
1	ONAF	Energized	Enabled	Enabled	De-Energized
2	ONAF	Energized	Enabled	Enabled	De-Energized
3	Alarm	De-Energized	Enabled	Disabled	NA
4	Alarm	De-Energized	Disabled	Disabled	NA
5	Alarm	De-Energized	Enabled	Disabled	NA
6	Alarm	Energized	Disabled	Disabled	NA

General Note:

Configuration files have a .txt extension and can be viewed with a text editor (as shown in these examples). To construct a file or make changes, the Configuration app in the Weschler Advantage Software must be used. This software is supplied with each unit and is also available from the Weschler website.